By E-mail only

Our ref: EPR/SP3421SU/P001

Date: 20/05/2024

Dear Andrew Sowerby,

Environmental Permitting – Recovery vs Disposal assessment of a waste recovery plan

Pre-application reference: EPR/SP3421SU/P001
Prospective applicant name: Balfour Beatty VINCI Joint Venture
Site name and address: BBV Pool Wood, Coleshill Heath Road, Coleshill, B46 3JB

You have submitted information to us that includes your assessment that the activity you wish to undertake at your site amounts to a recovery operation.

We have now considered your submission and we would like to advise you that:

We agree with your assessment that your activity is a recovery operation. This advice is based on the information you have provided to support that the waste is being used as a substitute for non-waste material plus details in relation to waste types and quantity and the purpose and nature of the proposal. If you change any of this information between now and when you submit an application, this advice may no longer apply.

Please note that the advice contained in this letter is <u>not</u> in itself a permitting decision or an indication that a permit will be granted or permit variation issued following submission of an application. Further assessment will take place during the permit determination stage and pre-application advice should be sought as required before preparing an application. See appendix for more information.

The following documents are considered to form the approved waste recovery plan:

Title	Reference (where applicable)	Date
Waste Recovery Plan	3020094 – R01(04)	21/03/24

If you have any questions regarding our advice above please phone me or email andrew.westoby@environment-agency.gov.uk

Yours sincerely

Andrew Westoby

Permitting Officer

Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Appendix

Recovery vs Disposal advice

The Recovery vs Disposal (RvD) assessment of a waste recovery plan enables us to advise an applicant regarding whether or not we agree in principle that a proposed waste activity is a recovery operation to inform what type of permit would be required (recovery or disposal).

This assessment is discrete from the pre-application advice that would be provided to support the preparation of a permit application (see below) attracting a separate charge.

Our decision to grant a recovery permit or to issue a variation is subject to further assessment carried out during the permit determination stage. In the case of bespoke permit applications, this includes site-specific risk assessment based on the location of the site and technical requirements of the scheme.

For example:

- RvD assessment considers what waste types *may* be suitable, not what waste types *will* be deemed suitable following technical assessment of a permit application which would take into account the sensitivity of the site location and the proposed appropriate measures to be carried out. This is particularly relevant where non-inert wastes are to be deposited.

- RvD assessment considers whether it has been demonstrated that the scheme will be designed and constructed to be fit for purpose. Further technical assessment of the design and the construction methods and/or quality standards to be met may be carried out during permit determination.

If the permit that you are intending to apply for includes the application of waste to improve / enhance or maintain soil quality (landspreading), you must make this clear in your permit application and provide a benefit statement with your application that shows that the specific use of the waste is suitable and will provide no more soils and/or nutrients than the plants need. This is separate to the RvD assessment of the waste recovery plan.

If you plan to mix or blend waste or manufacture a soil substitute under the permit this should be made clear in the permit application as it is a separate activity that will need to be assessed during permit determination.

Pre-application advice on a recovery permit application

Prior to preparing and submitting an application for a recovery permit, you should review our deposit for recovery guidance (https://www.gov.uk/government/publications/deposit-for-recovery-operators-environmental-permits) and consider seeking pre-application advice (https://www.gov.uk/government/publications/environmental-permit-pre-application-advice-form).

You should use the paid for enhanced pre-application advice service to discuss your proposal if any of the following apply:

- your site is in a sensitive location (https://www.gov.uk/guidance/landfill-operators-environmental-permits/plan-the-environmental-setting-of-your-site#sensitive-locations)
- you are depositing waste on top of a landfill
- you are depositing waste into water
- hazardous waste is to be deposited as part of the scheme

- additional activities (such as landspreading or soil treatment) are intended to be included in the permit

Changes to your waste recovery plan

Before making changes to your proposal you should review our waste recovery plan guidance (https://www.gov.uk/government/publications/deposit-for-recovery-operators-environmental-permits/waste-recovery-plans-and-deposit-for-recovery-permits).

Balfour Beatty Vinci Joint Venture

Landscape Bund at Pool Wood Embankment

Waste Recovery Plan

3020094 - R01(04)

RSK GEOSCIENCES

MARCH 2024

RSK GENERAL NOTES

Project No.: 3020094 R01 (04)

Title: Waste Recovery Plan: Landscape Bund at Pool Wood Embankment

Client: Balfour Beatty Vinci Joint Venture (BBV JV)

Date: 21 March 2024

Office: RSK Environment Limited, Fourways House, 57 Hilton Street, Manchester, M1 2EJ. Tel 0161 2362757

Status: Final

Author	Andrew Sowerby	**Technical reviewer**	Tim Holding
Signature	A Sowerby	Signature	T.B. Holding
Project manager	Andrew Sowerby	**Quality reviewer**	Joyce Saddington
Signature	A Sowerby	Signature	

Revision control sheet				
Revision ref.	**Date**	**Reason for revision**	**Amended by:**	**Approved by:**
Rev 00	July 2023	Draft for client comment	n/a	see above
Rev 01	08/02/2024	Updated with latest plans	A Sowerby	see above
Rev 02	26/02/2024	Updated following comment from client	A Sowerby	See above
Rev 03	29/02/2024	Updated following further comments from client	A Sowerby	See above
Rev 04	21/03/2024	Updated to include Appendices D2 and D3 and with updated Appendix B and F. Minor amendments to text to reflect updated appendices.	A Sowerby	See above

CONTENTS

FIGURES

APPENDICES

Appendix G Plans for the Pool Wood Embankment submitted within volume 2 CFA24 Birmingham Interchange and Chemsley Wood

Appendix H Technical Standard - Earthworks, Document No. HS2-HS2-GT-STD-000-000001 (P08)

Appendix I Technical Standard – Landscape Earthworks, Document No. HS2-HS2-EV-STD-000-000021 (P03)

Appendix J Specification for civil engineering works – contract specific appendices Series 0600 Earthworks: N1 & N2. Document No. 1MC08-BBV_MSD-GT-SPE-N000-100001

1 INTRODUCTION

RSK Environment Limited (RSK) was commissioned by Balfour Beatty Vinci Joint Venture ('BBV JV') to produce a Waste Recovery Plan relating to earthworks to create a landscape bund along a stretch of the new HS2 rail line at Pool Wood near Birmingham (between chainages (Ch) 158+90000 and 159+800), hereafter referred to as the 'Site'.

This Waste Recovery Plan has been produced to:

- Obtain approval that the scheme will constitute deposit for recovery in accordance with prevailing Environment Agency (EA) guidance
- Form part of a package of supporting documentation for the application for a bespoke Environmental Permit for the site which will be used for the movement of waste from another part of the project and the importation of waste materials to create the landscape bund.

1.1 Background

Pool Wood Embankment is located approximately 10.00 km to the south-east of Birmingham City Centre. The M42 motorway and a roundabout are situated at the southern boundary and the M6 motorway is present at the northern boundary. The A446 is present approximately 450 m to the east of the site. The site extends from the south of the roundabout and runs alongside the M42 motorway until it encounters the M6 motorway to the north.

A plan of the site is shown at **Appendix B.**

The site forms part of the wider HS2 works in the area.

The materials required to form site levels appropriate for the construction of the landscape bund will comprise the use of both material imported to site and waste material imported to site from other sites being developed as part of the overall HS2 development.

All of the waste material should derive from the nearby closed Middle Bickenhill Landfill which will require excavating in order to create an appropriate platform upon which to build the Birmingham Interchange Station (BIS). Some additional suitable waste materials may be imported from elsewhere should they be required.

Waste material excavated from Middle Bickenhill Landfill will be treated prior to leaving site to remove any contaminants. Regardless of their source, all waste materials to be deposited will be tested thoroughly to determine their suitability for reuse. As a sustainable approach, the reuse of waste materials is considered environmentally beneficial by reducing the use of virgin material and the need for landfill disposal.

In order to accommodate this proposal, and deposit waste at the site, an environmental permit for waste recovery (Deposit for Recovery or DfR) will be required. Due to the proximity of the site to a protected site and the expected quantities to be deposited, a bespoke environmental permit will be required.

1.2 Consultation with Regulators

A meeting to discuss the Waste Recovery Plan (WRP) and other work potentially related to Pool Wood Embankment was held on 23 June 2023. This was a meeting between BBV, Mott McDonald, the HS2 team, RSK and key representatives of the Environment Agency (EA) HS2 project team and EA National Permitting team to ensure that they were apprised of the situation and to determine if there was any specific advice or guidance.

1.3 Objective

The main objective of this Waste Recovery Plan is to demonstrate that the scheme is a waste recovery operation in that the excavated material imported to site is suitable for re-use under the construction scheme as referenced in **Section 1.1** above and the re-use of locally sourced waste materials would provide a sustainable and environmentally beneficial approach by recovering local wastes, avoiding landfill disposal and reducing the use of virgin material.

1.4 Scope

The scope of the Waste Recovery Plan has been designed with consideration of Environment Agency waste recovery plans and permit guidance (**link**), BS 10175: 2011 + A2 2017 (BSI, 2017) and guidance on land contamination risk management issued by the Environment Agency (2021) .

This document has been written to demonstrate that the re-use of wastes as part of the development at the site complies with the Definition of a Waste Recovery Operation as follows:

- The development could go ahead using non-wastes to get the same outcome;
- There is an obligation to do the work;
- Wastes will only be used in the minimum quantities necessary to achieve the proposed development scheme;
- Waste is suitable (physically and chemically) for its intended purpose and will not cause pollution; and
- Wastes will be used in accordance with the requirements for backfilling and to create the required development platform

Much of the relevant detailed information to support these proposals is provided in various associated reports and correspondence, which are referenced and contained within the appendices to this report. It is intended that this report, together with other supporting documentation and consents will form part of an application for an Environmental Permit to allow for use of waste within the proposed scheme.

1.5 Existing Reports

The following reports for the site have been completed. Relevant information from these sources has been gleaned to allow better interpretation of the site and underlying ground conditions:

- Pool Wood Embankment Land Quality Management Report, BBV, March 2022, Ref. 1MC09-BBV_MSD-EV-REP-NS04_NL10-1000167, Rev. P01 (**Appendix C**)
- London – West Midlands Environmental Statement Volume 5 – Waste and Material Resources Assessment - Birmingham Interchange and Chelmsley Wood (CFA 24),[1]
- Detailed Design Geotechnical Design Report for Pool Wood Embankment & Pool Wood Culvert (**Appendix D1**). With supporting Field Change Requests at **Appendix D2** and **D3.**
- HS2 Geo-environmental Report – Sub-Lots 5 and 6, BBV, Feb 2021, Ref. 1MC09-BBV_MSD-EV-REP-N002-100002 (**Appendix E**)

Where relevant these reports have been referenced and included within the appendices.

1.6 Limitations

This report should be considered in the light of any changes in legislation, statutory requirement or industry practices that may have occurred subsequent to the date of issue.

The comments given in this report and the opinions expressed are based on the ground conditions interpreted from preceding investigations completed by BBV JV and ‘others’ including intrusive site work and on results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by investigations and therefore could not be taken into account.

The comments given in this report are subject to RSK’s ‘Service Constraints’ provided in **Appendix A.**

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/265885/AllCFAs_Waste_and_Material_Resources_Assessment_WM-001-000.pdf

2 SITE LOCATION AND DESCRIPTION

The following section summarise the site setting.

2.1 Site Location and Description

Pool Wood Embankment Landscape Bund will be located approximately 10km to the south-east of Birmingham City Centre. The M42 motorway and a roundabout is situated at the southern boundary and the M6 motorway is present at the northern boundary. The A446 is present approximately 450m to the east of the asset.

The length of the embankment will be approximately 1414 metres from Ch 158+400 to 159+800. The landscape bund runs from Ch 158+920 to Ch 159+760 on the west side of Pool Wood Embankment.

The site covers an area of approximately 10 Ha, the majority of the site being open fields.

The railway alignment in the Pool Wood Embankment area will cut through open lands or agricultural fields and is flanked by Birmingham Business Park on the west side and by Coleshill and Bannerly Pools on the east side.

The construction of Pool Wood Embankment will be located on potentially contaminated land, as detailed within the Environmental Statement (ES) and the Sublot 5 and 6 Geo-environmental Report (**Appendix E**) .

The Site Location Plan is provided at **Figure 1** and a plan of the site is provided at **Figure 2**. A plan showing the site boundary is provided at **Appendix B** and shows that the permitted area will be located between Ch 159+200 and 159+700**.**

Three unnamed ponds are located at the Site. A drain is also present to the south of the Site, which has a north-east-west to northwest orientation. These ponds and drains will be removed as part of the works.

The River Blythe is the closest main watercourse located approximately 2.00 km to the east of the Site. This river flows in a northerly direction into the River Tame (part of the Trent Drainage Basin).

Coleshill Pools (designated as a Site of Special Scientific Interest (SSSI)) is located to the east of the site across the M42 and marshland areas are present to the south of the site.

Figure 1. Site Location

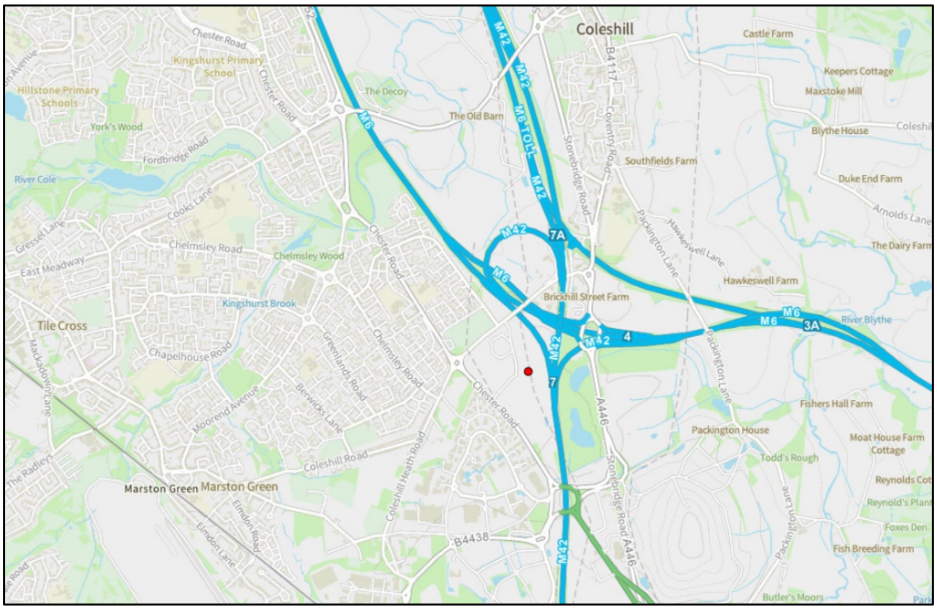
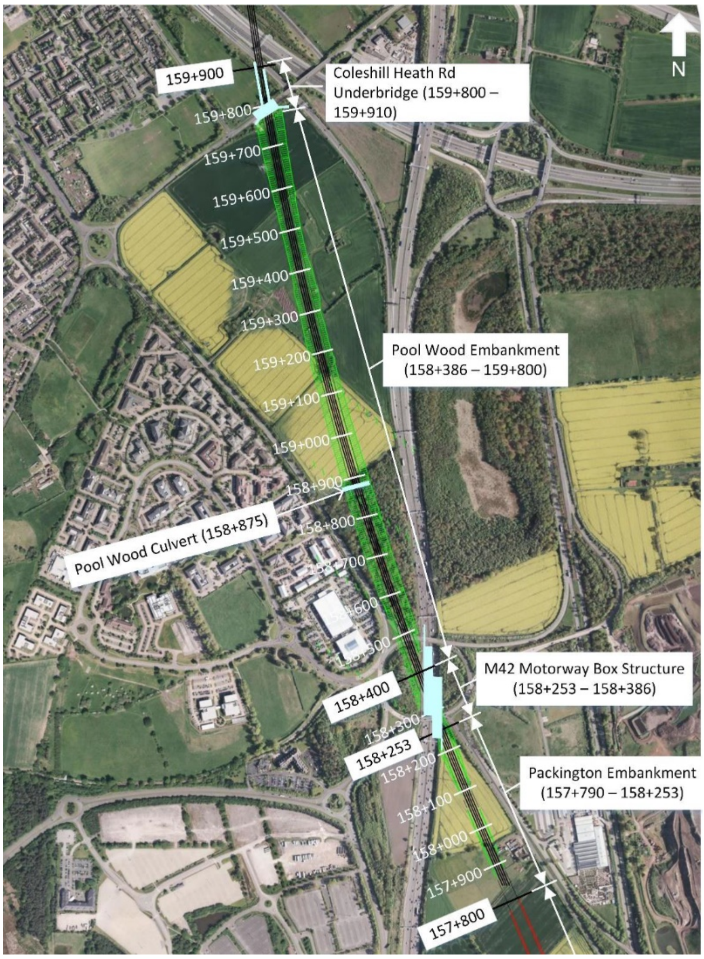


Figure 2. Plan of Site



2.2 Geology, hydrogeology and hydrology

2.2.1 Geology

Made Ground is recorded at several points within the site boundary. The overall area covered by made ground is not considered to be significant.

According to BGS records glaciolacustrine deposits (comprising of clay and silt) are present from the central part to the northern boundary of the Site, which are in turn underlain by Glaciofluvial deposits (comprising sand and gravel), likely to be present beneath the whole Site. Alluvial deposits (comprising clay, silt sand and gravel) are recorded approximately 200 m to the east of the asset footprint.

The superficial deposits are underlain by the bedrock geology of the Mercia Mudstone Group, which includes the Branscombe Mudstone Formation and the Sidmouth Mudstone Formation (both described as structureless with blocky weathering mudstone and siltstone) 200 m to the west of the asset.

2.2.2 Hydrogeology

The published geological units identified at the Site and surrounding area have the following aquifer characteristics, as determined by the Environment Agency (EA):

- Glaciofluvial and Alluvial deposits – Secondary A aquifers, which contain permeable layers capable of supporting water supplies at a local scale, and in some cases forming an important source of base flow to rivers.
- Glaciolacustrine deposit – Non-productive.
- Mercia Mudstone Group – Secondary B aquifer, which contain predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

2.2.3 Hydrology

Three unnamed ponds are located at the Site. A drain is also present to the south of the Site, which has a north-east-west to northwest orientation. These ponds and drains will be removed as part of the works.

Two unnamed ponds are present approximately 150 m north-west of the Site and two ponds identified as Coleshill Pools, are located approximately 330 m to the east of the Site. The Coleshilll Pools are identified as Sites of Special Scientific Interest (SSSI). Several land drains are recorded to the east of the Site.

The River Blythe is the closest main watercourse located approximately 2.00 km to the east of the Site.

The Flood Map for Planning shows that the entirety of the site is located within Flood Zone 1. Land within Flood Zone 1 is defined by the Environment Agency as being “low probability” and which is “assessed as having less than 1 in 1,000 annual probability of river or sea flooding (0.1%)”.

2.3 Statutory and Non-Statutory Environmental Designations

A search has been conducted using the Environment Agency's Magic mapping system to identify any nature and heritage conservation sites and/or protected species and habitats within 1.00 km of the site, which must be considered as part of a bespoke permit application.

The following features are listed, which will be considered in more detail for the permit application.

Site of Special Scientific Interest (SSSI)

- Coleshill and Bannerly SSSI. Located approximately 120 metres to the east at the closest point - comprises two pools and an area of bog between them which forms the only valley mire system in Warwickshire.

2.4 Proposed Development

The length of the embankment and accompanying landscape bund will be approximately 1,414 m. The height of the earthwork varies throughout the length of the landscape bund, with a maximum height from ground level to the top of the protection layer of approximately 14.00 m. (See Longitudinal Profile at **Appendix F**)

The landscape bund runs from Ch 158+920 to Ch 159+760 on the west side of Pool Wood Embankment. The internal gradient of the landscape bund is 1:3 and the external gradient is 1:4.

Due to the variability and soft ground conditions encountered during the ground investigation, rigid inclusions for the railway embankment have been included within the design.

Rigid inclusions are proposed under the trace embankment from Ch 159+015 to Ch 159+695. At around Ch 158+945 and Ch 159+015 ground treatment by excavation and replacement of 2.00 m is required for the anticipated soft soil layer.

A drainage blanket comprising of 6F5 material will be used to help convey any rising water west towards a Surface Water drain. This drainage blanket will also collect water runoff from the bund.

Figure 3 shows a diagram that was generated to show the proposed rigid inclusions within the embankment and the drainage blanket under the landscape bund.

As can be seen on **Figure 2**, a culvert will be located within the Pool Wood Embankment. Pool Wood Culvert will be located at the end of a woodland. The culvert will be approximately 90.00 m in length with a cross sectional size of 2.55 m by 2.05 m. Further design information for this culvert can be found in Detailed Design Geotechnical Design Report for Pool Wood Embankment & Pool Wood Culvert (**Appendix D1**).

Land drainage will comprise of two ditches around the western perimeter of the earthwork. It has been designed to collect external catchments and embankment flow runoff before discharging into Pool Wood culvert by gravity.

Embankment

Rigid Inclusions constructed of a steel bar sheathed in concrete of the necessary strength will be constructed to the design depth and diameter outlined within **Appendix D1, D2 and D3**.

No waste will be used in the construction of the embankment.

Landscape Bund

The landscape bund runs from Ch 158+920 to Ch 159+760 to the west side of Pool Wood Embankment. The maximum height of the landscape bund will be 14m and it is founded on GFD and on GLLD. The area within which waste will be deposited is located between CH 159+200 to 159+700.

Four stages have been designed for the construction of the landscape bund. Each stage is followed by a two-month holding period.

A 0.75 m drainage blanket is to be constructed from a clean granular material (6F5 containing less than 5% of material with grain size < 0.06 mm, subject to inspection on site) at the base of the staged embankment to allow flow to the drain to the west of the landscape bund. The drainage path through the blanket will have a gradient of at least 2%.

A geotextile layer will be added between the drainage blanket and the landscape bund fill.

Please note that the Detailed Design Geotechnical Design Report in **Appendix D1** (Ref: 1MC09-BBV_MSD-GT-REP-NS04_NL10-100048) refers to band drains and prefabricated vertical drains which were originally proposed but are not now proposed to be used (please see Field Change Requests included at **Appendices D2 and D3**).

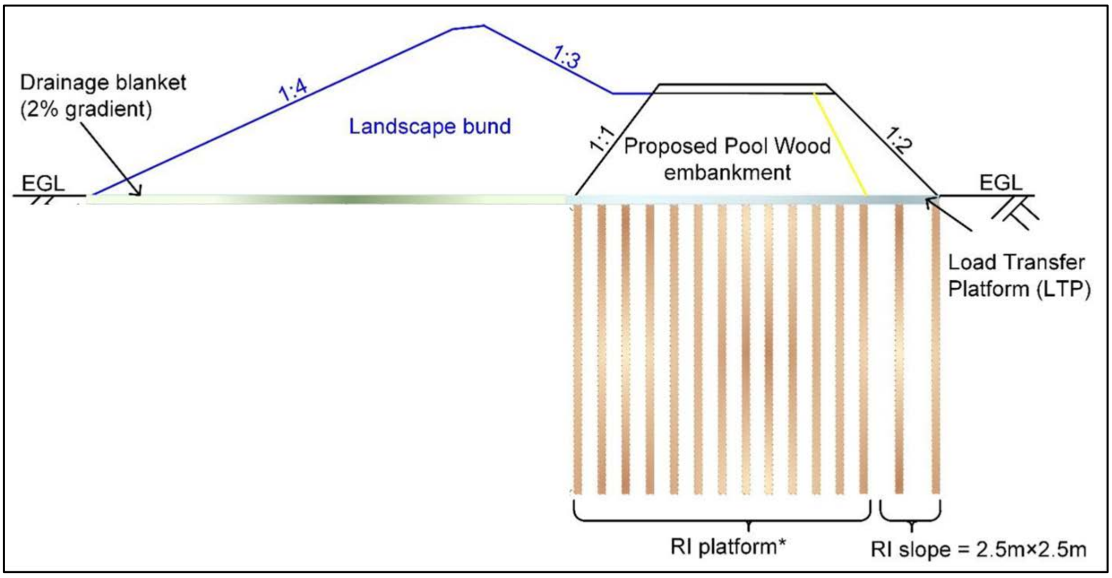


Figure 3. Diagram of Pool Wood Embankment Showing Rigid Inclusions within the Embankment and the Drainage Blanket Underlying the Landscape Bund

3 WASTE RECOVERY PROPOSAL

3.1 Proposed scheme

The scheme has been developed in-line with existing planning, submitted as part of the wider HS2 development.

The works on Pool Wood Embankment take place within the Birmingham Interchange and Chelmsley Wood section (CFA24) of the HS2 development. This section (CFA24) of the route commences south of the A45 Coventry Road in Hampton-in-Arden and proceeds northwest into a triangular site with the A452 Chester Road to the east, the M42, National Exhibition Centre (NEC) and Birmingham Airport to the west and the A46 Coventry Road to the south.

Within the triangular site, a new HS2 station and associated infrastructure, known as Birmingham Interchange station, will be constructed.

Leaving the triangular site, the route will continue north-west, crossing over the M42 on a viaduct, with Coleshill and Bannerly Pools SSSI to the north-east and Birmingham Business Park to the south-west. The route will then continue over the M6 on a box structure with Chelmsley Wood residential estate located to the south-west. The route will leave this area at the administrative boundary between Solihull Metropolitan Borough Council and North Warwickshire Borough Council, in close proximity to where the M42 intersects with the M6.

Pool Wood Embankment is located on the stretch of track just north of the viaduct that crosses over the M42.

To achieve the speed required for high-speed rail, the route must be designed without tight curves or steep gradients. One way to enable this is to build embankments. Embankments are where the rail level is maintained above the existing ground level. Embankments are formed by placing fill material where the local topography is lower than the desired route alignment.

It is estimated that once work commences on construction of the Pool Wood Embankment that it will take 1 year and 3 months to complete.

This WRP, and if approved, Environmental Permit application, seeks to authorise the use of suitable waste materials sourced from elsewhere within the area outlined in red within **Appendix B**.

3.2 Material Overview

Some of the material used within the embankment and for part of the landscape bund will comprise of clean and uncontaminated materials that meet specific structural specifications.

Class 9 stabilised cohesive fill will be used in steep slope areas and will be placed on top of the recovered material for the slope facing the HS2 railway embankment. The treatment with lime of the clean non-waste material to form Class 9 material will be carried out as a geotechnical treatment and not waste treatment process.

Some materials may be sourced from other parts of the HS2 development.

However, the majority of the materials to be reused on site within the landscape bund will be considered waste due to their nature and where they derive from.

It is anticipated that all of this material will derive from a former landfill site (Middle Bickenhill Landfill). Before being accepted at site for deposit it will have been treated to remove any contaminants (i.e. any non-compatible/ biodegradable waste and other visible contaminants that may be present) and to ensure it meets the assigned site-specific acceptance criteria (SSAC).

Waste material from Middle Bickenhill Landfill requires excavation in order to create a development platform for the Birmingham Interchange. It has been calculated that approximately 178,810 m^3 of material will be excavated from the landfill. This material will then be subjected to treatment at source to remove any contaminants. Based on an estimated 10% of this excavated material being unsuitable for reuse it is estimated that approximately 160,929 m^3 of treated excavated waste material will potentially be suitable for reuse at Pool Wood Embankment.

Should there be a shortfall then suitable wastes may potentially be sourced from throughout the HS2 development. At this time the precise locations are not known. As a result, a robust waste acceptance procedure will be adopted for all wastes received and accepted at the site. Additional waste types have been included within Table 1 should this be required.

Where source site chemical data indicate borderline or levels of contamination above the higher threshold, the waste will not be accepted at the site unless further investigation and testing is undertaken, including leachate testing, to illustrate that the waste is suitable and permissible within the waste acceptance criteria. Where the levels of contamination are found within the source site data to be unacceptable then waste will not be accepted at this site and will be rejected in accordance with the procedure.

Banksmen on site will be present during operational hours to visually inspect any deposited waste. Any loads which fail a visual inspection will be re-loaded and either removed from the site or stored in quarantine prior to further investigation.

Records will be collected and retained to show the source of any deposited wastes and the testing that was undertaken to ensure its suitability.

3.3 Substitution of non-wastes with wastes to produce the same outcome

This development would be completed using a non-waste material even if waste soils were not available for use. This is due to an obligation and requirement to complete the scheme. The proposal is considered to be a required component to the Site as it reduces any impact upon nearby receptors from the HS2 line.

It is considered that the use of non-waste materials in this development would involve the use of virgin minerals or recycled aggregates that would be obtained from local sources. The substitution of waste for a non-waste material in the development at the Site supports the Waste Framework Directive which states that – "... the recovery of waste and the use of recovered materials should be encouraged in order to conserve natural resources".

The principal objective in this case is to replace the non-waste material that would otherwise be used to construct the development with waste produced elsewhere on the overall HS2 development being put to a useful purpose.

The High-Speed Rail (London – West Midlands) Act 2017 is the mechanism through which the development has been provided with Planning Permission. The Environmental Statement referred to below is one of the deposited plans that outlines the scheduled works that make up the overall development.

The section of the HS2 project where Poolwood Embankment is located has a material deficit so if the landfill waste from Middle Bickenhill Landfill were not to be recovered to the Poolwood Embankment Earthworks Bund then the material deficit would be considerably higher.

3.3.1 The High-Speed Rail (London – West Midlands) Act 2017

The High-Speed Rail (London – West Midlands) Act 2017[2] states at Section 20 that "*planning permission is deemed to be granted under Part 3 of the Town and Country Planning Act 1990 for the carrying out of development authorised by this Act*."

Section 2 (1) of the Act states that "*The nominated undertaker may, for the purposes of or in connection with the scheduled works or otherwise for Phase One purposes, do any of the following within the Act limits –*

(c) construct, provide and maintain all such embankments, aprons, abutments, retaining walls, wing walls, culverts and other works as may be necessary or expedient".

In addition, Section 2 (3) states that "*The nominated undertaker may within the Act limits*

(a) *carry out and maintain landscaping and other works to mitigate any adverse effects of the construction, maintenance or operation of any of the works authorised by this Act*".

Section 61 of the Act refers to the plans and sections deposited in connection with the High-Speed Rail (London – West Midlands) Bill in the office of the Clerk of the Parliaments and the Private Bill Office of the House of Commons.

As stated in Schedule 1 of the Act, Scheduled Works permitted by the Act must be constructed in accordance with the deposited plans and in accordance with the levels shown in the deposited section.

Furthermore, "*In constructing or maintaining any of the scheduled works, the nominated undertaker may deviate—*

(a) laterally to any extent from the lines or situations shown on the deposited plans, within the limits of deviation so shown,

(b) vertically downwards to any extent from the level shown for that work on the deposited sections, and

[2] https://www.legislation.gov.uk/ukpga/2017/7/contents/enacted

(c) *vertically upwards to any extent not exceeding 3 metres from the level shown for that work on the deposited sections, but doing so in a case mentioned in sub-paragraph (1)(c) does not increase the limit referred to in that sub-paragraph*."

Sub-paragraph (1) (c) refers to any station, depot or shaft.

Construction of the railway at Pool Wood Embankment is listed as Scheduled Works under the Act and is covered by Work No. 3/25

"*A railway (5.27 kilometres in length) partly on viaduct commencing by a junction with the termination of Work No. 3/1 passing northwards and terminating at a point 195 metres west of the roundabout junction in Coleshill Industrial Estate. Work No. 3/25 includes bridges over Works Nos. 3/26, 3/28 and 3/151 and viaducts over the M6 Motorway, M6 Motorway Slip Road, M6-M42 Link Road, M42 Motorway, M6/M42 Motorway, Coleshill Brook, Works Nos. 3/26B, 3/26C, 3/26D, 3/27A, 3/29, 3/32 and 3/32B."*

3.3.2 Environmental Statement Submitted for Phase 1 of HS2

The Environmental Statement submitted to support Phase 1 of the HS2 development details the proposed scheme at Pool Wood Embankment. It is available on the gov.uk website.

Section Community Forum Area (CFA) 24 for Birmingham Interchange and Chelmsley Wood of Volume 2 (Community Forum Area Report) of the London-West Midlands Environmental Statement[3] states that Pool Wood Embankment will be up to 11m in height. It also outlines how Pool Wood Embankment will act as a noise bund for Birmingham Business Park and other sensitive receptors (to the west of the proposed scheme).

In addition, the report states that "Material for the Pool Wood Embankment will be received from neighbouring CFAs and locally within the Birmingham Interchange and Chelmsley Wood area."

The report also states that "The material for the Pool Wood Embankment will be deposited in layers to profiled earthwork slopes and compacted with heavy vibratory plant. Slopes will be covered with topsoil to a predetermined depth and then trimmed to the prescribed profile."

At Volume 1 Section 5.2 of the Environmental Statement[4] a description of a typical embankment is provided, and Section 6.8 provides associated construction techniques.

Within Section 5.2 it states that "Priority will be given to reusing material excavated from the Proposed Scheme in the engineering earthworks to form embankments, and environmental mitigation earthworks along the route. This will assist in reducing the need for the off-site disposal of surplus excavated material, and its associated environmental

[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/398107/Volume_2_CFA24_Birmingham_Interchange_and_Chelmsley_Wood.pdf

[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/259491/Volume_1_Introduction_to_the_Environmental_Statement_and_the_Proposed_Scheme.pdf

effects. This approach will also reduce the impact of the Proposed Scheme by making best use of the excavated material to significantly reduce the need to import material."

It also states in section 5.14 that "For surface, embankment and cutting sections of the route, the assessment has generally been based on noise barriers having a noise reduction performance equivalent to a noise fence barrier with a top level 3m above the top of the rail, that is acoustically absorbent on the railway side, and located 5m to the side of the outer rail. In practice, barriers may differ from this description, but will provide the same acoustic performance. For example, where noise barriers are in the form of landscape earthworks they will need to be higher above rail level to achieve similar noise attenuation to a 3m barrier because the crest of the earthwork will be further than 5m from the outer rail."

Appendix G shows the plans for the Pool Wood Embankment submitted within Volume 2 CFA24 Birmingham Interchange and Chelmsley Wood[5]

As has been outlined above the requirement for the embankment and landscape bund at Pool Wood is clearly shown in the Environmental Statement. The Environmental Statement is supported by the High-Speed Rail (London – West Midlands) Act 2017. The obligation to undertake the works to complete the landscape bund is therefore a legal requirement.

3.4 Benefit of the scheme

The proposed construction of the embankment and landscape bund is a requirement of the overall HS2 development as it will ensure a suitable platform for the HS2 line. The embankment is required for high-speed rail as the route must be designed without tight curves or steep gradients. By raising land within this area any changes in elevation are minimised.

The construction of the landscape bund will serve as both a sound and visual barrier and therefore reduce any detrimental impact from the high-speed rail system on nearby receptors.

The landscape bund will be planted with suitable vegetation that will serve to stabilise any slopes and increase its effectiveness as a sound and visual barrier. In addition to this purpose the vegetation will provide a suitable habitat to local flora and fauna.

Utilising the materials excavated from other phases of the development works demonstrates a clear environmental benefit in relation to the waste hierarchy, with recovery taking precedence over disposal. In addition to this, by utilising waste generated locally it is hoped that any impacts from transport will be significantly reduced.

3.5 Minimum volume of waste being used

Appendix B and **Appendix F** outline the proposed levels once the landscape bund has been completed.

---

5 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/398814/MB24_VOL2_CFA24_WATERMARKED.pdf

Calculations show that an estimated quantity of 160,929 m^3 of materials is required to achieve the proposed levels of the bund.

Assuming a typical density of around 2 tonnes per cubic metres, this volume can be converted to an estimated 321,858 tonnes of waste material.

The design seeks to ensure the volume of reused material is kept to the minimum needed to achieve the benefits for the site.

Should for any reason there be a shortfall of material for the landscape bund, it will be made up with non-waste material imported for that purpose.

No more than the permitted amount of waste specified by this Waste Recovery Plan and the environmental permit will be utilised.

3.6 Waste suitability

As discussed previously, it is intended to reuse appropriate fill material from elsewhere on the HS2 development scheme. These will include both clean and natural subsoils and suitable waste materials. The majority of this (if not all), assuming suitability, will be suitable excavated treated waste from a nearby closed landfill (Middle Bickenhill Landfill). In addition to this, other suitable wastes from elsewhere on the HS2 development may also be used if required.

During preparation of the Hydrogeological Risk Assessment that will need to be prepared for the Deposit for Recovery Environmental Permit Application, risk derived Site Specific Acceptance Criteria (SSAC) that are protective of controlled waters and human health will be derived. The SSAC will be used to ensure the waste is suitable for use within the landscape bund.

Any waste material accepted at the site and deposited to form either the landscape bund, especially if it is non-inert or may be contaminated, will be sampled and analysed. The waste material must meet the defined Acceptance Criteria.

The waste materials that could be deposited at the site can be categorised as outlined in **Table 1** below. All wastes will be characterised using the waste classification technical guidance WM3.

Table 1: Acceptable Wate Types

EWC Code	Description
01	WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS
01 01	**Wastes from mineral excavation**
01 01 02	Waste from mineral non-metalliferous excavation
01 04	**Wastes from physical and chemical processing of non-metalliferous minerals**
01 04 08	Gravel and crushed rocks other than those mentioned in 01 04 07
01 04 09	Waste sand and clays
17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)

EWC Code	Description
17 01	**Concrete, bricks, tiles and ceramics**
17 01 01	Concrete
17 01 02	Bricks
17 01 03	Tiles and ceramics
17 01 07	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06
17 05	**Soil, stones and dredging spoil**
17 05 04	Soil and stones, including chalk, other than those mentioned in 17 05 03*
17 05 06	Dredging spoil other than those mentioned in 17 05 05*
17 05 08	Track ballast, other than those mentioned in 17 05 07*
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE**
19 12	**Wastes from the mechanical treatment of waste (e.g. sorting, crushing, compacting, pelletising) not otherwise specified**
19 12 05	Glass (for fill purposes only, not for use in restoration top layer)
19 12 09	Minerals (for example sand and stones)**
19 12 12	Crushed bricks, tiles, concrete and ceramics, including mixtures of materials***
19 13	**Waste from soil and groundwater remediation**
19 13 02	Solid wastes from soil remediation other than those mentioned in 19 13 01

* Where clean naturally occurring topsoil is received from the cover layers, then this may be used within the topsoil subject to suitability and agreement with the DJV land quality lead.

** Excludes fines from treatment of any non-hazardous waste and gypsum from recovered plasterboard.

***Can comprise of the following –

- Soil substitutes other than those containing dangerous substances only – should not include hazardous waste or dangerous substances. The soil substitute must be free from contaminants such as asbestos fragments, plastics, glass, metals, treated timber, foils and films. If deposited in place of non-waste topsoil it must meet the British Standard for topsoil BS 3882:2015
- Crushed bricks, tiles, concrete and ceramics, including mixtures of materials - excludes metal from reinforced concrete, fines form treatment of any non-hazardous waste and gypsum from recovered plasterboard.

Subject to the application of suitable waste acceptance procedures at the site, these waste types will not pose an unacceptable risk to environmental or human health receptors. All are waste types listed in EA guidance as suitable for Deposit for Recovery.[6]

Full details of any waste acceptance procedures and operator competence will be provided as part of the Environmental Permit Application submission.

6 https://www.gov.uk/government/publications/deposit-for-recovery-operators-environmental-permits/check-if-your-waste-is-suitable-for-deposit-for-recovery

Records of all wastes accepted at site will be retained to show that it has all been properly classified in accordance with guidance WM3, and that it has been accurately described.

3.7 Standard of completion

The proposed construction works will be completed in accordance with the Technical Standards prepared for the HS2 scheme. The following technical guidance will apply to the earthworks required to construct the embankment and landscape bund.

- Technical Standard – Earthworks, Document No. HS2-HS2-GT-STD-000-000001 (P08) – **Appendix H**
- Technical Standard – Landscape Earthworks Design. Document No. HS2-HS2-EV-STD-000-000021 (P03) – **Appendix I**
- Specification for Civil Engineering Works – Contract Specific Appendices – Series 0600 Earthworks: N1 & N2. Document No. 1MC08-BBV_MSD-GT-SPE-N000-100001 – **Appendix J**

The material to be used within the landscape bund will need to comply with Class 1A and 1B general granular fill, Class 2A ,2B and 2C general cohesive fill or Class 4 landscape fill as per the Specification for Highway Works, in addition to any SSAC's once derived.

Class 1A is well graded materials that is used as general fill and Class 1B is uniformly graded material that is used as general fill.

Class 2A is a wet cohesive fill, Class 2B is a dry cohesive fill and Class 2C is a stoney cohesive material. None can contain chalk.

Various materials are permitted for use as Class 4 landscape fill.

The waste will be deposited in accordance with the technical guidance by experienced staff members. The final ground levels of the construction will be measured to ensure compliance with the design drawings.

Materials will be handled in accordance with the "Construction Code of Practice for the Sustainable Use of Soils on Construction Sites" (2009) produced by Department of Environment, Food and Rural Affairs (DEFRA). The construction materials will be handled and placed into the construction using bulldozers and excavators. Materials will be geotechnically suitable as well as environmentally suitable.

Once the development has been completed, an Environmental Permit surrender application will be made to the Environment Agency. The surrender application will demonstrate that the works have been completed in accordance with the High-Speed Rail (London – West Midlands) Act 2017 and the Waste Recovery Plan for the Site.

In conclusion it is clear that the scheme must be completed to an engineered standard appropriate to the final land use.

4 SUMMARY

The creation of the Pool Wood Embankment and Landscape Bund is required to ensure the safe operation of HS2 and to reduce any impacts upon nearby receptors.

The material used to create the landscape bund will be a mixture of suitable clean and natural materials accepted at the site and suitable waste materials generated from the excavation of Middle Bickenhill Landfill and potentially from elsewhere on the HS2 development.

Careful records will be maintained to ensure the placement of the different materials is accurately recorded.

Site Specific Acceptance Criteria will be developed at the Environmental Permit application stage, and these will be used as part of the waste acceptance criteria to ensure that only suitable waste materials are accepted at site. By ensuring compliance with an accepted and suitable waste acceptance procedure the risk of accepting potentially contaminated materials at the site will be managed.

This WRP has demonstrated that there is an obligation to construct the embankment and landscape bund and the principles of substitution and recovery of waste have been demonstrated.

In conclusion, it is considered that the scheme demonstrates waste recovery as defined in the Environment Agency waste recovery plans and permit guidance .

APPENDICES

APPENDIX A SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for BBV JV (the "Client") in accordance with the terms of a contract dated 7 June 2023..The Services were performed by RSK with the reasonable skill and care ordinarily exercised by an environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the Client.
2. Other than that, expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the Client. RSK is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK 's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the Client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the Client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off site of asbestos, invasive plants, electromagnetic fields, lead paint, heavy metals, radon gas, persistent, bioaccumulative or toxic chemicals (including PFAS and related compounds) or other radioactive or hazardous materials, unless specifically identified in the Services.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a visual inspection of the site together with RSK's interpretation of information, including documentation, obtained from third parties and from the Client on the history and usage of the site, unless specifically identified in the Services or accreditation system (such as UKAS ISO 17020:2012 clause 7.1.6):
    a. The Services were based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely.

b. The Services were limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the visual inspection.

c. The Services did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services.

RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the Client and RSK.

8. The intrusive environmental site investigation aspects of the Services are a limited sampling of the site at pre-determined locations based on the known historic / operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the properties of the materials adjacent and local conditions, together with the position of any current structures and underground utilities and facilities, and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters (as stipulated in the scope between the client and RSK, based on an understanding of the available operational and historical information) and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.

10. The comments given in this report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows, may vary from those reported due to seasonal, or other, effects and the limitations stated in the data should be recognised.

11. Asbestos is often observed to be present in soils in discrete areas. Whilst asbestos-containing materials may have been locally encountered during the fieldworks or supporting laboratory analysis, the history of brownfield and demolition sites indicates that asbestos fibres may be present more widely in soils and aggregates, which could be encountered during more extensive ground works.

12. Unless stated otherwise, only preliminary geotechnical recommendations are presented in this report and these should be verified in a Geotechnical Design Report, once proposed construction and structural design proposals are confirmed.

APPENDIX B SITE PLAN

Reference Information

In accordance with the Contract the Subcontractor shall have no liability for any errors, omissions and/or inadequacies for the following Third Party data upon which this drawing is based:
- Sixense 2019 Survey data supplied in HS2 Survey Grid.
- DTM, Associated Survey provided by BBV, Sixense (2019 LiDAR)
- Local Topographical information provided by BBV and Supply Chain Partners
- Alignment and Chainage for Stage 2 Detailed Design based upon PMA 3.0

METRES @ 1:500 — 0 5 10 20 50

Rev	Description	Drawn	Checked	Approved	Con App
P01.1	Fit for Review and Comment	BPAL 24/01/24	--- ---	--- ---	--- ---

HS2 accepts no responsibility for any circumstances which arise from the reproduction of this document after alteration, amendment or abbreviation or if it is issued in part or issued incompletely in any way.

Scale with caution as distortion can occur.

This document is issued for the party which commissioned it and for specific purposes connected with the captioned project only. It should not be relied upon by any other party or used for any other purpose. We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

Legends/Notes:

Landscape Bund

Additional Plan Notes:

R1. Pool Wood Embankment - Ground Improvement omitted for clarity, refer to Pool Wood Embankment - Ground Improvement - Advanced Works Drawing 1MC09-BBV_MSD-GT-DSH-NS04_NL10-218300
R2. For drainage details refer Drainage drawing index 1MC09-BBV_MSD-DR-DSH-NS04_NL10-118300.
R3. Models referenced beyond asset limits shown for coordination purposes and are subject to change.
R4. Models shown within LM JV site boundary (in blue) shown for coordination purposes and subject to change)

Fit for Review and Comment

HS2

Registered in England: Registration No. 06791686
Registered office: 2 Snow Hill, Queensway, Birmingham, B4 6GA

Official

Creator/Originator: Balfour Beatty VINCI

Field	Value
Project/Contract	(N2) Delta Junction To WCML Tie In
Zone	Delta Main Line
Drawn	BPAL
Checked	---
Approved	---
Drawing Title	Pool Wood Embankment Approximate Extent of Permitted Boundary
Date	24/01/24
Scale	As Shown
Size	A0x2
Deliverable	Yes (MIDP)
Gate	DD
Suitability	S3
Drawing No.	1MC09-BBV_MSD-CV-DPP-NS04_NL10-219402
Rev.	P01.1

APPENDIX C POOL WOOD EMBANKMENT LAND QUALITY MANAGEMENT REPORT

Contract No. 1MC13

Pool Wood Embankment Land Quality Management Report

Document Number: 1MC09-BBV_MSD-EV-REP-NS04_NL10-1000167

Current Revision	Author	Reviewed By	Approved By	Date Approved	Reason for Review
P01	D. Littig	J. Olsen M. Bickley T. Hodges	K. Zymnis	04/03/2022	S3 For comment

Stakeholder Review Required (SRR)	Purpose of SRR
☐ Yes – Please Specify Below	☐ Comment
☒ No	☐ Information
Click or tap here to enter text.	☐ Approval

Handling Instructions: Produced by BBV for project use only

Review Required

Team	Yes/No	Name	Position	Date
Quality				
Health & Safety				
Environment & Sustainability				
Other teams if required				

Revision History

Previous Revision	Author	Reviewed By	Approved By	Date Approved	Reason for Review

Revision Summary

Paragraph Modified	Details of Modification

Contents

1 ABBREVIATIONS

AC	Acceptability Criteria
AOD	Above ordnance datum
BBV	Balfour Beatty VINCI
bgl	below ground level
BS	Birmingham Spur
C4SL	Category 4 Screening Level
CCB	Consolidated construction boundary
CL: AIRE	Contaminated land: Applications in real environments
CLEA	Contaminated land exposure assessment
CLR	Contaminated Land Report
COSHH	Control of Substances Hazardous to Health
CSM	Conceptual Site Model
DEFRA	Department for Environment, Food and Rural Affairs
DJV	Mott MacDonald / Systra Design Joint Venture
DoW CoP	Definition of Waste Code of Practice
DS	Design Sulphate
DWS	Drinking Water Standard
DQRA	Detailed Quantitative Risk Assessment
EA	Environment Agency
EIC	Environmental Industries Commission
ES	Environmental Statement
EQS	Environmental Quality Standard
EWC	Enabling Works Contractor
GIS	Geographic Information System

GFDUD	Glaciofluvial deposits – Upper Devensian
GQRA	Generic Quantitative Risk Assessment
HCV	Health Criterion Value
HS2	High Speed Two Limited, also referred to as “HS2” or “EMPLOYER”
LLAU	Limits of land to be acquired and used
LOD	Limits of deviation
LQ	Land Quality
LQM	Land Quality Management
MBAT	Metals bioavailability assessment tool
MDL	Method Detection Limit
MGR	Made Ground
MM	Mott MacDonald
MMG	Mercia Mudstone Group
MMP	Material Management Plan
MRV	Minimum Reporting Value
MWCC	Main Works Civils Contracts
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PE	Polyethene
PID	Photo Ionisation Detector
POS	Public Open Space
PPE	Personal Protective Equipment
ppm	parts per million
S4UL	Suitable for Use Level
SOI	Scale of Interest

SOM	Scale of Measurement
SPOSH	Significant Possibility of Significant Harm
SPR	Source – Pathway – Receptor
SuRF	Sustainable Remediation Forum
TPH	Total Petroleum Hydrocarbons
WHO	World Health Organisation
WQS	Water Quality Standards
WRAP	Waste and Resources Action Programme

2 RESPONSIBLITIES

Role	Main Responsibilities
Dhuliany Littig (MM/Systra DJV)	Remediation Strategy/Land Quality Management Report and groundwater risk assessment author
Matthew Bickley John Olsen (MM/Systra DJV)	Remediation Strategy/Land Quality Management Report Checker
Tim Hodges (MM/Systra DJV)	DJV Land Quality Lead, Remediation Strategy/Land Quality Management Report Reviewer
Khaled Zeghidi (MM/Systra DJV)	DJV Environment coordinator, Remediation Strategy/Land Quality Management Report Approver
Stephen Phipps (BBV)	BBV Materials Manager, BBV Reviewer
Paul Sandall (BBV)	BBV Contaminated Land Specialist, BBV Reviewer

3 INTRODUCTION

3.1 Purpose and scope

The construction of Pool Wood Embankment will be located on potentially contaminated land, as detailed within the Environmental Statement (ES)[i] and the Sublot 5 and 6 Geo-environmental Report[ii] (1MC09-BBV_MSD-EV-REP-N002-100002). This report is a risk-based assessment of contamination risks to Human Health, Controlled Waters and the built environment. If risks have been identified that require remediation, a remediation options appraisal, objectives and methods have been completed to demonstrate that contamination risks post remediation will be low. For the purposes of this report the "Site" is considered to be the extent of the Pool Wood Embankment asset between chainages (Ch) 158+500 to 159+915; incorporating all sub-assets within these change limits and the Limit of Deviation (LoD) and Land to be Acquired and Used (LLAU).

This report has been produced in accordance with the Land Quality Technical Standard (HS2-HS2-EV-STD-000-000027 P05)[iii], Groundwater Technical Standard (HS2-HS2-EV-STD-000-000010 P07)[iv] and Material Management Plan (MMP) Framework Technical Standard (HS2-HS2-EV-STD-000-000006 P03)[v]. This report also follows the guidance laid out within the Environment Agency (EA) Land Contamination: Risk Management (LCRM).

The EA Model Procedures for the Management of Land Contamination (CLR11) defines a Remediation Strategy as:

"*…a plan that involves one or more remediation options to reduce or control the risks from all the relevant pollutant linkages associated with the Site*".

CLR11 has recently been withdrawn and replaced by the LCRM. LCRM states that a Remediation Strategy must:

- clearly set out how the selected remediation options will mitigate the risks from the Relevant Pollutant Linkages (RPLs) and meet Options Appraisal (OA) objectives
- meet any regulatory requirements - such as to fulfil a planning condition, a Part 2A obligation or to comply with permit conditions
- state how human health, the environment and ecology will be protected
- be practical, effective and durable
- be compatible with other aspects of work such as redevelopment
- be achievable, sustainable and able to deal with uncertainty
- be verifiable by testing, measuring, monitoring or other recording methods
- consider potential nuisance and disruption to local residents

This report draws on and develops a Conceptual Site Model (CSM) presented in the SL5 and 6 Geo-environmental Report[ii], through further Generic Quantitative Risk Assessment (GQRA) and a Detailed Quantitative Risk Assessment (DQRA) (where applicable) and identifies if Relevant Pollutant Linkages are present and require remedial action.

3.2 Sources of information

The following documents were used to inform the remediation strategy:

- HS2 Technical Standard – Land Quality: HS2-HS2-EV-STD-000-000027 P05[iii]
- HS2 Technical Standard – Groundwater: HS2-HS2-EV-STD-000-000010 P07[iv]
- HS2 Technical Standard – Materials Management Plan Framework: HS2-HS2-EV-STD-000-000006 P05[v]

- Environment Agency (2004): "Model Procedures for the Management of Land Contamination", CLR11 United Kingdom (UK) Government: Land contamination: risk management: https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks [vi]
- Environment Agency (2006): "Remedial Targets Methodology: Hydrogeological risk Assessment for Land Contamination"[xxxvi]
- UK Government: Groundwater protection: https://www.gov.uk/government/collections/groundwater-protection[xxxv]
- Environment Agency (2009): "Updated Technical background to the CLEA Model", Science Report, SC050021/SR3[xxvi]
- Environment Agency (2009): "Human Health Toxicological assessment of contaminants in soil", Science Report, SC050021/SR2
- DEFRA (2010): "SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document"[vii]

3.3 Report Layout

The report is structured as followed:

- Design Information – Section 4
- Environmental Setting – Section 5
- Summary of Previous Risk Assessments – Section 6
- Conceptual Site Model (CSM) – Section 7
- Detailed Quantitative Risk Assessment (DQRA) – Section 8
- Refined Conceptual Site Model – Section 10
- Land Quality Management – Section 11

4 DESIGN INFORMATION

4.1 Site location

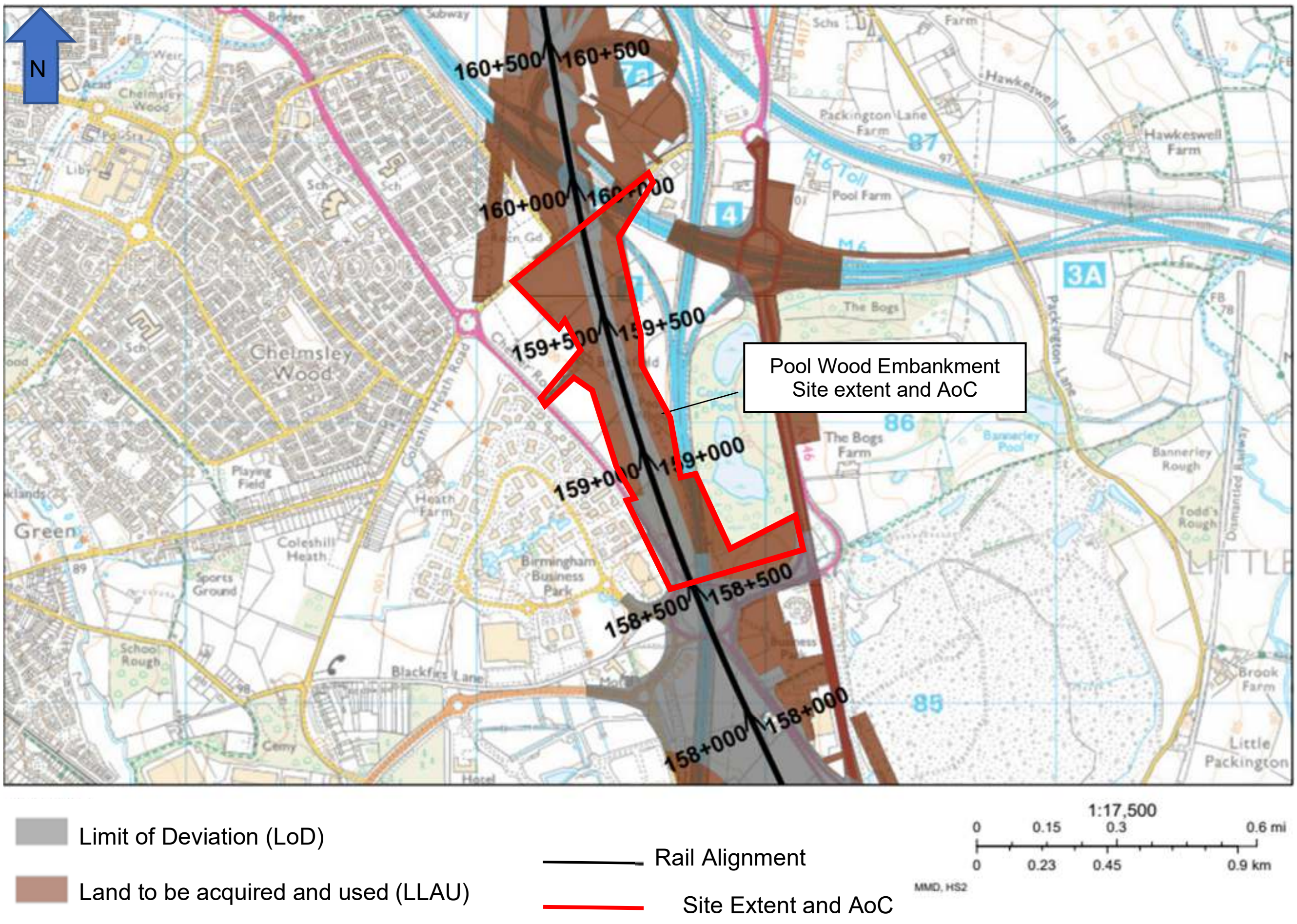
Pool Wood Embankment is located ~10km to the south-east of Birmingham City Centre. The M42 motorway and a roundabout is situated at the southern boundary and the M6 motorway is present at the northern boundary. The A446 is present ~450m to the east of the asset. The asset begins to the south of the roundabout and runs alongside the M42 motorway until it encounters the M6 motorway to the north.

It is understood that highways works will be undertaken at the roundabout, as part of the Enabling Works Contract (EWC), therefore, risks associated with land contamination in this area will be managed by the EWC. Consequently, the Site limits within this report only considers the area to the north of the roundabout from Ch 158+500 to 159+915. The location of the Site and the Site extent considered in this report is shown on Map 1, which comprise of the land within the LoD and LLAU. Map 2 shows the asset footprint (highlighted in green) and Map 3 shows an aerial image of the area.

It is important to note that the LoD specify the limits where the scheduled works may be constructed, and LLAU, is the area that outlines the additional limits for other works (e.g., ancillary works such as the provision of environmental mitigation), as well as the limits of land required in connection with the construction and future maintenance of the project.

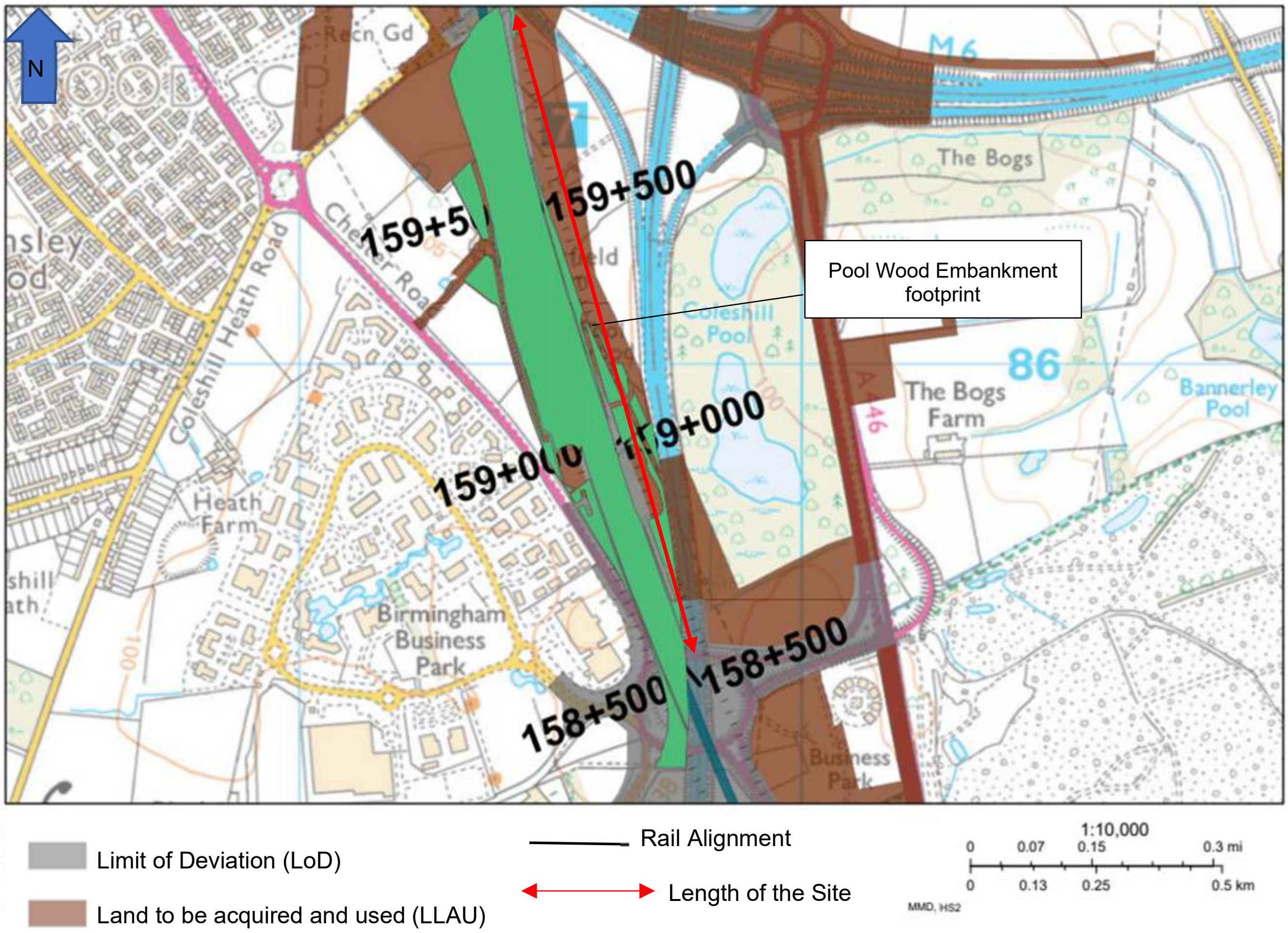
For the purposes of this report, contamination sources will be considered within the Area of Concern (AoC), which has been defined as the LOD and the LLAU. Potential contamination sources located beyond the AoC are considered to be “off-Site” sources.

Map 1: Site extents covering the Pool Wood Embankment location



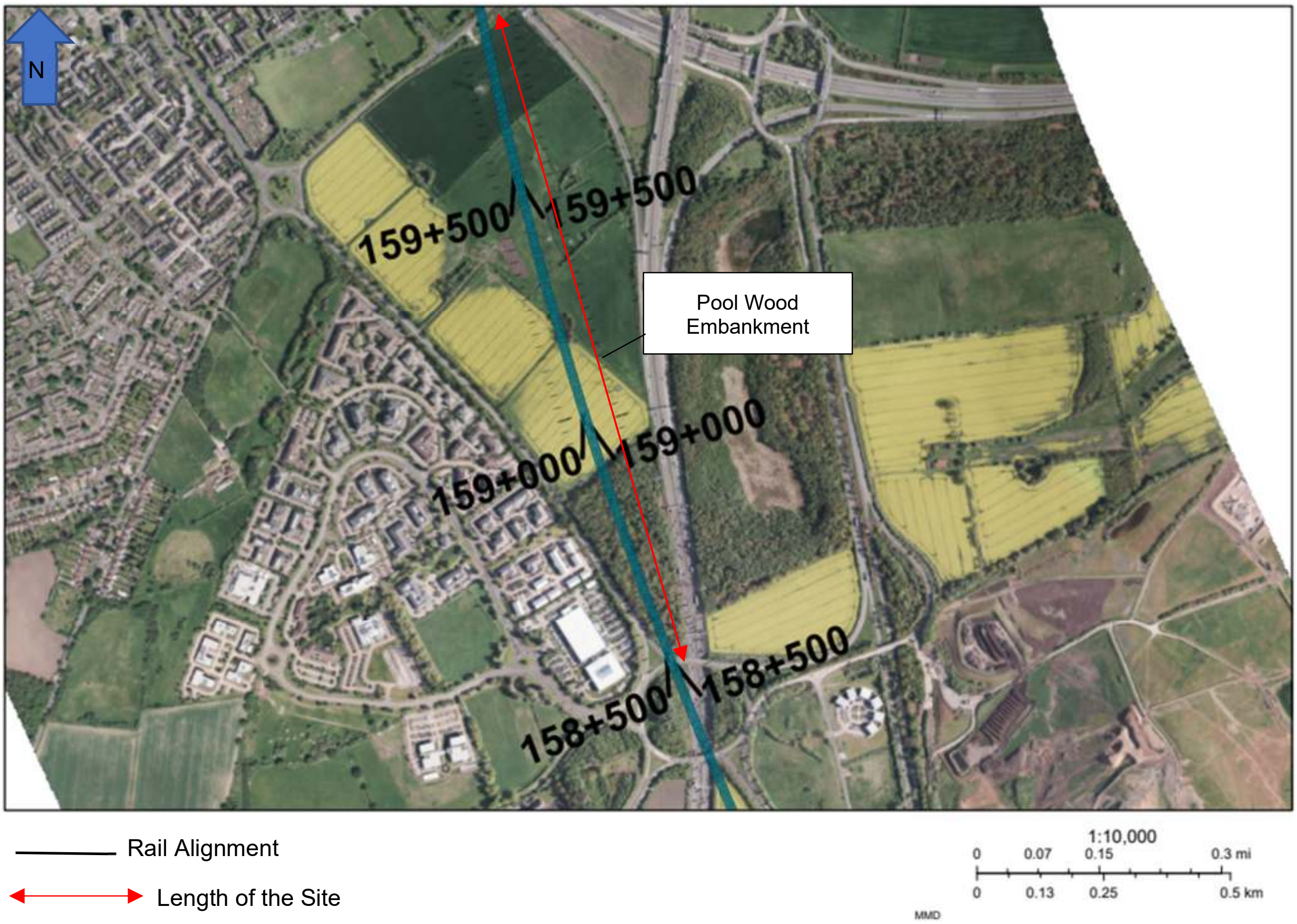
Source: HS2 Phase 1 MWCC web interface MOATA

Map 2: Pool Wood Embankment (embankment footprint shown in green)



Source: HS2 Phase 1 MWCC web interface MOATA

Map 3: Aerial imagery (2012) of Site extent



Source: HS2 Phase 1 MWCC web interface MOATA

4.2 Development proposal

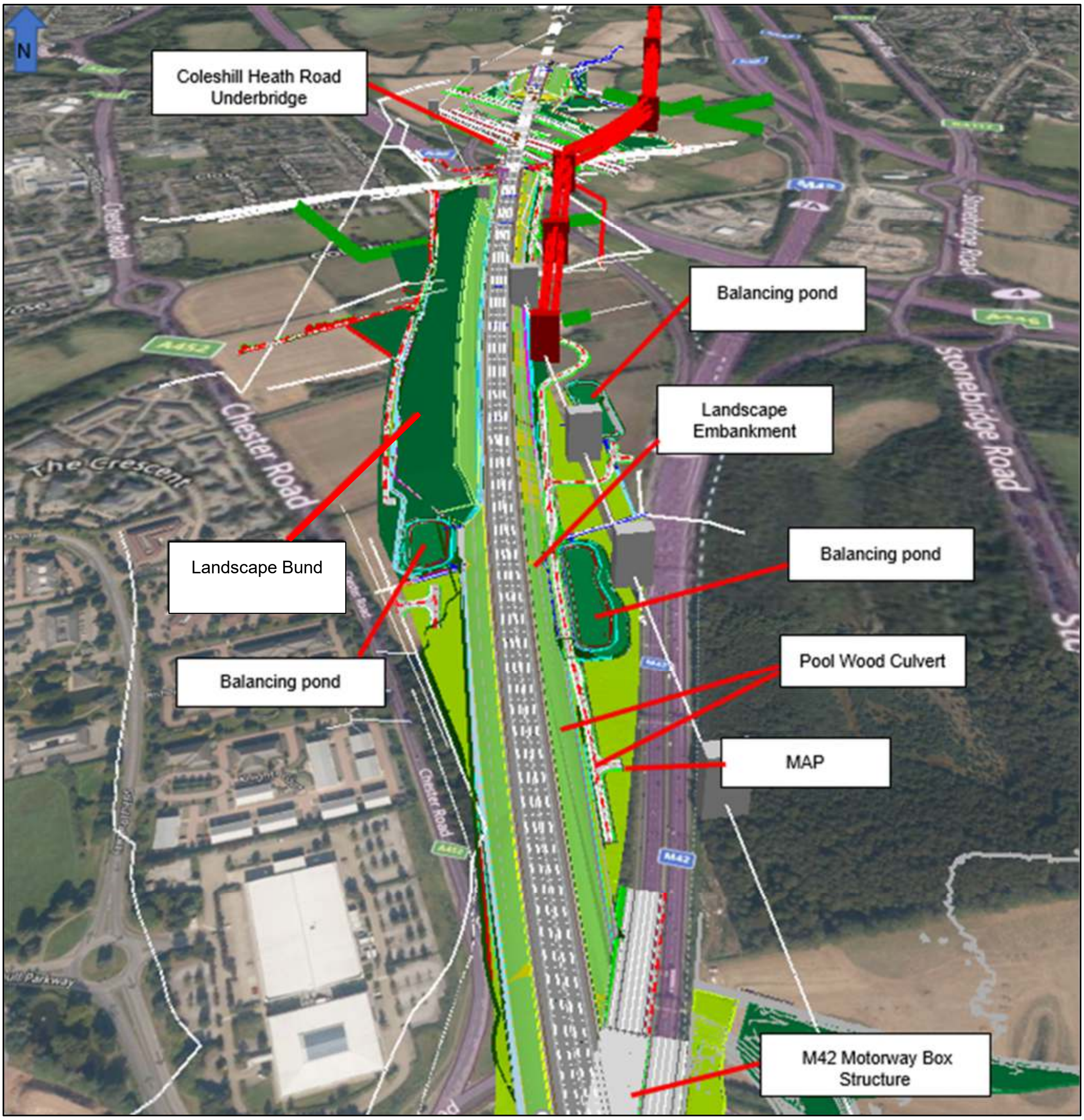
The federated model for the Site is located in 1MC09-BBV_MSD-GT-DM3-NS04_NL10-158320, and is shown in Schematic 1.

The length of the embankment will be approximately 1414m. The height of the earthwork varies throughout the length of the embankment, with a maximum height from ground level to the top of the protection layer of approximately 11m (without considering the landscape bund). The width for the mainline embankment trackbed is approximately 31m. The asset has a maximum side slope of 1:2. The landscape bund runs from Ch 158+920 to Ch 159+760 on the west side of Pool Wood Embankment. The maximum height of the landscape bund is 14m. The internal slope of the landscape bund is 1:3 and the external slope is 1:4.

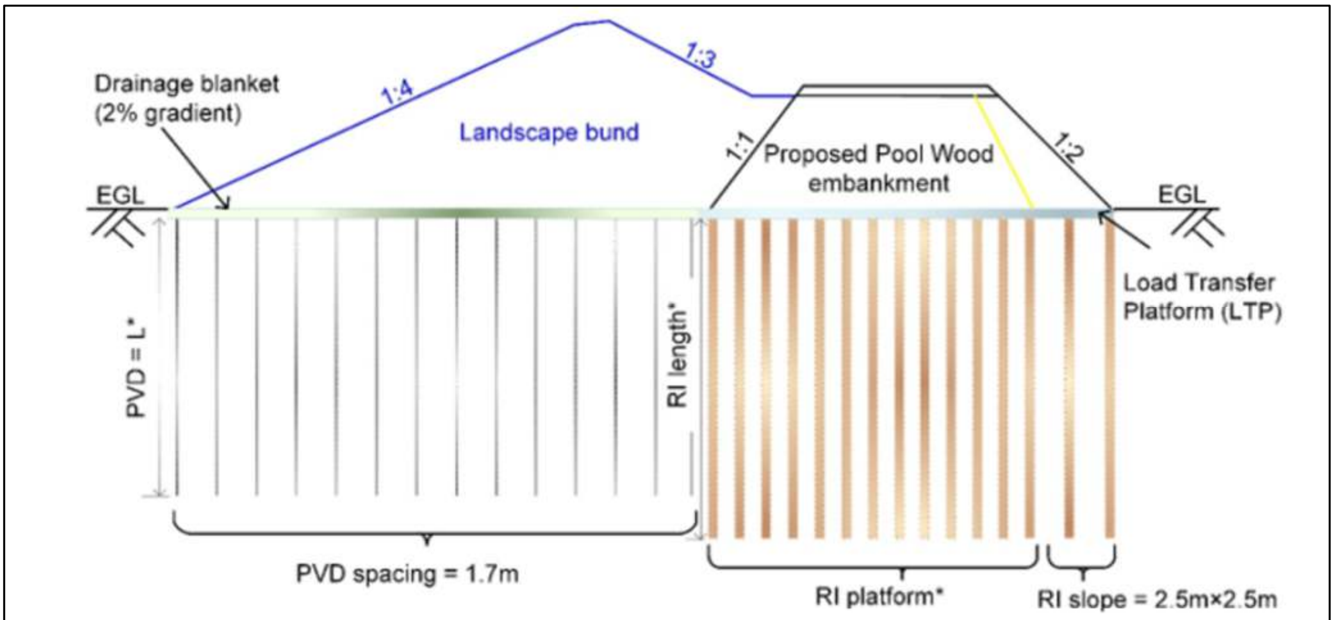
Due to the variability and soft ground conditions encountered during the ground investigation, rigid inclusions for the railway embankment and prefabricated vertical drains for the proposed landscape bunds have been proposed for the asset. Rigid inclusions are proposed under the trace embankment from Ch 159+015 to Ch 159+695 and vertical drains from around Ch 159+015 to Ch 159+695. Also, at around Ch 158+945 and Ch 159+015 ground treatment by excavation and replacement of 2m is required for the anticipated soft soil layer. Schematic 2 shows a model that was generated for the proposed rigid inclusions and vertical drains. For more information on ground profiles refer to document Detailed Design Geotechnical Design Report for Pool Wood Embankment & Pool Wood Culvert (*1MC09-BBV_MSD-GT-REP-NS04_NL10-100048*).

Several other assets and sub-assets interface with the Site, these are the M42 Motorway Box Structure (to the south), Coleshill Heath Road Underbridge (to the north), Pool Wood Culvert located around Ch 158+900 and Ch 158+650 and three balancing ponds at around Ch 158+800, Ch 158+900 and Ch 159+100. The location of these assets and sub-assets can also be seen within Schematic 1. It's important to note that this report comprises a detailed assessment solely for Pool Wood Embankment.

Schematic 1: Pool Wood Embankment Federated Model viewed from the south



Schematic 2: Pool Wood Embankment – Rigid inclusions and prefabricated vertical drains (not to scale)



Section	PVD length, L* (m)
Ch 159+015 to 159+245	6.5
Ch 159+245 to 159+475	10.0
Ch 159+475 to 159+600	8.0
Ch 159+600 to 159+695	5.5

Section	RI length*, (m)	RI platform*, m
Ch 159+015 to 159+070	9.0	1.5 x 1.5
Ch 159+070 to 159+195	13.5	1.5 x 1.5
Ch 159+195 to 159+405	15.0	1.7 x 1.7
Ch 159+405 to 159+445	10.0	1.5 x 1.5
Ch 159+445 to 159+495	8.0	1.8 x 1.8
Ch 159+495 to 159+595	9.0	1.7 x 1.7
Ch 159+595 to 159+645	9.0	1.3 x 1.3
Ch 159+645 to 159+695	8.0	1.3 x 1.3

Source: Detailed Design Geotechnical Design Report for Pool Wood Embankment & Pool Wood Culvert (1MC09-BBV_MSD-GT-REP-NS04_NL10-100048)

5 ENVIRONMENTAL SETTING

This chapter provides a review of historical and current information to establish where previous land use activities were located, and the likely areas of associated contamination. This section also identifies if, and where, sensitive receptors are present, and if they might potentially be affected by Site contamination.

5.1 Environmental Statement

The ES[i] classified contaminated land into the following four categories:

Group A Sites: Fall fully/partially within the land required to construct the Proposed Scheme, potentially affected by soil/groundwater contamination and ground gas.

Group B Sites: Fall fully/partially within the land required to construct the Proposed Scheme, potentially affected by soil/groundwater contamination only.

Group C Sites: Fall outside the land required to construct the Proposed Scheme, potentially affected by soil/groundwater contamination and ground gas.

Group D Sites: Fall outside the land required to construct the Proposed Scheme, potentially affected by soil/groundwater contamination only.

The following land quality Sites were identified as “High Risk Potential Land Contamination Sites”, within or near Site:

- 24-41: Packington operational landfill – Group A
- 24-43: Melbick Nursery – Group B
- 24-44: Brackenlands Farm Landfill (historical) - Group A
- 24-54: Coleshill Civic Amenity Site landfill (historical) - Group A
- 24-46: Birmingham Business Park - Group B
- 24-56: Infilled gravel pit - Group C
- 24-58: Highways Agency Depot (operational) - Group B

The following land quality Sites were identified as “Potential Land Contamination Sites” within or near the Site:

- Brickfield Farm
- Former Brick Works with kiln and infilled pond
- Infilled well
- Infilled Ponds (2No.)
- Fifield’s Farm
- The Bogs Farm

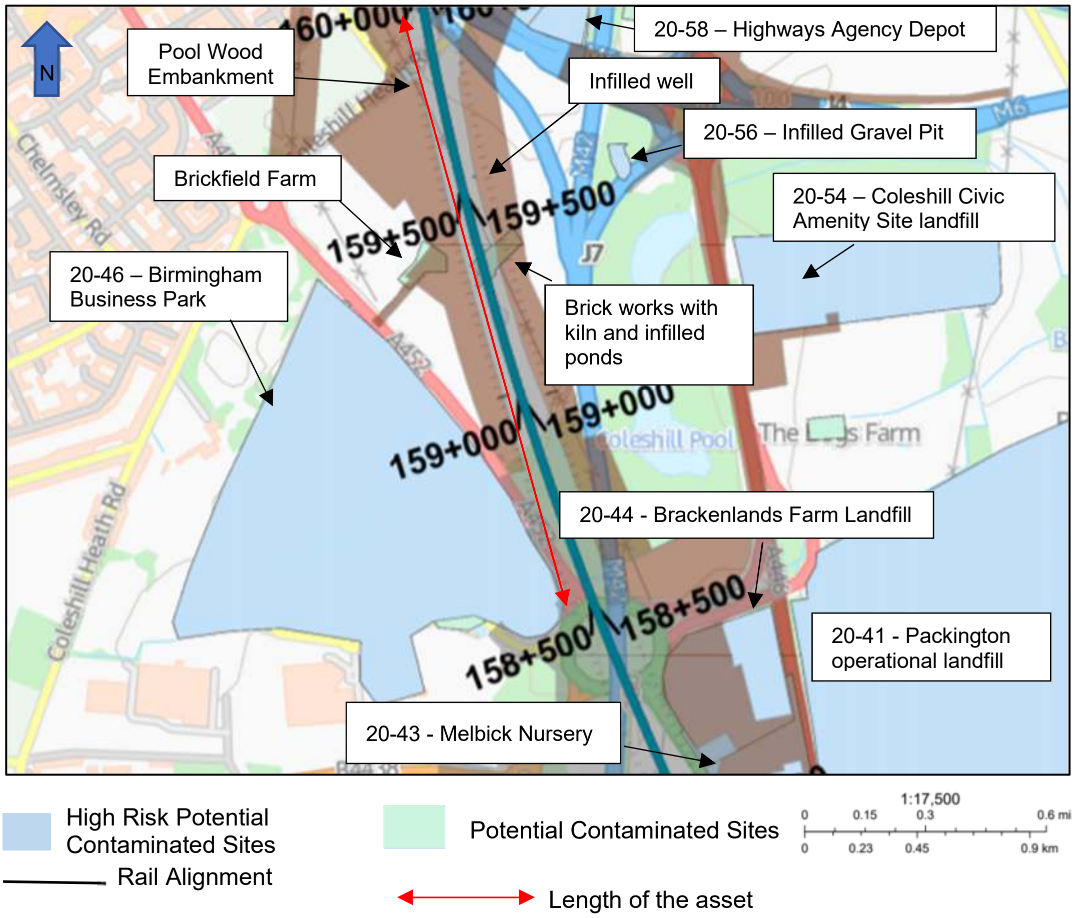
These land quality Sites are shown in are shown in Map 4. Schematic 3, shows the actual extent of these land quality Sites, from a figure extract from the ES[i].

The baseline CSM and preliminary qualitative risk assessment[viii] recorded the following moderate and high risks:

- Risks from contaminated soils/groundwater to residential users through direct contact, ingestion, and the inhalation of dust/vapour in contaminated soil and/water.
- Risks from contaminated soils/groundwater to groundwater through vertical and lateral migration.

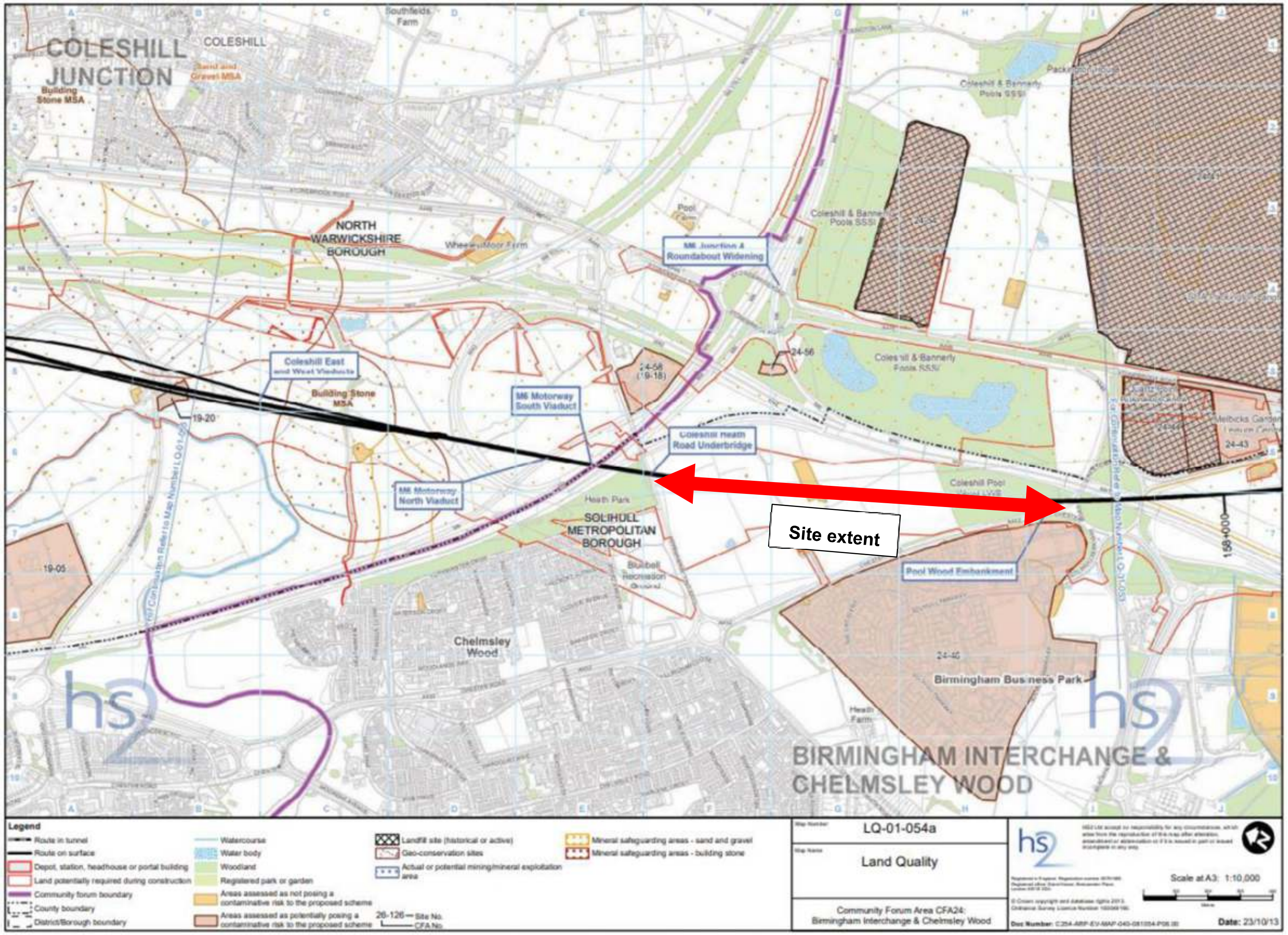
- Risks from contaminated soil/groundwater to surface waters through groundwater migration and direct run-off from Site.

Map 4: Land Quality Sites identified within the Environmental Statement



Source: HS2 Phase 1 MWCC web interface MOATA

Schematic 3: Land Quality features extracted from the ES.



5.2 Site history

The Delta Junction Geotechnical Desk Study Volume 1 and Volume 2 (C223-CSI-GT-REP-030-000003 P06)[ix] report was reviewed to obtain information on historical land use activities at the Site and surrounding area to identify potential historical sources of contamination. Table 1 presents a summary of the information contained within these maps.

Table 1: Summary of historical developments

Year	On-Site	Off-Site (250m or significant feature)	Contamination source
1888	The Site comprises mostly of open fields. A brick works named "Old Brick Works" with associated buildings and a kiln is present in the northern part of the Site. An unnamed pond is also present in the centre of the Site. A woodland area known as "Pool Wood" is situated in the southern part of the Site, extending towards to the east of the Site.	"Coleshill Pool" is present ~250m east of the Site, which comprises of a woodland area and a lake. A gravel pit is identified ~240m to the north-east of the Site. Chester Road and an unnamed farm are located ~50m and 30 m west of the Site respectively. Several unnamed ponds are identified within ~250m to the west of the Site.	Gravel Pit Brick works
1889	No significant change.	A well is recorded ~10m east of the Site.	-
1903	The brick works is no longer present.	The unnamed farm ~30m to the west of the Site is now identified as Brickfield farm. Brickhill Street Farm is present ~250m to the north-east of the Site.	Brick works
1949-1979	A land drain crosses the centre of the Site, with a north-west to south-east orientation. In the southern part of the Site a second drain is present with a south-west to north-east orientation.	No significant change.	-
1951	No significant change.	Melbick Nursery is present ~250m to the south-east of the Site.	-
1954	No significant change.	The gravel pit previously identified to the east of the Site is no longer recorded. Sand and gravel works are identified ~450m to the south-east of the Site. The A446 is present ~450m to the east of the Site.	Potentially infilled gravel pit Sand and gravel works
1962-1982	An overhead power line crosses the Site in a south-east to north-west direction.	Two pylons are present ~20m to the east and to the west of the Site associated with the overhead lines. Brickfields Cottage is present ~80m to the east of the Site. Brackenlands Farm is located ~135m to the south-east of the Site. The M42 motorway is present at the eastern boundary of the Site, while the M6 motorway is at the northern boundary of the Site.	-
1970	A roundabout, associated with the M42 motorway, is shown at the southern boundary of the Site.	A Highways Agency Depot is ~50m north of the Site.	Unknown depot activity
1999 (aerial photograph)	No significant change.	Birmingham Business Park present to the west of the Site.	Birmingham Business Park
2019 (aerial photograph)	A possible depot comprising large containers, heavy machinery and parking spaces is present at the northern boundary of the Site. An access road to the depot and to the pylons are also identified.	No significant change.	Unknown depot activity
2020 (aerial photograph)	The possible depot in the north of the Site is no longer present.	No significant change.	
2021 (google map)	No significant change.	A Motorway Maintenance Compound is present ~180m north of the Site and has replaced the previously identified depot. Edenhouse Solutions, Rolton Group and Hitachi Data Systems offices are present ~230m south-east of the Site whilst at ~450m the SUEZ recycling and recovery UK is identified. Earthworks are noted near the southern boundary.	Motorway Maintenance Compound SUEZ recycling and recovery UK

5.3 Site walkover

A walkover was attempted at Pool Wood Embankment area on September 2020, however, due to the ongoing EWC works, access was limited and observations were undertaken from the Coleshill Health Road, located at the northern boundary of the asset. The observations including photographs are include within Appendix A.

In addition, evidence of surface waste was also encountered in the centre part of the asset (ch. ML159+176 to ML159+450), which this is an area surrounded by the land quality site (former brick works with kiln and infilled pond). The material observed comprised of old carpets and plastic debris. It is anticipated that the waste is associated with fly-tipping and not directly associated with the land quality in the area. Also, for the purpose of this report, it has been assumed that any fly-tipping waste encountered on site it has been removed.

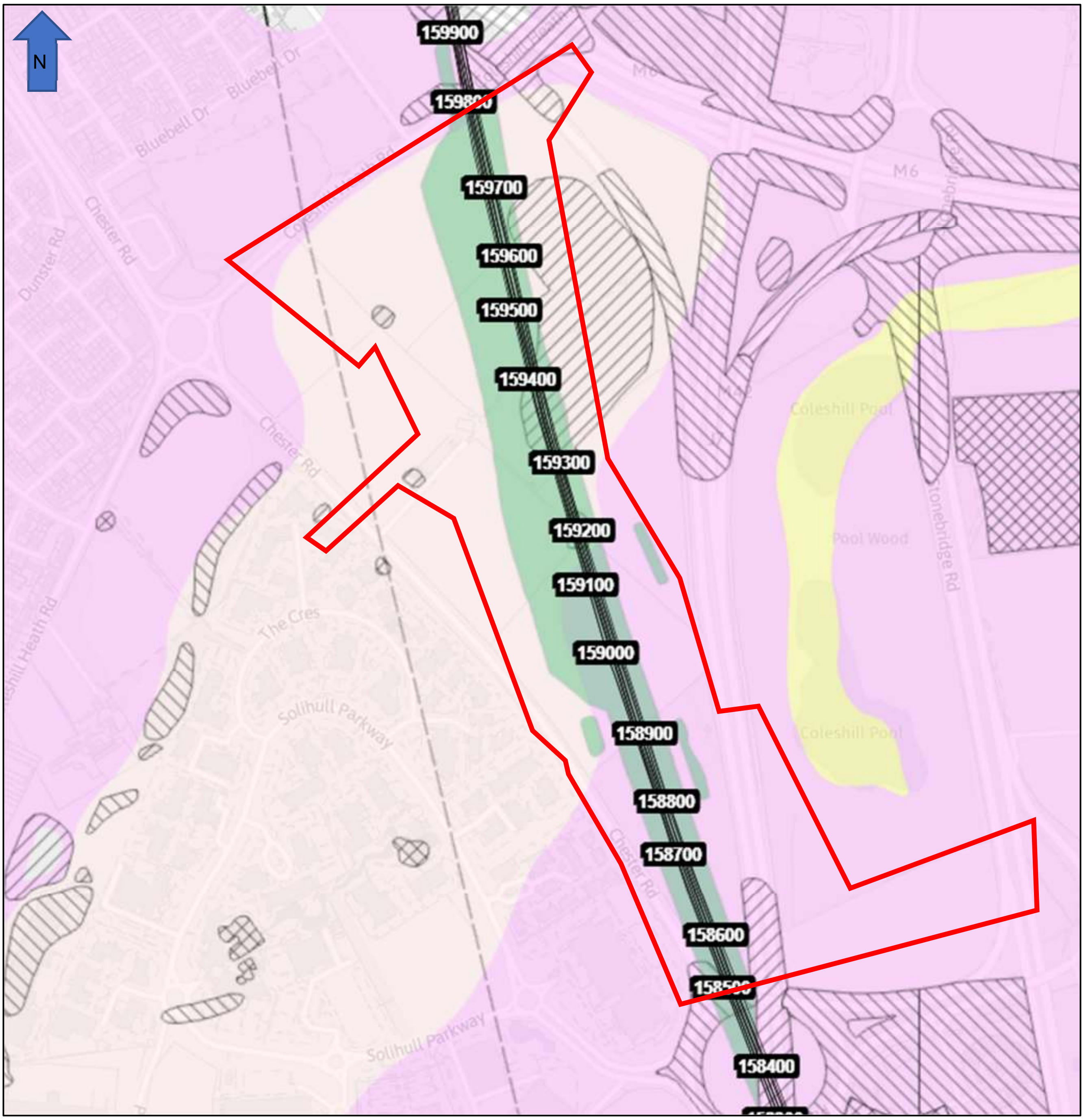
5.4 Published geology

British Geological Society records were reviewed to assess Site and local geology. Made Ground is recorded at approximate Ch 158+500 to 158+550, 159+150 to 159+200 and 159+275 to 159+500. Glaciolacustrine deposits (comprising of clay and silt) are present from the central part to the northern boundary of the Site, between Ch 159+125 to 159+750, which are in turn underlain by Glaciofluvial deposits (comprising sand and gravel), likely to be present beneath the whole Site. Alluvial deposits (comprising clay, silt sand and gravel) are recorded approximately 200m to the east of the asset footprint.

The superficial deposits are underlain by the bedrock geology of the Mercia Mudstone Group, which includes the Branscombe Mudstone Formation and the Sidmouth Mudstone Formation (both described as structureless with blocky weathering mudstone and siltstone) 200m to the west of the asset. An unnamed inferred fault is recorded between these bedrock formations, trending with a south-north orientation. No displacement details are recorded.

The geological maps for the Site and surrounding area are shown in Map 5 and Map 6.

Map 5: Artificial and superficial geology for the Site (the asset footprint is highlighted in green)



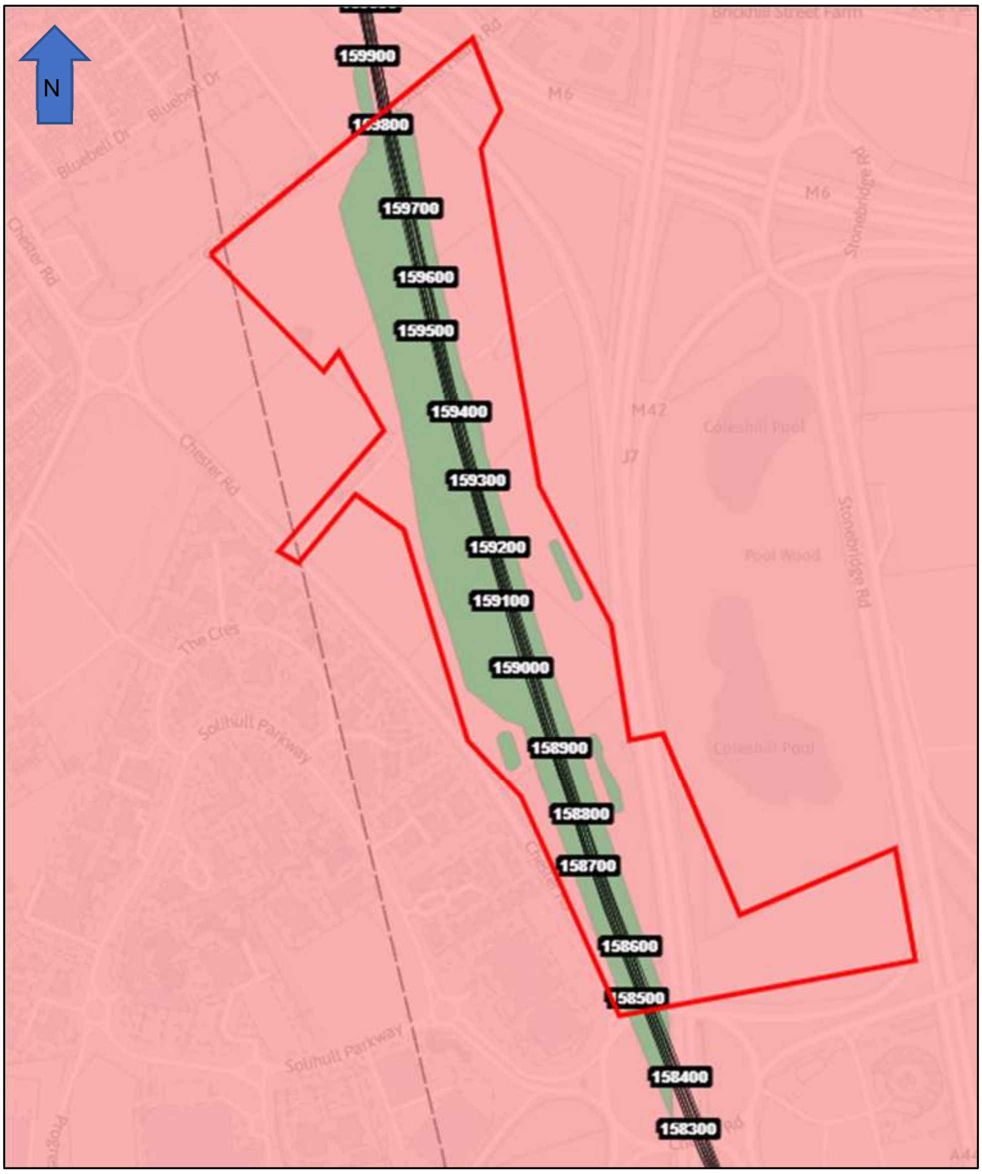
Glaciofluvial Deposits
Glaciolacustrine Deposits
Artificial (Worked Ground)
Alluvium Deposits
Artificial (Made Ground)
Artificial (Infilled Ground)

1:10,000
0 0.07 0.15 0.3 mi
0 0.13 0.25 0.5 km

Rail Alignment
Site extent
Inferred fault

Source: HS2 Phase 1 MWCC web interface MOATA

Map 6: Bedrock geology for the Site (the asset footprint is highlighted in green)



Mercia Mudstone Group
Site extent
Rail Alignment
Inferred fault
Site extent

1:10,000
0 0.07 0.15 0.3 mi
0 0.13 0.25 0.5 km

Source: HS2 Phase 1 MWCC web interface MOATA

5.5 Published hydrogeology

The published geological units identified at the Site and surrounding area have the following aquifer characteristics, as determined by the Environment Agency (EA):

- Glaciofluvial and Alluvial deposits – Secondary A aquifers, which contain permeable layers capable of supporting water supplies at a local scale, and in some cases forming an important source of base flow to rivers.

- Glaciolacustrine deposit – Non-productive.
- Mercia Mudstone Group – Secondary B aquifer, which contain predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

5.6 Hydrology

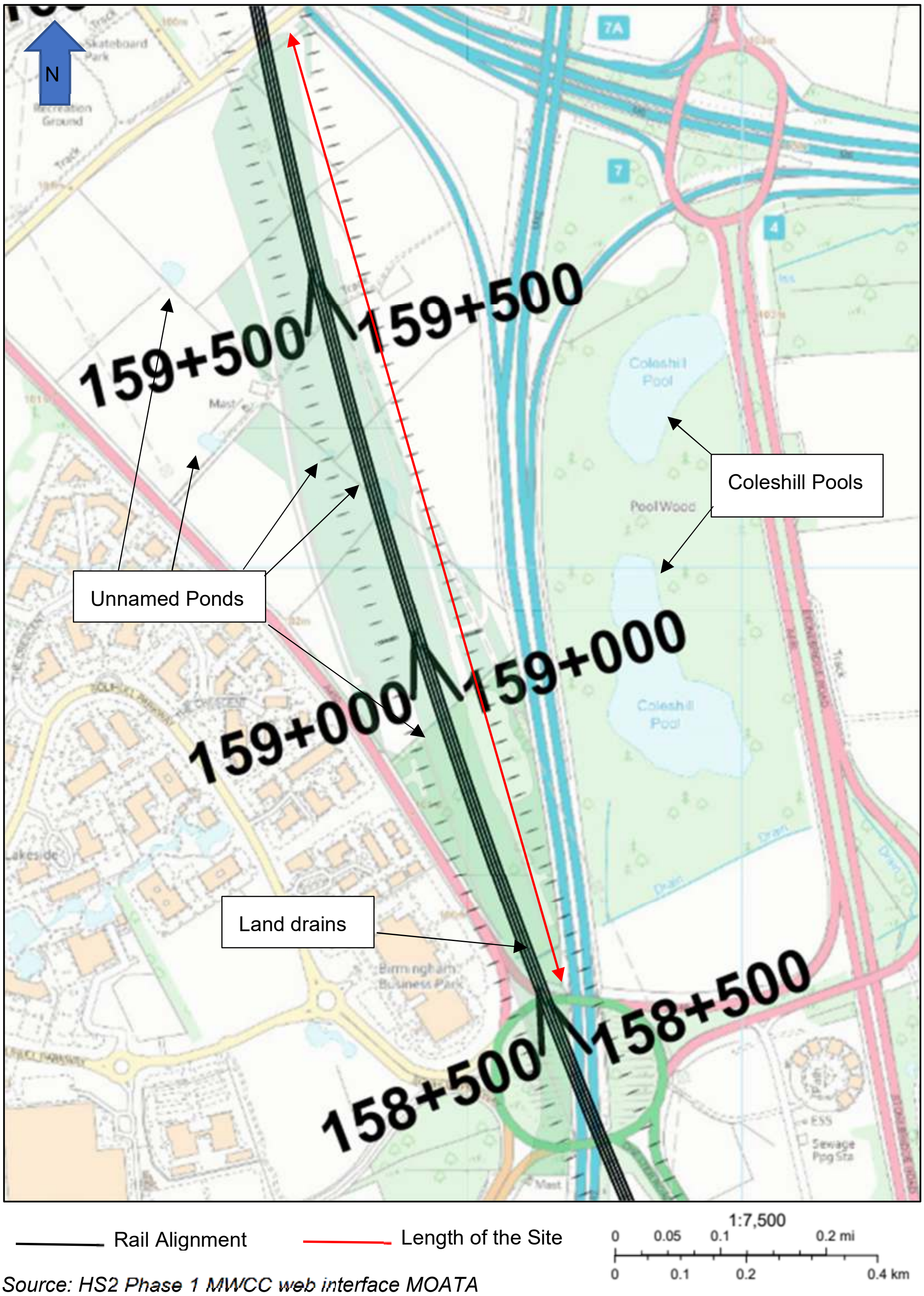
Three unnamed ponds are located at the Site, at approximate Ch 158+875, 159+175 and 159+250. A drain is also present to the south of the Site at Ch 158+550, which has a north-east-west to north-west orientation. These ponds and drains will be removed as part of the works.

Two unnamed ponds are present approximately 150m north-west of the Site and two ponds identified as Coleshill Pools, are located approximately 330m to the east of the Site. The Coleshilll Pools are identified as Sites of Special Scientific Interest (SSSI). Several land drains are recorded to the east of the Site.

The River Blythe is the closest main watercourse located approximately 2km to the east of the Site. This river flows in a northerly direction into the River Tame (part of the Trent Drainage Basin).

Map 7 shows the surface water features encountered at and within a 250m radius of the Site.

Map 7: Surface water features at Pool Wood Embankment (asset footprint is highlighted in green)



Source: HS2 Phase 1 MWCC web interface MOATA

5.7 Encountered geology and hydrogeology

5.7.1 Ground investigations

Ground investigation data from the following reports was used to inform the geological understanding at the Site:

- Delta Junction Area A, RPS, 2017[x]
- HS2 PHASE 1 Area North Additional GI Location NL10 To NL12, Soil Engineering, 2020[xi]

Subsequent to the above investigations, an additional ground investigation was undertaken in March 2021 by Soil Engineering, to collect data from around the former brick works. As part of the investigation, four additional boreholes labelled as ML159-CP403, ML159-CP404, ML159-CP405 and ML159-CP406 were drilled. Due to the recent completion of these investigations, whilst no factual report was available at the time of reporting, draft borehole logs and chemical laboratory data were available for review. On receipt, the factual report will be reviewed, and if required this report will updated accordingly.

Boreholes ML158-CP020 and ML158-CP021 located around 150 and 360m to the west of the proposed asset and to the north of the Brackenlands Farm Historic Landfill were not considered part of the ground investigating review and also the risk assessment. Due to its location and groundwater flow in this area, any contamination associated within these two boreholes are anticipated to be from the landfill source.

A summary of the exploratory holes completed during the three phases of investigation at the Site are presented in Table 2, and shown in Map 8. This assessment considers Table 2 ground investigation data up to May 2021.

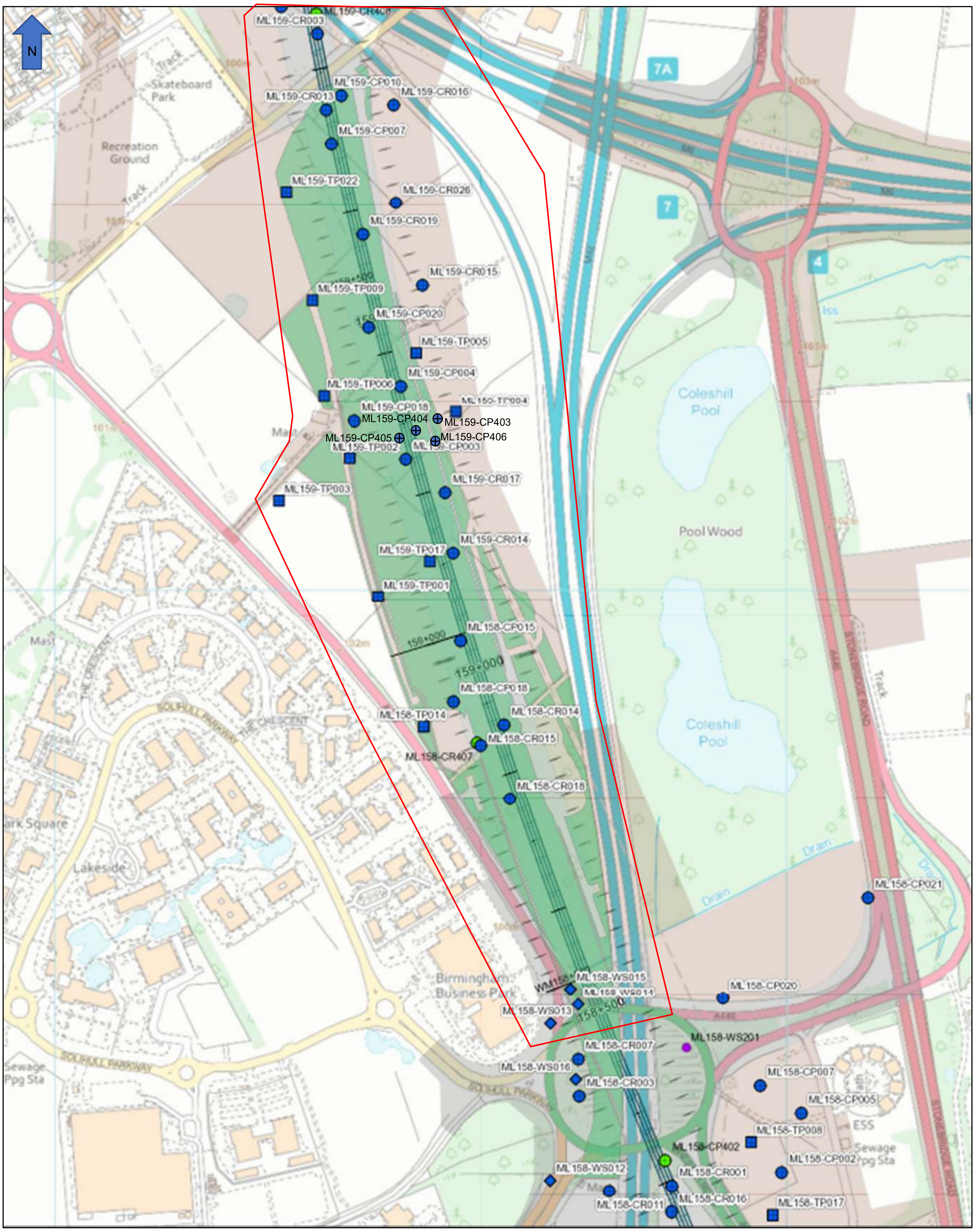
Table 2: Summary of ground investigations

Investigation technique	Number	Borehole ID	Maximum depth (m bgl)
Cable tool percussion drilling	11	ML159-CP403 ML159-CP404 ML159-CP405 ML159-CP406 ML159-CP010 ML159-CP007 ML159-CP020 ML159-CP004 ML159-CP003* ML158-CP015* ML158-CP018	15.00

Investigation technique	Number	Borehole ID	Maximum depth (m bgl)
Rotary drilling	13	ML159-CR003 ML159-CR013 ML159-CR016 ML159-CR026 ML159-CR019 ML159-CR015 ML159-CR017 ML159-CR014* ML158-CR014* ML158-CR015* ML158-CR018* ML158-CR016 ML158-CR407	35.60
Windowless sampling	3	ML158-WS015 ML158-WS014 ML158-WS013	4.39
Trial pits	10	ML159-TP022 ML159-TP009 ML159-TP005 ML159-TP006 ML159-TP004 ML159-TP002 ML159-TP003 ML159-TP017 ML159-TP001 ML158-TP014	4.50

*Note: * Boreholes completed as monitoring well.*

Map 8: Exploratory hole locations (asset footprint is highlighted in green)



Cable Percussion and Rotary Boreholes

Trial Pitting

Windowless Sampling

Extent of boreholes considered

Rail Alignment

1:5,000

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

MMD, HS2, DJV

5.7.2 Ground model

Made Ground is encountered at the centre of the Site at Ch 159+275 to 159+400, and at the southern and northern boundary of the Site. The superficial Glaciolacustrine deposits were encountered at the centre of the Site at Cc 159+175, and in the northern part of the Site at Ch 159+350 to 159+600. These deposits were underlain by the Glaciofluvial deposits which covered the whole of the Site. The bedrock geology of the Mercia Mudstone Group underlies the entire Site.

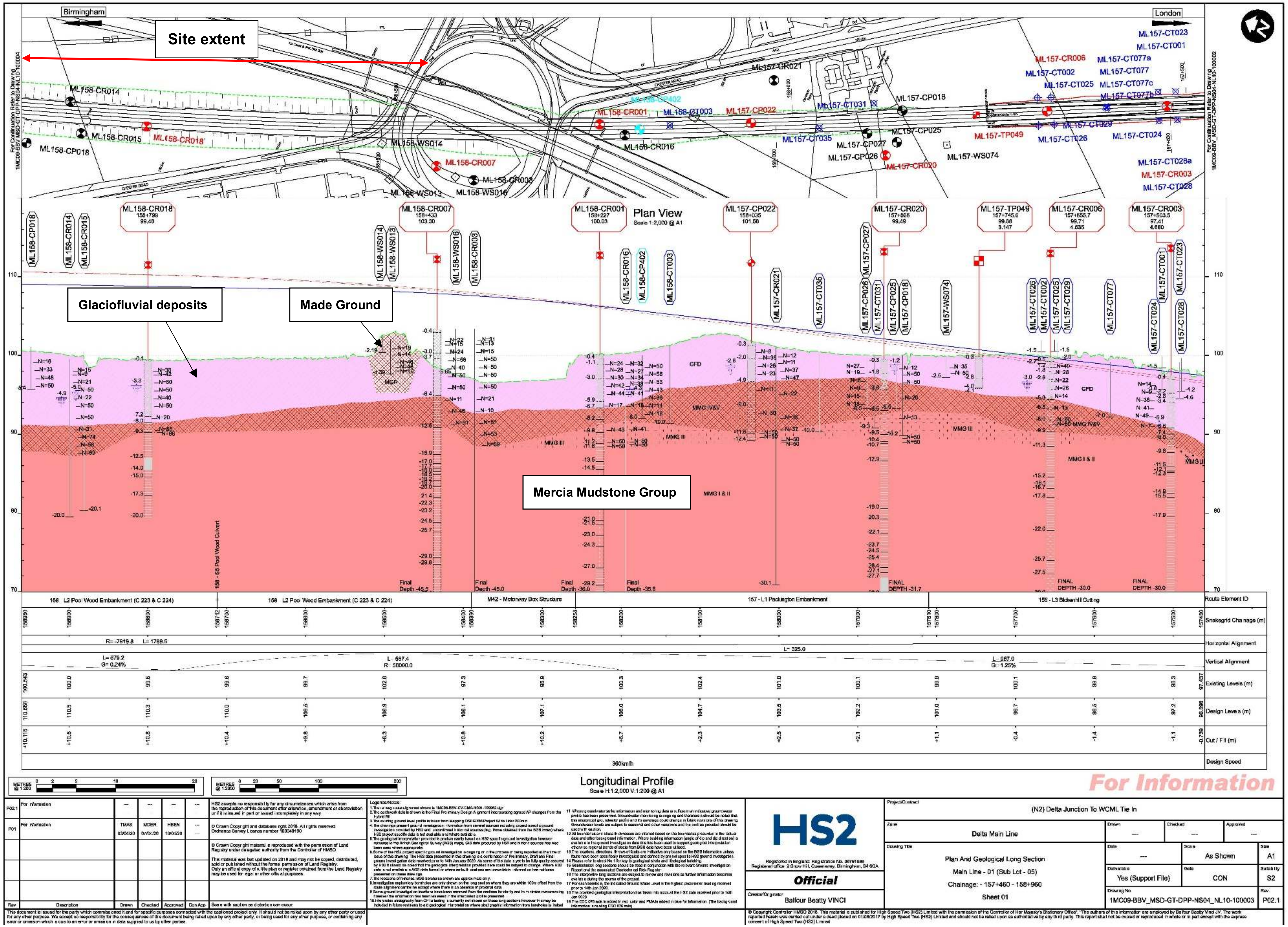
A summary description of the geology encountered at the Site during the previous investigations is shown in Table 3. Generalised cross-sections showing the encountered geology at the Site are presented in Schematic 4 and Schematic 5.

Table 3: Encountered geology at the Site

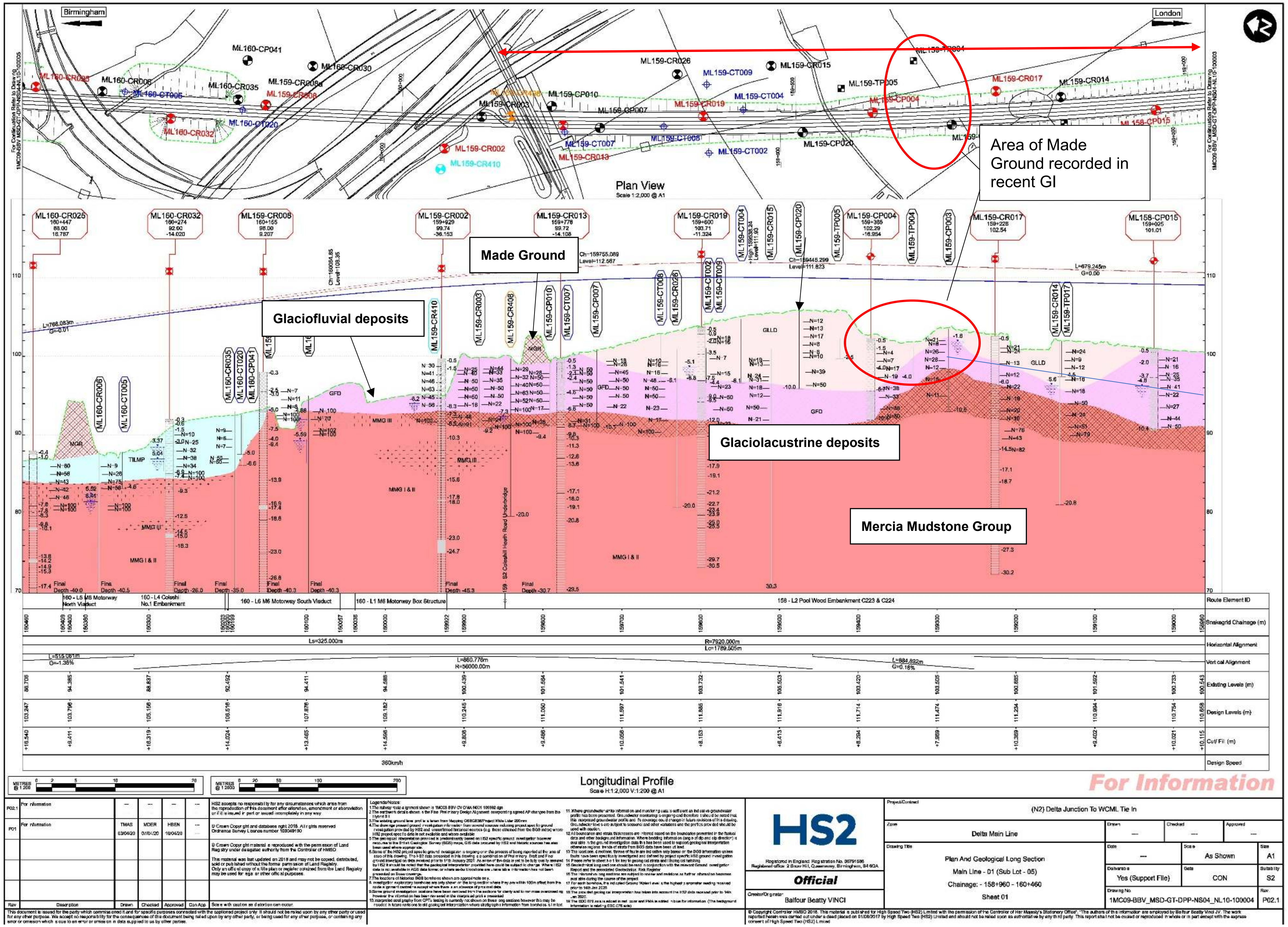
Strata	Distribution	Typical depth range (m bgl)	Description
Topsoil	Located across the Site at boreholes listed in Table 2	0 to 0.50	Mixture of granular and cohesive. Mostly recorded as agriculturally reworked deposits. Generally recorded as clay or sand.
Made Ground	ML158-WS013 ML158-WS014 ML159-CP004 ML159-CP003 ML158-WS013 ML159-CR003 ML159-TP005 ML158-WS015 ML159-CP403 ML159-CP404 ML159-CP405 ML159-CP406 (encountered at the southern and northern boundary and the centre of the Site)	0 to 5.65	Mixture of granular and cohesive materials. Mostly described as sand and gravel and clay. Gravel includes ash, flint, brick, concrete, glass and charcoal
Glaciolacustrine Deposits	ML159-CP018 ML159-CP004 ML159-CR014 ML159-CR015 ML159-CR019 ML159-CP403 ML159-CP405 ML159-CP406 (encountered in the centre and northern part of the Site)	0.20 to 9.50	Mostly cohesive described as sandy silty or sandy clay.
Glaciofluvial Deposits	Encountered across the Site in all boreholes listed in Table 2.	0 to 12.60	Mixture of granular and cohesive. Granular materials mostly described as fine to coarse sand and cohesive as sandy clay.

Strata	Distribution	Typical depth range (m bgl)	Description
Weathered Mercia Mudstone Group (Grade III/IV)	Encountered across the Site in all boreholes listed in Table 2.	0.50 to 15.00	Very high strength reddish orange, brown silty CLAY
Unweathered Mercia Mudstone Group (Grade I/II)	Encountered across the Site in all boreholes listed in Table 2.	8.61 to 35.60 (depth not proven)	Very weak, medium to thickly bedded, reddish brown MUDSTONE. Bedding is horizontal, undulating, smooth and clean

Schematic 4 Generalised geological cross-section of the Site (Sheet 1 -2)

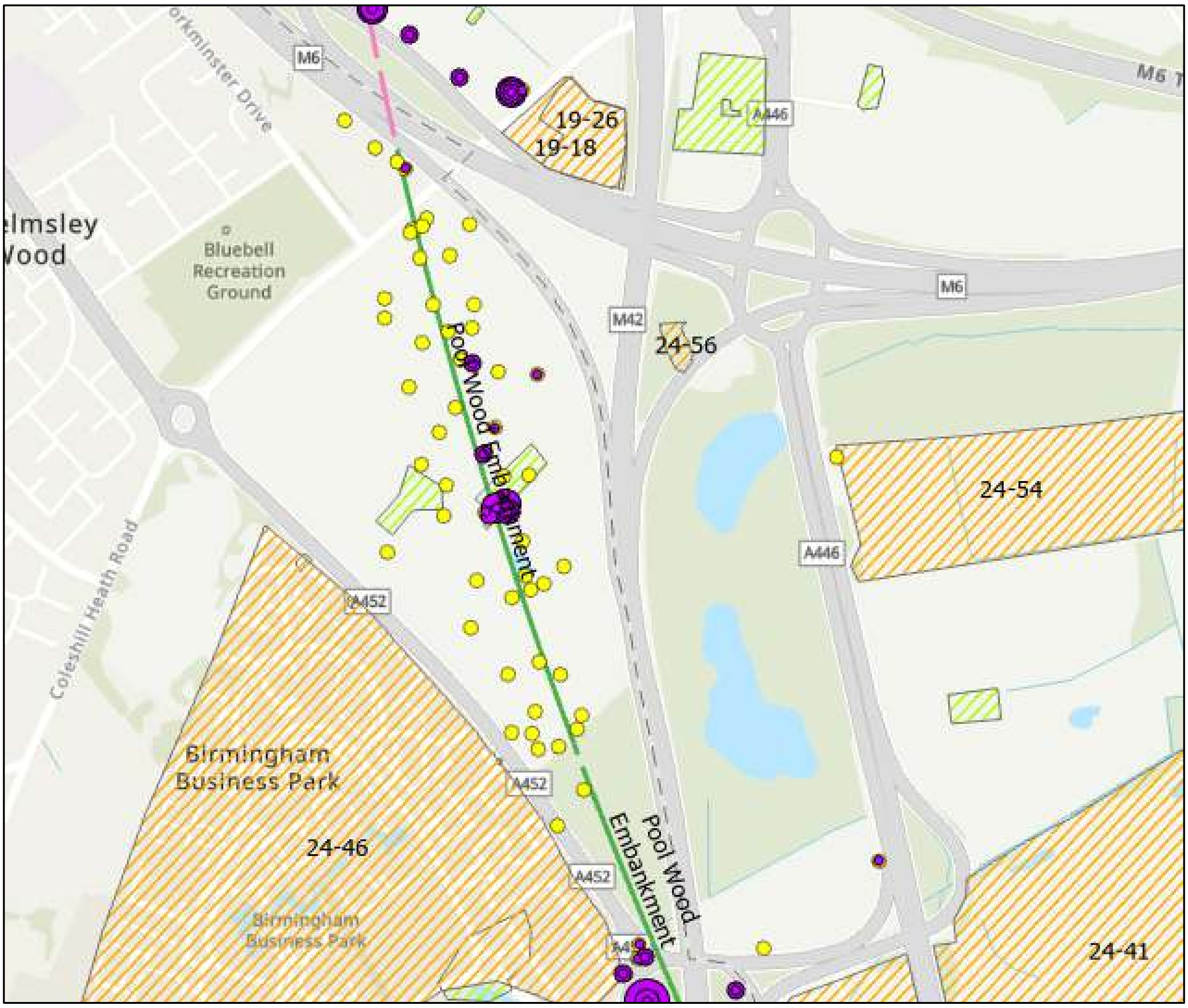


Schematic 5: Generalised geological cross-section of the Site (Sheet 2-2)



The schematics above were produced prior to the receipt of the BBV GI stage 2 data. The plan below shows locations (in purple dots) where made ground was encountered.

Map 9 Pool Wood Embankment: Made ground locations



5.7.3 Visual/olfactory evidence of contamination

Visual and/or olfactory evidence of contamination was recorded in two exploratory holes at the Site. A summary of visual and olfactory evidence of contamination is provided in Table 4.

Table 4: Summary of Visual and/or Olfactory Evidence of Contamination

Hole ID	Top (m bgl)	Base (m bgl)	Geological Formation	Description
ML159-CR018	3.3	4	Made Ground	Dense, orangish brown, clayey, fine and medium SAND and angular to subrounded, fine to coarse GRAVEL of sandstone, quartzite and roadstone. Strong odour (undefined).

ML159-TP015	1.1	1.8	Glaciofluvial Deposits	Dark brown, mottled black, very gravelly, fine and medium SAND with low cobble content and decomposing organic odour (undefined). Gravel is subrounded and rounded, medium and coarse of quartzite. Cobbles are subrounded and rounded of quartzite.
ML159-TP015	1.8	2.1	Glacial Till	Firm and stiff, friable, dark brown mottled black, slightly sandy, very gravelly CLAY with moderate organic odour (undefined). Gravel is subrounded and rounded, medium and coarse of quartzite.
ML159-CP003	0	1.10	Made Ground	Turf over dark brown slightly gravelly clayey fine to coarse SAND. Gravel is angular to subrounded fine to coarse of mixed lithologies including flint and quartzite with occasional glass, metal, pottery fragments, ash, slag, brick, rope plastic wood
ML159-CP403	0.7	5.3	Made Ground	Dark brown to black sandy subangular to subrounded fine to coarse gravel sized fragments of brick, glass, sandstone, wood and quartzite. Sand sized fragments are fine to coarse of ash.
ML159-CP403	5.3	5.65	Made Ground	Dark grey to black slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to medium of sandstone and siltstone. Slight sewage odour*
ML159-CP405	0	0.20	Made Ground	Black sandy angular to subangular fine to medium gravel sized fragments of bituminous material. Sand sized fragments are fine to coarse of bituminous material.
ML158-WS015	0	0.20	Made Ground	Firm dark brown sandy very gravelly SILT. Sand is fine to medium. Gravel is angular to rounded fine to coarse of mixed lithologies including flint, quartzite, slag and charcoal.

* Note: A slightly sewage odour was encountered at the base of the Made Ground which is the anticipated bottom of the infilled pond. No sewage odour was recorded within other strata and there is no evidence of old foul sewer or cess pit encountered at this location. It is anticipated that the odour is from the decaying of organic rich debris at the bottom of the infilled pond.

5.7.4 Elevated photo ionisation detection (PID) readings

Elevated photo ionisation detection (PID) readings were not recorded within the boreholes. PID readings were recorded at a maximum concentration of 16.30 parts per million by volume (ppmv) at ML159-CP403 at 4.0m bgl.

5.7.5 Groundwater monitoring elevations

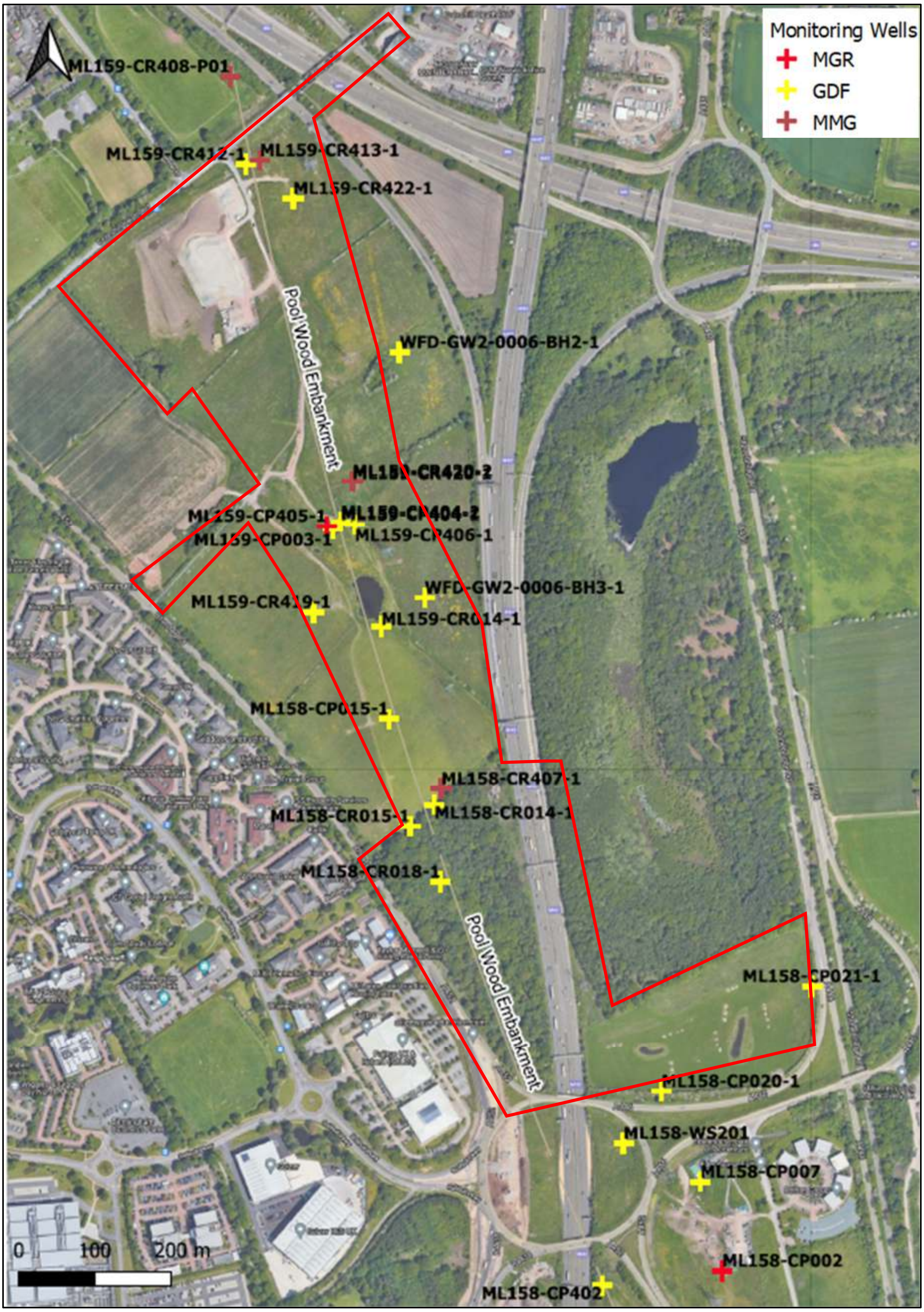
The data from twelve boreholes located within or near the Site was used to complete the groundwater assessment for the Site. Groundwater monitoring data collected for the period between November 2016 to August 2021 are shown in Table 5 and a location plan of the boreholes is shown in Map 8. A groundwater monitoring events for May 2017, February 2021, July 2021 and August 2021 is shown in Map 11, Map 12, Map 13 and Map 14. Hydrographs showing groundwater elevations are presented in Appendix B. It should be noted that monitoring wells where the response zone crosses multiple strata were not included within this assessment, due to potential errors.

Table 5: Groundwater monitoring data for the Site – readings in mAOD

Borehole ID	Response zone top	Response zone base	No. of monitoring rounds	No. of wells monitored dry	Strata Screened	Shallowest reading	Average reading	Deepest reading
ML158-CP015-1	95.51	93.51	17	0	GFDUD	96.25	95.8	95.6
ML158-CP020-1	97.61	94.61	35	0	GFDUD	98.36	97.2	96.46
ML158-CP021-1	98.02	95.02	35	0	GFDUD	98.35	96.8	95.82
ML158-CR014-1	94.51	92.01	31	0	GFDUD	96.86	95.4	94.29
ML158-CR015-1	95.41	92.41	28	0	GFDUD	97.03	95.8	94.94
ML158-CR018-1	95.48	92.48	12	0	GFDUD	96.21	95.9	94.42
ML158-CR407-1	91.64	89.64	15	0	MMG	96.44	95.4	95.24
ML159-CP003-1	101.98	98.98	24	0	GFDUD	103.18	101.3	100.54
ML159-CP404-1	94.3	91.3	11	0	GFDUD	97.65	97.0	96.38
ML159-CP404-2	102.3	99.3	8	0	GFDUD	101.43	101.1	100.97
ML159-CP405-1	102.76	98.76	12	0	MGR	103.22	101.6	99.06
ML159-CP406-1	94.31	91.11	11	0	GFDUD	97.54	96.6	93.41
ML159-CR014-1	93.98	92.48	16	0	GFDUD	96.35	95.9	95.67
ML159-CR408-P01	89.71	86.71	27	0	MMG	92.52	90.9	87.62
ML159-CR412-1	89.74	79.74	12	0	GFDUD	96.34	93.1	92.39

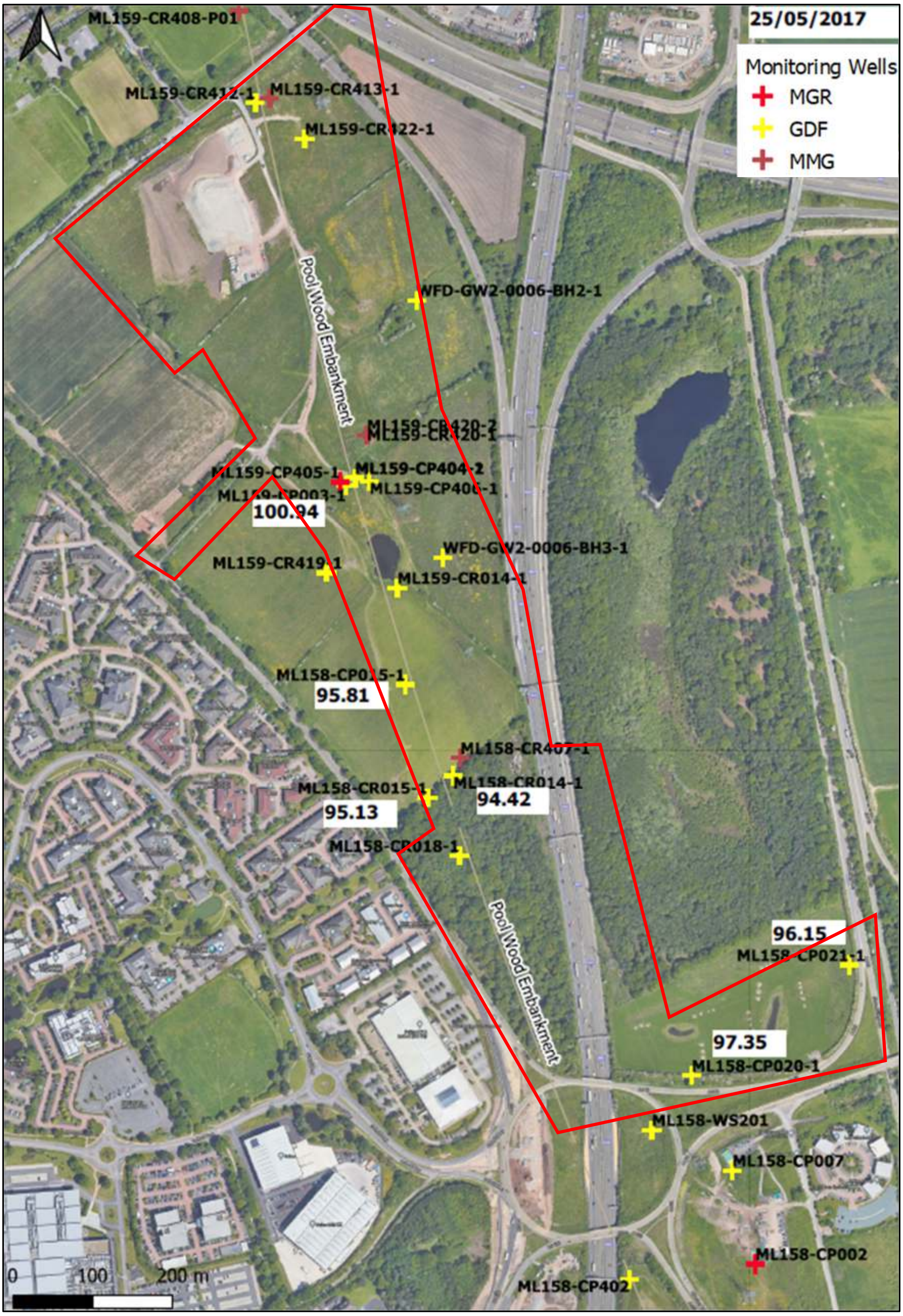
Borehole ID	Response zone top	Response zone base	No. of monitoring rounds	No. of wells monitored dry	Strata Screened	Shallowest reading	Average reading	Deepest reading
ML159-CR413-1	89.69	84.69	13	0	MMG	97.46	94.5	89.59
ML159-CR419-1	95.81	90.81	9	0	GFDUD	97.35	96.9	96.61
ML159-CR420-1	81.12	71.12	8	0	MMG	97.31	91.9325	76.92
ML159-CR420-2	96.42	91.42	10	0	BCMU	97.3	96.641	93.92
ML159-CR422-1	96.69	92.69	8	0	GFDUD	97.71	96.6	93.09
WFD-GW2-0006-BH2-1	95.3	92	1	0	GFDUD	96.6	96.6	96.6
WFD-GW2-0006-BH3-1	95.57	91.57	1	0	GFDUD	97.57	97.5	97.57
ML158-CP002	101.95	99.45	16	0	MGR	102.71	100.96	99.42
ML158-CP007	98.17	95.17	16	0	GFDUD	97.24	96.86	96.64
ML158-CP402	97.99	93.29	1	0	GFDUD	95.71	95.71	95.71
ML158-WS201	103.78	102.78	7	0	GFDUD	104.68	103.8	103.25

Map 10: Groundwater monitoring well locations



Note: Estimated AoC shown by the red polygon

Map 11: Groundwater monitoring level from May 2017 (mAOD)

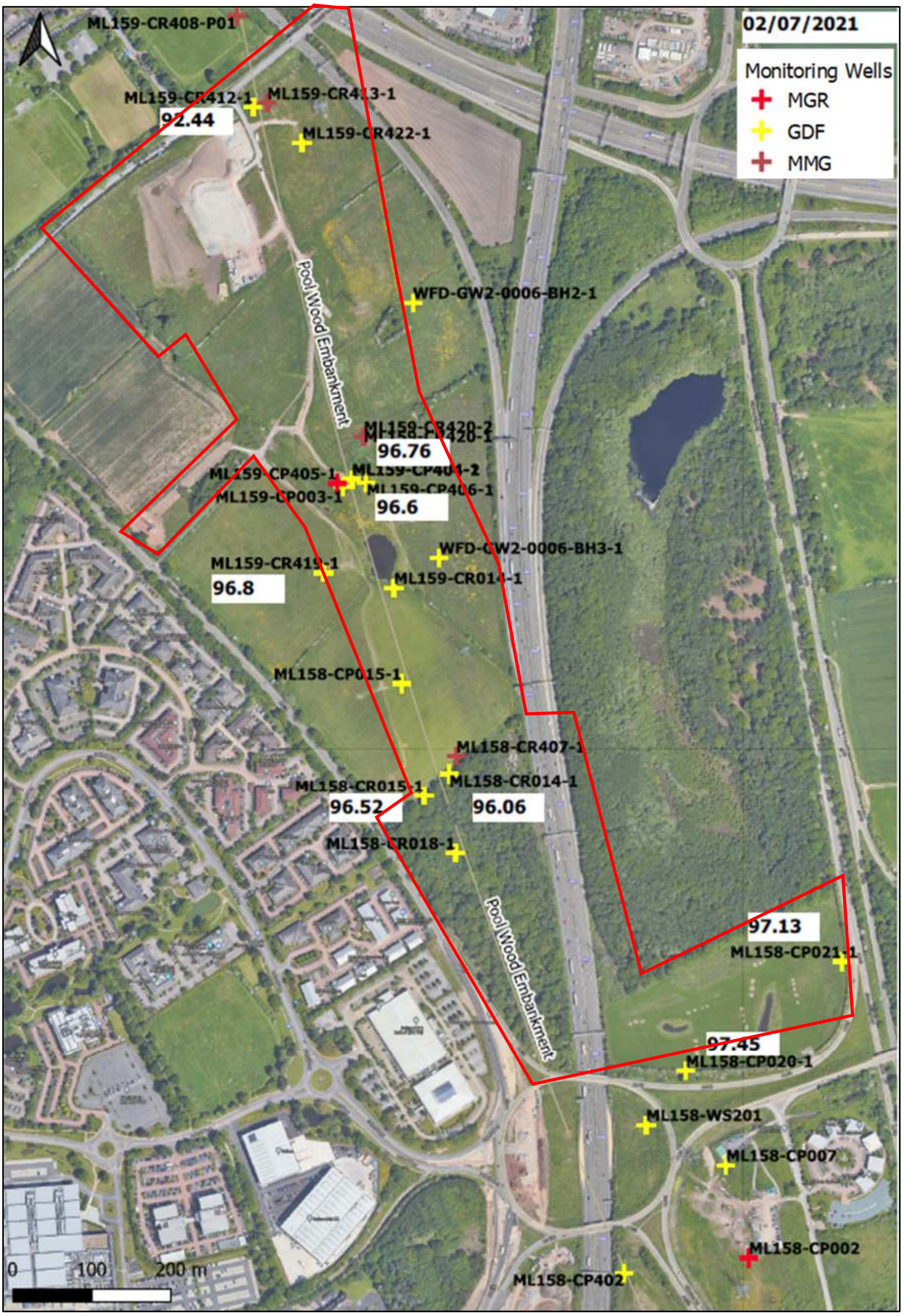


Note: Estimated AoC shown by the red polygon

Map 12: Groundwater monitoring level from February 2021 (mAOD)

Note: Estimated AoC shown by the red polygon

Map 13: Groundwater monitoring level from July 2021 (mAOD)



Note: Estimated AoC shown by the red polygon

Map 14: Groundwater monitoring level from August 2021 (mAOD)

Note: Estimated AoC shown by the red polygon

There is uncertainty in deriving the flow direction at the Site due to the limited and linear arrangement of the monitoring wells. A groundwater level plot was created for the Glaciofluvial deposits to help understand the groundwater direction. The plot is presented in Appendix B.

The assessment of groundwater monitoring levels has identified the following:

- Groundwater elevations within the Made Ground were shallower than those recorded in the superficial deposits, which could suggest a perched water table within the Made Ground. However, there are only two monitoring wells that targeted Made Ground, in which one is located at the centre of the Site and the other within the landfill area and due to the limited monitoring wells it is not possible to accurately characterise the groundwater level at this strata
- A water table is observed within the Glaciofluvial deposits, which is likely perched above the low permeability Mercia Mudstone Group
- In general, groundwater elevations over time shows a consistent pattern in the magnitude of the responses. Some variability is apparent which may reflect seasonal variations and the presence of cohesive and granular deposits within the Glaciofluvial deposits
- Allowing for data from the cable percussive and rotary boreholes, the highest groundwater elevations with the Glaciofluvial deposits were encountered in the centre of the Site and the lowest elevations were recorded to the south and to the north of the Site
- Although there is uncertainty in deriving a flow direction with the Glaciofluvial deposits, considering the topography of the area, and the presence of a major watercourse (River Blythe) to the east of the Site, generally the local groundwater flow direction is anticipated to be easterly, towards Coleshill Pool.

5.7.6 Conceptual Hydrogeological Model

The Site and local area are underlain by a mixture of low to relatively moderately permeable geological units associated with Made Ground/Artificial Ground, glacial and mudstone deposits.

The Made Ground will likely have variable permeability due to a mixture of granular and cohesive materials. Due to its variable nature, it is anticipated that water within the Made Ground will be disconnected and are situated above the Glaciolacustrine deposits will likely contain a perched water table. The Glaciolacustrine Deposits are generally non-productive units, which mainly contain low permeability materials that will inhibit the movement of groundwater. The Glaciofluvial deposits are a Secondary A Aquifer which are productive units that contain sand and gravel deposits. Due to its higher permeability, these deposits can support the movement of groundwater.

The superficial deposits are underlain by laterally extensive Mercia Mudstone deposits, which is a lower permeability lithological unit (Secondary B Aquifer) than the Glaciofluvial deposits. The exception to this is the siltstone/sandstone bands within the Mercia Mudstone Group, where permeability values may be slightly higher.

While there may be some hydraulic connection between the superficial deposits and mudstone, the horizontal bedding of the mudstone is such that vertical permeabilities tend to be very low, hence they support a water table in the overlying superficial strata. Given the low permeability characteristics of the mudstones, they are likely to inhibit the movement of groundwater at the Site.

Based on the ground elevations, catchment data and surface waters, the groundwater flow direction within the vicinity of the Site is anticipated to be easterly towards Coleshill Pool and the River Blythe. Dominant groundwater flow is likely to be through the Glaciofluvial deposits.

It should be noted that the current conceptual understanding of Site and local hydrogeology is based on a somewhat limited network coverage with monitoring wells located in a liner pattern. If more monitoring wells are proposed in the area, there may be a need to refine the current understanding of groundwater flow and interactions at the Site.

5.8 Contaminated land sources plan

The completion of the Sublot 5 and 6 Consolidation report involved the generation of a contaminated land sources plan, which summarised all the potential contaminated land constraints, identified from the ES and the MWCC assessment. This plan is shown in Schematic 6.

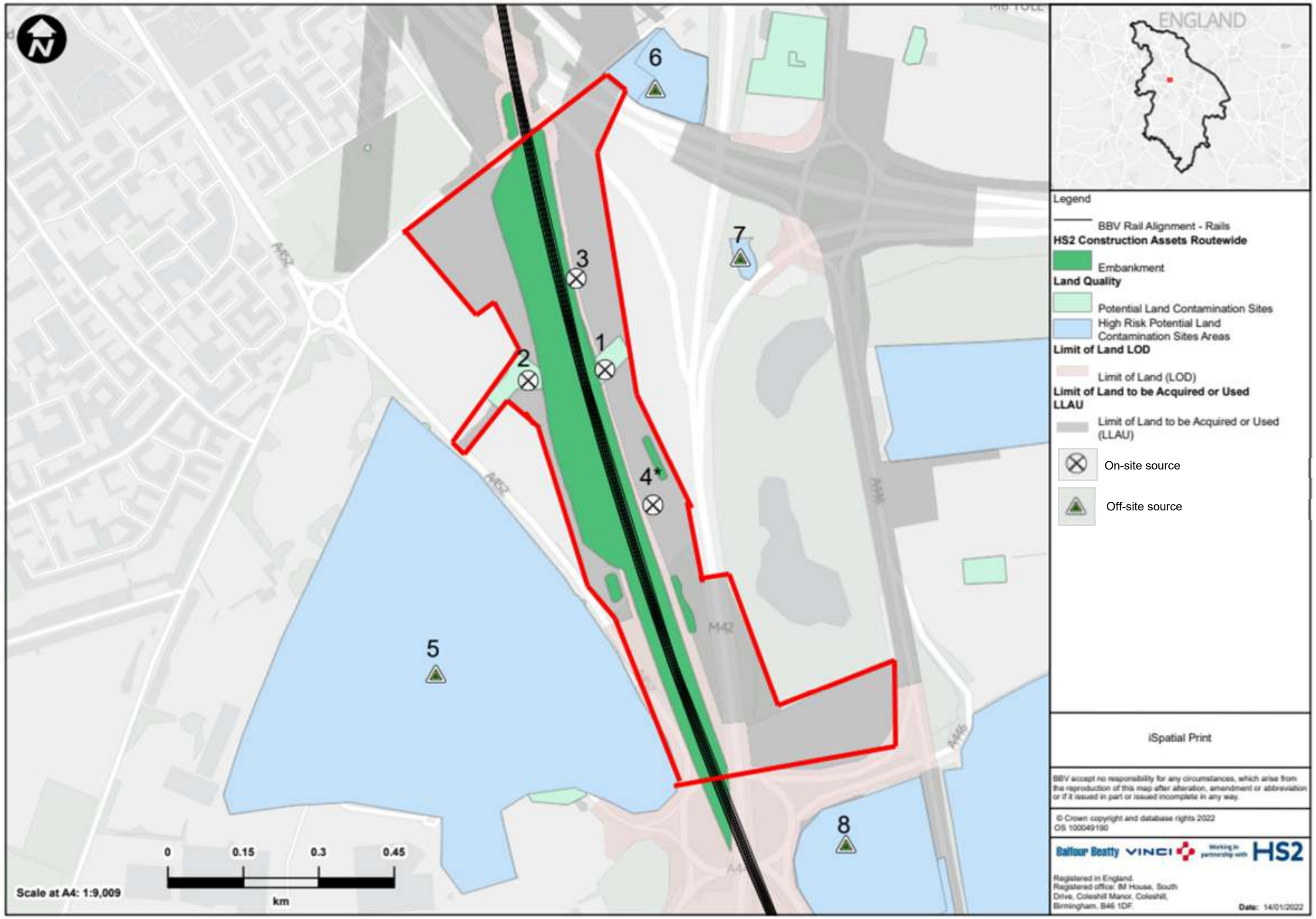
The Environment Agency reports that the Brackenlands Farm Landfill (Historical) (ES LQ 24-44) is a shallow 2m to 6m sand and gravel borrow pit formed during the construction of the M42. The landfill accepted inert and liquid/sludge waste including wastewater, sewage sludge and chemical waste mixed with municipal solid waste between 1975 and 1977. The western and northern margins of the landfill mark the boundary between the LoD and LLAU except for a portion of the LoD which is within the south-western corner of the landfill. Currently there are no proposed temporary or permanent works to be undertaken by the MWCC at Brackenlands Farm Historic Landfill. Therefore, this report does not consider contamination associated with the landfill site.

The main potential contamination sources are summarised in Table 6.

Table 6: Review of contaminated sources plan

Sources	Source ID	Location and Potential Contaminants of Concern
On-Site		
Brick Works with kiln and infilled pond	1	Located on-site. Potential contaminants include organics, metals, asbestos, sulphates and herbicides, pesticides and ground gas
Brickfield Farm and Brickfields Cottage	2	Located on-site to the west of the asset. Contaminants includes organics, solvents, metals, asbestos, herbicides and pesticides
Abandoned Well	3	Located in the northeast of the site. Potential contaminants include metals, organics, sulphates, asbestos and ground gases
Fly-tipping	4	Fly-tipping observed during site walkover. Potential contaminants include organics, metals and asbestos
Off-Site		
Birmingham Business Park	5	Located off-site to the west the asset. Contaminants includes organics, metals, inorganics, asbestos and solvents
Depot and Motorway Maintenance Compound	6	Located off-site to the north-east of the asset. Contaminants include organics, metals, solvents and inorganics
Gravel Pit	7	Located off-site to the northwest of the asset. Potential contaminants include metals, organics, sulphates, asbestos and ground gases
Brackenlands Farm Landfill	8	Located off-site to the south-west of the asset. Potential contaminants include organics, metals, asbestos, sulphates and herbicides, pesticides and ground gas

Schematic 6: Potential sources of concern



*Note: * - Fly-tipping source considered across the AoC*

6 SUMMARY OF RISK ASSESSMENTS

6.1 Risk assessment framework

The Sublot 5 and 6 Consolidation Geo-environmental report[ii] reviewed environmental data to determine if there were unacceptable land quality risks, which led to the development of a series of conceptual Site models for defined areas within the subplots. The ground investigation cut-off date for the consolidation geo-environmental report was August 2019. However, subsequent monitoring and sampling events undertaken up to September 2021 have also been used in this report.

The risk assessment was undertaken following the methodologies described in the Table 25 presented in Appendix D and in accordance with the framework set out in the in the Land Contamination: Risk Management (LC:RM)[xii].

The risk assessment and development of the CSM was based on the identification of sources from a review of the environmental setting, field investigation, monitoring data and soil/groundwater analysis including the data collected up to September 2021. A summary of source areas and locations where analytical and monitoring data was obtained from is presented in Section 6.2 and 6.3 respectively. The results of the risk assessment were used to identify potential viable pollutant linkages (source-pathways-receptors) and the requirement for additional ground investigation, risk assessment and/or the need for remediation to mitigate risks.

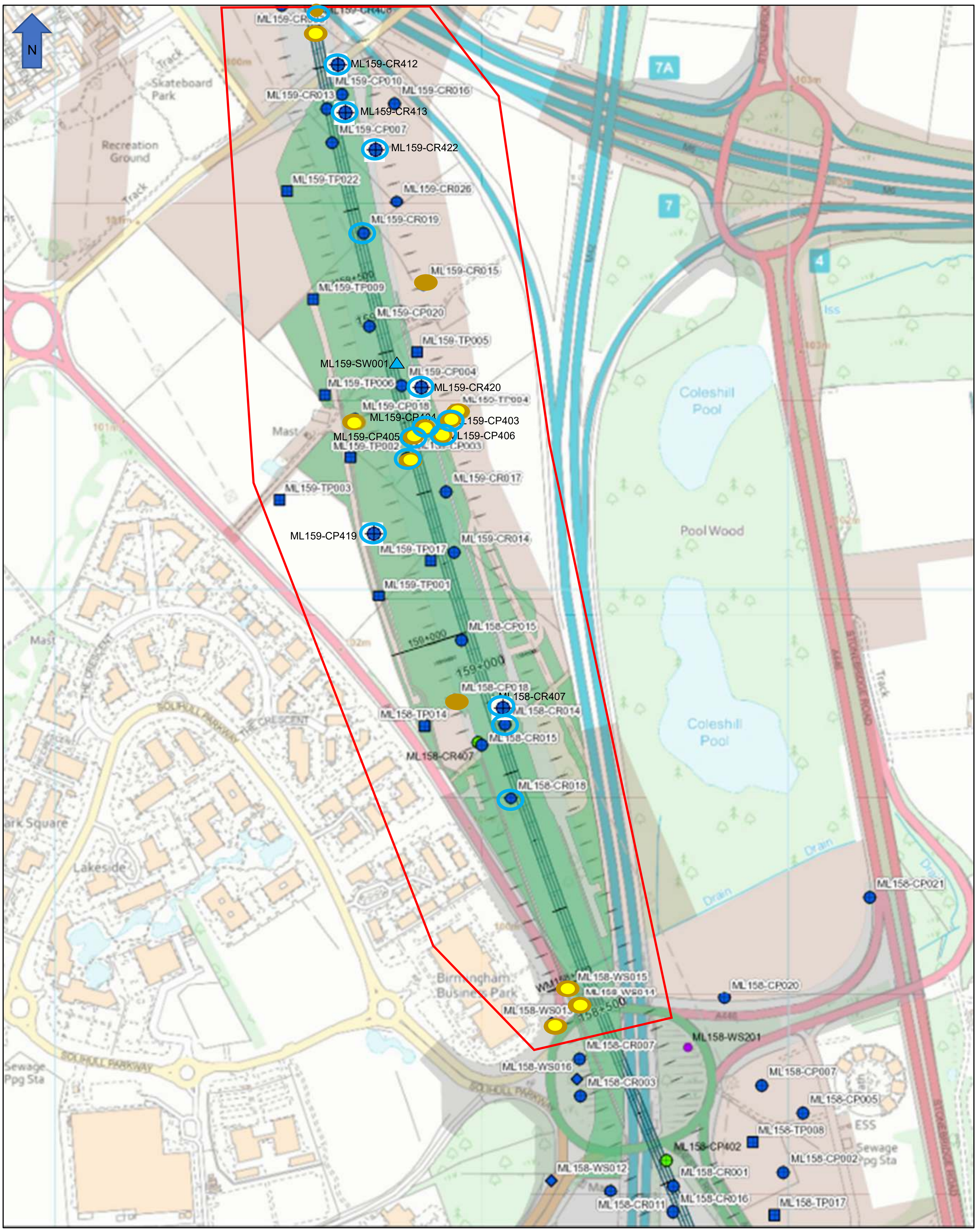
Qualitative definitions of risk are shown in Appendix C.

6.2 Contamination and Monitoring Data

Based on the Contaminated Land Sources plan, exploratory holes were formed across the Site to investigate these areas. Map 15 and Map 16 shows the locations where soil, groundwater and ground gas analytical samples and field data were collected for use as part of the assessment.

This report does not consider boreholes ML158-CP021 and ML158-CP021 located to the north of the Brackenlands Farm Historic Landfill, with the exception of groundwater and ground gas assessment, since contamination associated within these two boreholes are anticipate to be from the landfill, due to the expected groundwater flow from Brackenlands Farm Historic Landfill towards to the north.

Map 15: Sample locations for the Site



● ⊕ ⊕	Cable Percussion and rotary Borehole
■	Trial Pitting
◆	Windowless Sampling
——	Rail Alignment
●	Soil Sample
○	Groundwater Sample
●	Leachate Sample
▲	Surface Water Sample
——	Extent of borehole data considered

1:5,000
0 0.05 0.1 0.2 mi
0 0.07 0.15 0.3 km
MMD, HS2, DJV

Map 16: Gas and groundwater monitoring data for the Site

Note: Estimated AoC shown by the red polygon

6.3 Summary of main contamination risks

The main risks identified with the Sub-lot 5 and 6 geo-environmental report[ii] along with the additional data collected up to September 2021 associated with Pool Wood Embankment that require further assessment are presented in Table 7.

Although risks to construction and maintenance personnel are considered to be Moderate, these risks will be addressed through the adoption of measures specified in the Code of Construction Practice (CoCP), the COSHH Regulations 2017 and the CDM Regulations 2015. It should be noted that there is a potential for short term exposure to construction, maintenance workers and off-Site users from contaminants in soil and groundwater during redevelopment and Site maintenance works. These receptors could be exposed by direct contact, inhalation and ingestion pathways. In line with current legislation, guidance documents and occupational health and safety practises, risks to construction, maintenance workers and off-Site users should be mitigated by appropriate working/construction methods and standard good working practices such as use of dust suppression techniques to prevent liberation of transient dusts, wearing the correct Personal Protective Equipment (PPE) to prevent exposure. Risk identification and how to mitigate against such risks would normally be addressed through the development of risk assessments at the detailed design phase and through the preparation of a Construction Phase Plan or similar. As such these receptors are not considered further within this report.

Table 7: Low/Moderate to Moderate risks identified from the Subplot 5 and 6 Geo-environmental Consolidation report

Geo-environmental risk	Detail
Moderate risks from impacted soils to controlled water receptors (Glaciofluvial and Mercia Mudstone aquifer units and Coleshill Pools)	Moderate to high soil concentrations of total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) are mainly present within Made Ground and to a lesser extent within topsoil. Soil leachate concentrations above assessment criteria for heavy metals were reported mainly within Made Ground and in a single sample from the Glaciofluvial deposits.
Moderate risks from impacted groundwater to controlled water receptors (Glaciofluvial and Mercia Mudstone aquifer units and Coleshill Pools)	Groundwater data reported TPH, heavy metals (including lead, vanadium, cadmium, and chromium) at concentrations above assessment criteria in samples collected from the Glaciofluvial deposits. The Glaciofluvial deposits are likely to be in hydraulic connection with the Coleshill Pools located approximately 190m to the east of the Site.

6.4 Observations of Asbestos Contamination

No asbestos was detected within the AOC samples results. Also, during the GI no asbestos or fibres materials evidence were identified.

7 CONCEPTUAL SITE MODEL (CSM)

7.1 Introduction

This section summarises the potential pollutant linkages and their associated risk rating as presented in the Subplot 5 and 6 Consolidation report[ii] for the Site. Section 7.2 to 7.4 summarises the potential source, pathways and receptors and Section 7.5 presents a summary assessment of the linkages with recommendations to mitigate risks, and for the next phases of assessment.

7.2 Risks to Human Health

7.2.1 Sources

The sources of contamination for risks to human health are:

- S1a: Contaminated soils – on-Site (Source 1,2, 3 and 4 in Schematic 6)
- S1b: Contaminated soils – off-Site (Sources 5, 6, 7 and 8 Schematic 6)
- S1c: Asbestos contaminated soils
- S2: Ground gases
- S3: Contaminated groundwater

7.2.2 Pathways

The pathways for human health exposure to contamination are:

- P1: Direct contact, ingestion, inhalation of dust/vapour from contaminated soils
- P2: Inhalation of vapour from contaminated waters
- P3: Direct contact, ingestion from contaminated waters
- P7: Inhalation of ground gases

7.2.3 Receptors

The human health receptors are:

- R1: On-Site users – commercial/public open space
- R2: Off-Site users – commercial/public open space

7.3 Risks to controlled waters

7.3.1 Sources

The sources of contamination for risks to controlled waters are:

- S1a: Contaminated soils – on-Site (Source 1,2, 3 and 4 Schematic 6)
- S1b: Contaminated soils – off-Site (Sources 5, 6, 7 and 8 Schematic 6)
- S3: Contaminated groundwater

7.3.2 Pathways

The pathways for controlled waters exposure to contamination are:

- P5a: Vertical and lateral migration via natural pathways
- P5b: Vertical and lateral migration via anthropogenic pathways

7.3.3 Receptors

The controlled water receptors are:

- R3: Controlled waters on-Site - Groundwater Secondary A Glaciofluvial and the Secondary B Mercia Mudstone Group aquifer units
- R4: Controlled waters off-Site - Groundwater Secondary A Alluvium/Glaciofluvial deposits and the Secondary B Mercia Mudstone Group aquifer units. Surface water Coleshill Pools

7.4 Risks to property

7.4.1 Sources

The sources of contamination for risks to property are:

- S1a: Contaminated soils – on-Site
- S1b: Contaminated soils – off-Site
- S2: Ground gases
- S3: Contaminated groundwater

7.4.2 Pathways

The pathways for property exposure to contamination are:

- P6: Direct contact
- P4: Exposure to explosive gases

7.4.3 Receptors

The property receptors are:

- R5: Property Receptors – buildings, foundations and services (on and off-Site)

7.5 Summary conceptual Site model

The CSM is summarised in Table 8. Definitions of probability, consequence and risk are defined in the Sublot 5 and 6 Consolidation Geo-environmental[ii] report and presented in Appendix C of this report.

Table 8: Conceptual Site model

Source	Pathway	Receptor	Geo-environmental report risk assessment	Risk management deliverables	Method of assessment
S1a: Contaminated soils – on-Site (Source 1,2, 3 and 4 - Schematic 6) S1b: Contaminated soils – off-Site (Sources 5, 6, 7 and 8 - Schematic 6) S3: Contaminated groundwater (Source 1,2, 3 and 4 - Schematic 6)	P1: Direct contact, ingestion, inhalation of dust/vapour from contaminated soils P2: Inhalation of vapour from contaminated waters P3: Direct contact, ingestion from contaminated waters	R1: On-Site users – commercial/ public open space R2: Off-Site users – commercial/public open space	S1a, S1b, S3 > P1, P2, P3 > R1, R2 Probability: Unlikely Consequence: Medium Risk Rating: Low	SL5 and 6 Consolidation Geo-environmental Report	Generic Quantitative Risk Assessment
	P6: Direct contact	R5: Property– buildings, foundations and services (on and off-Site)	S1a, S1b, S3 > P6 > R5 Probability: Likely Consequence: Medium Risk: Moderate	GIR/GiDR and durability report (1MC08-BBV-MN-REP-N001-100001)[xiii] for foundation design sulphates; water supply pipe assessment and specification for potable mains to be undertaken by BBV)	BRE Special Digest Special Digest-1
S1c: Asbestos contaminated soils	P1: Inhalation of contaminated soils	R1: On-Site users – commercial/public open space R2: Off-Site users – commercial/public open space	S1c > P1 > R1 & R2 Risk assessment provided by asbestos specialist	Asbestos Remediation Strategy/Management Plan	Construction Industry Research and Information Association (CIRIA) C733
S1a: Contaminated soils – on-Site (Source 1,2, 3 and 4 - Schematic 6)	P5a: Vertical and lateral migration via natural pathways	R3: Controlled waters on-Site Groundwater: Secondary A Glaciofluvial and Secondary B – Mercia Mudstone Group aquifer units R4: Controlled waters off-Site Groundwater: Secondary A Alluvium/Glaciofluvial and Secondary B Mercia Mudstone Group aquifer units Surface water: Coleshill Pools	S1a > P5 > R3, R4 Probability: Likely Consequence: Medium Risk: Moderate	Remediation Strategy/ Land Quality Management Report	Detailed Quantitative Risk Assessment
	P5b: Vertical and lateral migration via anthropogenic created pathways				
S3a: Contaminated groundwater (Sources 1, 2, 3, 4, 5, 6, 7 and 8 - Schematic 6)	P5a: Vertical and lateral migration via natural created pathways	R3: Controlled waters on-Site Groundwater: Secondary A Glaciofluvial and Secondary B	S3a > P5a > R3, R4 Probability: Likely Consequence: Medium Risk: Moderate	Remediation Strategy/ Land Quality Management Report	Detailed Quantitative Risk Assessment

Source	Pathway	Receptor	Geo-environmental report risk assessment	Risk management deliverables	Method of assessment
	P5b: Vertical and lateral migration via anthropogenic created pathways	Mercia Mudstone Group aquifer units R4: Controlled waters off-Site Groundwater: Secondary A Alluvium/Glaciofluvial and Secondary B Mercia Mudstone Group aquifer units Surface water: Coleshill Pools	S3 a> P5b > R63, R4 Probability: Likely Consequence: Medium Risk: Moderate	Foundation Works Risk Assessment (Schedule 33) – to be completed Remediation Strategy/ Land Quality Management Report	Semi-Quantitative

8 GENERIC QUANTITATIVE RISK ASSESSMENT OF SOILS TO HUMAN HEALTH

The Sub-lot 5 and 6 geo-environmental and the additional data received up to September 2021 have been reviewed to assess the risk from contaminated soil to human health.

8.1 Summary of exceedances

Table 17 summaries the human health exceedances at the Site. Map 18 show the location of the exceedances.

Map 17: Human health exceedance location

Determinant	GSC (mg/kg)	No. Samples Analysed		Exceedances
		Total	No. Above GSC	
PoS Park				
Lead	1300	31	2	ML156-CP403 at 3mbgl = 4300 ML156-CP403 at 4mbgl = 1400
Commercial				
Lead	2300	31	1	ML156-CP403 at 3mbgl = 4300
Nickel	980	31	1	ML156-CP403 at 3mbgl = 1000

Map 18: Location of Human Health Exceedance

8.2 Conclusions and recommendations

Exceedances for PoS Park and commercial have been reported at a single borehole (ML159-CP403) at ch. ML159+300. Lead was reported above the PoS Park at 3m and 4mbgl at concentrations of 4300 and 1400mg/kg respectively. While a commercial exceedance was detected for Lead and Nickel, both at 3mbgl, at concentrations of 4300 and 1000mg/kg respectively. The exceedances are located within the proposed embankment footprint and at a considerable depth. Therefore, it is unlikely that these exceedances would pose a risk to the human health, indicating the risk from soil to human health at the site to be low.

9 DETAILED QUANTITATIVE RISK ASSESSMENT

The GQRA (Section 7) identified unacceptable pollutant linkages. Therefore, a DQRA was required to derive Site specific assessment criteria to determine if the pollutant linkages presented an inacceptable risk.

9.1 Reference to the conceptual model

The DQRA aims to assess whether the following moderate risk pollutant linkages identified by the generic quantitative risk assessment would still be present following a more detailed Site-specific assessment, and if there is the need for the adoption of remedial measures to mitigate against the risks to receptors post development:

- S1a > P5a/b > R3, R4 – risks from contaminated soils (Made Ground) migrating though the Glaciofluvial deposits into Coleshill Pond to the east of the Site.
- S3> P5a/b > R3, R4 – risks from contaminated groundwater migrating through the Glaciofluvial deposits into Coleshill Pond.

From reviewing published, groundwater monitoring and analytical data, the risks posed to Coleshill Pond assumes that the groundwater flow direction is easterly.

Unnamed ponds and drains were encountered at the Site, however, for the purpose of this report, it is anticipated that these features will be infilled as part of the proposed embankment construction, therefore they are not considered to be a receptor. However, if the design changes a review of this assessment would be required.

The River Blythe is located 2km to the east of the Site beyond the Coleshill Pond, due to its location beyond Coleshill Pond this surface water feature is not considered further in this report.

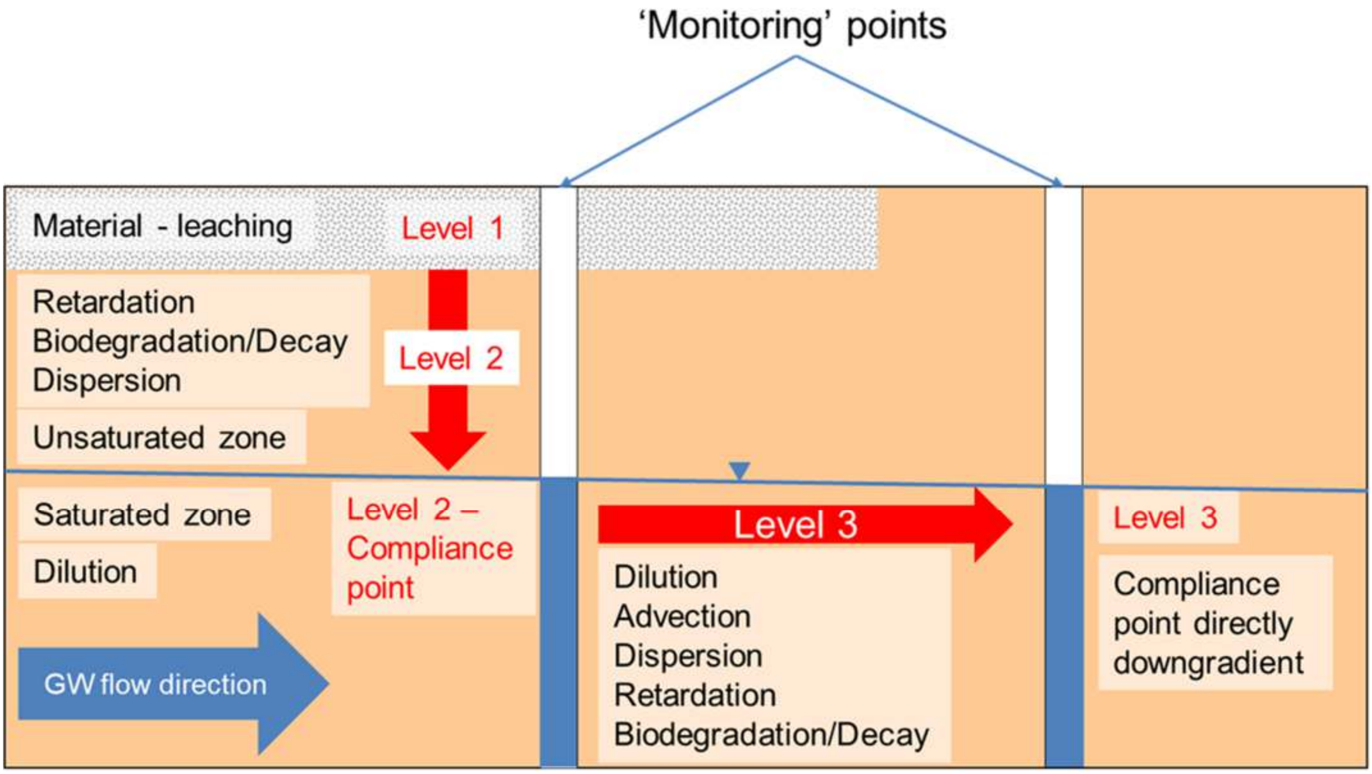
ConSim software (Version 2.5), a deterministic fate and contaminant transport model was used to assess how contaminants identified in the GQRA will change over time and distance from the source locations at the Site.

Using the source concentrations, the ConSim model uses tired analysis to calculate individual determinant concentrations over time at defined compliance points. The model also uses algorithms to quantify the effects of natural attenuation by dispersion, retardation and biodegradation on the concentrations of the determinant along the flow path from the source. The ConSim model is tiered into three levels as follows:

- Level 1 - the model predicts porewater concentrations from soil analyses and the partitioning between the solid and liquid phases.
- Level 2 - the model simulates migration through the unsaturated zone to the water table with consideration of degradation, adsorption and dispersion in the unsaturated pathway and dilution within the aquifer.
- Level 3 - model simulates the fate and transport of dissolved compounds at defined compliance points or receptors down hydraulic gradient of contaminant entry into the saturated zone. As with Level 2, the model simulates the processes of degradation, retardation and dispersion within the aquifer on the determinant.

The three levels are shown in Schematic 7.

Schematic 7: ConSim modelling methodology



9.2 Modelling undertaken

9.2.1 Models generated

Two ConSim models were generated for the soil and groundwater source contamination. Table 9 details the modelling undertaken.

Table 9: Summary of ConSim modelling

Model	Source	Pathway	Receptor (compliance point)	Level
1	Contaminants within the Made Ground	Vertical migration from the Made Ground into the Glaciofluvial deposits and lateral movement through the Glaciofluvial deposits	Base of the unsaturated zone	2
			Immediately down-gradient of source (5m point)	3
			10m downgradient of source	3
			50m down gradient of source	3
2	Groundwater contaminated within	Lateral movement through the Glaciofluvial deposits	5m downgradient of source	3

Model	Source	Pathway	Receptor (compliance point)	Level
	the Glaciofluvial deposits		50m down gradient of source	3

9.2.2 Source areas

Table 10, presents the results of the semi-quantitative screening assessment presented in the Sublot 5 and 6 Geo-environmental report[ii] for the soil TPH and PAH analytical data with the additional sampling undertaken up to September 2021. The report used the following system to classify the magnitude of the parameter concentration:

- Low – soil concentration <100 mg/kg for TPH and <10 mg/kg for PAHs
- Moderate – soil concentration 100 to <1000 mg/kg for TPH and 10 to <100 mg/kg for PAHs
- High – soil concentration >= 1000 mg/kg for TPH and >= 100 mg/kg for PAHs

Table 11 and Table 12 list the leachate and groundwater exceedances at the Site respectively. Table 13 lists the surface water exceedances at the Site. Appendix E includes the contamination data results.

Exceedance locations (source zones) are shown in Map 19 and Map 20 for soil leachate and groundwater respectively. Impacted soils are located mostly within the Made Ground, with a single exceedance identified within the topsoil and located at ML159-CP018 (0.30mgl). These were encountered at the centre of the Site (associated with the former brick works). Groundwater impacts are located within the Glaciofluvial deposits and located at ML158-CR018 and ML159-CR019, within the southern and northern parts of the Site.

Boreholes ML158-CP021 and ML158-CP021 are not considered in this assessment due to its location to the north of the Brackenlands Farm Historic Landfill contamination are anticipated to be from the landfill, due to the groundwater flow direction.

Table 10: Moderate and high organic soil concentrations

Borehole ID	Depth (mbgl)	Strata	Contaminant	Result (mg/kg)
ML158-WS015	0.2	Made Ground	TPH Aromatics >C12-44	103
			EPH/TPH >C21-40	213
			TPH Aliphatics & Aromatics >C5-44	160
ML159-CP003	0.05	Made Ground	EPH/TPH >C16-21	401
			EPH/TPH >C21-40	5270
			Total PAH, (USEPA 16)	36.4
	1.05	Made Ground	EPH/TPH >C16-21	143
			EPH/TPH >C21-40	1240
ML159-CP018	0.30	Topsoil	EPH/TPH >C21-40	162
ML159-CR003	0.05	Made Ground	EPH/TPH >C21-40	157
ML159-CP403	1	Made Ground	TPH Aromatics >C21-35	410
	2	Made Ground	TPH Aromatics >C21-35	190
	3	Made Ground	TPH Aliphatics >C21-35	1300
			TPH Aromatics >C12-16	120
			TPH Aromatics >C16-21	1500
			TPH Aromatics >C21-35	6800
			TPH Aromatics >C35-44	350
	4	Made Ground	TPH Aromatics >C16-21	1000
			TPH Aromatics >C21-35	4600
			TPH Aromatics >C35-44	250
	5	Made Ground	TPH Aromatics >C21-35	250
ML159-CP404	0.5	Made Ground	TPH Aromatics >C21-35	590
	1	Made Ground	TPH Aromatics >C21-35	350
	2	Made Ground	TPH Aromatics >C21-35	170
	3	Made Ground	TPH Aromatics >C21-35	390
	4	Made Ground	TPH Aliphatics >C21-35	130
	4	Made Ground	TPH Aromatics >C21-35	530
ML159-CP406	0.3	Made Ground	TPH Aromatics >C21-35	230
	0.5	Made Ground	TPH Aromatics >C21-35	130

Note: Orange cells represent a moderate organic soil risk to controlled waters. Red cells represent a high organic soil risk to controlled waters.

Table 11:Soil leachate exceedances at the Site

Borehole ID	Depth (mbgl)	Strata	Contaminant	*DWS (mg/l)	*EQS (mg/l)	Result (mg/l)
ML159-CP003	0.05	Made Ground	Copper	2	0.03	0.032
			Chromium - Hexavalent	-	0.0034	0.00482
	1.05	Made Ground	Cadmium	0.005	0.00015	0.000161
			Nickel	0.02	0.02	0.166
ML159-CP018	0.30	Topsoil	Cadmium	0.005	0.00015	0.000431
			Chromium III	-	0.0047	0.0169
			Copper	2	0.03	0.134
			Nickel	0.02	0.02	0.02
ML159-CP403	0.5	Made Ground	Cadmium	0.005	0.00015	0.00031
			Copper	2	0.03	0.032
			Nickel	0.02	0.02	0.12
	1.0	Made Ground	Copper	2	0.03	0.043
	3	Made Ground	Arsenic	0.01	0.05	0.011
			Cadmium	0.005	0.00015	0.00063
			Nickel	0.02	0.02	0.3
			Zinc	5	0.03	0.095
			Chromium - Hexavalent	-	0.0034	0.01
	5	Made Ground	Nickel	0.02	0.02	0.038
			Zinc	5	0.03	0.045
ML159-CP404	0.5	Made Ground	Copper	2	0.03	0.057
			Nickel	0.02	0.02	0.031
			Zinc	5	0.03	0.045
			Chromium - Hexavalent	-	0.0034	0.03
	1	Made Ground	Nickel	0.02	0.02	0.028
			Zinc	5	0.03	0.034

Borehole ID	Depth (mbgl)	Strata	Contaminant	*DWS (mg/l)	*EQS (mg/l)	Result (mg/l)
			Chromium - Hexavalent	-	0.0034	1.5
	3	Made Ground	Chromium - Hexavalent	-	0.0034	1.5
	5	Glaciofluvial Deposits	Chromium - Hexavalent	-	0.0034	0.0097
ML159-CP406	0.3	Made Ground	Chromium - Hexavalent	-	0.0034	0.0044
	0.5			-	0.0034	0.028
	1			-	0.0034	0.13

*Note: *DWS are the Drinking Water Standards and EQS are the Environmental Quality Standards. Red cells indicate an exceedance of the Water Quality Standards*

Table 12: Groundwater exceedances at the Site

Borehole ID	Response zone (mbgl)	Strata	Contaminant	*DWS (mg/l)	*EQS (mg/l)	Result (mg/l)
ML158-CR018	4 – 7	Glaciofluvial deposits	Cadmium	0.005	0.00015	0.000196
			Iron	0.2	1	8.29
			Zinc	5	0.03	0.0839
			Manganese	0.05	0.41	0.272
			Simazine	0.0001	0.001	0.000482
			Aliphatics >C21-35	0.01	-	0.028
			EPH >C10-40	0.01	-	0.143
			Bis(2-ethylhexyl)phthalate	-	0.0013	0.00575
			Isoproturon	0.0001	0.0003	0.000501
ML159-CR019	7 – 12		Cadmium	0.005	0.00015	0.000533
			Chromium	0.05	0.005	0.045
			Copper	2	0.03	0.0708
			Iron	0.2	1	178
			Lead	0.01	0.008575	0.0618
			Nickel	0.02	0.02	0.0466
			Zinc	5	0.03	0.118
			Manganese	0.05	0.41	3.12
			Nitrate	11.295	-	27.2
			Simazine	0.0001	0.001	0.000476
			Aliphatics >C21-35	0.01	-	0.137
			EPH >C10-40	0.01	-	0.309
			Isoproturon	0.0001	0.0003	0.000492
ML158-CR014	5-8	Glaciofluvial deposits	Ammoniacal Nitrogen as N	0.38	0.2	0.23
			Phenol	0.0005	0.0077	0.38
ML158-CR407	8-10	Mercia Mudstone Group	Magnesium	50	-	51
			Nitrate as N	11.295	-	19
ML159-CP003	1.20-4.20	Glaciofluvial deposits	Ammoniacal Nitrogen as N	0.38	0.2	0.78
			Potassium	12	-	20
ML159-CP403	9-13	Glaciofluvial deposits	Ammoniacal Nitrogen as N	0.38	0.2	0.47
			Magnesium	50	-	110
ML159-CP406	8.5-11.7	Glaciofluvial deposits	Ammoniacal Nitrogen as N	0.38	0.2	1.5
			Cadmium	0.005	0.00015	0.00029
			Chromium - Hexavalent	-	0.0034	0.0036
			Magnesium	50	-	100
ML159-CP404	1-4	Made Ground	Ammoniacal Nitrogen as N	0.38	0.2	13
			Magnesium	50	-	87
			Potassium	12	-	36
			Sulphate as SO4	250	-	670
			Zinc	5	0.03	0.032
	9-12	Glaciofluvial deposits	Chromium - Hexavalent	-	0.0034	0.004
			Magnesium	50	-	97
			Nitrate	11.295	-	20
ML159-CR408	10-13	Mercia Mudstone Group	Ammoniacal Nitrogen as N	0.38	0.2	0.32
			Magnesium	50	-	52
			Nitrate	11.295	-	17
ML159-CR422	4-8	Glaciofluvial deposits	Nitrate	11.295	-	20
			Nitrite as N	0.152	-	0.37

Borehole ID	Response zone (mbgl)	Strata	Contaminant	*DWS (mg/l)	*EQS (mg/l)	Result (mg/l)
ML159-CR419	5.9-10.9	Glaciolacustrine deposits	Magnesium	50	-	56
			Nitrite as N	0.152	-	0.19
ML159-CR420	Unknown	Glaciolacustrine deposits	Cadmium	0.005	0.00015	0.00017
ML159-CP405	1-5	Glaciofluvial deposits	Ammoniacal Nitrogen as N	0.38	0.2	1.9
			Cadmium	0.005	0.00015	0.0006
			Lead	0.01	0.008575	0.024
			Potassium	12	-	15
			Selenium	0.01	-	0.012
			Zinc	5	0.03	0.093
ML159-CR412	10-20	Glaciofluvial deposits	Nitrate	11.295	-	25

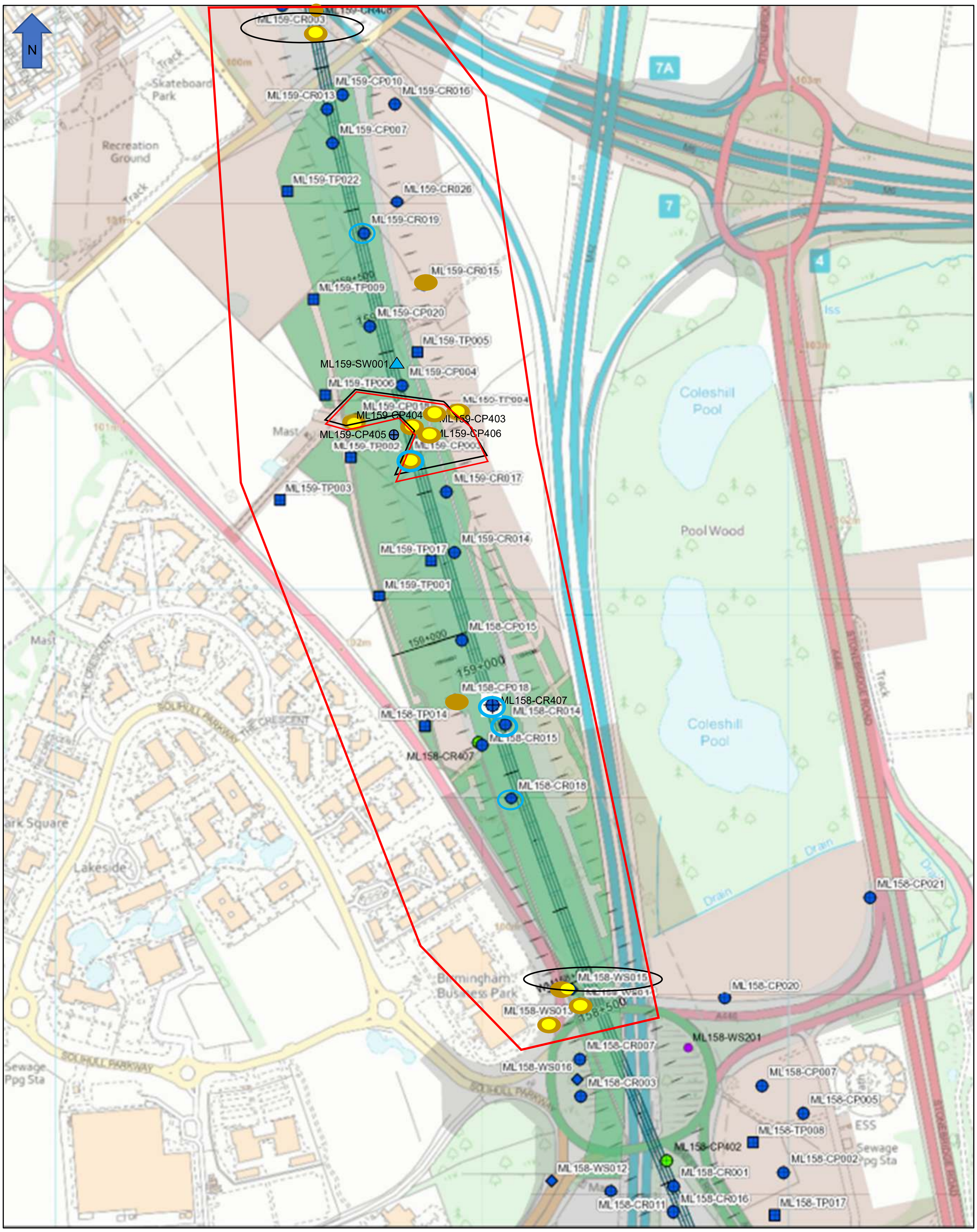
*Note: *DWS are the Drinking Water Standards and EQS are the Environmental Quality Standards. Red cells indicate an exceedance of the Water Quality Standards*

Table 13: Surface water exceedances identified at the Site

Borehole ID	Contaminant	DWS (mg/l)	EQS (mg/l)	Result (mg/l)
ML159-SW001	Iron	0.2	1	0.925
	Ammoniacal Nitrogen	0.38	0.2	0.562
	Simazine	0.0001	0.001	0.00048
	Potassium	12	-	23.4
	Isoproturon	0.0001	0.0003	0.000515

Note: Red cells indicate an exceedance of the Water Quality Standards

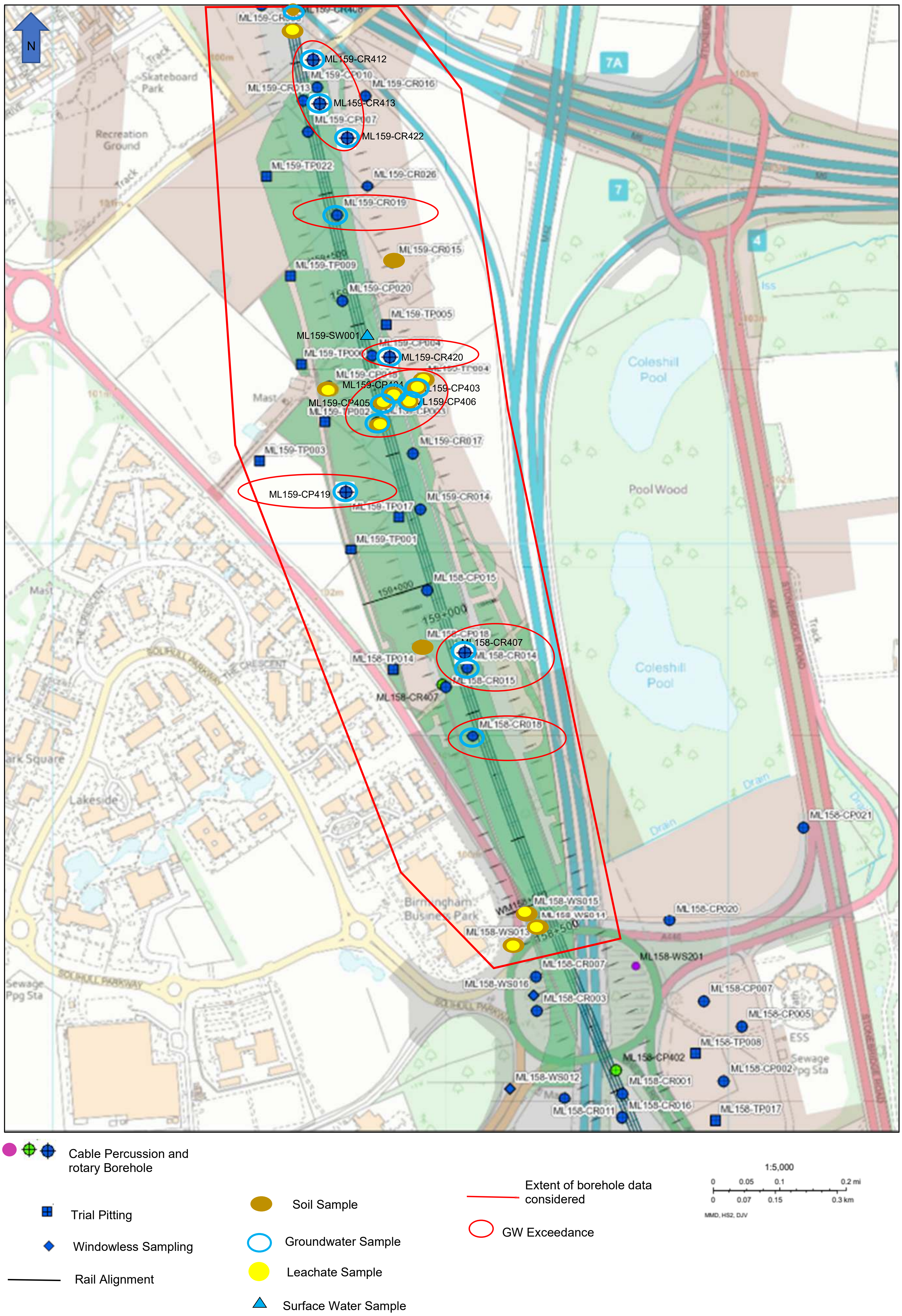
Map 19: Location of elevated soil concentrations and leachate exceedances at the Site



Cable Percussion and rotary Borehole
Trial Pitting
Windowless Sampling
Rail Alignment
Soil Sample
Groundwater Sample
Leachate Sample
Surface Water Sample
Soil Exceedance
Soil Leachate Exceedance

1:5,000
0 0.05 0.1 0.2 mi
0 0.07 0.15 0.3 km
MMD, HS2, DJV

Map 20: Location of groundwater and surface water exceedances at the Site



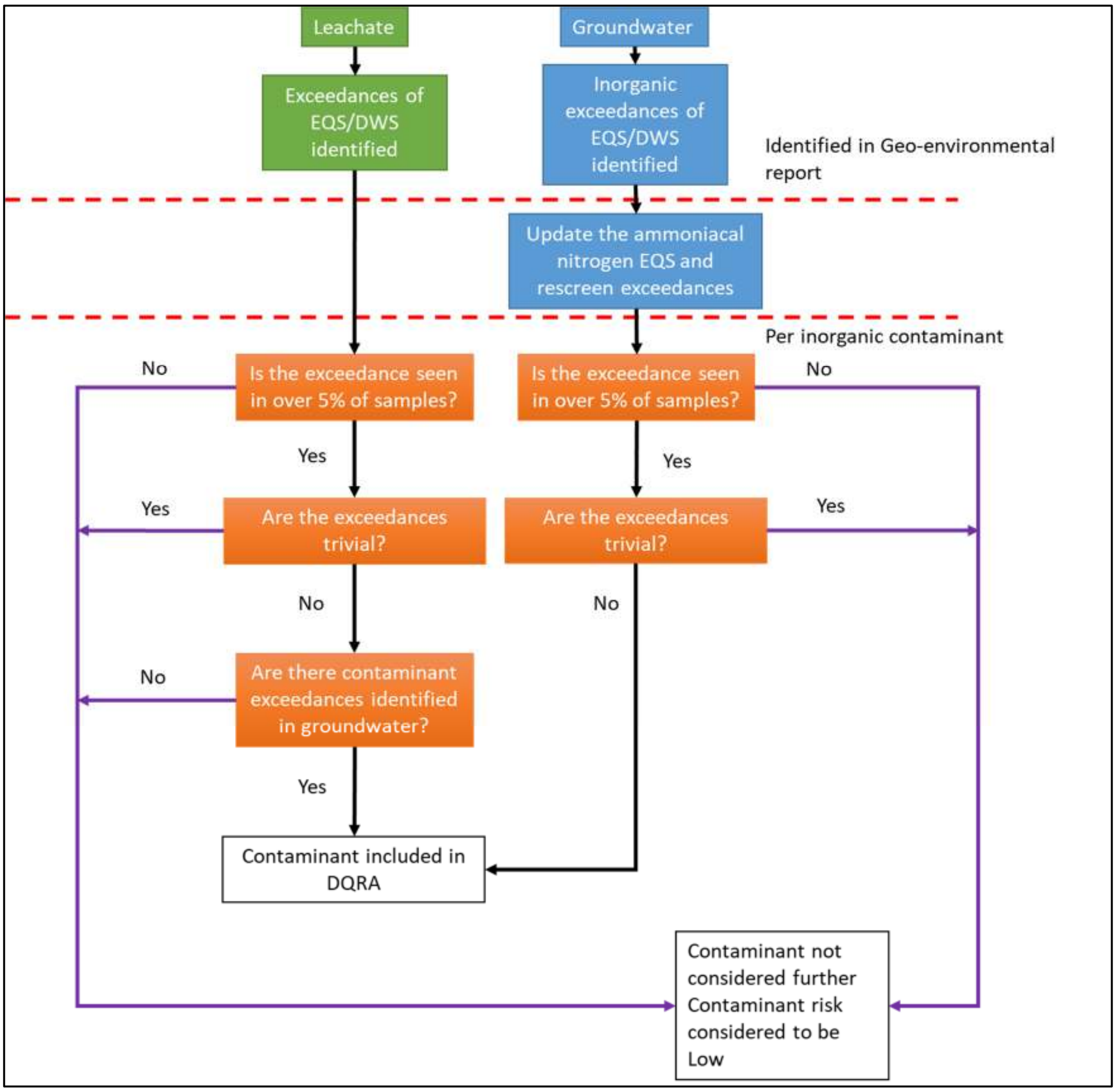
9.2.3 Inorganic Contaminants of concern (CoC)

Exceedances (through direct comparison) of DWS and EQS in soil leachate, groundwater and surface water samples are shown in Table 11, Table 12 and Table 13 respectively. The contaminants of concern (CoC) that exceeded the assessment criteria were selected for fate and transport modelling. The assessment criteria included:

- A refined standard for Ammoniacal nitrogen as N based on unionised ammonia (discussed in Section 8.2.4).
- A statistical analysis of inorganic exceedances completed for leachate and groundwater where a percentage of the exceedances is calculated for each contaminant to identity whether exceedances are observed more than 5% of the samples tested. Inorganic exceedances that are identified within less than 5% of samples tests are not considered to be a CoC given that an appropriate number of samples were tested.
- A consideration of whether inorganic contamination is in the leachate and within the groundwater samples. Contaminant exceedances that are not observed within the groundwater on Site are not considered further as a CoC and the anticipated risk is considered to be low.

The process used to determine if inorganic CoC require additional assessment is shown in Schematic 8.

Schematic 8: Process for determining inorganic contaminants of concern



9.2.4 Assessment of ammonia exceedances

The GQRA determined seven groundwater exceedances of ammoniacal nitrogen as N against the DWS (0.38 mg/l) and EQS (0.2 mg/l), across to the Site. The EQS for total ammonia was calculated at 0.3 mg/l due:

- Water hardness < 200mg/l (determined in the geo-environmental report)
- Site elevation >80m.
- A Type 6 river[xiv], which equates to a "Good Status" for ammoniacal nitrogen as N EQS standard of 0.3 mg/l.

These exceedances are:

- ML158-CR014 - screened in the Glaciofluvial deposits - 0.23mg/l
- ML159-CP003 - screened in the Glaciofluvial deposits - 0.78mg/l
- ML159-CP403 - screened in the Glaciofluvial deposits – 0.47mg/l
- ML159-CP406 - screened in the Glaciofluvial deposits – 1.5mg/l

- ML159-CP404 - screened in Made Ground - 13mg/l
- ML159-CR408 - screened in the Mercia Mudstone – 0.32mg/l
- ML159-CP405 screened in the Glaciofluvial deposits – 1.9mg/l

Ammoniacal nitrogen as N is the calculation of the total ammonia which comprises ammonia (NH_3) and ammonium (NH_4^+) which is ionised. Ammonia is more toxic to fish than the ammonium, and therefore the EQS for ammonia is more stringent. To determine the proportion of ammonia and ammonium within the ammoniacal nitrogen as N readings, the following equations are used:

$$pKa = 0.0901821 + \frac{2729.92}{T} \ (1)$$

$$f_{NH_3} = \frac{1}{10^{(pKa-pH)} + 1} \times 100 \ (2)$$

$$f_{NH_4^+} = 100 - f_{NH_3} \ (3)$$

Where

pKa (-)	is the acid dissociation constant
T (°K)	is the temperature of the receiving water, in Kelvin
f_{NH3} (%)	is the percentage of the ammoniacal nitrogen that is un-ionised ammonia (NH_3)
pH (-)	is the pH of the receiving water body
f_{NH4+} (%)	is the percentage of the ammoniacal nitrogen that is ionised ammonium (NH_4^+)

The closest surface water sampling point is ML159-SW001, which is located on Site, where a pH of 7.8 was reported. A conservative surface water temperature of 15 °C (288.15 °K) has been used in the calculations. This is conservative as surface water temperatures are typically lower, but higher temperatures relate to a greater proportion of ammoniacal nitrogen comprising ammonia. Table 14 details the concentration of ammonia and ammonium in the groundwater samples where exceedances were identified.

Table 14: Assessment of ammoniacal nitrogen as N exceedances

Borehole (strata)	ML158-CR014 (Glaciofluvial)	ML159-CP003 (Glaciofluvial)	ML159-CP403 (Glaciofluvial)	ML159-CP406 (Glaciofluvial)	ML159-CP404 (Made Ground)	ML159-CR408 (Mercia Mudstone Group)	ML159-CP405 (Glaciofluvial)
Ammoniacal nitrogen as N (mg/l)	0.23	0.78	0.47	1.5	13	0.32	1.9
Surface water temperature (°K)	288.15	288.15	288.15	288.15	288.15	288.15	288.15
Surface water pH (-)	7.8	7.8	7.8	7.8	7.8	7.8	7.8

Borehole (strata)	ML158-CR014 (Glaciofluvial)	ML159-CP003 (Glaciofluvial)	ML159-CP403 (Glaciofluvial)	ML159-CP406 (Glaciofluvial)	ML159-CP404 (Made Ground)	ML159-CR408 (Mercia Mudstone Group)	ML159-CP405 (Glaciofluvial)
Acid dissociation constant, pka (-) – equation 1	9.564	9.564	9.564	9.564	9.564	9.564	9.564
Derived ammonia (%) – equation 2	1.69	1.69	1.69	1.69	1.69	1.69	1.69
Derived ammonium (%) – equation 3	98.31	98.31	98.31	98.31	98.31	98.31	98.31
Ammonia concentration (mg/l)	0.004	0.013	0.008	0.025	**0.220**	0.005	0.032
Ammonia EQS (mg/l)	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Ammonium concentration (mg/l) – equation 4	0.23	0.77	0.46	1.47	12.78	0.31	1.87

When comparing the derived ammonia values against the specific EQS for ammonia[xv], there is one exceedance detected, at ML159-CP404 (Made Ground), with concentrations of 0.220mg/l.

Only a single groundwater sample was available for ML159-CP404 within Made Ground (further sampling rounds are to be undertaken), while within the Glaciofluvial Deposits two samples were available for the monitoring wells, in which Ammoniacal nitrogen as N concentrations were below the limit of detection at 0.063mg/l (below the EQS). Organic matter ranging from 11 to 18% was also detected at ML159-CP404 (Made Ground), which could indicate that the high concentration of Ammoniacal nitrogen as N at this location could be the decomposition of organic matter. There is no evidence that Ammoniacal nitrogen as N has impacted the superficial deposits at this location. Also the borehole indicates that there is a >4m thick layer of cohesive Glaciofluvial Deposits between the Made Ground and a granular Glaciofluvial Deposits which the cohesive strata is likely to offer an effective barrier to the movement of the contamination into the underlying aquifer. Therefore, it is unlikely that this single exceedance would pose a significant risk to the controlled waters. However, the continuous monitoring of this strata is recommended to confirm the findings of this risk assessment.

9.2.5 Organic Contaminants of concern (CoC)

For organic soil and groundwater contaminants exceedances the following CoC are deemed representative of organic contamination at the Site:

- Aliphatic >C16 – 21 (model 1 – soil source)
- Aliphatic >C21 – 35 (model 1 – soil source and model 2 groundwater source)

- Aliphatic >C35 – 44 (model 1 – soil source)
- Aromatic >C12 – 16 (model 1 – soil source)
- Aromatic >C16 – 21 (model 1 – soil source)
- Aromatic >C21 – 35 (model 1 – soil source)
- Aromatics >C35 – 44 (model 1 – soil source)
- Bis(2-ethylhexyl)phthalate (model 2 – groundwater source)

Some soil organic TPHs test results were reported as a total value and not as a speciated value. Where this occurred, the highest maximum total concentration was used for a more robust analysis. A PAH soil exceedance was detected at a single location at ML159-CP003 (0.05mbgl). However, as the contamination is anticipated to be removed as part of the proposed works PAHs are not considered a CoC at the Site.

For organic groundwater contamination, most of the samples report organic concentrations below the limit of detection. Aliphatic >21-35 and Bis(2-ethylhexyl)phthalate were encountered at ML158-CR018 and Aliphatic >21-35 were also encountered at ML159-CR019, which was considered as an organic CoC for groundwater.

9.2.6 Consideration of inorganic contamination

Table 15 and Table 16 provides a summary analysis of the soil leachate and groundwater inorganic exceedances and an explanation as to whether the inorganic contaminants will be subjected to modelling.

In boreholes where soil leachate exceedances were detected shallower than 0.30mbgl, it is assumed that the material will be excavated and removed as part of the proposed embankment works and any contamination associated with the shallow material will no longer pose a risk to the identified receptors. Consequently, the contamination associated with ML159-CP018 (0.30m bgl) is no longer considered in this report.

Table 15: Determination of inorganic soil leachate contaminants of concern (CoC)

Contaminant	EQS (mg/l)	DWS (mg/l)	No. of Samples	EQS exceedances – Number (Percentage)	DWS exceedances – Number (Percentage)	Exceedances identified within groundwater data	Discussion	Recommendations
Copper	0.03	2	26	5 (19)	0	Yes	EQS exceedances of 0.032 and 0.134mg/l identified. Exceedances are not considered trivial. Parameter at exceedance concentration also reported in the groundwater data.	Copper is considered a CoC
Hexavalent Chromium	0.0034	-	18	9 (50)	0	Yes	EQS exceedances ranged from 0.0044 to 1.5mg/l. Exceedance is not trivial. Marginal concentrations encountered in the groundwater samples.	Hexavalent Chromium is considered a CoC
Nickel	0.02	0.02	26	7 (27)	7 (27)	Yes	EQS and DWS exceedances of 0.02 to 0.3mg/l identified. Exceedances identified in the groundwater data and not considered trivial	Nickel is considered a CoC
Cadmium	0.00015	0.005	26	4 (15)	0	Yes	EQS exceedances ranged from 0.000161 to 0.00063mg/l. Exceedances identified in the groundwater and not considered trivial.	Cadmium is considered a CoC
Arsenic	0.05	0.01	26	0 (0)	1 (4)	No	A single DWS exceedance of 0.011mg/l identified. No principal aquifer or drinking water abstraction well is identified near the Site. No exceedance recorded in the groundwater samples. Exceedance considered trivial and detected in <5% of samples tested.	Arsenic is not considered a CoC
Chromium III	0.0047	-	4	1 (25)	0	Yes	A single EQS exceedance of 0.0169mg/l identified. Concentration is not trivial.	Chromium III is considered a CoC
Zinc	0.03	5	16	4 (25)	0	Yes	EQS exceedances ranged from 0.034 to 0.095mg/l. Concentration is not trivial.	Zinc is considered a CoC

Table 16: Determination of inorganic groundwater contaminants of concern (CoC)

Contaminant	EQS (mg/l)	DWS (mg/l)	No. of Samples	EQS exceedances – Number (Percentage)	DWS exceedances – Number (Percentage)	Discussion	Recommendations
Cadmium	0.00015	0.005	22	5 (23)	0 (0)	EQS exceedances range from 0.00017 to 0.0006mg/l. Since cadmium was also encountered within the soil leachate exceedances it will be considered as CoC for a more robust analysis.	Cadmium is considered a CoC
Iron	1	0.2	2	2 (100)	2 (100)	EQS and DWS exceedances of 8.29 and 178mg/l were recorded in ML158-CR018 and ML159-CR019. As no land quality areas are located near these boreholes and considering that the local groundwater flow direction is generally to the east (towards Coleshill Pool), the source of iron at these locations is unclear. It is possible that impacts may be associated with off-Site and natural sources and therefore remediation of the groundwater at these locations is unlikely to be effective.	Iron is not considered a CoC
Zinc	0.03	5	22	4 (20)	0 (0)	EQS exceedances of 0.032 to 0.118mg/l were detected within ML158-CR018, ML159-CR019, ML159-CP404 and ML159-CP405. It is possible that impacts may be associated with off-Site sources and therefore remediation of the groundwater at these locations is unlikely to be effective. However, since zinc was also encountered within the soil leachate exceedances it will be considered as CoC for a more robust analysis.	Zinc is considered a CoC

Contaminant	EQS (mg/l)	DWS (mg/l)	No. of Samples	EQS exceedances – Number (Percentage)	DWS exceedances – Number (Percentage)	Discussion	Recommendations
Manganese	0.41	0.05	2	1 (50)	2 (100)	EQS and DWS exceedances of 0.272 and 3.12mg/l were identified. As no land quality areas are located near the boreholes and considering that the local groundwater flow direction is generally to the east (towards Coleshill Pool), the source of manganese at these locations is unclear. It is possible that impacts may be associated with off-Site sources and therefore remediation of the groundwater at these locations is unlikely to be effective. Manganese was not encountered in exceedance within the soil leachate samples. Manganese is often elevated in natural ground and mobility can be affected by natural changes in redox.	Manganese is not considered a CoC
Simazine	0.001	0.0001	2	0 (0)	2 (100)	Simazine is a banned herbicide. DWS exceedances of 0.000482 and 0.000476mg/l were recorded. As the presence of simazine is likely to be due to historic dispersed and regional agricultural land uses near the Site, the parameter is not considered to be a CoC. Also, there is no groundwater abstraction well and principal aquifer within the Site or near to the Site. Levels of Simazine are expected to decline following an EU wide ban in 2004.	Simazine is not considered a CoC
Isoproturon	0.0003	0.0001	4	2 (50)	2 (50)	Isoproturon is a banned herbicide. DWS exceedances of 0.000501 and 0.000492mg/l were recorded which are regarded as marginal. As the presence of isoproturon is likely to be due to historic dispersed and regional agricultural land uses near the Site, the parameter is not considered to be a CoC. Levels of Isoproturon are expected to decline following an EU wide ban in 2017.	Isoproturon is not considered a CoC
Chromium III	0.0047	-	25	3 (12)	0 (0)	Exceedance of 0.00562 to 0.045mg/l was recorded. Since chromium was also encountered within the soil leachate exceedances it will be considered as CoC for a more robust analysis.	Chromium is considered a CoC
Copper	0.03	2	22	1 (5)	0 (0)	A single EQS exceedance of 0.0708mg/l was recorded at ML159-CR019. As no land quality areas are located near the borehole and considering that the local groundwater flow direction is generally to the east (towards Coleshill Pool), the source of copper at these locations is unclear. It is possible that impacts may be associated with off-Site sources and therefore remediation of the groundwater at these locations is unlikely to be effective. However, since copper was also encountered within the soil leachate exceedances it will be considered as CoC for a more robust analysis.	Copper is considered a CoC
Lead	0.008575	0.01	22	2 (9)	2 (9)	Exceedance of 0.024 and 0.0618mg/l was recorded above the EQS and DWS at ML159-CR019 and ML159-CP405. The highest concentration of lead were encountered at ML159-CR019. As no land quality area are located near this borehole and considering that the local groundwater flow direction is generally to the east (towards Coleshill Pool), the source of lead at is unclear. It is possible that impacts may be associated with off-Site sources and therefore remediation of the groundwater is unlikely to be effective. Lead was also not encountered in exceedance within the soil leachate samples.	Lead is not considered a CoC
Nickel	0.02	0.02	22	1 (5)	2 (9)	A single EQS and DWS exceedance of 0.0466mg/l was recorded at ML159-CR019. As no land quality areas are located near the borehole and considering that the local groundwater flow direction is generally to the east (towards Coleshill Pool), the source of nickel at these locations is unclear. It is possible that impacts may be associated with off-Site sources and therefore remediation of the groundwater at these locations is unlikely to be effective. However, since nickel was also encountered within the soil leachate exceedances it will be considered as CoC for a more robust analysis.	Nickel is not considered a CoC

Contaminant	EQS (mg/l)	DWS (mg/l)	No. of Samples	EQS exceedances – Number (Percentage)	DWS exceedances – Number (Percentage)	Discussion	Recommendations
Nitrate as N	-	11	22	0 (0)	8 (35)	Exceedances ranging from 12 to 27.2mg/l was recorded above the DWS. No principal aquifer or groundwater abstraction well was located within or near the Site. It is possible that impacts may be associated with off-Site sources and also with widespread agricultural activity in the region. Therefore remediation of the groundwater at these locations is unlikely to be effective.	Nitrate as N is not considered a CoC
Magnesium	-	50	22	0 (0)	9 (40)	DWS exceedances of 51 to 110mg/l were recorded. As the presence of magnesium is likely to be due to the agricultural land uses near the Site or also from background concentration, the parameter is not considered to be a CoC. Also, there is no groundwater abstraction well and principal aquifer within the Site or near to the Site.	Magnesium is not considered a CoC
Potassium	-	12	22	0 (0)	3 (13)	DWS exceedances ranges from 15 to 36mg/l. As the presence of potassium is likely to be due to the agricultural land uses near the Site or also from background concentration, the parameter is not considered to be a CoC. Also, there is no groundwater abstraction well and principal aquifer within the Site or near to the Site.	Potassium is not considered a CoC
Sulphate as SO_4	-	250	15	0 (0)	1 (7)	A single exceedance of 670mg/l were detected above DWS. No principal aquifer or groundwater abstraction well was located within or near the Site. Sulphate as SO_4 may be the result from widespread agricultural activity or background concentrations.	Sulphate as SO_4 is not considered a CoC
Chromium Hexavalent	0.0034	-	22	2 (9)	0 (0)	EQS exceedances of 0.0036 and 0.004mg/l. Exceedances are considered trivial. However, since exceedances were also encountered in the soil leachate it will be considered as COC for a more robust analysis.	Chromium Hexavalent is considered a CoC
Nitrite	0.152	-	22	0 (0)	2 (9)	Exceedances of 0.19 and 0.37mg/l above the DWS were reported. Concentrations were encountered at ML159-CR422 and ML159-CR419. Both monitoring wells are not associated with Made Ground. There are no land quality areas located near these boreholes and considering that the local groundwater flow direction is generally to the east (towards Coleshill Pool), the source of nitrite at these locations is likely to be from dispersed agricultural activities. It is possible that impacts may be associated with off-Site sources or it may the result from widespread agricultural activity. Therefore, remediation of the groundwater at these locations is unlikely to be effective.	Nitrite is not considered CoC
Phenol	0.0077	0.0005	22	1 (5)	1 (5)	EQS and DWS exceedances of 0.038mg/l were reported at ML158-CR014. The exceedance is not considered trivial. However, it has been identified at a single location across to the site. The monitoring well is not associated with Made Ground. There are no land quality areas located near the monitoring well and the source of phenol at this location is likely to be from off-Site sources. Therefore, remediation of the groundwater at this location is unlikely to be effective.	Phenol is not considered CoC

9.2.6.1 Summary of Soil Constituents of Concern

Based on the analysis of the inorganic exceedances undertaken for the Site, soil leachate assessment criteria exceedances were recorded in samples collected from ML159-CP003, ML159-CP018, ML159-CP403, ML159-CP404 and ML159-CP406. With the exception of arsenic, all other soil leachate exceedances were also detected in groundwater samples collected from the Site. From the detailed review the soil leachate parameters concentrations compared to WQS, copper, nickel, cadmium, chromium III, Hexavalent chromium and zinc may pose a risk to controlled waters.

The soil organic TPH and PAHs assessment criteria reported exceedances at ML158-WS015, ML159-CP003, ML159-CR003, ML159-CP403, ML159-CP404 and ML159-CP406. Exceedances identified within shallow Made Ground (0.2 and 0.05m bgl) are anticipated to be removed for the proposed earthworks at the Site. Therefore, it is expected that any contamination up to this depth would be removed. Therefore, PAH contamination is not considered a CoC.

Moderate to high TPH concentrations were encountered in soils. In the detailed quantitative risk assessment, the TPHs carbon bands have been modelled with the highest concentration results for each carbon range identified. Where carbon bands have not been tested the highest concentration of the extractable petroleum hydrocarbons (EPH) has been applied to the fractions for a more robust analysis. However, this is a very conservative approach and may not reflect the actual Site contamination concentration.

9.2.6.2 Summary of Groundwater Constituents of Concern

With regards to inorganic exceedances within the groundwater samples results, all monitoring wells show exceedances of organics with the exception of ML159-CR408. It should be noted that although inorganic exceedances were reported in samples collected from ML158-CR018, ML159-CR019, ML158-CR014, ML158-CR407 and ML159-CP003, currently there are no historical or recent land uses activities at or within close proximity to these boreholes that would clearly explain the inorganic contaminants identified and the inorganic exceedances at these locations may reflect natural groundwater quality conditions and/or an upgradient off-Site source. However, for a more robust analysis inorganics contaminants that were encountered within the groundwater and soil leachate samples were considered a CoC to be modelled. These are copper, nickel, cadmium, chromium III, Hexavalent chromium and zinc

Groundwater organic contamination was encountered at boreholes ML158-CR018 and ML159-CR019, with exceedances of TPH (Aliphatics >C21-35) and bis(2-ethylhexyl)phthalate which has been considered a CoC.

9.2.6.3 Summary of contaminants of concern

A summary of the CoCs for each of the models is shown in Table 17.

Table 17: Contaminants of concern modelled with ConSim

Contaminant of Concern	Model 1 (soil source)	Model 2 (groundwater source)
Metals		
Copper	✓	✓
Nickel	✓	✓
Cadmium	✓	✓
Chromium III	✓	✓
Zinc	✓	✓
Hexavalent Chromium	✓	✓
Organics		
Aliphatic >C16 – 21	✓	×
Aliphatic >C21 – 35	✓	✓
Aliphatic >C35 - 44	✓	×
Aromatics >C12-16	✓	×
Aromatics >C16-21	✓	×
Aromatics >C21-35	✓	×
Aromatics >C35-44	✓	×
Bis(2-ethylhexyl)phthalate	×	✓

9.2.7 Compliance with regulations and policy (determination of compliance points and standards)

The Groundwater Daughter Directive (2006/118/EC) defines hazardous and non-hazardous substances for the purposes of groundwater protection. Hazardous substances should be prevented from entering groundwater (the "prevent" objective). Entry of non-hazardous substances into groundwater should be limited to prevent pollution (the "limit" objective). Where there is evidence of contaminants having already entered groundwater due to historical contamination, the 'prevent' objective may not be achievable and therefore the 'limit' objective may be considered appropriate. This is supported by the Water Framework Directive (2000/60/EC) with respect to improving water quality.

Concentrations at the receptor have been determined using input concentrations from soil and soil leachate analysis. Attenuation, retardation and dispersion factors are then calculated by the model and used to simulate the movement of the selected compounds through the ground.

There are three compliance points within the saturated zone (level 3 assessment), as follows:

- Immediately downstream the entry into the saturated zone (5m) – this is the default compliance point used by the model to represent concentrations of contaminants entering the Glaciofluvial deposits (aquifer)
- A 10m downstream of the source – this relates to the Glaciofluvial deposits (aquifer)
- A maximum compliance point of 50m downstream from the source

The Environment Agency Groundwater Protection pages on gov.uk (formerly GP3) provides guidance on the selection of different compliance points and targets, and the level of modelling which is appropriate for Hazardous and Non-Hazardous substances. For substances which have been deemed hazardous, but no minimum reporting value has been determined, the laboratory detection limit of the contaminant has been used. This is compliant with the Environment Agency's Remedial Targets Methodology[xxxvi].

Tables 18 and 19 detail the compliance values used for each of the contaminants, within the ConSim models. The highest concentration identified for each TPH compound were used as input concentration for a more conservative analysis.

Table 18: Determinants and compliance values used for Model 1 (soil source contamination migration)

Contaminant	Substance	Compliance standard	Compliance value (mg/l)	Input concentration *
Inorganics				
Copper	Non-Hazardous	EQS – M-BAT	0.03	0.134 mg/l
Nickel	Non-Hazardous	EQS – M-BAT	0.02	0.3 mg/l
Cadmium	Non-Hazardous	EQS	0.00015	0.00063 mg/l
Chromium III	Non-Hazardous	EQS	0.0047	0.0169 mg/l
Zinc	Non-Hazardous	EQS	0.03	0.095 mg/l
Hexavalent Chromium	Hazardous	EQS	0.0034	1.5 mg/l
Organics				
Aliphatic >C16 – 21	Hazardous	DWS	0.01	401 mg/kg
Aliphatic >C21 – 35	Hazardous	DWS	0.01	1300 mg/kg
Aliphatic >C35 - 44	Hazardous	DWS	0.01	1240 mg/kg
Aromatic > C12 - C16	Hazardous	DWS	0.01	120 mg/kg
Aromatic > C16 - C21	Hazardous	DWS	0.01	1500 mg/kg
Aromatic > C21 - C35	Hazardous	DWS	0.01	6800 mg/kg
Aromatics >C35 - 44	Hazardous	DWS	0.01	1240 mg/kg

Note: Organic soil concentrations will be input as mg/kg and inorganic soil concentrations will be input as mg/l. Values represent the maximum concentrations recorded.

Table 19: Determinants and compliance values used for Model 2 (groundwater source contamination migration)

Contaminant	Hazardous Substance	Compliance standard	Compliance value (mg/l)	Input concentration (mg/l)*
Copper	Non-Hazardous	EQS – M-BAT	0.03	0.0708
Nickel	Non-Hazardous	EQS – M-BAT	0.03	0.0466
Cadmium	Non-Hazardous	EQS	0.00015	0.0006
Chromium III	Non-Hazardous	EQS	0.0047	0.045
Zinc	Non-Hazardous	EQS	0.03	0.118
Hexavalent Chromium	Hazardous	EQS	0.0034	0.004
Aliphatic >C21 – 35	Hazardous	DWS	0.01	0.137
Bis(2-ethylhexyl)phthalate	Hazardous	EQS	0.0013	0.00575

**Maximum concentration found in groundwater*

9.2.8 Model input parameters

Modelling has been undertaken using physical and chemical parameters derived from Site specific and literature data, as shown in 0.

The retarded travel time of each compound was simulated to predict the time of travel from the source to the receptor. Environment Agency Remedial Targets Methodology (2006)[xxxvi] assumes a risk acceptable to a receptor if the retarded travel time is >1,000 years (Section 5.5) and the contamination spreads no further than tens of metres from the source. Table 20 shows the general input parameters used for the models.

Table 20: Model input parameters

Model input	Model 1 (soil source zone)	Model 2 (groundwater source zone)
Level used	Level 2 and level 3 analysis	Level 3a analysis
Active processes	The model uses retardation in the unsaturated zone and aquifer. Biodegradation and retardation were applied in the unsaturated zone and aquifer. A calculated declining source terms was not used.	
Simulation parameters	The model has been run for 1001 iterations to increase the confidence level (or percentile) in the results.	
Background concentrations	Background groundwater contaminant concentrations were not considered for a more conservative analysis.	

9.2.9 Model assumptions

The main assumptions within model 1 (soil source) and model 2 (groundwater source) are as follows:

- The Made Ground is the source of contamination, with water identified in the Made Ground as perched;
- The unsaturated pathway comprises the unsaturated Glaciofluvial deposits, the thickness of which has been determined by measuring the depth of the groundwater level from the bottom of the Made Ground;
- Dry bulk density, air filled soil porosity and water filled soil porosity for Made Ground were obtained from borehole BD162-TP003, located off-Site. No compaction data was available for on Site Made Ground, therefore data considered to representative of Made Ground conditions at the Site was obtained from BD162-TP003 located approximately 2km north of the Site (around Ch162+100). The Ground Investigation Report (Report E2), suggests that due to the large variety of Made Ground across to the area, site specific parameters should be considered;
- Hydraulic conductivity has been determined from in-situ permeability tests of the Glaciofluvial Deposits . The data was taken from Permeability Statistics for HS2 N1/N2 (document number:1MC08-BBV_MSD-GT-CAL-N001-100209;
- Total organic carbon values for Made Ground and the Glaciofluvial Deposits were determined from soil samples taken across Sublot 5 and 6;
- The anticipated horizontal hydraulic gradient within the Glaciofluvial Deposits is east towards the Coleshill Pond;
- Based on the ground model (section 5.7.2) mostly low permeability Glaciolacustrine Deposits are expected in the source area, however, in the interests of conservatism these deposits were not included in the model;
- It has been assumed that non speciated TPHs are within the heavier carbon bands, as the speciated TPHs recorded exceedances were only within the heavier bands. The highest TPH

concentrations recorded for each carbon band have been considered as the input concentration;

- The main receptor is the Coleshill Pools located around 330m east of the Site. However, a maximum compliance point of 50m has been used instead for a more conservative analysis;
- The highest soil leachate concentrations were used in the model; and,
- Effective porosity has been determined from literature reviews.

9.2.10 Model outputs

Outputs generated from the models are shown in the Table 21 and Table 22. Values identified with red text represent concentrations in exceedance of the WQS, while values that are in bold represent retarded travel times greater than 1,000 years. Where retarded travel time exceeds 1,000 years no action is required due the anticipated low risk at the compliance point, even if the WQS is exceeded.

Acceptability criteria (AC) are derived based on the following equation:

$$AC = Water\ quality\ standard\ \times \frac{Input\ concentration}{Concentration\ at\ receptor\ (95\%\ percentile)}$$

AC = mg/l or mg/kg depending on input concentration units.

Water quality standard = mg/l

Input concentration = mg/l (inorganic) or mg/kg (organic)

Concentration at receptor = mg/l

Non-Applicable (N/A) = No AC is derived due to anticipated low risk

Table 21: Modelling outputs from ConSim model 1 (soil source)

Contaminant	WQS	Source of Standard	Input concentration	Retarded travel time to the base of the unsaturated zone -50th percentile (yrs)	Concentration at the base of the unsaturated zone at 1000 years -95th percentile (yrs)	Retarded travel time to the 5m compliance point - 50th percentile (yrs)	Concentration at the 5m compliance point at 1000 years - 95th percentile (mg/l)	Retarded travel time to 10m compliance point - 50th percentile (yrs)	Concentration at the 10m compliance point at 1000 years - 95th percentile (mg/l)	Retarded travel time to the 50m compliance point -50th percentile (yrs)	Concentration at the 50m compliance point at 1000 years - 95th percentile (mg/l)	Controlled water Soil AC
Copper	0.03mg/l	EQS (MBAT)	0.134 mg/l	**>1000**	0.0909735	**>1000**	0.0139999	**>1000**	0.0125598	**>1000**	0	**N/A**
Nickel	0.02mg/l	EQS (MBAT)	0.3 mg/l	**>1000**	0	**>1000**	0	**>1000**	0	**>1000**	0	**N/A**
Cadmium	0.00015 mg/l	EQS	0.00063 mg/l	**>1000**	0	**>1000**	0	**>1000**	0	**>1000**	0	**N/A**
Chromium III	0.0047mg/l	EQS	0.0169 mg/l	**>1000**	0	**>1000**	0	**>1000**	0	**>1000**	0	**N/A**
Zinc	0.03mg/l	EQS	0.095 mg/l	**>1000**	0.0595665	**>1000**	0.00871463	**>1000**	0.00717621	**>1000**	0	**N/A**
Hexavalent Chromium	0.0034mg/l	EQS	1.5 mg/l	975.474	1.40505	**>1000**	0.439127	**>1000**	0.391521	**>1000**	0.177713	**N/A**
Aliphatic >C16 – 21	0.01mg/kg	DWS	401	**>1000**	0	**>1000**	0	**>1000**	0	**>1000**	0	**N/A**
Aliphatic >C21-35	0.01mg/kg	DWS	1300 mg/kg	**>1000**	0	**>1000**	0	**>1000**	0	**>1000**	0	**N/A**
Aliphatic >C35 - 44	0.01mg/kg	DWS	1240	**>1000**	0	**>1000**	0	**>1000**	0	**>1000**	0	**N/A**
Aromatic > C12-16	0.01mg/kg	DWS	120 mg/kg	**>1000**	0.0962626	**>1000**	0.014588	**>1000**	0.0109106	**>1000**	0	**N/A**
Aromatic > C16-21	0.01mg/kg	DWS	1500 mg/kg	**>1000**	0	**>1000**	0	**>1000**	0	**>1000**	0	**N/A**
Aromatic > C21-35	0.01mg/kg	DWS	6800 mg/kg	**>1000**	0	**>1000**	0	**>1000**	0	**>1000**	0	**N/A**
Aromatics >C35-44	0.01mg/kg	DWS	1240mg/kg	**>1000**	0	**>1000**	0	**>1000**	0	**>1000**	0	**N/A**

Note: Organic compounds were input into ConSim as mg/kg, inorganic compounds were input as mg/l. Bold cells relate to retarded travel times being greater than 1,000 years and red cells relate to exceedances against the water quality standard.

*Table 22:Modelling outputs from ConSim (model 2 (groundwater)_*

Contaminant	WQS	Standard	Input concentration	Retarded travel time to the 5m compliance point (50th percentile)	Concentration at the 5m compliance point at 1000 years (95th percentile)	Retarded travel time to the 10m compliance point (50th percentile)	Concentration at the 10m compliance point at 1000 years (95th percentile)	Retarded travel time to the 50m compliance point (50th percentile)	Concentration at the 50m compliance point at 1000 years (95th percentile)	Controlled water Soil AC	Retarded travel time to the 80m compliance point (50th percentile)	Concentration at the 80m compliance point at 1000 years (95th percentile)	Retarded travel time to the 115m compliance point (50th percentile)	Concentration at the 115m compliance point at 1000 years (95th percentile)
-	mg/l	-	mg/l	Years	mg/l	Years	mg/l	Years	mg/l	mg/kg	Years	mg/l	Years	mg/l
Copper	0.03mg/l	EQS (MBAT)	0.0708	4.26858	0.0707992	82.3212	0.070797	740.891	0.070486	**0.0301**	**>1000**	0.0677519	**>1000**	0.053063
Nickel	0.02mg/l	EQS (MBAT)	0.0466	60.7618	0.0400097	**>1000**	0.03	**>1000**	0.00000151	**N/A**	**-**	**-**	**-**	**-**
Cadmium	0.00015mg/l	EQS	0.000533	12.1655	0.000597691	234.677	0.000593822	**>1000**	0.000345139	**N/A**	**-**	**-**	**-**	**-**
Chromium III	0.0047mg/l	EQS	0.045	583.172	7.24E-03	**>1000**	1.51E-04	**>1000**	4.01E-15	**N/A**	**-**	**-**	**-**	**-**
Zinc	0.03mg/l	EQS	0.118	4.63305	1.18E-01	89.3515	1.18E-01	804.163	1.17E-01	**0.0303**	**>1000**	1.10E-01	**>1000**	7.70E-02
Hexavalent Chromium	0.0034mg/l	EQS	0.004	2.32413	0.004	44.808	0.004	403.272	0.00399996	**0.003**	683.102	0.0039994	**>1000**	0.0039902
Aliphatic >C21-35	0.01mg/kg	DWS	0.137	**>1000**	1.10E-28	**>1000**	0	**>1000**	0	**N/A**	**-**	**-**	**-**	**-**
Bis(2-ethylhexyl)phthalate	0.0013mg/l	EQS	0.00575	75.5322	0.00319151	**>1000**	0.0040429	**>1000**	0.0000018317	**N/A**	**-**	**-**	**-**	**-**

9.2.11 Modelling summary

9.2.11.1 Soil contamination

The soil model simulations do not identify significant contamination risk associated with inorganics and organic contaminants. The following summarises the key outputs from the ConSim soil model:

- All other inorganic contaminants reach the base of the unsaturated zone and enter the Glaciofluvial aquifer unit in excess of 1000 years expect of hexavalent Chromium
- Hexavalent Chromium concentrations at the base of the unsaturated zone and at the 50m compliance point exceeded the WQS. However, exceedances take more than 1000 years to reach the 5m compliance point and consequently the 50m compliance point, suggesting that the contaminant is unlikely to pose a risk to the identified receptor (Colehill Pools) due to the long-retarded travel times
- For organic contaminants, all retarded travel times were more than 1000 years at the base of the unsaturated zone and the compliance points. Only aromatic > C12-16 are anticipated to reach the base of the unsaturated zone point with a concentration higher than the WQS, however, its concentration decreased to zero at the 50m compliance indicating that is likely to pose a low risk to Coleshill Pools.

9.2.11.2 Groundwater contamination

For the groundwater, the model does not identify contamination risks associated with the inorganic and organic contamination. The following summarises the key outputs from the ConSim model:

- For the organics, ConSim modelling suggests that Aliphatic >C21-35 and bis(2-ethylhexyl)phthalate would reach the 10m and 50m compliance points above 1000 years and with concentration below the WQS, indicating that a low risk to controlled waters is present.
- For the inorganics in groundwater, the model suggests that at 50m compliance point most contaminants would reach above 1000 years or at concentrations below the WQS indicating a low risk to the Coleshill Pools. However, for copper, hexavalent chromium and zinc the model indicates that these contaminants would reach a 50m compliance point at concentrations above the WQS in less than 1000 years suggesting a risk to the Coleshill Pools. However, it is deemed unlikely that either determinant would pose a risk to Coleshill Pools on the basis of the following:
    - Only a single exceedance of **copper** was identified (ML159-CR019) above the WQS. The exceedance represents just 5% of the exceedances, and due to contaminant being reported in leachate samples, for a more robust analysis it was considered. The borehole is not associated with Made Ground and it is not near a known land quality site, which may indicate that high concentration may be from off-Site sources. The ConSim model also suggests that at 80m compliance point copper would reach above 1000 years, suggesting that due to the distance of the Coleshill Pools (330m) it is unlikely that copper would pose a risk to the receptor;
    - Three exceedances of **zinc** were identified within three boreholes on Site (ML158-CR018, ML159-CR019 and ML159-CP405). The leachate samples results did not report zinc exceedances at ML158-CR018 and ML159-CP405. No leachate samples are available for ML159-CR019. Zinc exceedances represents 22% of the groundwater samples tested. Only one borehole exceedance is associated with Made Ground and a land quality site (ML159-CP405), however, the highest concentration of zinc was identified at ML159-CR019 where no associated Made Ground and land quality is anticipated. These indicate that high concentrations of Zinc may be from off-Site sources. The ConSim model also suggests that at 80m compliance point zinc would reach above 1000 years, suggesting that zinc is unlikely to pose a risk to the receptor;

- **Hexavalent chromium** was detected at boreholes ML159-CP406 and ML159-CP404 with concentrations of 0.0036 and 0.004mg/l above the 0.0034mg/l EQS. Exceedances represent 9% of the groundwater samples tested. Exceedances are considered to be low. Also, no total chromium was tested, and concentrations may not actually reflect the total concentration of the speciated hexavalent chromium. The ConSim model also suggests that hexavalent chromium would take >1000 years to reach the 115m compliance point, suggesting that the contaminant is likely to pose a low risk to the receptor;
- It's important to note that the Site geology also comprises of cohesive deposits as part of the Glaciolacustrine Deposits, but for a more robust analysis only granular deposits from the Glaciofluvial Deposits were considered. For example, the slotted zone for the monitoring well ML159-CP406 in which identified hexavalent chromium is within Glaciolacustrine Deposits (non-productive aquifer), where permeability is anticipated to be lower than actual considered in the model.

Basis on this analysis copper, hexavalent chromium and zinc are not considered to pose a significant risk to the controlled waters and any remediation is not considerate practical reasonably.

9.2.11.3 Potential for Residual non-aqueous phase liquid

An assessment of the potential for mobile non-aqueous phase liquids (NAPL) has been undertaken in accordance with Brost *et al*. (2000)[xvi]. This paper recognises that NAPL can exist at concentrations significantly above the soil saturation limit while effectively immobilised in the pore spaces. Above the residual NAPL concentration (C_{res}) NAPL is considered to be potentially mobile and free flowing. Actual mobility depends upon the composition of NAPL mixtures and the pore space, with lighter TPH fractions and lower soil porosities resulting in higher C_{res} limits. Two methods of C_{res} prediction are presented in Brost *et al.* (2000): C_{res} based on empirical and theoretical measurements.

The paper derives lower (more conservative) C_{res} thresholds from empirical studies than modelled results. As a result, conservative literature values from an empirical study by Cohen and Mercer (1990)[xvii] have been selected based on equivalent Site soil conditions and credible NAPL mixtures observed at the Site to determine potential risks from mobile NAPL.

A $C_{res,soil}$ of 3879mg/kg has been used based on the soil type *"coarse sand and gravel"* and a conservative assumption that the hydrocarbons present represent middle distillates as a worst case.

Based on this value, the reported TPH Aromatics >C21-35 concentrations of 4600 and 6800mg/kg at 3.0 and 4.0mbgl in Made Ground at ML159-CP403 may pose a risk to controlled waters due to potential free-phase mobility. The stratum description recorded states "Dark brown to black sandy subangular to subrounded fine to coarse gravel sized fragments of brick, glass, sandstone, wood and quartzite. Sand sized fragments are fine to coarse of ash". No evidence of sheen or free phase product detected during the ground investigation at this location. The boreholes log records clay deposits (Glaciolacustrine Deposits) of 3.85m in thickness beneath the Made Ground and it is anticipated that the cohesive deposit is likely to prevent the movement of potential NAPL to controlled water receptors. In addition, the groundwater monitoring events undertaken at ML159-CP403 did not identify the presence of hydrocarbons in the samples tested. Therefore, the potential NAPL identify is considered unlikely to pose a risk to controlled waters near to the Site.

10 REFINED CONCEPTUAL SITE MODEL

As shown in Table 23 the conceptual Site model was refined to reflect the model outputs described in Section 8.

Table 23: Refined conceptual Site model following DQRA

Source	Pathway	Receptor	Previous Risk Assessment Rating	Updated Risk Assessment	Remediation required?
S1a: Contaminated soils – on-Site (Source 1, 2, 3 and 4 - Schematic 6) S1b: Contaminated soils – off-Site (Sources 5, 6 and 7 - Schematic 6) S3: Contaminated Groundwater (Sources 1, 2, 3, 4, 5, 6 and 7 - Schematic 6)	P1: Direct contact, ingestion, inhalation of dust/vapour from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	R1: On-Site users – commercial/ public open space R2: Off-Site users – commercial/public open space	**S1a, S1b, S3 > P1, P2, P3 > R1, R2** Probability: Unlikely Consequence: Medium **Risk Rating: Low**	**S1a, S1b, S3 > P1, P2, P3 > R1, R2** Probability: Unlikely Consequence: Medium **Risk Rating: Low**	No remediation proposed
	P6: Direct Contact	R5: Property Receptors – buildings, foundations and services (on and off-Site)	**S1a, S1b, S3 > P6 > R5** Probability: Likely Consequence: Medium **Risk: Moderate**	**S1a, S1b, S3 > P6 > R5** Probability: Likely Consequence: Medium **Risk: Moderate**	Refer to durability report and GIR for sulphates
S1c: Asbestos Contaminated Soils	R1: On-Site users – commercial/ public open space R2: Off-Site users – commercial/public	P1: Inhalation of contaminated soils	**S1c > P1 > R1 & R2** Risk assessment provided by asbestos specialist	**S1c > P1 > R1 & R2** Risk assessment provided by asbestos specialist.	Risk assessment to be undertaken by asbestos specialist and incorporated in this report once available. A Management Plan (AMP) should also be produced prior to any works on site.
S2: Ground Gases	P7: Inhalation of Ground Gases	R1: On-Site users – commercial/ public open space R2: Off-Site users – commercial/public open space	**S2, S2b > P7 > R1, R2** Probability: Unlikely Consequence: Medium **Risk Rating: Low**	**S2, S2b > P7 > R1, R2** Probability: Unlikely Consequence: Medium **Risk Rating: Low**	No
	P4: Exposure to explosive ground gases	R5: Property Receptors – buildings, foundations	**S2a, S2b > P4 > R5** Probability: Unlikely Consequence: Medium **Risk Rating: Low**	**S2a, S2b > P4 > R5** Probability: Unlikely Consequence: Medium **Risk Rating: Low**	No remediation proposed.
S1a: Contaminated soils – on-Site (Sources 1, 2, 3 and 4- Schematic 6)	P5a: Vertical and lateral migration via natural pathways	R3: Controlled waters on-Site Groundwater: Glaciofluvial – Secondary A; Mercia Mudstone Group – Secondary B R4: Controlled waters off-Site Groundwater: Alluvium and Glaciofluvial – Secondary A; Mercia Mudstone Group – Secondary B, Surface water: Coleshill Pools	**S1a > P5 > R3, R4** Probability: Likely Consequence: Medium **Risk: Moderate**	**S1a > P5 > R3, R4** Probability: Unlikely Consequence: Medium **Risk: Low** The ConSim model indicates that all inorganic and organic contaminants would take more than 1000 years to reach surface water compliance points. Due to the long-retarded travel times, soil exceedances are unlikely to pose risks to Coleshill Pools.	No remediation proposed.

Source	Pathway	Receptor	Previous Risk Assessment Rating	Updated Risk Assessment	Remediation required?
	P5b: Vertical and lateral migration via man-made created pathways				
S3a: Contaminated groundwater Contaminated Groundwater (Sources 1, 2, 3, 4, 5, 6 and 7 - Schematic 6)	P5a: Vertical and lateral migration via natural pathways P5b: Vertical and lateral migration via man-made created pathways	R3: Controlled waters on-Site Groundwater: Glaciofluvial – Secondary A; Mercia Mudstone Group – Secondary B R4: Controlled waters off-Site Groundwater: Alluvium and Glaciofluvial – Secondary A; Mercia Mudstone Group – Secondary B, Surface water: Coleshill Pools	**S3 > P5 > R3 & R4** Probability: Likely Consequence: Medium **Risk: Moderate**	**S3 > P5 > R3 & R4** Probability: Unlikely Consequence: Medium **Risk Rating: Low** The ConSim model indicates that all inorganic and organic contaminants would take more than 1000 years to reach the 50m compliance point due to the long-retarded travel times, with the exception of copper, hexavalent chromium and zinc. Copper and zinc are considered to be off-Site source, while hexavalent chromium is considered to pose a low risk due to the conservative ConSim model, such as geology, aquifer and distance from the Coleshill Pools. Also, ConSim model suggested that a maximum compliance point of 115m all these determinants would reach above 1000 years.	No remediation proposed.

11 LAND QUALITY MANAGEMENT

11.1 Overview

The culmination of the previous assessments and DQRA concluded that contaminated soils and groundwater identified at the Site are unlikely to present a risk to Coleshill Pools and the need for specific targeted soil and groundwater remediation is not warranted.

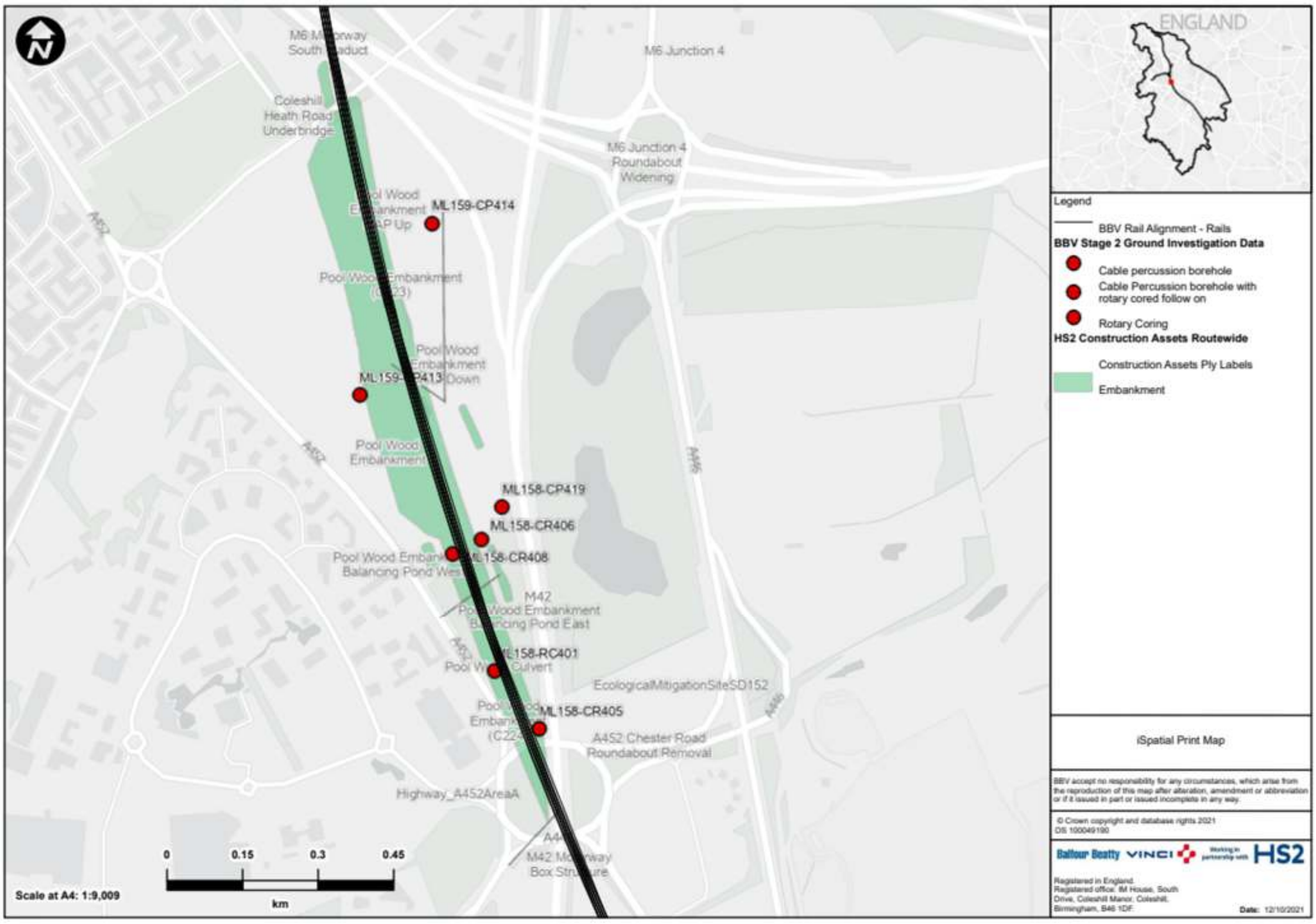
Although the current assessments do not indicate the need for remediation, the following section provides guidance on land management as development progresses at the Site.

11.2 DQRA verification ground investigation

Additional ground investigation in order to collect further soil and groundwater samples will be completed by BBV to inform the current understanding of ground conditions and to confirm the findings of the DQRA assessment. In addition, there are still groundwater sampling events outstanding from the available ground investigation, which also will be used to validate the findings of the risk assessment. Further groundwater monitoring events should also be carried out at ML159-CP404 to confirm the presence of elevated ammoniacal nitrogen as N, as specified at Section 9.2.4.

Schematic 9 shows the proposed locations of exploratory holes at the Site. This ground investigation should be delivered prior to the groundwork's operations. An indicative schedule 2 is shown in Appendix G.

Schematic 9: Proposed boreholes



11.3 Material re-use and disposal

11.3.1 Material Re-use

Reuse of excavated waste will be managed through the Contaminated Land Applications in Real Environments (CL:AIRE) definition of waste (DoW) code of practice (COP) (CL:AIRE DoWCOP)[xviii] and the HS2 MMP Framework.

The Made Ground generated by the works and other material impacted by contamination may be recovered in accordance with CL:AIRE DoWCOP Development Route A; the use of waste as a material where contamination is suspected or known to be present. For uncontaminated natural materials, this may be re-used in the North Contract areas in accordance with the Development Route B Design Statement 1MC08-BBV_MSD-EV-RIA-N001-100002.

All Route A material generated that is to be re-used should be tested and screened according to the acceptability criteria (both chemical and physical) for the final placement of the material defined in the MMP Route A Remediation Strategy 1MC08-BBV_MSD-EV-REP-N001-100058. A material management plan (MMP) will be required to determine that material re-used has met the following criteria:

- Protection of human health and the environment
- Suitability for use, without further treatment
- Certainty of use
- Quantity of material

The MMP will require details of the volumes of material generated, volumes to be transferred, and specific testing requirements for this material prior to re-use. A verification report will be required to demonstrate that the MMP has been fully implemented.

11.3.2 Disposal of material

To determine the likely waste class of excavated soils, a waste categorisation exercise was should be undertaken, if offsite disposal of material excavated will occur. Every effort should be taken within the design to minimise volumes of waste, or that material can be re-used in preference to landfill disposal. Where re-use is possible, Made Ground should be tested for contaminants and, where required, remediation/screening should be considered to enable re-use in preference of disposal.

Waste classification is a two-stage process, with the first step comprising a hazard assessment of the soil quality data in line with the guidance set out in the Environment Agency: Guidance on the Classification and Assessment of Waste Technical Guidance WM3 document[xix], to provide the likely List of Waste (LoW) code. Once the hazardous nature of the materials is known, the second step is to assess the potential performance of the materials in a hazardous or inert landfill; this is undertaken by considering the results of Waste Acceptance Criteria (WAC) testing.

Generally, wastes that are classified as hazardous will need to be deposited in a hazardous waste landfill or within a stable non-reactive hazardous waste cell in a non-hazardous waste landfill (depending on the WAC test results). Wastes that are shown not to be hazardous may either be deposited in a non-hazardous waste landfill (for which no WAC tests are required) or as inert waste (which would require confirmation of suitability for this particular waste stream through WAC testing). A formal classification has not been undertaken, since this is beyond the scope of this report.

11.4 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) should be prepared in accordance with the Code of Construction Practice (CoCP)[xx]. The following sections of the CoCP relevant to the management of contamination are as follows:

- 5.12: Pollution incident control and emergency procedures
- 7.2: Measures to reduce potential impacts on air quality
- 7.3: Monitoring of air quality
- 11.2: Measures to reduce potential impacts on geology and soils
- 11.3: Monitoring
- 16.2: Measures to reduce impacts to water resources
- 16.4: Monitoring

Given the proximity of the Site to the Colehill Pool, BBV s attention is drawn towards the CoCP sections relevant to pollution of watercourses. The CEMP should include measures to manage surface water run-off. The CEMP should include Site specific measures to manage surface water run-off, in particular, in relation to piling works (if deemed necessary), and to monitor controlled waters as necessary during the works. If any dewatering activities are proposed for construction, this will need to be completed under a permitted consent as per Section 16 of the CoCP.

11.5 Asbestos Management Plan

A single sample detected asbestos above the trace concentration (see Section 6.4). An asbestos risk assessment is to be provided by an asbestos specialist and to be included as part of this report. At the time of writing this report, the risk assessment was still pending. The document will be added to Appendix G once available.

In addition, prior to the commencement of excavation works an Asbestos Management Plan (AMP) should be provided by BBV. The AMP should also reference the asbestos risk assessment provided by the specialist.

11.6 Unexpected contamination

In advance of construction works a protocol in the form of a 'Watching Brief' for dealing with unexpected contamination should be established and form part of the works method statement. The watching brief would provide guidance to construction workers on how to identify suspected contaminated soil and groundwater and how to respond to it in the immediate term. As part of the process, a contaminated land specialist should be engaged to advise on the requirement for assessment, remediation and/or revisions to the existing remedial approach and liaison with the regulatory authorities.

Any further assessment and revisions to this report will need to be agreed with all stakeholders and gain regulatory approval.

11.7 Stockpile Management

No stockpile management is anticipated on Site. However, if materials excavated from hotspots that may be removed off-Site (if ACs are not met for re-use without treatment) will need to be securely stockpiled to minimise the risk of fugitive emissions of leachates to groundwater and surface water. If soil stabilisation remediation is undertaken at the point of material deposition it will need to be preceded by laboratory or field trial data to demonstrate that the stabilisation techniques (cement and additive mixes) are capable of meeting the verification criteria prior to Site deployment. This must also be accompanied by use of chemical risk assessment in accordance with HS2 Technical Standards.

The mixing of hazardous wastes with non-hazardous waste is prohibited under the Hazardous Waste Regulations (2005), unless authorised by a waste permit or registered exemption. The Landfill Regulations 2002 (as amended) require the pre-treatment of waste prior to disposal off-Site to appropriately permitted landfills. Wastes should be strictly segregated into hazardous, hazardous non-reactive, non-hazardous, and inert waste streams. Sufficient laboratory testing should be undertaken to ensure that waste is classified correctly and is assigned the correct European Waste Catalogue (EWC) code.

11.8 Unexploded ordnance (UXO)

Any works undertaken at the Site must be undertaken following UXO guidance measures. The review of the regional Unexploded Bomb (UXB) Risk Map available interpreted the Zetica UXO Desk Study[xxi], indicated the Site to be located within a Low risk area from unexploded ordnance. Low risk areas are defined as "Tolerable to the client as engineering activity need not alter if UXO related procedures and controls are strictly adhered to". The report recommends a UXO Awareness Briefing to accompany the works.

11.9 Existing Utilities

During ground works caution should be taken to avoid damaging underground services on Site if present. A minimum safe working distance from services are required, and safe distances should be confirmed with the utility provides. As a standard the following should be taken into consideration:

- Excavations and drillings should not be undertaken within 15m to a gas main. However, it may be possible to minimize the safety distance to 3m of the pipeline if the owner/operator supervisor is present on-Site during earthworks.
- To avoid any unexpected risk when working near sewers (and water pipes), service plans from relevant water and sewer companies and the use of a pipe locator (where viable) should be considered. It is recommended that a safe distance of 4.0m should be considered. Normally, a

low risk is anticipated for construction personnel working near sewers and water pipes, however, the disruption to services and the cost of the damage should be avoided.

- Live electrical cables should be made dead if possible. If there is not an alternative option, agreement of safe methods of excavation with the cable owners should be made. Excavation should not be carried out within 5.0m of a high voltage electricity cable without contacting the provider. Also, it is recommended that the provider company should be contacted when working within 10m of an overhead power lines, including pylons.
- Safe distance of work from railways are anticipated to be 4.0m with supervision.

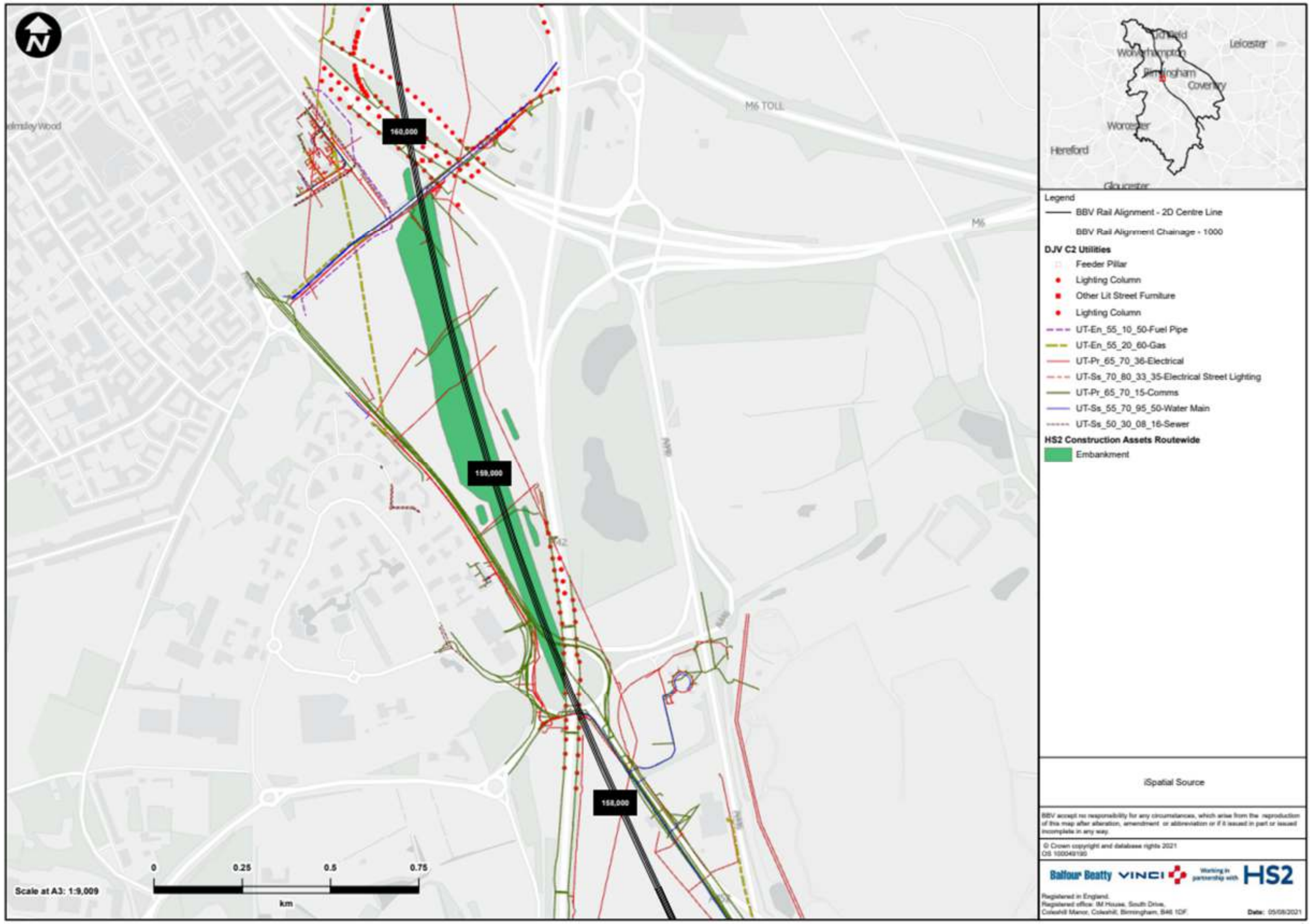
A report on utility services coordination requirements (Detailed Design – Utilities: 1MC09-BBV_MSD-UT-DMB-NS04_NL10-164400) has been produced to be used during the detailed design phase for HS2 Lot N1 and N2. Any utility service management on Site should also be undertaken with reference to the document.

A plan of the existing below ground utilities including telecommunications, sewers, water mains, electricity and gas present on Site are shown in Schematic 10. However, this figure should not be relied upon for design or any intrusive works.

It should be noted that there could be unmanaged or undetected utilities present at the Site. Moreover, caution is required when designing intrusive investigation as the location of utilities and services may not be as indicated on plans.

To manage the risk associated with encountering services it is understood that BBV are currently in the process of completing utility surveys at all assets including the Site.

Schematic 10 Utility services



11.10 Decommissioning of redundant boreholes

Boreholes completed as groundwater/gas monitoring wells will become redundant and unserviceable once the construction works are undertaken. As such, well installations will need to be decommissioned to ensure that they do not act as conduits for the movement of contamination. Decommissioning should be undertaken with reference to the following documents:

- Environment Agency (2006): Guidance on the design and installation of groundwater quality monitoring points. Science Report SC020093. Section 5.[xxii]
- Environment Agency (2012): Good practice for decommissioning redundant boreholes and wells. Reference: LIT 6478 / 657_12[xxiii]. This document is included in Appendix I.

11.11 Invasive species

No Invasive Non-Native Species (INNS) are anticipated to be present on Site and/or within close proximity to the Site boundary. If any INNS are encountered during ground works, it should be managed and removed in accordance with the EWC biosecurity Invasive Non-Native Species (INNS) Plan.

11.12 Foundation works risk assessment

A foundation works risk assessment (FWRA) will be undertaken to assess the risks of piling at the Site. If necessary, this will include a gas and groundwater monitoring plan to confirm that piling works do not create any new preferential contaminant pathways.

11.13 Redundant pipe work and tanks

The previous ground investigation did not encounter any underground storage tanks (USTs) or pipework. During future Site works if any unexpected USTs are encountered, a contaminated land specialist should be engaged to assess the potential risks associated with the USTs/pipework to human health and environment and, if required prepare a remediation strategy for the safe removal of the underground features to mitigate risk.

11.14 Verification reporting

As required, a summary of verification reporting requirements is provided in the Table 24.

Table 24: Verification reporting requirements

Verification Report Section	Content
Background information	Names, roles and responsibilities of personnel managing the groundworks.
Investigation	Pre-groundworks verification: • Exploratory holes (logged to BS5930). • Summary of visual and olfactory evidence of contamination (with supporting photographs). • Updated risk assessment produced by a contaminated land specialist to confirm that the CSM presented in this report is correct (if necessary). • Formation inspection.

Verification Report Section	Content
Remediation	Utilities • Plans showing the location of removed utilities and capping of redundant service trenches • Plans showing the location of underground storage tanks and redundant pipework. Records of tank contents chemical testing and tank removal/backfilling details
	Unexpected contamination (if present): • Location of unexpected contamination • Records of regulatory discussion • Ground investigation factual data for areas of unexpected contamination • Contamination conceptual models for unexpected contamination • Summary of updates to report to manage unexpected contamination • Summary of remediation programme
	Invasive Species: • Plan showing areas of any invasive species infestation identified as part of the construction works • Record of measures taken to removal Invasive Species
	Stakeholder Liaison and Health and Safety: • Summary of complaints • Summary of remediation-related environmental and H&S incidents and near misses, and actions taken to address these.
Material Management	Verification Reporting requirements to be determined in MMP.
Final Site condition	Status at completion: • Post remediation contamination conceptual model. • Written statement on post remediation contamination risks. • Health and Safety File including requirements for long term monitoring (if required by updated the report).

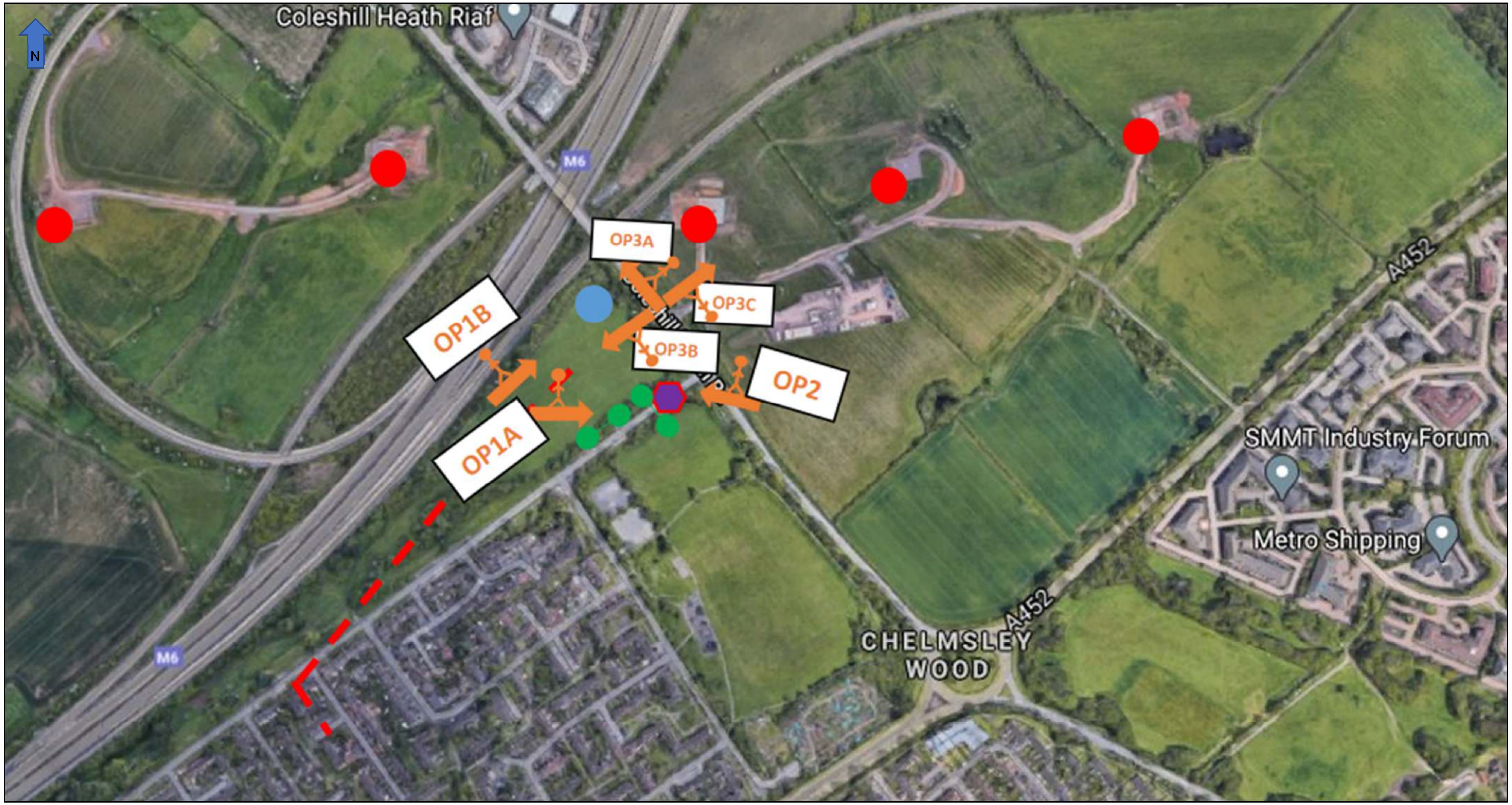
12 ASSUMPTIONS AND LIMITATIONS

This report is subject to the following limitations:

- Excludes assessment of the risks from asbestos, radioactive substances and toxic mould.
- Where gaps in GI data are identified this precludes GQRA for certain contaminant linkages. For these linkages a preliminary qualitative risk assessment has been undertaken based on available desk-based information.
- In certain areas of the assessment we have relied upon information from draft and preliminary GI factual reports. A review has been conducted on this data to check its integrity, and where it contains errors and inconsistencies it has been excluded from analysis. Where it has been used in our assessment it should be noted that preliminary and draft data may be subject to change following finalisation of the factual reports. This may affect the data interpretation.
- The report should be reviewed following completion of pre-works verification ground investigation to ensure that the conclusions remain valid.
- Should the development proposals detailed in the Design Element Statement or the ground investigation data upon which the risk assessment in this report change then the conclusions and recommendations provided in this report should be reviewed to ensure that they remain valid.
- Responsibility for risk assessment and remediation/mitigation measures to address contamination risks specifically associated with temporary works rests with the temporary works designer, BBV and is outside the scope of this report.
- This report is based only on the existing available data. Further ground investigation is proposed to assess the ground conditions and potential risk posed to human health and to the environment. Ground investigation should collect additional soil, leachate and groundwater samples. A review and an update of this report should be carried out when new data is received in which the conclusion of the assessment presented in this report could change following further Site data interpretation.
- Please refer to our disclaimer in Appendix I for general limitations.

Appendix A Site Walkover

Map 21: Site walkover (sheet 1-4)



Map 22: Site walkover (sheet 2-4)

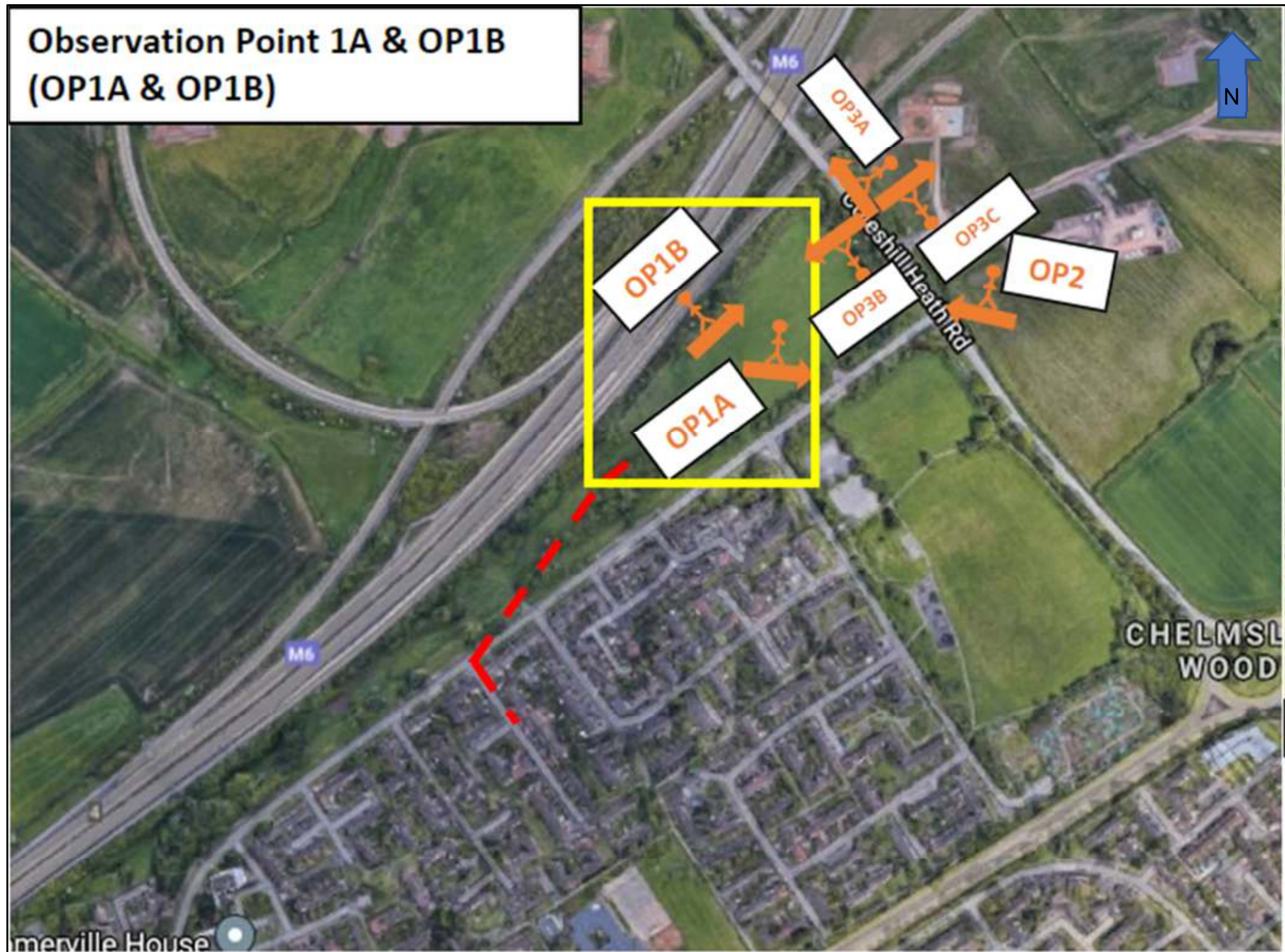


Photo OP1A.1


Photo OP1A.2


Photo OP1B.1


Photo OP1B.2

Observations:

OP1A.1: Esso HP Oil Pipeline (52.477758, -1.717745). Black arrow (indicated by a red circle) on marker post indicates pipeline is running West-South West (W-SW).
OP1A.2: Made ground exposed in a small bund running parallel to Yorkminster Drive (52.4782030, -1.7182030). Description - MADE GROUND: Reddish brown, gravelly, clayey SILT. Gravel is rounded of quartzite and mudstone. Fragments of brick and tarmacadam also present.

OP1B.1 and OP1B.2: Nearby field and highways embankment (Made Ground) (52.478160, -1.716503). OHL visible, assumed to be in new location due to EWC utilities diversion.

Map 23: Site walkover (sheet 3-4)

Observation Point 2 (OP2)

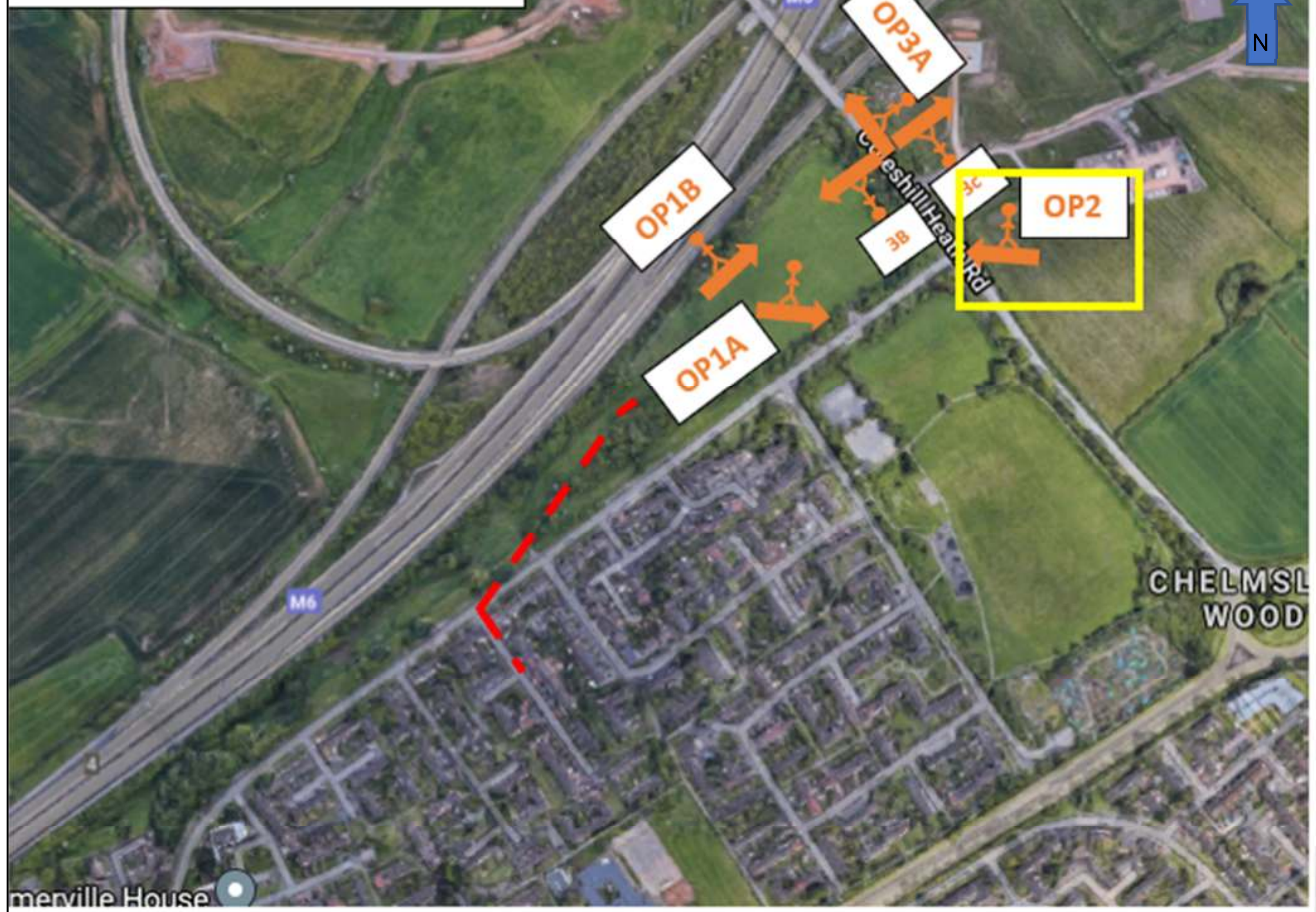


Photo OP2.1

Photo OP2.2

Photo OP2.3.

Photo OP2.4

Observations:

OP2.1: Esso HP Oil Pipeline on the corner of Coleshill Heath Rd and Yorkminster Drive (52.4775295, -1.7174935). Black arrow on marker post indicates pipe is running WSW along tree line parallel to Yorkminster Drive.
OP2.2: Manhole (52.4775295, -1.7174935), potentially associated with sewage system.
OP2.3 and OP2.4: Nearby land- currently in use as a public football pitch.

Map 24: Site walkover (sheet 4-4)

Observation Point 3A, 3B & 3C (OP3A, OP3B & OP3C)

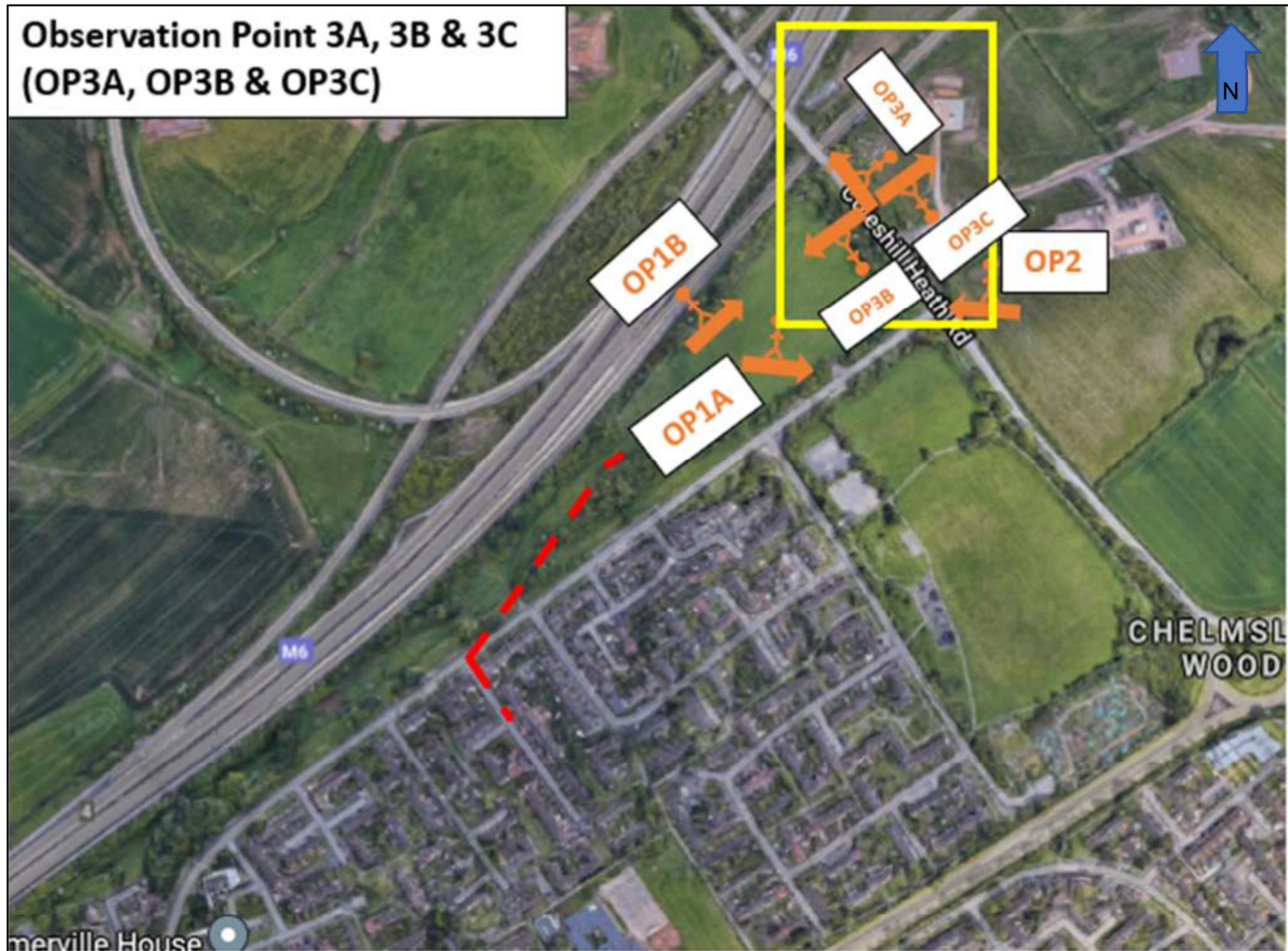



Photo OP3A.1


Photo OP3A.2

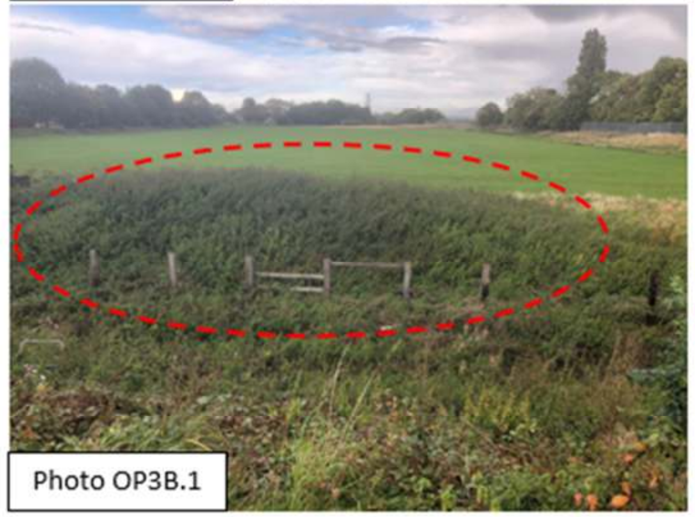


Photo OP3B.1

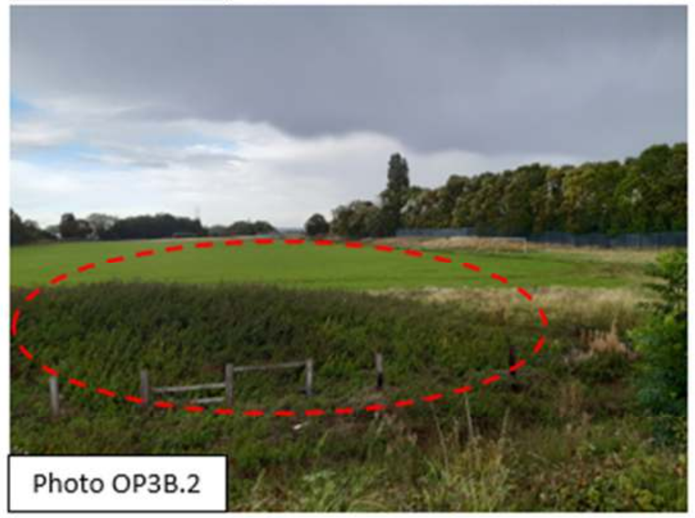


Photo OP3B.2


Photo OP3C.1


Photo OP3C.2

Observations:

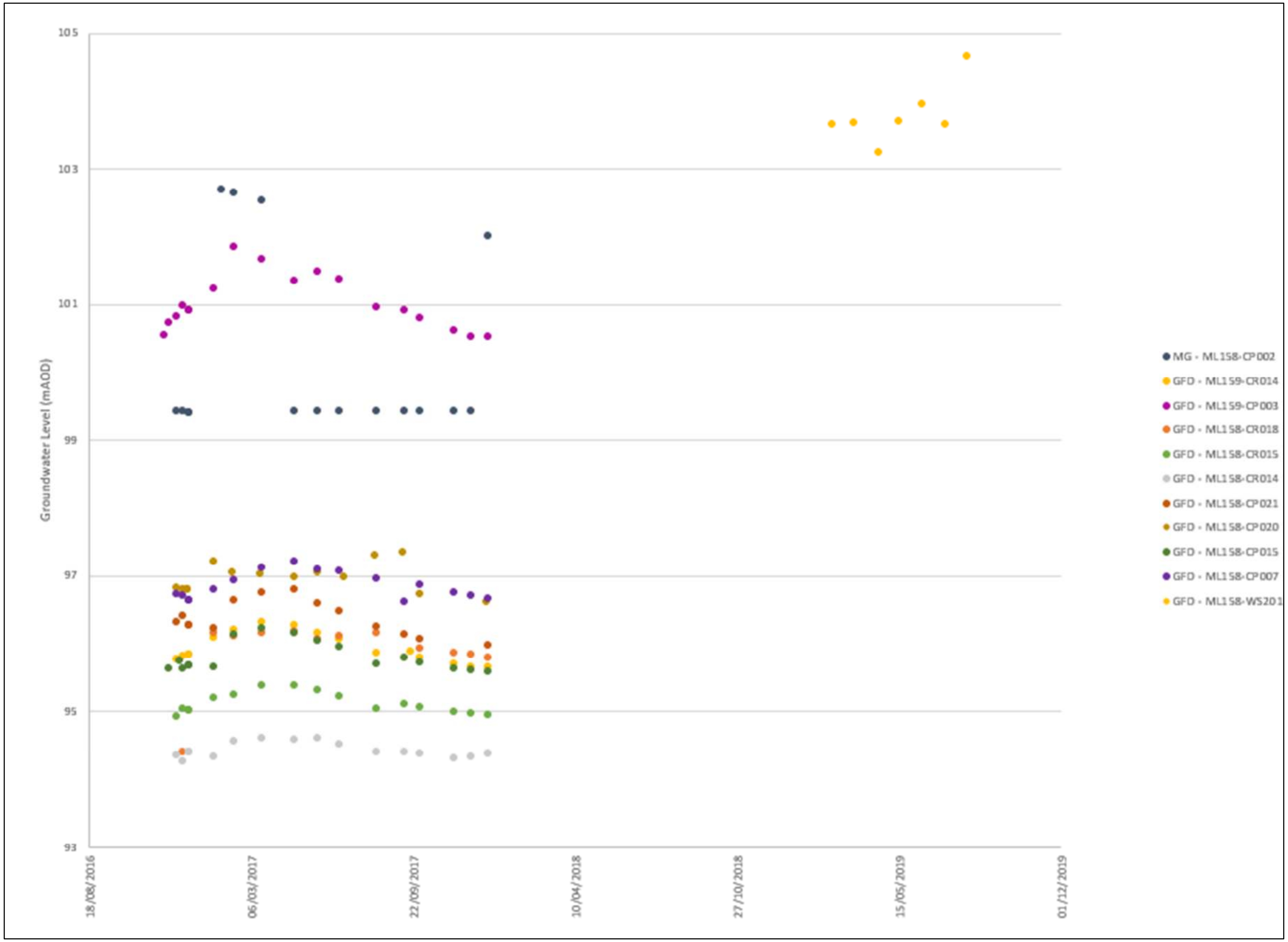
OP3A.1 and OP3A.2: Coleshill Heath Road and its associated highways embankment (52.478002, -1.716320). Made ground, slopes are vegetated. Slope angle appears to be potentially greater than 1V:2H.

OP3B.1 and OP3B.2: Made Ground (vegetated, encircled in red on the photos), appears to be associated with Coleshill Heath Road.

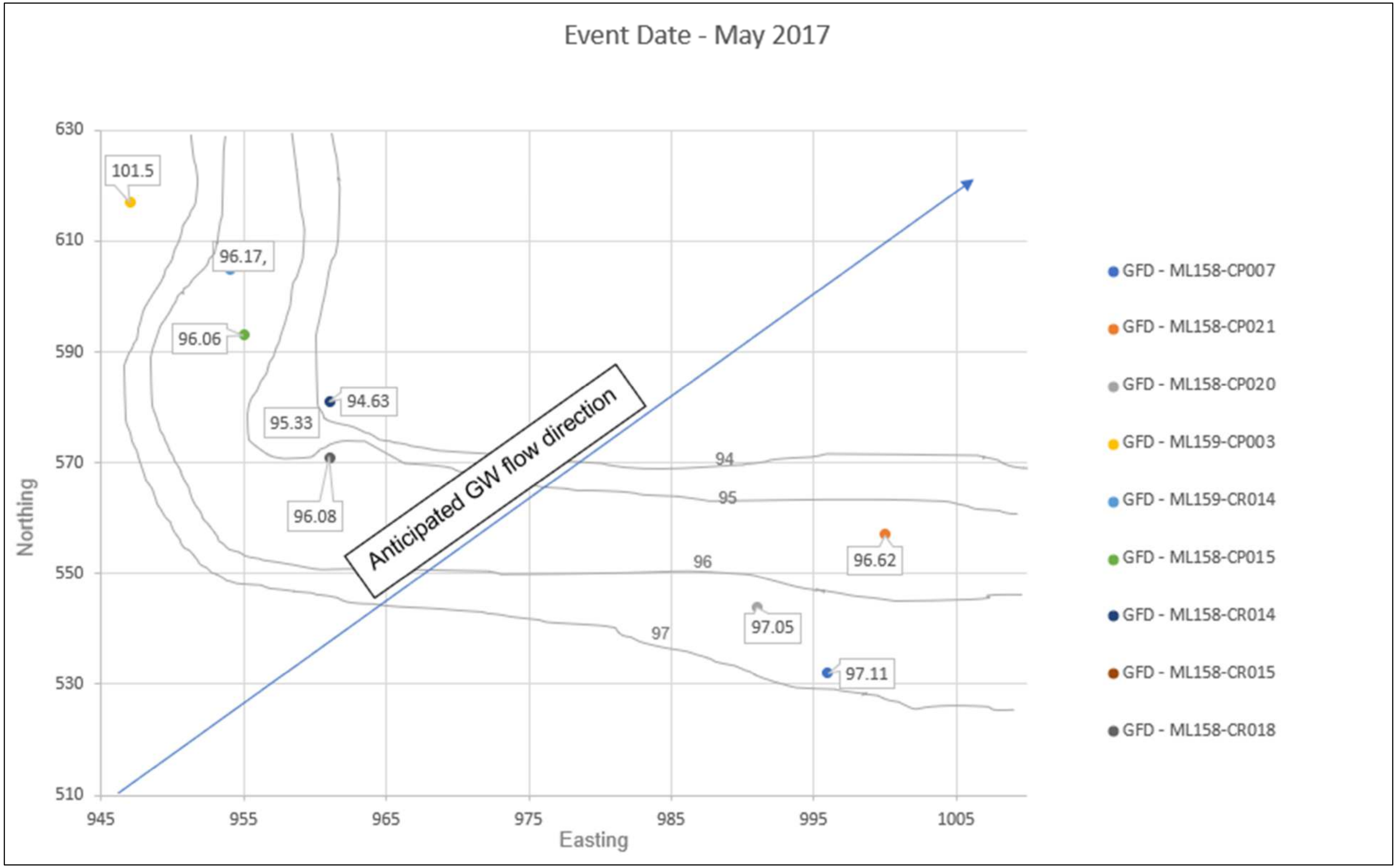
OP3C.1 and OPC3.2: EWC work zone (Excalon), restricted access to Pool Wood Embankment area. OHL's visible and appear to be in new location following EWC utility diversions.

Appendix B Hydrographs for Pool Wood Embankment

Schematic 11: Hydrograph for all monitoring points screened up to April 2021



Schematic 12: Inferred groundwater plot for the superficial deposits



Appendix C Qualitative Risk Assessment Definitions

The qualitative risk summaries for non-controlled waters are derived from the Environmental Statement Volume 5, Technical Appendices, Scope and methodology Report Addendum (CT-001-000/2), Annex F, (HS2, 2013)

Table G.1: Classification of probability

Classification	Definition of the Probability of Harm/Pollution Occurring
High Likelihood	The contaminant linkage exists and it is very likely to occur in the short term, and/or will almost inevitably be realised in the long term, and/or there is current evidence of it being realised.
Likely	The source, pathway and receptor exist for the contaminant linkage and it is probable that this linkage will occur. Circumstances are such that realisation of the linkage is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	The source, pathway and receptor exist and it is possible that it could occur. Circumstances are such that realisation of the linkage is by no means certain in the long term and less likely in the short term.
Unlikely	The source, pathway and receptor exist for the contaminant linkage but it is improbable that it will be realised even in the long term.

Table D.2: Classification of consequence (non-controlled water receptors)

Classification	Definition of Consequence
Human Health Receptors – Site End Users	
Severe	Acute damage to human health based on the potential effects on the critical human health receptor.
Medium	Chronic damage to human health based on the potential effects on the critical human health receptor.
Minor	Minimal short- term effects on human health based on the potential effects on the critical human health receptor.
Negligible	No appreciable impact on human health based on the potential effects on the critical human health receptor.
Ecosystem Receptors	
Severe	For sites with designations as follows – Site of Special Scientific Interest, National Nature Reserve, Special Protection Area (and potential sites), Special Area of Conservation (and candidate sites) or Ramsar. Irreversible adverse change in the functioning of the ecological system or any species of special interest that forms part of that system.
Medium	For sites with designations as follows – Site of Special Scientific Interest, National Nature Reserve, Special Protection Area (and potential sites), Special Area of Conservation (and candidate sites) or Ramsar. Substantial adverse change in the functioning of the ecological system or any species of special interest that forms part of that system.
Minor	Harm to ecosystems of a low sensitivity such as sites of local importance. No appreciable harm to ecosystems with statutory designations.
Negligible	Limited harm to ecosystems of low sensitivity such as sites of local importance.
Property Receptors – Buildings, Foundations and Services including the operational HS2 scheme	
Severe	Collapse of a building or structure including the services infrastructure from explosion due to ground gasses.
Medium	Significant damage to a building or structure including the services infrastructure impairing their function.
Minor	Damage to buildings/structures and foundations but not resulting in them being unsafe for occupation. Damage to services but not sufficient to impair their function.
Negligible	No appreciable damage to buildings/structures, foundations and services.
Property Receptors – Grade 1 Agricultural land	
Severe	Substantial loss in the value of crops or domestically-grown produce resulting from disease, death or other physical damage. Death to livestock, domesticated animals or wild animals subject to shooting or fishing rights.
Medium	Substantial diminution in yield of crops or domestically-grown produce resulting from disease, death or other physical damage. Serious disease or other serious physical damage to livestock, domesticated animals or wild animals subject to shooting or fishing rights.
Minor	Harm to crops but not resulting in a substantial loss in value or diminution in yield. Limited harm in terms of disease or other physical damage to livestock, domesticated animals or wild animals subject to shooting or fishing rights.
Negligible	No appreciable harm, or harm to a low sensitivity receptor.

The qualitative risk summaries for controlled waters are derived from HS2 Technical Standard – groundwater protection Document number HS2-HS2-EV-STD-000-000010.

Table D.1: Classification of Probability (Controlled Waters)

Classification	Definition
High likelihood	There is a linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a linkage and all the elements are present and in the right place, which means that it is probably that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Table D.2: Classification of Consequence (Controlled Waters)

Classification	Criteria	Example
Major	Adverse: Loss of an attribute and /or quality and integrity of an attribute	Adverse: Increased flood risk to essential infrastructure, highly or more vulnerable developments; loss of a fishery; decrease in surface water ecological or chemical WFD status or groundwater qualitative or quantitative WFD status
	Beneficial: Creation of new attribute or major improvement in quality of an attribute	Beneficial: Creation of flood plain and decrease in flood risk; increase in productivity or size of fishery; increase in surface water ecological or chemical WFD status; increase in groundwater qualitative or quantitative WFD status.
Moderate	Adverse: Loss of part of an attribute or decrease in integrity of an attribute	Adverse: Increased flood risk to less vulnerable developments; Partial loss of fishery; measurable decrease in surface water ecological or chemical quality or reversible change in the yield or quality of an aquifer, affecting existing users, but not changing any WFD status
	Beneficial: Moderate improvement in quality of an attribute	Beneficial: Measurable increase in surface water quality or in the yield or quality of aquifer benefiting existing users but not changing any WFD status
Minor	Adverse: Some measurable change to the integrity of an attribute	Adverse: Increased flood risk to water compatible development or impact which does not affect existing or any possible future developments; measurable decrease in surface water ecological or chemical quality; decrease in yield or quality of aquifer not affecting existing users or changing any WFD status
	Beneficial: Measurable increase, or reduced risk of negative effect to an attribute	Beneficial: Measurable increase in surface water ecological or chemical quality; increase in yield or quality of aquifer not affecting existing users or changing any WFD status
Negligible	No change to integrity of attribute	Negligible change to flood risk; discharges to watercourse or changes to an aquifer which lead to no change in the attribute's integrity

Table D.3: Comparison of Magnitude of Effect (Consequence) Against Probability

	Consequence			
Probability	**Major**	**Moderate /Medium**	**Minor**	**Negligible**
High likelihood	Very high risk	High risk	Moderate risk	Moderate/low risk
Likely	High risk	Moderate risk	Moderate/low risk	Low risk
Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

Table D.4: Estimation of Risk (All receptors)

Risk	Definition
6 (Very High risk)	There is a high probability that a contaminant linkage could exist between a source and a designated receptor resulting in detriment to the receptor. Investigation and remediation will be required prior to (or as part of) construction. During construction further mitigation and monitoring measures (in accordance with the draft Code of Construction Practice (CoCP)) are likely be required. Such Sites are considered significant.
5 (High Risk)	It is likely that a contaminant linkage exists with potentially a severe affect on designated receptors. Investigation and remediation is very likely to be required. Such Sites are considered significant.
4 (Moderate risk)	It is possible that an effect could arise to a designated receptor through a contaminant linkage. However, the effect is most likely to be moderate to minor. Further investigative work is likely to be required to clarify the risk. Some remediation works may be required. Such Sites may be considered significant.
3 (Moderate / Low Risk)	It is possible that a contaminant linkage could exist, but if it does, any effects would normally be minor. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.
2 (Low risk)	It is a low possibility that a contaminant linkage could exist. However, should there be a linkage the effect to the receptor (with regards to controlled waters) would normally be minor or negligible and the effect on human health would be negligible. No investigation or remedial works are likely to be required.
1 (Very Low risk)	It is unlikely that a contaminant linkage could exist between a source and a designated receptor.

Appendix D Methodologies employed for the risk assessment

Table 25: Methodology employed for the risk assessment

Geo-environmental risk	Methodology employed
Risks from Non-Asbestos Soil Contaminants to On-Site Commercial / Public Open Space Receptors	Risks to human health were assessed using Generic Screening Criteria (GSC) using the SP1010[xxiv] framework developed by Contaminated Land: Applications in Real Environments (CL:AIRE) on behalf of the Department for Environment, Food and Rural Affairs (DEFRA), and the Environment Agency Contaminated Land Exposure Assessment (CLEA)[xxv,xxvi] Framework. The commercial and public open space park (PoS(park)) end uses have been used. Where available, the GSC are the Category 4 Screening Levels (C4SLs) published in the SP1010 policy companion document by DEFRA (2014). C4SLs are based on Low Level of Toxicological Concern "*which represents the estimated concentration of a contaminant [expressed as a daily intake] that poses a low risk to human health*". This is regarded as far below an intake level that would represent a Significant Possibility of Significant Harm (SPOSH) to human health. C4SLs have been published for a limited number of determinants. Where no C4SL exists, Suitable for Use Values (S4ULs) published by Land Quality Management Ltd (LQM)[xxvii], were used as GSCs. These sets of GSCs are based on Health Criteria Values (HCVs) representing a minimal / tolerable level of risk. This is regarded as far below an intake level that would represent a SPOSH to human health. Organic GSCs have been developed by Mott MacDonald for the PoS(park) and commercial land uses using CLEA v1.071 adopting low level of toxicological concern (LLTCs) (where available) or published HCVs and pathway and receptor parameters approved by DEFRA under the SP1010 framework. All GSCs assume Soil Organic Matter (SOM) contents of 1% representing a typical lower bound for this parameter. The human health risk posed by the additive total petroleum hydrocarbons (TPH) concentrations in samples was assessed in accordance with Environment Agency guidelines[xxviii] by calculating an individual Hazard Quotient (HQ) for each TPH fraction (TPH band concentration divided by the GSC) and then summing the HQ to derive a Hazard Index (HI).
Risks from Non-Asbestos Soil Contaminants to Construction and Maintenance Personnel	The GSC used to assess the risk to human health is designed to assess the risk from long term exposure rather than the acute risks which would typically be faced by construction and maintenance personnel. Risks have therefore been assessed on a qualitative basis.
Risks from Permanent Ground Gases to On-Site and Off-Site Receptors	To assess the risk from ground gas to building occupants, the gas monitoring results have been interpreted and assessed in accordance with British Standard (BS) 8485:2015 (+A1:2019)[xxix] and Construction Industry Research and Information Association (CIRIA) C665[xxx]. Radon risks were assessed using publicly accessible radon maps[xxxi].
Risks from Ground Gases to Construction and Maintenance Workers	The gas monitoring results from the monitoring boreholes have been compared against the occupational exposure limits (OELs) published by the Health and Safety England (HSE)[xxxii].
Risks from Flammable/ Explosive Ground Gases to Property	To assess the risk from flammable/explosive ground gas to building occupants, the gas monitoring results have been interpreted and assessed in accordance with BS8485:2015 (+A1:2019)[xxxiii].
Risks from Groundwater Vapours to On-Site and Off-Site Receptors	Risks from volatile contaminants in groundwater to on-Site commercial, public open spaces and off-Site commercial and residential receptors have been assessed using the generic acceptance criteria for groundwater vapour (GAC_{gwvap}) developed by the Society of Brownfield Risk Assessment (SoBRA)[xxxiv].
Risks from Soils to Controlled Water Receptors	Risks from contaminants leached from soils to controlled water receptors (groundwater and surface water) were assessed following the procedures set out in, notably, Groundwater Protection Guidance[xxxv], and Remedial Targets Methodology[xxxvi]. Risks from soils to on-Site and off-Site controlled water receptors comprise contaminants, whose concentrations exceed the relevant generic assessment criteria, entrained in water which has been leached from contaminated soils. Laboratory soil leachate data is compared with Drinking Water Standards (DWS) to protect groundwater (Principal and Secondary aquifers) and Environmental Quality Standards (EQS) for fresh water, to protect surface waters. The rivers and lakes metal bioavailability tool (M-BAT) has been used for determining Site specific $EQS_{bioavailable}$ for copper, zinc, manganese, lead, and nickel[xxxvii]. This was done using a downstream surface water monitoring point. The cadmium EQS (which is based on hardness) was also determined from the downstream surface water monitoring point. Data was accessed from the Environment Agency's water quality data archive[xxxviii], specifically point MD-64496050. A high-level assessment of the organic contaminants recorded in the soil data (both TPH and polycyclic aromatic hydrocarbons, PAH) has been performed to establish, on a semi-quantitative basis the risks from organic soils to controlled waters.
Risks from Existing Groundwater Pollution	Risks from existing groundwater pollution were assessed following the procedures set out in Groundwater Protection Guidance[xxxv] and Remedial Targets Methodology[xxxvi]. Risks from existing groundwater pollution to on-Site and off-Site Controlled Water Receptors, includes both groundwaters and surface waters. For this assessment, groundwater pollution is defined as an exceedance of the generic assessment criteria by contaminant concentrations in groundwater samples. Laboratory groundwater data has been compared with Drinking Water Standards (DWS) to protect groundwater (Principal and Secondary aquifers) and Environmental Quality Standards (EQS) for fresh water, to protect surface waters. The rivers and lakes metal bioavailability tool (M-BAT) has been used for determining Site specific $EQS_{bioavailable}$ for copper, zinc, manganese, lead, and nickel[xxxvii]. This was done using a downstream surface water monitoring point. The cadmium EQS (which is based on hardness) was also determined from the downstream surface water monitoring point. Data was accessed from the Environment Agency's water quality data archive[xxxviii], specifically point MD-64496050.
Risk from Soils and Groundwater to Property	The aggressive chemical environmental for concrete (ACEC) and design sulphate class (DSC) for each strata type has been determined based on the guidance presented in BRE Special Digest 1:2005[xxxix] Risks to modified water mains were assessed against United Kingdom Water Industry Research (UKWIR) guidance[xl]
Risks from Soils and Groundwater to Ecological Sites	No ecological or geological designated Sites are recorded within the Site and therefore no pollutant linkages are considered to be present.

Appendix E Contamination Data Spreadsheet

ADDED TO PDF

Appendix F ConSim input parameters

The physical and chemical input parameters for ConSim model 1 (soil source) are shown in Table 26 and Table 27.

Table 26: Physical input parameters for ConSim model 1 (soil source)

Parameter	Unit	Distribution	Value	Source of parameter value/ justification
Source				
Lithology	N/A	Made Ground - perched water horizons exist within the strata Typical description: Predominately granular but cohesive Made Ground is also present. Typically described as medium dense reddish brown mottled black and brown slightly silty fine to coarse SAND and subangular to rounded fine to coarse GRAVEL of mixed lithologies including flint and quartzite.		
Dry bulk density of source zone	g/cm³	Triangular	1.52, 1.60, 1.70	Minimum, mean and maximum values of the dry bulk density values of Made Ground. Data taken from compaction tests in the Made Ground from BD162-TP003 (similar Made Ground description; dark brown, slightly gravelly, fine and medium SAND with some clay pockets. Gravel is subangular and subrounded of quartzite with occasional brick, plastic and timber fragments.). No compaction tests were carried out on boreholes within MG at the site. Also, the GIR Report E2, suggests that due to the large variety of MG across the area, specific site parameters should be considered.
Calculate porosities?	-	-	No	
Air filled soil porosity	fraction	Triangular	0.014, 0.12, 0.232	Minimum, mean, and maximum values calculated from the dry bulk density values and moisture content values of the Made Ground at BD162-TP003. No compaction tests were carried out from boreholes within the Site.
Water filled soil porosity	fraction	Triangular	0.195, 0.29, 0.382	Minimum, mean, and maximum values calculated from the dry bulk density values and moisture content values of the Made Ground at BD162-TP003. No compaction tests were carried out from boreholes within the Site.
Thickness of source	m	Triangular	0.20, 3.22, 5.65	Minimum and maximum thickness of Made Ground identified at the site within the brick works area.
Length source	m	Single	142.5	95% of the approximate length of the source (most contaminated part of the Site)
Width source	M	Single	133	95% of the approximate width of the source (most contaminated part of the Site)
Area source	m2	Single	18,952.5	Approximate area of the source (most contaminated part of the Site)
Fraction of organic carbon (in source soil)	%	Log triangular	1.46, 8.36, 14	Data taken the Made Ground deposits across Pool Wood Emb. Statistical analysis showed that 75% of data was <14%, therefore minimum, mean, and maximum values were calculated from this dataset.
Declining source?	-	No		Conservative approach
Pathway (unsaturated pathway) (level 2)				
Lithology	N/A	Glaciofluvial deposits - pathway and aquifer is the Glaciofluvial paleochannel which is hydraulically connected to Coleshill Pool (principal receptor). Typical description: mixture of granular and cohesive. For a more robust assessment granular pathway has been considered.		
Infiltration	mm/yr	Triangular	47, 69, 101	Minimum, arithmetic mean, and maximum of Rainfall – slope runoff coefficient - actual evaporation: Rainfall - determined from UK hydrometric register and CEH[xli] Actual evaporation - determined from Hess (2010)[xlii], Estimating green water footprints in a temperate environment As the contaminated areas will largely be located beneath landscaping bunds and embankments, it is considered appropriate to add a slope runoff factor. The highways slope runoff coefficient (as given in DMRB) is 16%. As a conservative measure 50% of this value (8%) will be applied to the minimum rainfall value, 16% to the maximum value and midpoint of 12% to the mean rainfall value. This is in line with slope rainfall coefficients from US sources.
Overall unsaturated zone thickness	m	Triangular	0.38, 1.52, 2.9	Average groundwater levels observed in the Glaciofluvial deposits minus the minimum and maximum Made Ground thickness. Unsaturated zone thickness calculated from the bottom of the Made Ground until the groundwater depths observed in the Glaciofluvial deposits.

Parameter	Unit	Distribution	Value	Source of parameter value/ justification
Fraction of organic carbon (in pathway soil)	%	Triangular	0.13, 0.68, 1.3	Data taken from Sublot 5 and 6 geo-environmental summaries to provide a representative data set. This is for the Glaciofluvial deposits within the Sublot 5 and 6 area.
Pathway				
Thickness of unsaturated zone	m	Triangular	0.38, 1.52, 2.9	Average groundwater levels observed in the Glaciofluvial deposits minus the minimum and maximum Made Ground thickness. Unsaturated zone thickness calculated from the bottom of the Made Ground until the groundwater depths observed in the Glaciofluvial deposits.
Water filled porosity	fraction	Triangular	0.006, 0.15, 0.448	Minimum, Mean, and Maximum values calculated from the dry bulk density values and moisture content values of the Glaciofluvial Deposits data from GIR Report E2.
Dry bulk density	g/cm³	Triangular	1.99, 2.6, 2.94	Minimum, mean and maximum values of the dry bulk density values of GFD. Data taken the GIR Report E2.
Unsaturated hydraulic conductivity	m/s	Triangular	2.4x10-8, 3.7 x10-06, 2.5x10-5	In-situ permeability tests of the GFD. Taken from Permeability Statistics for HS2 N1/N2 (document number:1MC08-BBV_MSD-GT-CAL-N001-100209).
Vertical dispersivity	m	Triangular	0.038, 0.152, 0.290	10% of unconfined thickness
Retarded travel in the UZ?	-	-	Yes	Model due to retardation will happen within the aquifer itself
Biodegradation in the UZ?	-	-	Yes	Aquifer is unconfined and well aerated, allowing for biodegradation to occur
Flow model	-	-	Porous medium	Sandy gravel unsaturated zone - flow model will be porous medium
Aquifer Pathway (Level 3)				
Thickness	m	Single	8	Glaciofluvial deposits is around 9.5m thick, with the top 1.52m (average) being unsaturated, therefore a saturated thickness of 8.00m has been used.
Dry bulk density	g/cm³	Triangular	1.99, 2.6, 2.94	Minimum, mean and maximum values of the dry bulk density taken the GIR Report E2.
Mixing Zone thickness	N/A	N/A	Calculated	
Hydraulic conductivity	m/s	Triangular	0.000000024, 3.71711111111111E-06, 0.000025	In-situ permeability tests of the GFD. Taken from Permeability Statistics for HS2 N1/N2 (document number:1MC08-BBV_MSD-GT-CAL-N001-100209).
Effective porosity	fraction	Uniform	0.18 - 0.43	Literature Rev
Hydraulic gradient	fraction	Single	0.019318182	Calculated from average groundwater levels around the brick works.
Groundwater flow direction	degrees	Single	90	South-east travel to Coleshill Pool
Longitudinal dispersivity	m	Single	5	10% of distance to 50m compliance point
Lateral dispersivity	m	Single	0.5	1% of distance to 50m compliance point
Retarded travel in the Aquifer?	N/A	N/A	Yes	Retardation is believed to occur within the aquifer
Fraction of organic carbon (in aquifer)	%	Triangular	0.13, 0.68, 1.3	Data taken from Sublot 5 and 6 geo-environmental summaries to provide a representative data set. This is for the Glaciofluvial deposits within the Sublot 5 and 6 area.

Parameter	Unit	Distribution	Value	Source of parameter value/ justification
Biodegradation in the Aquifer?	N/A	N/A	Yes	Aquifer is unconfined and well aerated, allowing for biodegradation to occur
Receptors				
Base of the unsaturated zone	N/A	N/A	Base of the UZ	Automatic ConSim compliance point (Level 2 analysis)
Receptor 1	N/A	N/A	5m compliance point	Automatic ConSim compliance point
Receptor 2	N/A	N/A	10m compliance point	Receptor to highlight minimal risks to underlying Glaciofluvial deposits (Level 3 analysis)
Receptor 3	N/A	N/A	50m compliance point	Additional receptor to protect defined surface waters

Table 27: Chemical input parameters for ConSim model 1 (soil source) and 2 (groundwater source)

Contaminant	Organic carbon to water partition coefficient/partition coefficient (m/lg)	Henry's Law Constant (unitless)	Max solubility (mg/l)	Max solubility (ug/l)	Half Life: (Source and USZ) (years)	Half Life: (Water) (years)
TPH and BTEX						
TPH Ali 5-6	794	33	3.60E+01	3.60E+04	0.04	0.96
TPH Ali 6-8	3981	50	5.4	5400	0.06	0.55
TPH Ali 8-10	31623	8	0.43	430	0.03	0.55
TPH Ali 10-12	251189	120	0.034	34	0.13	0.82
TPH Ali 12-16	5.01E+06	520	0.00076	0.76	2.05	4.11
TPH Ali 16-21	630957345	4900	0.0000025	0.0025	2.71	5.43
TPH Ali 21-35	630957345	4900	0.0000025	0.0025	2.71	5.43
TPH Ali 35-44	630957345.00	4900.00	0.00000250	0.0025	2.71	5.43
TPH Aro 5-7/ Benzene	68	0.23	1800	1800000	0.04	2
TPH Aro 7-8/ Toluene	204	0.115	590	590000	0.06	0.55
TPH Aro 8 -10	1585	0.48	65	65000	0.03	0.34
TPH Aro 10-12	2512	0.14	25	25000	0.13	0.55
TPH Aro 12-16	5012	0.053	5.8	5800	2.05	4.11
TPH Aro 16-21	15849	0.013	0.65	650	2.71	5.43
TPH Aro 21-35	125893	0.001	6.60E-03	6.60E+00	2.71	5.43
TPH Aro 35-44	125893	0.001	6.60E-03	6.60E+00	2.71	5.43
Ethylbenzene	447	0.139	1.80E+02	1.80E+05	0.027	0.62
Xylene	454	0.104	200	200000	0.08	1
PAH						
Anthracene	29512	1.60E-03	4.50E-02	4.50E+01	1.26	2.52
Acenaphthylene	5027	4.66E-03	1.61E+01	1.61E+04	0.164	0.329
Acenaphthene	5027	7.52E-03	3.9	3900	0.279	0.559
Benzo(a)anthracene	176900	4.91E-04	9.40E-03	9.40E+00	1.86	3.73

Contaminant	Organic carbon to water partition coefficient/partition coefficient (m/lg)	Henry's Law Constant (unitless)	Max solubility (mg/l)	Max solubility (ug/l)	Half Life: (Source and USZ) (years)	Half Life: (Water) (years)
Benzo(a)pyrene	128825	0.00000176	0.0038	3.8	1.45	2.9
Benzo(b)fluoranthene	104713	0.00000205	0.002	2	1.67	3.34
Benzo(k)fluoranthene	147911	0.00000174	8.00E-04	8.00E-01	5.86	11.7
Benzo(g,h,i)perylene	416869	0.00000236	2.60E-04	2.60E-01	1.78	3.6
Chrysene	180500	2.14E-04	2.00E-03	2.00E+00	2.72	5.48
Di-benzo(a,h)anthracene	1912000	5.76E-06	2.49E-03	2.49E+00	2.58	5.15
Fluorene	9160	3.93E-03	1.69	1690	0.164	0.329
Fluoranthene	18197	0.0000629	0.23	230	1.21	2.41
Indeno(1,2,3-cd)pyrene	87069	2.05E-06	2.00E-04	2.00E-01	2	4
Naphthalene	646	0.00662	19	19000	0.13	0.71
Phenanthrene	16690	1.73E-03	1.15	1150	0.548	1.1
Pyrene	16218	4.87E-04	1.35E-01	1.35E+02	5.2	10.4
Styrene	446	0.112	3.10E+02	3.10E+05	0.08	0.58
Metals						
Arsenic	500	0	10000000	10000000000	10000000	10000000
Antimony	45	0	10000000	10000000000	10000000	10000000
Boron	10	0	10000000	10000000000	10000000	10000000
Cadmium	100	0	10000000	10000000000	10000000	10000000
Chromium (III)	4800	0	10000000	10000000000	10000000	10000000
Chromium (VI)	19	0	10000000	10000000000	10000000	10000000
Copper	35	0	10000000	10000000000	10000000	10000000
Iron	25	0	10000000	10000000000	10000000	10000000
Mercury	500	0	10000000	10000000000	10000000	10000000
Nickel	500	0	10000000	10000000000	10000000	10000000
Lead	900	0	10000000	10000000000	10000000	10000000
Manganese	65	0	10000000	10000000000	10000000	10000000
Selenium	5	0	10000000	10000000000	10000000	10000000
Vanadium	12.6	0	10000000	10000000000	10000000	10000000
Zinc	38	0	10000000	10000000000	10000000	10000000
Other contaminants						
Ammoniacal Nitrogen	0.45		10000000	10000000000	10	10
Cresol	307	0.0000253	9.07E+03	9.07E+06	0.079	0.13
Phenol	83	0.00000835	8.41E+04	8.41E+07	0.027	0.27
Trichloroethene	141	0.187	1370	1370000	1	4.5
Tetrachloroethene	269	3.16E-01	2.25E+02	2.25E+05	1	2
1,4-Dichlorobenzene	708	0.047	5.12E+01	5.12E+04	0.5	1
1,2-Dichloroethene	39.6	0.167	3.50E+03	3.50E+06	0.5	7.91
1,2-Dichlorobenzene	692	0.0338	1.33E+02	1.33E+05	0.5	1
Hexachlorobutadiene	10965	0.155	4.80E+00	4.80E+03	0.5	1
Trichlorobenzenes (Koc, and H are avg for 123, 124 and 135 TCB)	2497	0.0307	4.14E+01	4.14E+04	0.5	1
Chloroform	50	7.65E-02	8.95E+03	8.95E+06	0.5	5
Bis(2-ethylhexyl)phthalate	120000	0.000011	0.003 & 0.27 (uniform)	3 & 270	-	0.82 & 12.8
Inorganics						
Sulphate	1	0	10000000	10000000000	10000000	10000000
Nitrate	1			0		
Environment Agency/Atkins, 2003. Review of the Fate and Transport of Selected Contaminants in the Soil Environment. Tables 2.4, 3.2 & 4.3.[xliii]						

Contaminant	Organic carbon to water partition coefficient/partition coefficient (m/lg)	Henry's Law Constant (unitless)	Max solubility (mg/l)	Max solubility (ug/l)	Half Life: (Source and USZ) (years)	Half Life: (Water) (years)
Total Petroleum Hydrocarbon Criteria Working Group Series (TPHCWG), 1999. Human Health Risk-Based Evaluation of Petroleum Release Sites: Implementing the Working Group Approach, Volume 5, Table 1.[xliv]						
RAIS database (Risk Assessment Information System, http://rais.ornl.gov/tools/)[xlv]						
Howard et al. 1991. Environmental Degradation Rates. Max values. [xlvi]						
Buss *et al.*, 2004. A Review of Ammonium Attenuation in Soil and Groundwater. QJEGH v37. Mid point kd values chosen for clean sand and gravel. Half-life is maximum for strata with mean pore size of >1um assuming aerobic conditions[xlvii]						
Environment Agency 2008. Compilation of data for priority organic pollutants for derivation of Soil Guideline Values [xlviii]						
See table below						
Nathanail et al 2015: "The LQM / CIEH S4ULs for Human Health Risk Assessment ", Copyright Land Quality management Limited reproduced with permission: Publication No. S4UL3389[xlix]						
Agency for Toxic Substances and Disease Registry webSite[l]						
Environment Agency (2002): Research & Development technical Report P2-228/TR[li]						

Soil half-lives for Total Petroleum hydrocarbons

TPH fraction	***Soil half Lives***
Aliphatic C5-6	Maximum soil half-life for Benzene (C6): 16 days: Howard et al. 1991[xlvi]
Aliphatic C6-8	Maximum soil half-life for Toluene (C7): 22 days: Howard et al. 1991[xlvi]
Aliphatic C8-10	Maximum soil half live for Ethylbenzene (C8) and Xylene (C8): 10 days: Howard et al. 1991[xlvi]
Aliphatic C10-12	Maximum aerobic half live for Naphthalene (C10): 48 days: Howard et al. 1991[xlvi]
Aliphatic C12-16	Average of maximum soil half-lives for Pyrene (C16), Anthracene (C14), Phenanthrene (C14) and Fluoranthene (C16): 749 days (Howard *et al*, 1991)[xlvi]
Aliphatic C16-21	Average of maximum aerobic half-lives for Benzo(a)anthracene (C18), Chrysene (C18), Benzo(a)pyrene (C20), Benzo(k)Fluoranthene (C20) and Benzo(b)Fluoranthene (C20): 989 days (Howard *et al*, 1991)[xlvi]
Aromatic C8-10	Maximum soil half live for Ethylbenzene (C8) and Xylene (C8): 10 days: Howard et al. 1991[xlvi]
Aromatic C10-12	Maximum aerobic half live for Naphthalene (C10): 48 days: Howard et al. 1991[xlvi]
Aromatic C12-16	Average of maximum aerobic half-lives for Pyrene (C16), Anthracene (C14), Phenanthrene (C14) and Fluoranthene (C16): 749 days (Howard *et al*, 1991)[xlvi]
Aromatic C16-21	Average of maximum aerobic half-lives for Benzo(a)anthracene (C18), Chrysene (C18), Benzo(a)pyrene (C20), Benzo(k)Fluoranthene (C20) and Benzo(b)Fluoranthene (C20): 989 days (Howard *et al*, 1991)[xlvi]
Aromatic C21-35	Average of maximum aerobic half-lives for Benzo(a)anthracene (C18), Chrysene (C18), Benzo(a)pyrene (C20), Benzo(k)Fluoranthene (C20) and Benzo(b)Fluoranthene (C20): 989 days (Howard *et al*, 1991)[xlvi]

Appendix G Asbetos Management Plan

TO BE ADDED ONCE RECEIVED

Appendix H Proposed geo-environmental ground investigation

Table 28: Proposed geo-environmental ground investigation

Borehole ID	Depth (m)	Rationale for Ground Investigation	Laboratory Analytical requirements*	Monitoring requirements	In-situ testing	Installation details**
ML158-CR408	20	Near to ES LQ 24-46: Birmingham Business Park (potential land quality Site)	Standard soils, standard leachate and groundwater (Suites I, 12). INDICATIVE: DJV Environmental scientist to approve test schedule. TPH to TPHCWG bands with speciated split	3 x rounds of groundwater level and quality sampling; Gas (6 visits/3 months)	PID; Permeability; Groundwater Temp, EC, DO, Redox, pH	Superficial/Mercia Mudstone Group. Response zones not to cross multiple horizons of differing permeability
ML158-RC401	20	Near to ES LQ 24-46: Birmingham Business Park (potential land quality Site)	Standard soils, Standard leachate and Groundwater (Suites I, 12). INDICATIVE: DJV Environmental scientist to approve test schedule. TPH to TPHCWG bands with speciated split	3 rounds of groundwater level and quality sampling; Gas (6 visits/3 months)	PID; Permeability; Groundwater Temp, EC, DO, Redox, pH	Superficial/Mercia Mudstone Group. Response zones not to cross multiple horizons of differing permeability
ML158-CR406	20	Near to: 24-44: Brackenlands Farm Landfill	Standard soils, standard leachate and groundwater (Suites I, 12). INDICATIVE: DJV Environmental scientist to approve test schedule. TPH to TPHCWG bands with speciated split	3 rounds of groundwater level and quality sampling; Gas (6 visits/3 months)	PID; Permeability; Groundwater Temp, EC, DO, Redox, pH	Superficals / Mercia Mudstone Group. Response zones not to cross multiple horizons of differing permeability
ML158-CR405	30	Near to: 24-44: Brackenlands Farm Landfill	Standard soils, standard leachate and groundwater (Suites I, 12). INDICATIVE: DJV Environmental scientist to approve test schedule. TPH to TPHCWG bands with speciated split	3 rounds of groundwater level and quality sampling; Gas (6 visits/3 months)	PID and Permeability	Superficals / Mercia Mudstone Group. Response zones not to cross multiple horizons of differing permeability
ML158-CP419	10	-	Laboratory analysis for: pH, EC, Major ions (Calcium, Magnesium, Sodium, Potassium, Chloride, Sulphate, Alkalinity). Suspended Solids	Weekly for first 4 weeks then Monthly to December 2022	-	GW: Glaciofluvial and lacustrine
ML159-CP413	10	-	Laboratory analysis for: pH, EC, Major ions (Calcium, Magnesium, Sodium, Potassium, Chloride, Sulphate, Alkalinity). Suspended Solids	Weekly for first 4 weeks then Monthly to December 2022	-	GW: Glaciofluvial and lacustrine
ML159-CP414	10	-	Laboratory analysis for: pH, EC, Major ions (Calcium, Magnesium, Sodium, Potassium, Chloride, Sulphate, Alkalinity). Suspended Solids	Weekly for first 4 weeks then Monthly to December 2022	-	GW: Glaciofluvial and lacustrine

Borehole ID	Depth (m)	Rationale for Ground Investigation	Laboratory Analytical requirements*	Monitoring requirements	In-situ testing	Installation details**
ML159-CP403	-	-	-	Outstanding monitoring - 3 rounds of groundwater level and quality sampling; Gas (6 visits/3 months)	-	-
ML159-CP404	-	-	-	Outstanding monitoring - 3 rounds of groundwater level and quality sampling; Gas (6 visits/3 months)	-	-
ML159-CP405	-	-	-	Outstanding monitoring - 3 rounds of groundwater level and quality sampling; Gas (6 visits/3 months)	-	-
ML159-CP406	-	-		Outstanding monitoring - 3 rounds of groundwater level and quality sampling; Gas (6 visits/3 months)	-	-
ML159-CR419	-	-	-	Outstanding monitoring - 3 rounds of groundwater level and quality sampling; Gas (6 visits/3 months)	-	-

**Specific geo-environmental testing suites are detailed within HS2-HS2-GT-SPE-000-000001 P02 GI framework spec. Standard Soil: Suites E, E1-E6. Suite E9 is to be undertaken where field PID readings are >25ppm. Suite H, and H1 if asbestos is identified Standard leachate: Suite F. **Response zones are to not cross multiple horizons of differing permeability*

Appendix I Environment Agency guidance on decommissioning redundant boreholes

ADDED TO PDF

Appendix J Disclaimer

This disclaimer should be read in accordance with the technical limitations in Section 12.

This report has been prepared solely for use by the party which commissioned it (the “client”) in connection with the captioned project. It should not be used for any other purpose. No person other than the client may rely on the content, information or any views expressed in this report. We accept no duty of care, responsibility or liability to any other recipient of this report. This report is confidential and contains proprietary intellectual property.

No representation, warranty or undertaking, express or implied, is made and no responsibility or liability is accepted by us to any party other than the client, as to the accuracy or completeness of the information contained in this report.

We disclaim all and any liability whether arising in tort or contract or otherwise which it might otherwise have to any party other than the client, in respect of this report, or any information attributed to it.

This report represents the technical findings and opinions of experienced geo-environmental specialists and does not constitute legal, insurance or financial advice, for which separate, independent advice should be consulted from qualified professionals if so required.

The findings and opinions of this report are based on information obtained from a variety of sources as detailed in this report. We cannot and do not guarantee the authenticity or reliability of the information from other sources upon which we have relied. To the extent that this document is based on information supplied by other parties, we accept no liability for any loss or damage suffered by the client due to an error or omission in this report which is (i) due to an error or omission data, information or statements supplied to us by other parties including the client (“Data”) or (ii) which arises from any conclusions based on such Data. We have not independently verified such Data and have assumed it to be accurate, complete, reliable and current as of the date of such information.

To the extent that this report is based on information obtained from a ground investigation, any such investigation can examine only a small part of the subsurface conditions. Where we have been responsible for the design of a ground investigation, we shall have used reasonable skill and care. However, in any ground investigation there remains a risk that pockets or “hot-spots” of contamination may not be identified, because investigations are necessarily based on sampling at localised points. Not finding any indicators of contamination does not mean that hazardous substances do not exist at the Site.

Certain indicators or evidence of hazardous substances or conditions may have been outside the limited portion of the subsurface investigated or monitored and thus may not have been identified or their full significance appreciated. Such risks may be mitigated to a degree by carrying out further ground investigation, or during construction works, by on-Site visual observation and validation testing.

It is also possible that environmental monitoring has not identified certain conditions because of the relatively short monitoring period. Accordingly, it is possible that the ground investigation and monitoring failed to indicate the presence or significance of hazardous substances or conditions. If so, their presence could not have been considered in the formulation of our findings and opinions.

For the avoidance of doubt, where the words “remediation” or “remedial” actions / operations are used in this report, these words and phrases shall refer to actions to eliminate, control or reduce risks from relevant pollutant linkages associated with the Site. Unless explicitly stated, remediation shall NOT be assumed to refer to actions to eliminate contamination risks.

This report has been produced using due skill and care, in accordance with statute and best practice at the reporting date stated in the report. We accept no liability for any change in geo-environmental risk interpretation resulting from changes in guidance and/or statute after the reporting date.

We believe that providing information about limitations is essential to help the client identify and thereby manage its risks. These risks can be mitigated – but they cannot be eliminated - through additional research. We will, on request, advise the client of the additional research opportunities available, their impact on risk, and their cost.

Appendix K References

[i] HS2 (Arup, Atkins, Capita, ERM, Ineco, Mott MacDonald, Parsons Brinckerhoff, Temple, URS), "*Environmental Statement, Volume 1 – 5*", November 2013.
[ii] Balfour Beatty Vinci joint venture (produced by Mott MacDonald/Systra design joint venture), "*HS2 Geo-environmental Report – Sub-Lot 5 & 6*" Document number: 1MC08-BBV-EV-LST-N000-000002 Revision: C01, February 2021
[iii] HS2, "*Technical Standard – Land Quality"* Document number: HS2-HS2-EV-STD-000-000027 Revision: P05, April 2019
[iv] HS2, "*Technical Standard – Groundwater"* Document number: HS2-HS2-EV-STD-000-000010 Revision: P07, November 2017
[v] HS2, "*Technical Standard – Material Management Plan"* Document number: HS2-HS2-EV-STD-000-000006 Revision: P05, April 2019
[vi] United Kingdom (UK) Government: *Land contamination: risk management*: https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks [Accessed 14th May 2021]
[vii] DEFRA (2010): "*SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document*"
[viii] HS2 "*Volume 5: Technical Appendices. CFA26: Washwood Heath to Curzon Street – Land Quality*" Data Appendix LQ-001-026. November 2013.
[ix] Delta Junction Geotechnical Desk Study Volume 1 and Volume 2 (C223-CSI-GT-REP-030-000003 P06)
[x] Delta Junction Area A, WP-DJA-001. Factual Report for Ground Investigation Work Package. RPS. Document number: 1G026-RPS-GT-REP-000-000005. August 2017.
[xi] HS2 PHASE 1 Area North Additional GI Location NL06 to NL09. Report on a Ground Investigation. Soil Engineering. Document number: 1MC08-BBV-GT-REP-N001-222443_C01. October 2019.
[xii] United Kingdom (UK) Government: *Land contamination: risk management*: https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks [Accessed 14th July 2020].
[xiii] Balfour Beatty Vinci joint venture (produced by Mott MacDonald/Systra design joint venture), "*HS2 Geotechnical Interpretative and Design Report 19 Duddeston Junction Viaduct to Curzon No. 3 Viaduct Ch 173+468 to Ch 175+195*" Document number: 1MC08-BBV_MSD-GT-REP-NS03_NL09-100001Revision: C03, April 2020
[xiv] WFD (Standards & Classification) Directions (England and Wales) 2015 Freshwater Annual Average, Schedule 2 and 3, https://www.legislation.gov.uk/uksi/2015/1623/pdfs/uksiod_20151623_en_auto.pdf
[xv] UK Technical Advisory Group on the Water Framework Directive *"Updated Recommendations on Environmental Standards River Basin Management (2015-21)*" April 2012. Intermittent discharges, Table 19 , 1 year return period.
[xvi] Brost E.J. *et al.* (2000): "Non-aqueous phase Liquid (NAPL) Mobility Limits In Soil", *Soil & Groundwater Research Bulletin*, **9,** American Petroleum Institute
[xvii] Mercer, J.W, Cohen, R.M. (1990): "A review of Immiscible fluids in the Subsurface: Properties, Models, Characterisation and Remediation", *Journal of Contaminant Hydrology*, **6**, 107-163
[xviii] Contaminated Land: Application in Real Environments (CL:AIRE) (2011) "The Definition of Waste: Development Industry Code of Practice – Version 2.0" March 2011
[xix] Environment Agency (2021): "Guidance on the classification and assessment of waste (1st Edition v1.1.GB) Technical Guidance WM3".
[xx] HS2, "*Environmental Minimum Requirements Annex 1: Code of Construction Practice"* February 2017 CS755 Accessed via: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/593592/Code_of_Construction_Practice.pdf
[xxi] Zetica, "Unexploded Ordnance Desk Study", Ref: 0615-ZET-GT-REP-000-000001.
[xxii] Environment Agency (2006): *"Guidance on the design and installation of groundwater quality monitoring points*". Science Report SC020093.
[xxiii] • Environment Agency (2012): *"Good practice for decommissioning redundant boreholes and wells*". LIT 6478 / 657_12
[xxiv] CL:AIRE (2014): "*SP1010- Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, Final Project Report (Revision 2)".*

[xxv] Environment Agency (2009): "*Human Health toxicological assessment of contaminants in soil*", Science Report SC050021/SR2.
[xxvi] Environment Agency (2009): "*Updated technical background to the CLEA Model*", Science Report SC050021/SR3
[xxvii] Nathanail, C., McCaffrey, C., Gillett, A., Ogden, R., & Nathanail, J. (2015). *The LQM/CIEH S4ULs for Human Health Risk Assessment*. Nottingham: Land Quality Press.
[xxviii] Environment Agency (2005): "*The UK Approach for Evaluating Human Health risks from Petroleum Hydrocarbons in Soils".*
[xxix] British Standards Institution (2019): "*Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings*", BS8485:2015+A1:2019.
[xxx] CIRIA C665, *Assessing risks posed by hazardous ground gases to buildings*, 2007.
[xxxi] Public Health England, UK Maps of Radon, Online Map Viewer, http://www.ukradon.org/information/ukmaps
[xxxii] HSE, "*EH40/2005 Workplace exposure limits, Containing the list of workplace exposure limits for use with the Control of Substances Hazardous to Health Regulations (as amended)",* March 2013.
[xxxiii] British Standards Institution (2019): "*Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings*", BS8485:2015+A1:2019.
[xxxiv] SOBRA GWVAP ref in S 4.9 Society of Brownfield Risk Assessment (SoBRA) (2017) *Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater,* Version 01 February 2017
[xxxv] Groundwater Protection guidance – Environment Agency (2017) Groundwater protection technical guidance Published 14 March 2017 https://www.gov.uk/government/publications/groundwater-protection-technical-guidance/groundwater-protection-technical-guidance
[xxxvi] Environment Agency. (2006). "*Remedial Targets Methodology - Hydrogeological Risk Assessment for Land Contamination"*.
[xxxvii] Water Framework Directive – United Kingdom Technical Advisory Group (WFD-UKTAG) (2014) "*River & Lake Assessment Method Specific Pollutants (Metals) Metal Bioavailability Assessment Tool (M-BAT)"* July 2014
[xxxviii] Environment Agency Water quality data archive https://environment.data.gov.uk/water-quality/view/landing
[xxxix] BRE (2005): *"Concrete in aggressive ground BRE Special Digest 1: 2005*".
[xl] UKWIR, "*Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites*", Report Ref; 10/WM/03/21, August 2010.
[xli] Centre for Ecology and Hydrology (2020) data accessed at: https://www.ceh.ac.uk/ May 2020
[xlii] Hess, T. 2010. Estimating Green water footprints in a temperature environment. Water. 2. pp 351-362
[xliii] Environment Agency/Atkins, 2003. *Review of the Fate and Transport of Selected Contaminants in the Soil Environment.* Tables 2.4, 3.2 & 4.3.
[xliv] Total Petroleum Hydrocarbon Criteria Working Group Series (TPHCWG), 1999. *Human Health Risk-Based Evaluation of Petroleum Release Sites: Implementing the Working Group Approach*, Volume 5, Table 1.
[xlv] RAIS database (Risk Assessment Information System, http://rais.ornl.gov/tools/)
[xlvi] Howard, P.H., Boethling, R.S., Jarvis, W.F., Meylan, W.M, Michalenko, E.W. (1991), *Handbook of Environmental Degradation Rates*, 1st edn.
[xlvii] Buss, S. & Herbert, A. & Morgan, Philip & Thornton, Steven & Smith, Jonathan. (2004). *A Review of Ammonium Attenuation in Soil and Groundwater*. Quarterly Journal of Engineering Geology and Hydrogeology - Q J ENG GEOL HYDROGEOL. 37. 347-359. 10.1144/1470-9236/04-005.
[xlviii] Environment Agency (2008) *Compilation of data for priority organic pollutants for derivation of Soil Guideline Values*
[xlix] Nathanail, C.P.; McCaffrey,C.; Gillett, A.G.; Ogden, R.C. & Nathanail, J.F. (2015). *The LQM / CIEH S4ULs for Human Health Risk Assessment*, Copyright Land Quality management Limited reproduced with permission: Publication No. S4UL3389
[l] Agency for Toxic Substances and Disease Registry, https://www.atsdr.cdc.gov/
[li] Environment Agency (2002) Environment Agency (2002): *The Effects of Contaminant Concentration on the Potential for Natural Attenuation* Research & Development technical Report P2-228/TR

APPENDIX D1 DETAILED DESIGN GEOTECHNICAL DESIGN REPORT

Balfour Beatty VINCI Working on behalf of HS2

Contract No. 1MC09

Detailed Design Geotechnical Design Report for Pool Wood Embankment & Pool Wood Culvert

Document Number: 1MC09-BBV_MSD-GT-REP-NS04_NL10-100048

Current Revision	Author	Reviewed By	Approved By	Date Approved	Reason for Review
C02	T Haji I Manolakis L Figueiredo R Greenstreet F. Ardakani	T Ngai L Rodriguez S Cooper	Navroop Matharu Thomas Baxendale	15/10/2021	For HS2 Acceptance

Stakeholder Review Required (SRR)	Purpose of SRR
☐ Yes – Please Specify Below	☐ Comment
☒ No	☐ Information
Click or tap here to enter text.	☐ Approval

Handling Instructions: Produced by BBV for project use only

Review Required

Team	Yes/No	Name	Position	Date
Quality	No			
Health & Safety	No			
Environment & Sustainability	No			
Other teams if required	No			

Revision History

Previous Revision	Author	Reviewed By	Approved By	Date Approved	Reason for Review
P01	T Haji I Manolakis L Figueiredo R Greenstreet	T Ngai L Rodriguez	S. Cooper	04/05/2021	DD S3 Submission
P02	T Haji I Manolakis L Figueiredo R Greenstreet F. Ardakani	T Ngai L Rodriguez S Cooper	Konstantinos Zymnis	20/09/2021	S4 submission
C01	T Haji I Manolakis L Figueiredo R Greenstreet F. Ardakani	T Ngai L Rodriguez S Cooper	Konstantinos Zymnis Thomas Baxendale	23/09/2021	For HS2 Acceptance
P03	T Haji I Manolakis L Figueiredo R Greenstreet F. Ardakani	T Ngai L Rodriguez S Cooper	Navroop Matharu	14/10/2021	For HS2 Acceptance
C02	T Haji I Manolakis L Figueiredo R Greenstreet F. Ardakani	T Ngai L Rodriguez S Cooper	Navroop Matharu Thomas Baxendale	15/10/2021	For HS2 Acceptance

Revision Summary

Paragraph Modified	Details of Modification
1.3	Pool Wood culvert classification information was added in Table 1.2
1.3.1	Post-design ground investigation validation information was updated.
2.2	Specified that "HS2 Geotechnical Interpretative and Design Report 22 - Packington Embankment to Pool Wood Embankment Ch 157+795 to 159+915" in Table 2.1 is from Consolidation Stage
2.2	Specified that "Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions" in Table 2.1 is also presented in Appendix B.
2.5	Table 2.4 was updated with the document numbers
2.5	The assumption of using treated landscape fill for the landscape bund is removed from Table 2.7.
2.5	Topsoil definition changed to top ground layer in assumption Tables 2.7 & 2.8.
3.3	Table 3.18 has been added to present the landscape bund geometry.
3.3	The following was added in Table 3.1 to specify the change in embankment west slope from 1:2 to 1:1 from Ch 159+000 to Ch 159+740: "West slope 1V:1H from Ch 159+000 to Ch 159+740 where landscape bund exists"
3.3	Landscape fill material properties were added to Tables 3.5 & 3.6.
3.3	Section "Landscape earthworks" was changed to subheading (3.3.2) so that it comes under the embankment stability.
3.3	Table 3.3 was added to present the ground profiles considered for rigid inclusions design in Pool Wood Embankment.
3.4	"Re-use of materials" section was updated.
4.1	Ground model added on the asset form
9.2	Construction stages were added.
9.2	This section was modified to present detailed information about the rigid inclusion design including the requirement of the steel reinforcement and concrete grades.

Paragraph Modified	Details of Modification
9.2	The type of replacement material (foundation treatment- cohesive material underneath the trace embankment, and untreated landscape fill with an undrained shear strength of 100kPa underneath the landscape bund) was specified from Ch 159+695 to Ch 159+800.
9.3	The material type of the LTP was classified (class 6F5 with a friction angle of at least 38°).
9.3	Section 9.3 was updated with the type of water drainage layer (Class 6C, damp and flood compensation material) from Ch 158+386 to Ch 158+795 and the installation of a geotextile between the granular layer and the LEF.
9.4	Section 9.4 was updated with design details on transition zones.
10.5	Ground investigation information required to verify/validate design was updated.
12.1	Ground conditions, ground model, geological long section and available investigation holes were added to the asset form.
12.1	Hold period information was added.
12.1	Landscape bund foundation improvement was added.
12.1	Foundation layer was removed from the Earthworks Design table.
General	Chainages have been updated to be consistent with PMA 3.0 alignment.
General	Geological long section was updated with the DD one.

Contents

1 INTRODUCTION

1.1 Scope and objectives of the report

This is a Geotechnical Design Report (GDR) for detailed design of advanced works (rigid inclusions) in Pool Wood Embankment, from Ch 159+015 to Ch 159+695. The report also presents the main Pool Wood Embankment asset (Ch 158+386 to Ch 159+800) and the Pool Wood Culvert (Ch 158+875) for information. This report summarises asset details, design inputs and design methodology for both assets.

Details have been included on geometry and material properties for the overlying earthwork, landscape and load transfer platform elements of the asset. This information is required to justify the design of the underlying rigid inclusions. However, the focus of this report is solely upon the design of the rigid inclusions and it is anticipated that an additional full GDR will be issued in due course to provide further justification of those elements of design associated with the overlying earthwork.

Producing GDRs covering the design of the scheme is a requirement of the HS2 Technical Standard for Earthworks (HS2-HS2-GT-STD-000-000001). The structure of this GDR generally follows the structure given in HD 22/08.

Geotechnical design has been carried out in accordance with the HS2 Technical Standard for Earthworks (HS2-HS2-GT-STD-000-000001).

The relevant GIR is the 'Detailed Design (DD) Ground Investigation Report (GIR) Annex E2' (1MC09-BBV_MSD-GT-REP-NS04_NL10-100014), which covers Diddington Lane Embankment to Coleshill N°2 Embankment.

1.2 Description of Asset

1.2.1 Asset Description

Asset ID numbers and start and end chainages are provided in Table 1.1. Chainages are based on the PMA 3.0 alignment.

Table 1.1 Asset ID numbers, start and end chainages

Asset name	HS2 ID	Legacy asset ID	Approximate start chainage (PMA 3.0)	Approximate end chainage (PMA 3.0)
Pool Wood Embankment	HS2-000001162	158-L2 & 158-L3	158+386	159+800
Pool Wood Culvert	HS2-000020023	158–S5	158+875	158+875

Pool Wood Embankment is 1414m in length and has been designed with side slopes of 1V:2H, and 1V:1H internally where it interfaces with its associated landscape bund from Ch 158+920 to around 159+730. The embankment varies in height, up to a maximum of 11m approximately. This means that Pool Wood Embankment is classed as a 'medium embankment' in the HS2 technical standard for earthworks (HS2-HS2-GT-STD-000-000001) section 2.3.8, Fig 2.3.

The location of the assets is shown in Figure 1-1. General arrangement drawings are referenced in Appendix A and presented in Appendix H.

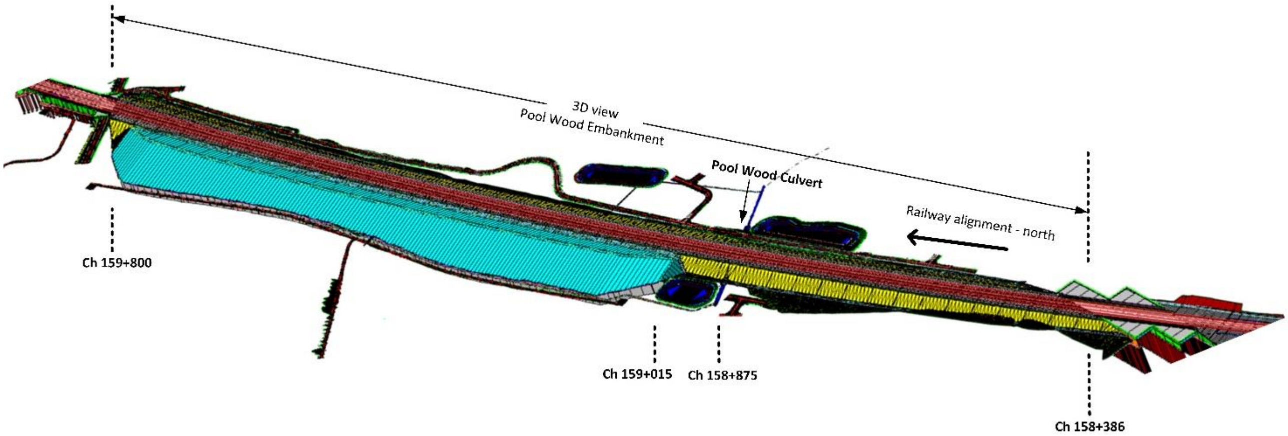


Figure 1-1 Location of Pool Wood Embankment & Pool Wood Culvert

1.2.2 Location, Topography and Land Use

The approximate extent of Pool Wood Embankment is shown in Figure 1-2. The assets present in this area are Pool Wood Embankment and Pool Wood Culvert.

The railway alignment in the Pool Wood Embankment area mainly cuts through open land or agricultural fields and is flanked on the west side by Birmingham Business Park and on the east side by Coleshill and Bannerly Pools (SSSI).

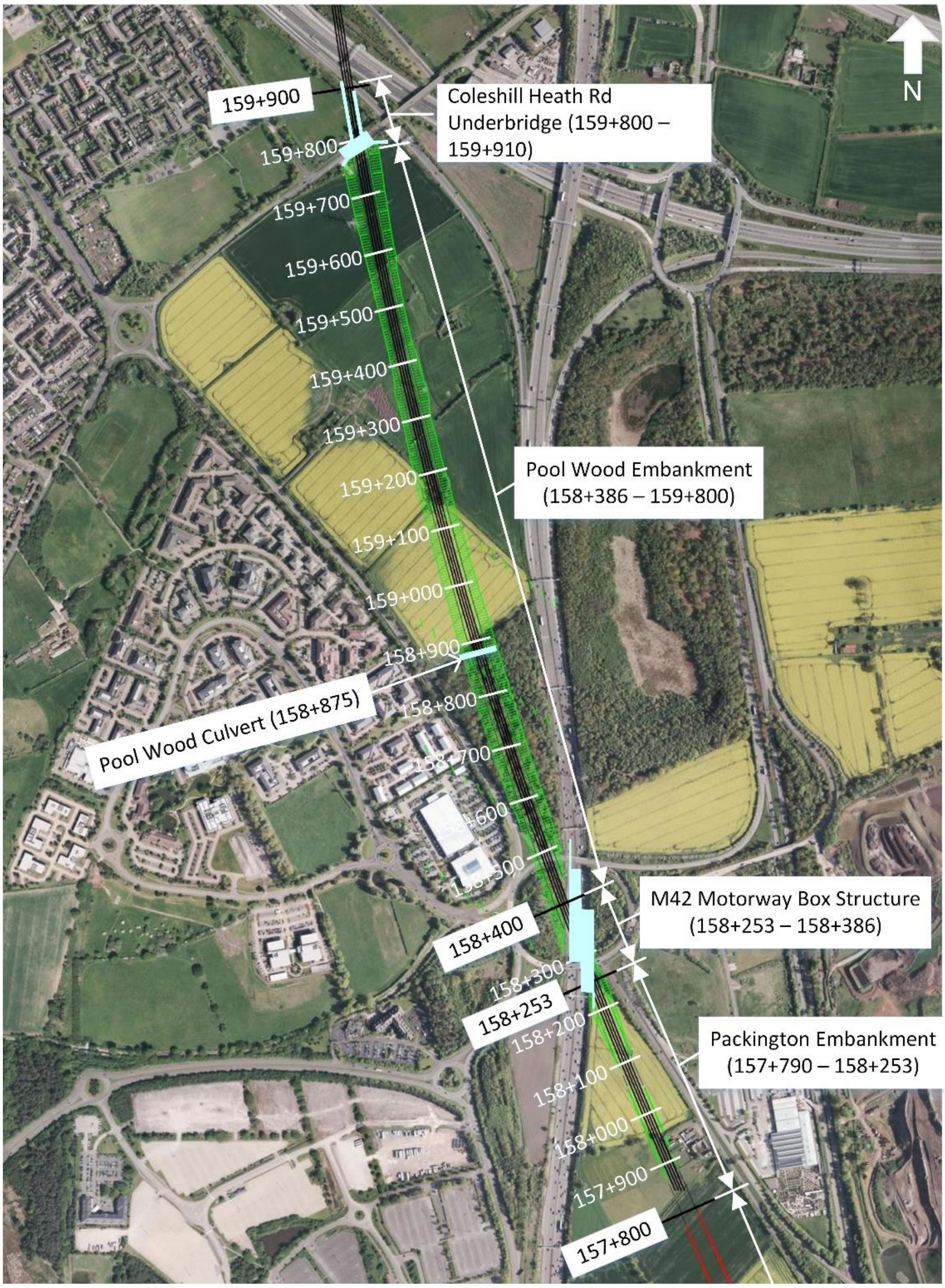


Figure 1-2 Assets location plan

1.3 Asset Classifications

Asset classification is provided in Table 1.2. Further details about the classification, including the approach used for assignation, are provided in the documents referenced.

Table 1.2 Asset classification - Pool Wood Embankment & Pool Wood Culvert

Asset	Classification	Value	Description	References
Pool Wood Embankment	Tranche allocation	3	Tranche 3 – Non-complex / lower value assets.	1MC08-BBV_MSD-GT-REP-N001-100157 (Section 1.3)
	EC7 Geotechnical Category	3	The HS2 standard specifies 3 geotechnical categories for embankments along the HS2 mainline. Geotechnical categories are described in detail in BS EN 1997-1, Section 2.1. Geotechnical Category 1 covers small and relatively simple structures for which: it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations; with negligible risk. Geotechnical Category 2 covers conventional types of structures and foundations with no exceptional risk or difficult ground or loading conditions. Geotechnical Category 3 covers structures or parts of structures, which fall outside the limits of Geotechnical Categories 1 and 2.	HS2-HS2-GT-STD-000-000001 (Sections 2.2.7, 2.2.8, 2.2.9, and Table 2.2/2) BS EN 1997-1 (Section 2.1)
	GI Class	2.4	Class 2.4* Significant additional information required for Detailed Design and Construction (some areas of uncertainty still existing whether it be stratigraphy, groundwater, geomechanical (ULS or SLS properties or combination of thereof) Detailed Design can be completed but with some residual risks which require validation during construction to mitigate risk.	1MC08-BBV_MSD-GT-REP-N001-100157, Section 1.5. Figure 2
	Tranche allocation	3	Tranche 3 – Non-complex / lower value assets.	1MC08-BBV_MSD-GT-REP-N001-100157 (Section 1.3)

Asset	Classification	Value	Description	References
Pool Wood Culvert	EC7 Geotechnical Category	2	The HS2 standard specifies 3 geotechnical categories for embankments along the HS2 mainline. Geotechnical categories are described in detail in BS EN 1997-1, Section 2.1. Geotechnical Category 1 covers small and relatively simple structures for which: it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations; with negligible risk. Geotechnical Category 2 covers conventional types of structures and foundations with no exceptional risk or difficult ground or loading conditions. Geotechnical Category 3 covers structures or parts of structures, which fall outside the limits of Geotechnical Categories 1 and 2.	HS2-HS2-GT-STD-000-000001 (Sections 2.2.7, 2.2.8, 2.2.9, and Table 2.2/2) BS EN 1997-1 (Section 2.1)
	GI Class	2.3	Class 2.3 Some additional information required to complete Detailed Design and Construction to optimise design fully. Detailed Design can be completed but with some residual risks which require validation during construction to mitigate risk.	1MC08-BBV_MSD-GT-REP-N001-100157, Section 1.5. Figure 2

*For Class 2.4 assets, in accordance with the 'Detailed Design – Basis of Design for Geotechnics, Earthworks and Retaining Structures' (1MC08-BBV_MSD-GT-REP-N001-100157), the application of an uncertainty factor of 1.25 is required for the design. However, the GI class of 2.4 in Pool Wood Embankment asset is mainly due to the lack of GI data from Ch 158+386 to Ch 158+780. Hence, for the zones outside the aforementioned area, an uncertainty factor of 1.05 was deemed appropriate for the design. In order to expediate the design and assurance process, GI available beyond the formal cut-off date has been utilised to optimise the design. This will be formally acknowledged in a subsequent validation note that details the additional GI received.

For the zone of the missing GI, the designs are undertaken based on the assumption that the validation GI will arrive within an appropriate time scale prior to on-site construction commencement, in order that design assumptions can be verified.

1.3.1 Post-Design Ground Investigation Validation

The post-design ground investigation validation will be performed in accordance with section 1.6 "Consideration of new Ground Information into the Detailed Design" of "DD – Basis of Design Report for Geotechnics, Earthworks and Retaining Structures" (ref. 1MC08-BBV_MSD-GT-REP-N001-100157).

At the time of writing, 17 Stage 2 scheduled GI locations were available within the August 2021 AGS data provided to the DJV (ML158-TP417, ML158-TP418, ML158-CT401, ML159-CP403, ML159-CP404, ML159-CP405, ML159-CP406, ML159-CP407, ML159-CP408, ML159-CP409, ML159-CR412, ML159-CR413, ML159-CR418, ML159-CR419, ML159-CR420, ML159-CR421 and ML159-CR422). The available information including in-situ test data, laboratory test data, groundwater monitoring and the geological summaries of the locations identify changes required for the ground model beneath Pool Wood Embankment. It should be noted here that these changes identified in the data available up to March 2021 have been considered as part of the accelerated design of the rigid inclusions for Pool Wood Embankment. Further laboratory testing is expected and as of the August 2021 AGS update is still outstanding. Seventeen additional locations requested for the design of Pool Wood Embankment are also still outstanding, these are ML158-CP403, ML158-CR405, ML158-CR406, ML159-CR407, ML158-HP401, ML159-CR414, ML158-CR408, ML159-CT408, ML158-CT407, ML158-CP415, ML158-RC401, ML158-TP414, ML158-TP415, ML158-TP416, ML159-TP401, ML159-TP402 and ML159-TP403.

A validation note will be produced. If the design assumptions are appropriate with reference to the additional investigation, the design will be validated. Otherwise, if worst the design shall be updated, if better the design may be updated depending on opportunity and construction delays.

1.4 Exclusions

As well as the exclusions explicitly stated within the introduction of this GDR, there is one element that is outside of the scope of this GDR: Coleshill Heath Road Underbridge and Retaining Walls. A separate GDR is issued for this asset (1MC09-BBV_MSD-GT-REP-NS04_NL10-100051).

1.5 Associated HS2 Assets

Associated HS2 assets are listed in Table 1.3.

Table 1.3 Associated HS2 assets

Asset name	Legacy asset ID	Approximate start chainage (PMA 3.0)	Approximate end chainage (PMA 3.0)	Interface description
M42 Motorway Box Structure	158–L1	158+253	158+386	Transition from a box structure to an embankment
Coleshill Heath Road Underbridge	159–S2	159+800	159+910	Transition from embankment to underbridge

1.6 Associated Third-Party Assets

The third-party assets in Pool Wood Embankment area are presented in Table 1.4. There will be some interactions on the westerly aspect to the south of the asset with respect to the A452. This will be dealt with at a later date and does not influence the area of Rigid Inclusion further to the north, nonetheless, it is mentioned here for completeness.

Table 1.4 - Associated third-party assets for Pool Wool Embankment

Asset Type	HS2 Asset ID	Asset owner	Asset details	Approximate start chainage (PMA 3.0)	Approximate end chainage (PMA 3.0)	Interface description
Power Duct (diverted)	CNO-158-005	Western Power Distribution	11(kV) - Cable - AL XLPE - 95(mm) - 5.64(MVA), Fed From: Elmdon 132kV to 11kV Substation (670059-03)	158+845	158+903	Buried service crossing the mainline embankment.
Power Duct (diverted)	CNO-159-001	Western Power Distribution	LV(kV) - Cable - AWC - 185(mm) - 0.17(MVA), Fed From: Lighting Comms Substation (04358--)	159+220	159+395	Buried service on the west side of the earthworks.
Power Duct (diverted)	CNO-159-003A	Western Power Distribution	11(kV) - OHL - SIL - 0.25(mm) - 6.55(MVA), Fed From: Elmdon 132kV to 11kV Substation (670059-03) - Diverted 11kv circuit requires a permanent diversion to increase the depth below the HS2 trace.	159+295	159+765	Buried service on the west side of the earthworks.

Asset Type	HS2 Asset ID	Asset owner	Asset details	Approximate start chainage (PMA 3.0)	Approximate end chainage (PMA 3.0)	Interface description
Overhead line (OHL) tower (diverted)	CNO-158-006 & CNO-160-002	National Grid	A diverted tower (30m x 15m x 50m) transferring the OHL CNO-158-006 & CNO-160-002.	159+220	159+220	OHL tower foundation at 3m distance from the embankment toe.
Electrical Cable (diverted)	CNO-158-006 & CNO-160-002	National Grid	The National Grid Overhead Line is on steel towers and runs at 275/400kV. The nom. diameter is 50mm and the cable length is 260.8m	159+220	159+495	OHL on the east side of the earthworks.

1.7 Stage 1 Carry Over Comments from the GiDR

According to the Comment Carry Over Register (1MC08-BBV_MSD-GT-REG-N001-100095), GiDR 22 (Packington Embankment to Pool Wood Embankment) with reference 1MC09-BBV_MSD-GT-REP-NS04_NL10-100003, C02 produced in Stage 1, has the following carry over comments from HS2 (documented in 1MC09-HS2-IM-CMT-NS04_NL10-000057), presented in Table 1.5 to be addressed in Stage 2 GDR for Pool Wood Embankment. These comments, where they pertain to the design of the rigid inclusions, have been reviewed and actioned accordingly either as modifications to the report where required, or through clarification via agreed response to stated comments. Appendix I shows a snapshot of the carried-over comments with these responses.

Table 1.5 – Stage 1 carry over comments

Original C01 comment	Stage 1 comment summary
'Ground Treatment - It is indicated that ridged inclusions in the form of CFA piles are required between Ch 159+000 - Ch 159+750 to approximate depth of 11m through the Glaciolacustrine deposits. The predicted settlement is showed to be <60mm which means that the settlement is not the main reason for proposing the ground treatment. Can you clarify what is the reason for proposing the rigid inclusions underneath the main embankment as well as why the use of CFA piles as opposed to the CMC is proposed.'	Use of rigid inclusions
'Ground treatment - Landscape bunds. The landscape bunds up to 15m in height are proposed between Ch 158+800 - Ch 159+760 on the western side of the railway with 1in 3 internal and 1 in4 external slopes. Clarify if the proposed ground treatment extends underneath the landscape bunds and justify the reason for that. What is a consequence of the settlements and/or slope failure of the external slope? If required, is there an opportunity identified in the Project Risk and Opportunity Register to eliminate/reduce them at the detailed design with the associated costs?'	Use of rigid inclusions
'Details for transition should be included *Also 4.2, p.147-148.'*	Details of transitions
'Contaminated land risk should be summarised rather than reference to another report.'	Contaminated land

2 DESIGN – GENERAL

2.1 Design Requirements

The assets have been designed in accordance with the requirements of the relevant HS2 standards, specifications, and basis of design documents, as listed in Section 14, References.

2.2 Design Inputs – Geotechnical

Details of the design inputs listed in Table 2.1 are provided in the documents referenced.

Table 2.1 Design inputs – geotechnical

Input	Title	Reference	Notes
Ground investigations Ground conditions Material properties and descriptions Hydrogeological setting	Area North Detailed Design Ground Investigation Report – Annex E2 Diddington Lane Embankment to Coleshill N°2 Embankment (Ch 154+525 to 160+990)	1MC09-BBV_MSD-GT-REP-NS04_NL10-100014	The GIR considered the available ground investigation data up to 4th June 2020
Geotechnical interpretation, Assessment of geotechnical parameters Summary of geotechnical design carried out pertinent to the geotechnical and structural assets from Ch 157+790 to Ch 159+910	Consolidation Design Stage - HS2 Geotechnical Interpretative and Design Report 22 - Packington Embankment to Pool Wood Embankment Ch 157+795 to 159+915	1MC09-BBV_MSD-GT-REP-NS04_NL10-100003	-
Design ground models Geotechnical parameters Design groundwater profiles	Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions	1MC09-BBV_MSD-GT-REP-NS04_NL10-100022 Snapshots of the DD Technical Note are presented in Appendix B of this GDR.	Provides design ground models, short-term and long-term groundwater profiles and geotechnical parameters for the materials encountered in the area of the asset

2.3 Design Inputs - Other

The following BIM models have been used in the design of Pool Wood Embankment.

Table 2.2 Design inputs - other

Title	Reference
3D Alignment	1MC08-BBV_MSD-RT-DM3-N000-100003
Digital Terrain Model	HS2_3_SG_Main line & Birmingham spur_Pk159300-164950.dgn

2.4 Independent Checking Requirements

Independent checking requirements are provided in Table 2.3 and have been determined based on the requirements of HS2-HS2-GT-STD-000-000001 P05, Table 2.2/2.

Table 2.3 Independent checking requirements

Asset/design element name	Independent checking category	Rationale
Pool Wood Embankment (158–L2 & 158–L3)	CAT III	The foundation ground is improved by constructing rigid inclusions. Additionally, there is a landscape bund to the west of the trace embankment that will have a staged construction with band drains. This results in a potentially complex scenario that merits an external review process.
Pool Wood Culvert (158–S5)	CAT II	The asset is not complex and high degree of redundancy is not required.

Checking categories are defined in DMRB Volume 1 Section 1 Part 1 BD 2/05, Clause 2.20:

- ‘Categories 0 and 1 require an independent check by another engineer who may be from the Design/Assessment Team.’
- ‘Category 2 requires a check by a Checking Team, which may be from the same organisation but shall be independent of the Design/Assessment Team.’
- ‘Category 3 requires a check to be carried out by a Checking Team from a separate organisation proposed by the Designer Assessor and agreed by the Overseeing Organisation.’

2.5 Assumptions, Risks and Opportunities

Assumptions, risks, and opportunities associated with detailed design are detailed in the registers listed in Table 2.4 below:

Table 2.4 Registers for assumptions and risks

Document Name	Document Number
Geotechnical risk register	1MC09-BBV_MSD-GT-REG-NS04_NL10-100004
CDM Risk Register	1MC09-BBV_MSD-DS-REG-NS04_NL10-100053
Assumptions Register	1MC09-BBV_MSD-DS-REG-NS04_NL10-100052
Opportunities Register	1MC09-BBV_MSD-GT-REG-N002-100002

A snapshot of the geotechnical risk register is included in Appendix D. For context, the identified risks are summarised in Table 2.5 and Table 2.6 for Pool Wood Embankment and Pool Wood Culvert, respectively. Additionally, the assumptions are summarised in Table 2.7 and Table 2.8 for Pool Wood Embankment and Pool Wood Culvert, respectively.

Table 2.5 Geotechnical Risks Summary for Pool Wood Embankment

Classification	Risk description	Impact of the risk	Mitigation action(s)
Construction	Pond at this location.	Excessive settlements, embankment bearing failure and potential for contamination.	Pond relocation and ground inspection for potential contamination is required at this location. Rigid inclusions are designed for this area. Additional dig out and replace may be required subject to site inspection.
Detailed Design	ES assumes CFA piling (which is not a significant source of vibration) throughout Wmids (except one location at Bromford Tunnel & at NEC lake). Local ground conditions may dictate other methods of piling. ES based on specific assumptions regarding the size/type/scale and location of compaction works involving vibratory rollers, changes may be required as contractor appointed and design progresses. (Transferred from C224-ARP-PC-REG-040-000002.xlsx).	Potential to identify new effects requiring mitigation or changes to construction works.	Ensure Sec 61 applications/.assessments started as soon as possible after contractor appointed to finalise insulation/temp rehousing requirements, plus ensure adequate time in the programme to carry out works.
Construction	Ground Movements induced by proposed works affecting a diverted pylon at approximate chainage 159+220.	This could lead to serviceability issues, potential collapse of the pylon, or H&S risks.	A Plaxis analysis was undertaken for that area, which showed possibility of ground heave induced by embankment loads around the pylon. Instrumentation and monitoring is proposed to monitor the ground movements around the pylon during and after construction. In case of any pylon stability issues, contractor to consider stabilising the pylon by means of anchoring or potential relocation of the pylon.

Classification	Risk description	Impact of the risk	Mitigation action(s)
Detailed Design	Significant leachate exceedance of nickel and high TPH soil concentrations within former infilled pond (ML159-CP003).	Potential risk to underlying controlled waters.	Contractor to refer removal of fill material within this area, and stabilisation of material prior to recovery in accordance with MMP. Refer to 1MC09-BBV_MSD-EV-REP-NS04-100007 Pool Wood Embankment DQRA and Remediation Strategy covering a small localised hotspot within an infilled pond at approximate Chainage 159+350 associated with former brickworks.
Detailed Design	Moderate leachate contamination of metals in deep Made Ground associated with highways (ML158-WS016).	Potential risk to underlying controlled waters.	Risk register item: Removal of contaminated Made Ground and stabilisation prior to recovery in accordance with MMP. Refer to 1MC09-BBV_MSD-EV-REP-NS04-100007 Pool Wood Embankment DQRA and Remediation Strategy.
Construction/ Operation	Failure of earthworks due excessive surcharge loadings.	Slope failure.	In line with the Detailed Design – Basis of Design Report Methodology – Earthworks (1MC08-BBV-MSD-GT-REP-N001-100159); for: Embankment: Designed to accommodate a 50kPa live surcharge loading 3.0m from the crest of the embankment slope in the long-term condition. Designed to accommodate a 50kPa live surcharge loading 3.0m from the crest of the slope in the short-term construction situation. Contractor to note a maximum of 50kPa construction plant loading is considered and allowed in the design of the construction phase.

Classification	Risk description	Impact of the risk	Mitigation action(s)
Construction/ Operation	Ingress of groundwater into the embankment from Ch 159+210 to Ch 159+420	Slope failure of the embankment.	Rigid inclusions have a Load Transfer Platform (LTP) layer which is constructed from granular material (6F5) and will help with draining the potentially rising groundwater. This will reduce the possibility of the groundwater ingress into the embankment. Although, there is a residual risk of insufficient draining capacity of the LTP which is unable to be mitigated. Contractor to provide safe system of work and drain groundwater when needed. Contractor to confirm that a permeable layer will be constructed under the Load Transfer Platform (LTP) to eliminate the risk of groundwater ingress into the embankment.
Detailed Design	Lack of groundwater monitoring within 150m either side of the alignment between chainages 158+300 and 158+795 (PMA 3.0) near an unnamed tertiary watercourse/drain.	Uncertainty as to whether the unnamed tertiary watercourse/drain is in hydraulic continuity with groundwater system- groundwater table may be higher than previously anticipated.	Consider groundwater monitoring from wells beyond 150m either side of the alignment to determine the groundwater system in this area. Carry out further groundwater monitoring near this location within 150m of the alignment and potential water surface sampling. A 0.6m thick drainage layer from granular fill 6C should be constructed at the base of the embankment from Ch 158+386 to Ch 158+795 (PMA 3.0). Please note this is outside the area of rigid inclusions.

Classification	Risk description	Impact of the risk	Mitigation action(s)
Detailed Design	11 kv buried electricity line.	Cable trench backfill results in localised soft ground potentially affecting slope stability. Water ingress produces soft spot or localised erosion to affect slope stability.	Removal/diversion of cables. Remediation of cable trench in permanent slope. Providing water drainage for the slope.
Detailed Design	Western Power buried electricity line.	Cable trench backfill results in localised soft ground potentially affecting slope stability. Water ingress produces soft spot or localised erosion to affect slope stability.	Removal/diversion of cables. Remediation of cable trench in permanent slope. Providing water drainage for the slope.
Construction	Lack of GI data from Ch 158+391 to Ch 158+800.	High uncertainty associated with the ground model, geotechnical parameters and groundwater level. The actual values may be worse than the ones assumed in the design.	Based on the requirement of the Basis of design report for Geotechnics, Earthworks and Retaining Structures, worst credible parameters were used for the detailed design with reference to the Global Parameters Design Report. A layer of selected material (0.75m thickness) to be constructed at the base of the embankment to protect from groundwater ingress. The area to be inspected by a competent engineer on site.

Classification	Risk description	Impact of the risk	Mitigation action(s)
Construction	Compressible Ground.	Risk of settlement of the embankment due to the presence of Glaciolacustrine deposits. Risk of bearing failure of the embankment.	Rigid inclusions are designed for earthworks to mitigate possible failures. The base of the rigid inclusions must not be founded within Glaciolacustrine deposits or MMG IV/V. This design requirement should be strictly followed by the contractor during the construction. Should any ground variations be found during the installation of the rigid inclusion, designer to be consulted.
Detailed Design/ Construction	Clash of trace embankment with highways embankment from Ch 158+250 to Ch 158+825.	Differences in material properties between the highways and the trace embankments, and the possibility of drainage construction could result in the slope failure of the trace embankment.	An agreement with Highways England should be sought. Current proposal is either a minor retaining feature to deal with the clash, or avoid the clash via a slight raise in the toe of both embankment with a shared specification for the underlying ground in accordance with the minimum requirements for both Series 0600 Earthworks Specification for Highways and the HS2 approved SCEW documentation.

Classification	Risk description	Impact of the risk	Mitigation action(s)
Detailed Design	The existence of Glaciolacustrine deposits (GLLD; soft soil) beneath the landscape bund.	The existence of a landscape bund with a height up to 14m, founded on the soft Glaciolacustrine materials, which may result to bearing failure and slope stability failure of the landscape bund.	A staged construction with band drains is designed to improve the ground stability. Monitoring to be undertaken on site to ensure that the required undrained shear strength is developed in the foundation soil to support the landscape bund. Refer to the detailed design Earthworks Specifications (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100004) and Instrumentation and Monitoring Plan (1MC09-BBV_MSD-GT-REP-NS04_NL10-100039).
Detailed Design	Possibility of deep Made Ground layer existing around 159+300 beneath the landscape bund.	The existence of deep Made Ground layer existing around 159+300 could lead to the bearing failure of the landscape bund.	A staged construction with band drains is designed to improve the ground stability. Monitoring to be undertaken on site to ensure that the required undrained shear strength is developed in the foundation soil to support the landscape bund. Refer to the detailed design Earthworks Specifications (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100004) and Instrumentation and Monitoring Plan (1MC09-BBV_MSD-GT-REP-NS04_NL10-100039). Localised dig-out and replacement may be required in this area. Alternatively, the observational method could be undertaken by competent geotechnical personnel during the phase construction with the understanding that some localised remediation could be required if the Made Ground remains in-situ.

Classification	Risk description	Impact of the risk	Mitigation action(s)
Detailed Design	Existence of a cohesive layer of soft Glaciofluvial deposits (from Ch 158+875 to Ch 159+020).	The existence of a cohesive layer could lead to the slope failure of the trace embankment.	Ground treatment by excavation and replacement of 2m is required for the Glaciofluvial deposits between Ch 158+875 and Ch 159+020 due to the existence of a soft cohesive layer.
Construction	Groundwater ingress into earthworks/excavations from Ch 158+870 to Ch 159+015 (PMA 3.0).	The ingress of groundwater could damage the ground improvement under the embankment, and potentially impact the trace embankment.	Contractor to provide safe system of work and drain groundwater when needed. A pre-construction inspection to be undertaken to check the groundwater level and if needed the contractor to consider the construction of a layer of selected material (0.6m in thickness) above the original ground level to protect the trace embankment from ingress of groundwater.
Construction	Groundwater ingress into earthworks/excavations from Ch 159+700 to Ch 159+805.	The ingress of groundwater could damage the ground improvement under the embankment, and potentially impact the trace embankment.	Contractor to provide safe system of work and drain groundwater when needed. A pre-construction inspection to be undertaken to check the groundwater level and if needed the contractor to consider the construction of a layer of selected material (0.6m in thickness) above the original ground level to protect the trace embankment from ingress of groundwater.

Classification	Risk description	Impact of the risk	Mitigation action(s)
Construction	Unforeseen ground conditions.	Slope failure due to incompetent founding stratum of the embankment.	The founding stratum of the embankment should be inspected by a competent geotechnical engineer to ensure that the ground conditions are consistent with those assumed in the design. Specific requirements are presented in the HS2 Earthworks Specification Appendix Series 0600: Pool Wood Embankment. Ref. 1MC09-BBV_MSD-GT-SPE-NS04_NL10-100004.
Construction/ Operation	Possibility of existence of very soft or highly organic subsoil to a depth of 1m below the topsoil.	Risk of damage and failure to the embankment.	The subsoil of 1m below the topsoil to be inspected by a competent engineer. If it is found to be very soft or high in organic content it should be excavated and replaced with suitable embankment fill.
Construction	Buried or overhead services.	Striking buried or overhead services during works resulting injury to workforce. Damage of buried services due to surcharge from the embankment.	Buried services and cables to be identified, diverted, removed or protected by the contractor prior to the commencement of work . Contractor to use safe system of work, including checking buried and overhead service records, CAT scanning and issuing permits to dig prior to any ground breaking work. Contractor to undertake risk assessment and agree to the working and protection requirement in Work Package Plan with HS2.

Classification	Risk description	Impact of the risk	Mitigation action(s)
Construction	Rigid inclusions clash with the existing mast (ZF107) foundations.	The clash will either cause obstruction to the construction of rigid inclusions if the foundations are not removed, or impose the risk of local bearing failure to the rigid inclusions if the depth of the removed soil exceeds the length of the negative skin friction assumed in the design of rigid inclusions. This could potentially cause stability issues and failure to the embankment.	Contractor to ensure that the existing mast foundations will be removed. Any excavation beyond 3m depth must be backfilled with granular fill (6F5).
Construction	Rigid inclusions clash with the existing mast (ZF108) foundations.	The clash will either cause obstruction to the construction of rigid inclusions if the foundations are not removed, or impose the risk of local bearing failure to the rigid inclusions if the depth of the removed soil exceeds the length of the negative skin friction assumed in the design of rigid inclusions. This could potentially cause stability issues and failure to the embankment.	Contractor to ensure that the existing mast foundations will be removed. Any excavation beyond 3m depth must be backfilled with granular fill (6F5).

Classification	Risk description	Impact of the risk	Mitigation action(s)
Construction	According to new ground investigation data for Pool Wood Embankment, there is possibility that the extent of soft GLLD could extend further to the south of RIs zone (i.e. beyond Ch 159+015 to the south).	If the depth of soft GLLD is found to exceed the 2m depth assumed for dig-out and replacement, there is a risk of potential instability or failure to the embankment.	A dig out and replacement of 2m of the top ground layer is designed for this zone. A further depth of up to 1m beyond the bottom of the dig out and replacement to be inspected prior to the construction of the embankment. If the depth of soft ground extends beyond the 2m depth of dig out and replacement, an extra 1m of soft ground to be excavated and replaced with the cohesive embankment fill.
Construction	Use of 6F5 material for the construction of the combined layer of Load Transfer Platform (LTP) and floodplain zone. In case of an unexpected rise of groundwater, if the draining capacity of the LTP layer (6F5) is exceeded, groundwater will potentially enter the embankment.	Potential failure of the embankment slopes.	BBV to confirm that a permeable layer will be designed by the temporary contractor and be placed at the base of the working platform that will mitigate this risk and prevent groundwater ingress into the embankment.
Construction	There is insufficient ground investigation for reliable C_v values to be assigned to ground layers. There is a risk that should lower C_v values be encountered than assumed in the design then greater post-construction settlement will occur.	There could be an extended 'hold period' delaying construction for primary settlement to occur.	An observation and monitoring approach to be used during construction to monitor the primary settlement and only cast the track slab when primary settlement is substantially complete.

Table 2.6 – Geotechnical Risks Summary for Pool Wood Culvert

Classification	Risk description	Impact of the Risk	Mitigation action(s)
Construction/ Operation	Lack of GI data within the foundation area of the culvert. Insufficient bearing capacity of founding stratum.	Bearing failure.	Dig out and replace of top 2m of Glaciofluvial deposits is required for the area where the culvert is to be constructed. A competent engineer to inspect the ground for any soft spots or discrepancies with the geotechnical parameters assumed for the design. Validation GI is scheduled for the culvert area.
Detailed Design	High sulphate content of ground conditions, particularly in any unforeseen Made Ground and Mercia Mudstone.	Degradation of buried concrete, compromising the compressive strength.	Existing chemical test information for the site is limited and it is recommended that additional chemical testing is to be undertaken as part of scheduled validation ground investigation for Stage 2 Detailed Design, to classify the sulphate content of the ground. An appropriate grade of concrete should be selected based on the sulphate content.
Operation	Existence of a soft cohesive layer (2m	The cohesive layer could lead to bearing	Ground treatment by excavation and

Classification	Risk description	Impact of the Risk	Mitigation action(s)
	thickness) around the culvert from Ch 158+875 to Ch 159+020.	capacity failure and differential or excessive settlements of the culvert and the embankment.	replacement of 2m is required for the Glaciofluvial deposits between Ch 158+875 and Ch 159+020 due to the existence of a soft cohesive layer around the Pool Wood Culvert area.

Table 2.7 – Design Assumptions Summary for Pool Wood Embankment

Assumption	Rationale
It is assumed that the landscape bund in Pool Wood Embankment will be built in a staged construction with Prefabricated Vertical Drains. This assumption was agreed upon with BBV.	The ground under the landscape bund is soft soil. Rigid inclusions were designed to support the embankment of the landscape bund in the Consolidation Design Stage. The replacement of the rigid inclusions with Prefabricated Vertical Drains will reduce the carbon footprint and is more cost effective.
Made Ground associated with highways embankment for the M42/A452 Roundabout at the southern end of Pool Wood Embankment is assumed to be dug out and replaced.	The Made Ground should be removed due to uncertainties and a high level of data scatter/variation associated with this soil. Furthermore, the excavation of this Made Ground conforms with geo environmental recommendations requiring the removal of contaminated material. It should be mentioned that the Made Ground is likely to be removed due to leachate exceedances of water quality standards for arsenic, boron, cadmium and vanadium recorded in ML158-WS016, also recommended by HS2 Geo-environmental Report for Sublots 5 and 6 (1MC09-BBV_MSD-EV-REP-N002-100002). the Made Ground is also likely to be removed as part of the M42/A452 Roundabout removal.
It is assumed that the pond under Pool Wood embankment (around Ch 159+150 to Ch 159+230) will be relocated and any associated contamination will be remediated.	This is in accordance with the Geo-environmental recommendation due to the contamination identified within the surrounding area.
Geotechnical parameters of the soft GLLD were assumed for the MGR that exists around 159+300.	Unavailability of geotechnical parameters of the MGR.
2m of the top ground layer from Ch 158+860 to 159+020 to be excavated and replaced with treated embankment fill.	Existence of a cohesive layer of soft Glaciofluvial deposits.
There are existing pylon foundations (ZF107 and ZF108) at Ch 159+675 and Ch 159+350, respectively. At these pylon locations, the associated foundation bases should be fully excavated to depth. In general the excavation can be later replaced with compacted site won material. Should the excavation for the foundation removal extend beyond 3.0mbgl, then the resulting void below that 3.0m level should be backfilled with a compacted granular	The removal of the mast foundations is required to avoid the clash with rigid inclusions and cause obstruction to the construction process. The stipulation of use of granular material below the 3.0m level is to avoid undue negative skin friction being induced upon the rigid inclusions subsequently to be installed in the area. In addition to these above conditions, the removal of the foundations and replacement process

Assumption	Rationale
material conforming to 6F5 criteria as stipulated with the defined Specification for Civil Engineering Works Series 600: Earthworks (ref: 1MC08-BBV_MSD-GT-SPE-N000_100001). Above this 3.0m level site won compacted material may be utilised. The site won material itself in general should be inspected and it is assumed it will be of reasonably manageable consistency and not excessively soft or high in organic content.	should be supervised by a suitably qualified geotechnical engineer.
2.5m of the top ground layer from Ch 159+700 to 159+805 to be excavated and replaced with treated embankment fill.	Existence of Glaciolacustrine deposits and a cohesive layer of soft Glaciofluvial deposits.
The longitudinal gradient of the Load Transfer Platform (LTP) is assumed to be up to 3%.	A gradient of up to 3% is required for Pool Wood Embankment rigid inclusion zone in order to obtain a reasonable cut to fill balance.
The friction angle of 6F5 for the construction of the load transfer platform for Pool Wood Embankment rigid inclusions must at least be 38°.	A minimum of 38° is required for the load transfer platform to eliminate punching of the rigid inclusions through the load transfer platform.
It is a design assumption that the geogrid in the load transfer platform of the rigid inclusions will be anchored sufficiently at each end to mobilise the full tensile design strength between all the rigid inclusions.	This is a design requirement in accordance with BS 8006.
The upfill material to set the level of the load transfer platform is assumed to have an undrained shear strength of at least 35kPa subject to site verification.	An undrained strength of 35kPa is required to reduce settlements and eliminate bearing capacity failure of the ground in between rigid inclusions.

Table 2.8 – Design Assumptions Summary for Pool Wood Culvert

Assumption	Rationale
2m of the top ground layer at the location of Pool Wood culvert from Ch 158+855 to Ch 159+015 to be excavated and replaced with treated embankment fill.	Existence of a soft cohesive layer of Glaciofluvial deposits.

3 EARTHWORKS

3.1 General

This section covers the detailed design undertaken for the earthworks. It summarises design inputs, design methodology, and the design outputs.

3.2 Cutting Stability

Not applicable to this area.

3.3 Embankment Stability

3.3.1 Pool Wood Embankment

3.3.1.1 Geometry

The geometry of Pool Wood Embankment is summarised in Table 3.1. Full details of the geometry are provided in the federated 3D model of the embankment (1MC09-BBV_MSD-DS-DMB-NS04_NL10-158301). Design drawings are listed in Appendix A.

Table 3.1 Summary of embankment geometry

Asset geometry	Left side (i.e. west)	Right side (i.e. east)
Chainage	Ch 158+320 to Ch 159+790	Ch 158+430 to Ch 159+800
Gradient	Slope: 1V:2H West slope 1V:1H from Ch 158+995 to Ch 159+735 where landscape bund exists	Slope: 1V:2H
Height (m)	11 (from the ground level to the top of protection layer)	
Length (m)	1414 (excluding Coleshill Heath Road Underbridge and Retaining walls)	

3.3.1.2 Methodology

Due to the variability and thickness variation of ground stratigraphy in the asset area, Pool Wood Embankment is split into 14 ground profiles. Six profiles were used for slope stability analysis, settlement assessment and bearing capacity checks, as shown in Table 3.2. After that, the zone of the soft soil (Glaciolacustrine Deposits) was split into eight sections in order to design rigid inclusions beneath the trace embankment, as shown in Table 3.3.

The static and seismic (pseudo static) stability analyses are undertaken using the proprietary limit equilibrium slope stability software package Talren v5. The analysis method adopted the Bishop approach with the moment equilibrium being satisfied. The analyses were based upon the identification of a circular slip that produces the lowest factor of safety, noting that a minimum slip depth of 1m is adopted. The ‘grid’ and ‘radius’ approach were used to identify the geometry of the failure surfaces.

Numerical modelling using PLAXIS 2D was undertaken to examine vertical and lateral displacements induced in embankment due to the self-weight and the surcharge loads.

The seismic analysis was undertaken in accordance with the methodology set out within 'Detailed Design – Basis of Design Report – Methodology – Seismic Design' (1MC08-BBV_MSD-GT-REP-N001-100163).

Partial factors were applied to actions, materials, and resistances in accordance with BS EN 1997-1, using the partial factors set out in the UK National Annex to BS EN 1997-1: 2004 for Design Approach 1 - Combination 1 (DA1-C1), and Design Approach 1 - Combination 2 (DA1-C2).

Table 3.2 - Ground profiles considered for the design of Pool Wood Embankment (bearing resistance analysis, settlement analysis, slope stability analysis)

Profile location	Stratigraphy	Thickness (m)	Embankment height (m)	GWL (m bgl)	Seismic Class
Profile 1					
158+535 (158+386 to 158+775)	GFD	6.0	9.0	1.3	C
	MMG IV/V	3.0			
	Substratum	-			
Profile 2					
158+855 (158+775 to 159+015)	GFD	7.5	11.0	2.1	C
	MMG IV/V	3.0			
	Substratum	-			
Profile 3					
159+215 (159+015 to 159+245)	GLLD	3	8.0	0	D
	GFD	1.8			
	MMG IV/V	9.7			
	Substratum	-			
Profile 4					
159+290 (159+245 to 159+395)	MGR	5.5	8.0	0	D
	GLLD	5.9			
	GFD	3.4			
	MMG IV/V	2.7			
	Substratum	-			

Profile location	Stratigraphy	Thickness (m)	Embankment height (m)	GWL (m bgl)	Seismic Class
Profile 5					
159+415 (159+395 to 159+695)	GLLD	9.5	7.0	4.3	D
	GFD	4.5			
	MMG IV/V	3.0			
	Substratum	-			
Profile 6					
159+775 (159+695 to 159+800)	GFD	7.0	11.0	1.6	C
	MMG IV/V	2.0			
	Substratum	-			

Table 3.3 – Ground profiles considered for the rigid inclusions design in Pool Wood Embankment

Profile location	Stratigraphy	Thickness (m)	Embankment height (m)	GWL (m bgl)	Seismic Class
Profile 7					
159+070 (159+015 to 159+070)	GLLD	4.7	9.0	4.4	D
	GFD	7.3			
	MMG IV/V	1.3			
	Substratum	-			
Profile 8					
159+145 (159+070 to 159+195)	GLLD	6.0	10.0	0	D
	GFD	2.5			
	MMG IV/V	5.0			
	Substratum	-			
Profile 9					
159+295	GLLD	9.0	8.0	0	D

Profile location	Stratigraphy	Thickness (m)	Embankment height (m)	GWL (m bgl)	Seismic Class
(159+195 to 159+405)	GFD	3.3			
	MMG IV/V	2.7			
	Substratum	-			
Profile 10					
159+415 (159+405 to 159+445)	GLLD	9.5	7.0	4.3	D
	GFD	4.5			
	MMG IV/V	3.0			
	Substratum	-			
Profile 11					
159+465 (159+445 to 159+495)	GLLD	7.0	6.0	4.3	D
	GFD	8.0			
	MMG IV/V	2.0			
	Substratum	-			
Profile 12					
159+595 (159+495 to 159+595)	GLLD	7.0	7.5	4.4	D
	GFD	5.0			
	MMG IV/V	2.3			
	Substratum	-			
Profile 13					
159+645 (159+595 to 159+645)	GLLD	4.5	9.0	3.2	D
	GFD	6.5			
	MMG IV/V	2.0			
	Substratum	-			
Profile 14					

Profile location	Stratigraphy	Thickness (m)	Embankment height (m)	GWL (m bgl)	Seismic Class
159+695 (159+645 to 159+695)	GLLD	1.5	9.5	1.9	D
	GFD	7.5			
	MMG IV/V	2.0			
	Substratum	-			

The slope stability analysis demonstrates that the stability is not satisfied for profiles 3, 4 and 5. To ensure against failure in the foundation soil due to low undrained shear strength of soft Glaciolacustrine Deposits, rigid inclusions are designed to be constructed under the trace embankment from Ch 159+015 to Ch 159+695. The analysis was performed for profiles 3, 4 and 5 after ground improvement, modelled in Talren v5 as nails (B40 steel bars).

Due to the extension of the soft Glaciolacustrine Deposits to the area where Pool Wood landscape bund will be constructed, a staged upfill process with prefabricated vertical drains has been designed for the landscape bund. It is worth noting that the risk profile for the landscape bund differs considerably to that of the trace embankment and as such, the design performance criteria are less stringent. Hence, a highly controlled staged construction with prefabricated vertical drains was deemed satisfactory for the construction of the Pool Wood landscape bund.

3.3.1.3 Parameters

The proposed geotechnical parameters for design are presented in Table 3.4, Table 3.5 and Table 3.6 representing the southern, central and northern sections of the Pool Wood area, as explained earlier in Section 1.3.1. The exact chainages are referenced in the table titles below.

For more information on ground geotechnical parameters refer to 'Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions' (1MC09-BBV_MSD-GT-REP-NS04_NL10-100022).

Table 3.4 - Material geotechnical parameters for analysis (Ch 158+386 to Ch 158+775)

Material	Unit Weight	Undrained Shear Strength	Peak Angle of Shearing Resistance	Cohesion	Effective Angle of Shearing Resistance	Undrained Young's Modulus	Drained Young's Modulus	Coefficient of volume compressibility	Pore Pressure Ratio
	γ (kN/m^3)	c_u (kPa)	φ'_{pk} (°)	c' (kPa)	φ'_{cv} (°)	E_u (MPa)	E' (MPa)	m_v (m^2/MN)	r_u (-)
Embankment Fill	20	75	28	10	26	60	-	-	0.1
Vadose Zone	20	-	-	5	26	-	-	-	0.2
Glaciofluvial Deposits	19	-	30	0	28	-	10+1.6z	-	-
Mercia Mudstone Grade IV/V	20	c_u = 30 + 10z, capped at 70 kPa	23	0	21	E_u = 15.6 + 5.2z, capped at 36.4 MPa	E' = 13.4 + 4.5z, capped at 31.3 MPa	m_v = 0.0746 + 0.2z, capped at 0.0319 MPa	-

Table 3.5 - Material geotechnical parameters for analysis (Ch 158+775 to Ch 159+015)

Material	Unit Weight	Undrained Shear Strength	Peak Angle of Shearing Resistance	Cohesion	Effective Angle of Shearing Resistance	Undrained Young's Modulus	Drained Young's Modulus	Coefficient of volume compressibility	Pore Pressure Ratio
	γ (kN/m³)	c_u (kPa)	φ'_{pk} (°)	c' (kPa)	φ'_{cv} (°)	E_u (MPa)	E' (MPa)	m_v (m²/MN)	r_u (-)
Embankment Fill	20	75	28	10	26	60	-	-	0.1
Vadose Zone	20	-	-	5	26	-	-	-	0.2
Landscape Fill (Class 4, untreated)	20	50, 75, 100	25	1	23	-	-	-	-
Glaciofluvial Deposits	19	-	34	0	32	-	E' = 40 MPa for z ≤ 2m E' = 40 + 6(z – 2) for z > 2m, capped at 88 MPa	-	-
Mercia Mudstone Grade IV/V	20	c_u = 80 kPa for z ≤ 6.5m c_u = 80 + 10(z – 6.5) for z > 6.5m, capped at 135 kPa	28	0	26	E_u = 27.5 MPa for z ≤ 6.5m E_u = 27.5 + 4(z – 6.5) for z > 6.5m, capped at 49.5 MPa	E' = 24 MPa for z ≤ 6.5m E' = 24 + 3.5(z – 6.5) for z > 6.5m, capped at 43 MPa	m_v = 0.072 m²/MN for z ≤ 6.5m m_v = 0.072 – (z – 6.5)/140 for z > 6.5m, capped at 0.033 m²/MN	-

Table 3.6 - Material geotechnical parameters for analysis (Ch 159+015 to Ch 159+800)

Material	Unit Weight	Undrained Shear Strength	Peak Angle of Shearing Resistance	Cohesion	Effective Angle of Shearing Resistance	Undrained Young's Modulus	Drained Young's Modulus	Coefficient of volume compressibility	Pore Pressure Ratio
	γ (kN/m³)	c_u (kPa)	φ'_{pk} (°)	c' (kPa)	φ'_{cv} (°)	E_u (MPa)	E' (MPa)	m_v (m²/MN)	r_u (-)
Embankment Fill	20	75	28	10	26	60	-	-	0.1
Vadose Zone	20	-	-	5	26	-	-	-	0.2
Landscape Fill (Class 4, untreated)	20	50, 75, 100	25	1	23	-	-	-	-
Glaciolacustrine Deposits	20.5	c_u = 16 + 5.7z, capped at 50 kPa	27	0	26	13	11	0.133	-
Glaciofluvial Deposits	19	-	34	0	32	-	E' = 40 MPa for z ≤ 2m E' = 40 + 6(z – 2) for z > 2m, capped at 88 MPa	-	-

Material	Unit Weight	Undrained Shear Strength	Peak Angle of Shearing Resistance	Cohesion	Effective Angle of Shearing Resistance	Undrained Young's Modulus	Drained Young's Modulus	Coefficient of volume compressibility	Pore Pressure Ratio
	γ (kN/m^3)	c_u (kPa)	φ'_{pk} (°)	c' (kPa)	φ'_{cv} (°)	E_u (MPa)	E' (MPa)	m_v (m^2/MN)	r_u (-)
Mercia Mudstone Grade IV/V	20	c_u = 80 kPa for z ≤ 6.5m c_u = 80 + 10(z – 6.5) for z > 6.5m, capped at 135 kPa	28	0	26	E_u = 27.5 MPa for z ≤ 6.5m E_u = 27.5 + 4(z – 6.5) for z > 6.5m, capped at 49.5 MPa	E' = 24 MPa for z ≤ 6.5m E' = 24 + 3.5(z – 6.5) for z > 6.5m, capped at 43 MPa	m_v = 0.072 m^2/MN for z ≤ 6.5m m_v = 0.072 – (z – 6.5)/140 for z > 6.5m, capped at 0.033 m^2/MN	-

Table 3.7 – Seismic parameters

Seismic parameters	Importance Factor (NA BS EN 1998)	Reference Peak Ground Acceleration on Type A Ground	Soil Factor	Topographical Amplification Factor, EC8	Factor for Calculation of k_h	Horizontal Coefficient*	Vertical Coefficient*
	γ_I	a_{gR}	S	S_T	r	k_h	k_v
Value (from Ch 158+386 to 159+015, and from Ch 159+730 to 159+800)	1.0	0.10g	1.5	1.0	2	0.075	0.02475
Value (from Ch 159+015 to 159+730, where GLLD exists)	1.0	0.10g	1.8	1.0	2	0.09	0.0297

3.3.1.4 Stratigraphy

Due to the variability and thickness variation of ground stratigraphy in the asset area, Pool Wood Embankment is split into six ground profiles as presented before in Table 3.2. Note that in addition to these six profiles, the zone where Glaciolacustrine deposits exist, has further been divided into eight sections in order to optimise the rigid inclusions design.

More details about Pool Wood Embankment ground profiles can be found in Figure 3-1 and Figure 3-2.

For more information on ground profiles refer to 'Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions' (1MC09-BBV_MSD-GT-REP-NS04_NL10-100022).

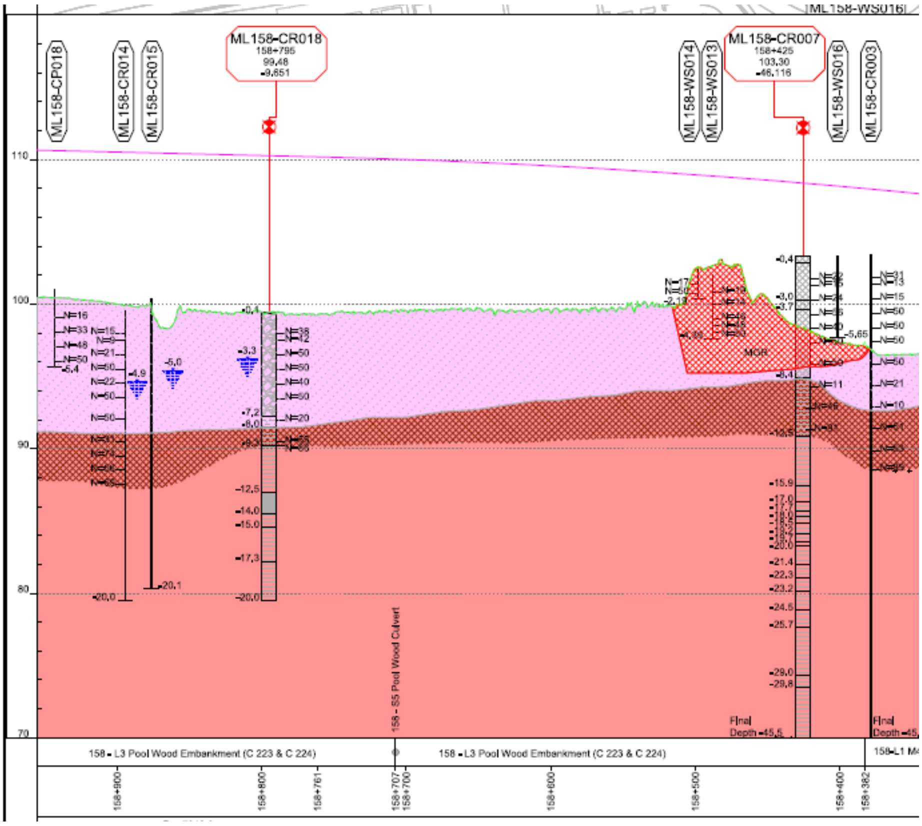


Figure 3-1 – Pool Wood Embankment long section (1)

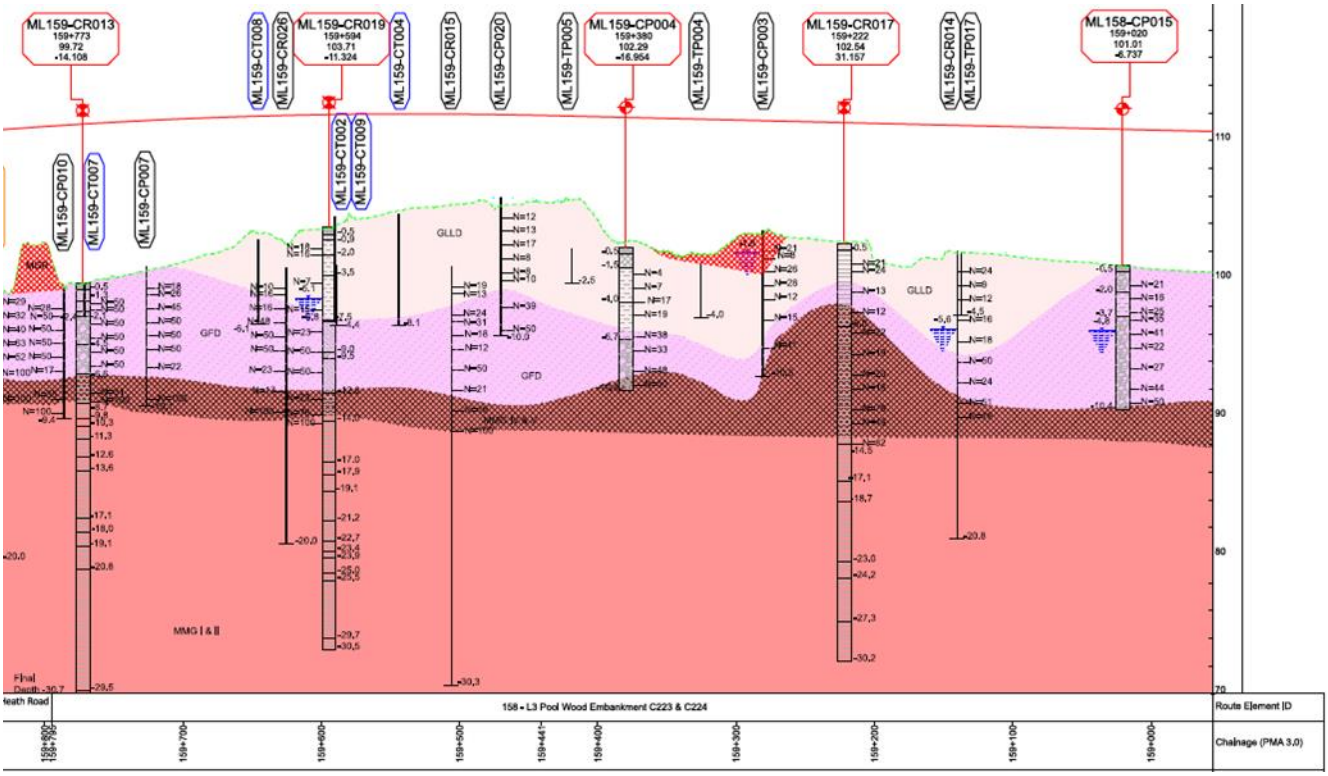


Figure 3-2 -Pool Wood Embankment Long section (2)

3.3.1.5 Groundwater

The design groundwater pore pressure assumptions are presented in Table 3.8.

For more information on design groundwater profiles refer to 'Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions' (1MC09-BBV_MSD-GT-REP-NS04_NL10-100022).

Table 3.8 – Summary of Groundwater Pore Water Pressure Profiles

Section	Short-term Characteristic	Long term – Ultimate (Maximum)
Ch. 158+386 to Ch. 158+745	Hydrostatic from 96.5m AOD	Hydrostatic from 98.7m AOD
Ch. 158+745 to Ch. 159+015	Hydrostatic from 96.0m AOD	Hydrostatic from 97.4m AOD
Ch. 159+015 to Ch. 159+800	Hydrostatic from 96.0m AOD between Ch 159+015 and Ch 159+140	Hydrostatic from 97.4m AOD between Ch 159+015 and Ch 159+140
	Hydrostatic from 101.0m AOD between Ch 159+140 and Ch 159+380	Hydrostatic from 102.9m AOD between Ch 159+140 and Ch 159+380
	Hydrostatic from 96.0m AOD between Ch 159+380 and Ch 159+800	Hydrostatic from 99.6m AOD between Ch 159+380 and Ch 159+800

3.3.1.6 Loads

Operational loading: A variable surcharge of 50kPa was applied to the top of the embankment along the trackbed width (3m from the crest of the embankment), and 10 kPa was applied to the top of the landscape bund.

Construction loading: A variable surcharge of 50kPa was applied to the top of the embankment along the trackbed width (3m from the crest of the embankment), and 20 kPa was applied to the top of the landscape bund.

Seismic loading: 30% of the operational loading was applied to the model for seismic analysis, which resulted in 15kPa and 3kPa pressure for the top of the embankment along the trackbed width (3m from the crest of the embankment), and the top of the landscape bund, respectively.

3.3.1.7 Slope Stability Analysis Results

The design cases considered in the slope stability analysis and the computed factors of safety are summarised in following tables.

Table 3.9 – Slope Stability calculations for cross section 1 (Ch 158+535) – without Ground Treatment

Slope 2H/1V			Safety factor	Validation
Static	DA1-1	Long term	1.14	OK
	DA1-2		1.09	OK
	DA1-1	Short term	1.42	OK
	DA1-2		1.22	OK
Seismic	Horizontal seismic	Short term	1.38	OK
	Upward seismic		1.62	OK

Slope 2H/1V			Safety factor	Validation
	Downward seismic		1.66	OK

Table 3.10 – Slope Stability calculations for cross section 2 (158+855) – without Ground Treatment

Slope 2H/1V			Safety factor	Validation
Static	DA1-1	Long term	1.13	OK
	DA1-2		1.07	OK
	DA1-1	Short term	1.33	OK
	DA1-2		1.18	OK
Seismic	Horizontal seismic	Short term	1.34	OK
	Upward seismic		1.56	OK
	Downward seismic		1.62	OK

Table 3.11 - Slope Stability calculations for cross section 3 (159+215) – without Ground Treatment

Slope 2H/1V			Safety factor	Validation
Static	DA1-1	Long term	1.16	OK
	DA1-2		**1.01**	**NOT OK**
	DA1-1	Short term	**0.80**	**NOT OK**
	DA1-2		**0.73**	**NOT OK**
Seismic	Horizontal seismic	Short term	**0.85**	**NOT OK**
	Upward seismic		1.04	OK
	Downward seismic		1.11	OK

Table 3.12 - Slope Stability calculations for cross section 4 (159+290) – without Ground Treatment

Slope 2H/1V			Safety factor	Validation
Static	DA1-1	Long term	1.16	OK
	DA1-2		**1.01**	**NOT OK**
	DA1-1	Short term	**0.79**	**NOT OK**
	DA1-2		**0.72**	**NOT OK**
Seismic	Horizontal seismic	Short term	**0.83**	**NOT OK**
	Upward seismic		**1.03**	**NOT OK**
	Downward seismic		1.09	OK

Table 3.13 - Slope Stability calculations for cross section 5 (159+415) – without Ground Treatment

Slope 2H/1V			Safety factor	Validation
Static	DA1-1	Long term	1.17	OK
	DA1-2		**1.02**	**NOT OK**
	DA1-1	Short term	**0.83**	**NOT OK**
	DA1-2		**0.76**	**NOT OK**
Seismic	Horizontal seismic	Short term	**0.89**	**NOT OK**
	Upward seismic		1.11	OK
	Downward seismic		1.18	OK

Table 3.14 - Slope Stability calculations for cross section 6 (159+775) – without Ground Treatment

Slope 2H/1V			Safety factor	Validation
Static	DA1-1	Long term	1.12	OK
	DA1-2		1.07	OK
	DA1-1	Short term	1.33	OK
	DA1-2		1.18	OK
Seismic	Horizontal seismic	Short term	1.34	OK
	Upward seismic		1.56	OK
	Downward seismic		1.61	OK

All stability checks are satisfied for profiles 1, 2 and 6. The checks are not satisfied for profiles 3, 4 and 5 (where GLLD underlays the embankment).

Ground reinforcement is required to address the slope stability issues. Section 9.2 presents the details of the rigid inclusions required for ground improvement.

In order to ensure the stability of the foundation soil, rigid inclusions under the embankment were modelled in Talren v5 as nails (1B40 steel bars). The analysis was performed for cross sections 3, 4 and 5. Slope stability results after the ground treatment are presented the following tables.

Table 3.15 – Slope Stability calculations for cross section 3 (Ch 159+215) – with Ground Treatment

Slope 2H/1V			Safety factor	Validation
Static	DA1-1	Long term	1.16	OK
	DA1-2		1.15	OK
	DA1-1	Short term	1.61	OK
	DA1-2		1.40	OK
Seismic	Horizontal seismic	Short term	1.61	OK
	Upward seismic		1.93	OK
	Downward seismic		2.01	OK

Table 3.16 - Slope Stability calculations for cross section 4 (Ch 159+290) – with Ground Treatment

Slope 2H/1V			Safety factor	Validation
Static	DA1-1	Long term	1.16	OK
	DA1-2		1.15	OK
	DA1-1	Short term	1.61	OK
	DA1-2		1.40	OK
Seismic	Horizontal seismic	Short term	1.61	OK
	Upward seismic		1.93	OK
	Downward seismic		2.01	OK

Note: MGR was treated as GLLD, as during the design there was not any GI data available for MGR.

Table 3.17 - Slope Stability calculations for cross section 5 (Ch 159+415) – with Ground Treatment

Slope 2H/1V			Safety factor	Validation
Static	DA1-1	Long term	1.17	OK
	DA1-2		1.19	OK
	DA1-1	Short term	1.72	OK
	DA1-2		1.48	OK
Seismic	Horizontal seismic	Short term	1.74	OK
	Upward seismic		2.12	OK

Slope 2H/1V			Safety factor	Validation
	Downward seismic		2.20	OK

3.3.2 Landscape Earthworks

For methodology, design information and loads refer to Section 3.3.1.

3.3.2.1 Geometry

The geometry of the landscape bund is summarised in Table 3.18.

Table 3.18 – Summary of landscape bund geometry

Asset geometry	Left side (i.e. west)	Right side (i.e. east)
Chainage	Ch 158+920 to Ch 159+760	-
Gradient	Exterior (West) Slope: 1V:4H Interior (East) Slope: 1V:3H	-
Height (m)	Variable, approximately 14m maximum, and 4m above the top of rail	
Length (m)	840	

3.3.2.2 Slope Stability Analysis Results

For the landscape bund, ground improvement (installation of prefabricated vertical drains) is proposed in order to achieve the required undrained shear strength within GLLD. The slope stability results for the landscape bund, after the ground improvement are presented for the interior and the exterior slopes, respectively, in Table 3.19 and Table 3.20.

Table 3.19 – Slope stability analysis for landscape bund – interior slope (Ch 159+195)

Slope 3H/1V			Safety factor	Validation
Static	DA1-1	Long term	1.44	OK
	DA1-2		1.18	OK
	DA1-1	Short term	2.14	OK
	DA1-2		2.01	OK
Seismic	Horizontal seismic	Short term	1.88	OK
	Upward seismic		2.47	OK
	Downward seismic		2.62	OK

Table 3.20 – Slope stability analysis for landscape bund – exterior slope side (159+195)

Slope 4H/1V			Safety factor	Validation
Static	DA1-1	Long term	1.78	OK
	DA1-2		1.44	OK
	DA1-1	Short term	1.48	OK
	DA1-2		1.36	OK
Seismic	Horizontal seismic	Short term	1.10	OK
	Upward seismic		1.49	OK
	Downward seismic		1.57	OK

All stability checks are satisfied for the landscape bund.

3.4 Re-Use of Materials

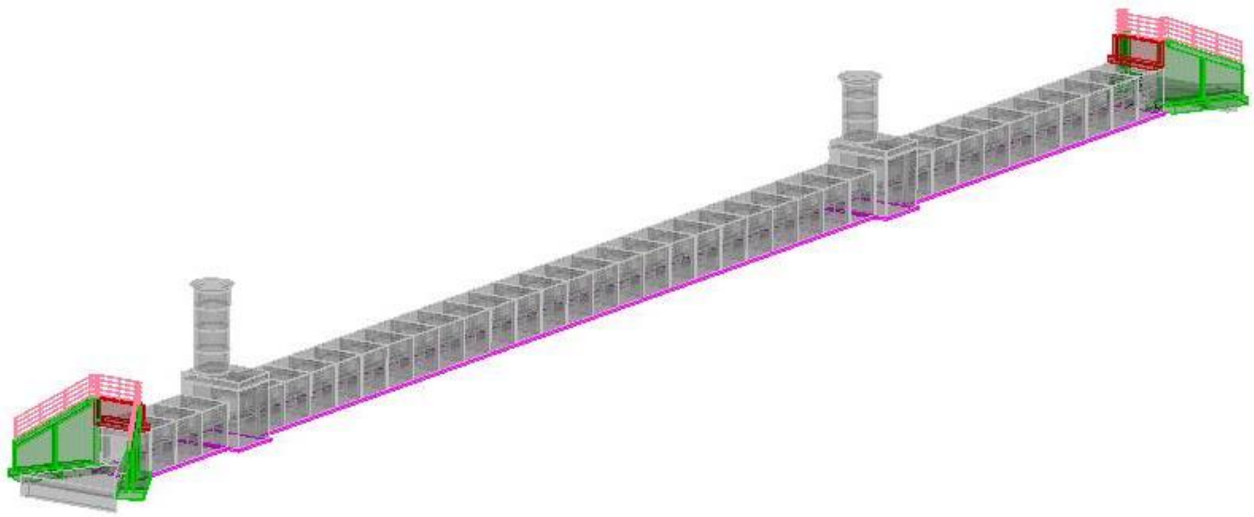
An assessment of reuse of the excavated materials may be provided for Pool Wood Embankment subject to future agreements on material usage. Until this agreement is achieved, the relatively smaller amount of Made Ground on site and volumes generated from dig-out and replace should be removed to agreed depth, and subject to inspection on site by a suitably qualified geotechnical engineer. These soils should be stockpiled until such agreement has been achieved with HS2 for potential future re-use.

4 STRUCTURES

4.1 Pool Wood Culvert

DETAILS OF STRUCTURE				
Legacy Asset ID	158-S5	Chainage:	From: 158+75	To: 158+875
HS2 ID	HS2-000020023			
Tranche score (ref MUGC)	3	DD GI Class		2.3
EC7 Geotechnical Category	2	Stage 2 Check Level		CAT II
Design Life	120 yrs	Design Uncertainty Factor		1.05
LOCATION - DESCRIPTION				
Pool Wood Culvert is located within Pool Wood Embankment at Ch 158+875.				
ASSOCIATED ASSETS Pool Wood Embankment (158-L3).				
TOPOGRAPHICAL SETTING AND TERRAIN The asset is located at the end of a woodland. M42 motorway is to the east of the culvert, and to the west side is an industrial/residential area. The existing ground level in the location of the asset is approximately at 100m AOD. The height of the embankment at the location of Pool Wood Culvert is approximately 10.5m.				
PREVIOUS GROUND HISTORY The immediate surroundings of the culvert is a woodland.				
CULVERT GEOMETRY				
The length of the culvert is approximately 90m and its cross sectional size is 2.55m x 2.05m.				

GENERAL LAYOUT



GROUND CONDITIONS

A summary description of ground conditions can be found in the Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions (1MC09-BBV_MSD-GT-REP-NS04_NL10-100022).

Ch 158+875

Strata	Typical depths to base (m AOD)	Approximate thickness (m)	Typical description
Glaciofluvial Deposits – Cohesive (top 2m)	98.37	2	Soft to firm reddish brown slightly sandy slightly gravelly CLAY. The sand is fine. Gravel is fine to coarse subangular to subrounded of flint, mudstone, siltstone, and quartzite.
Glaciofluvial Deposits - Granular	91.47	6.9	Medium dense to dense reddish brown, slightly clayey sandy fine to coarse subangular to rounded GRAVEL with low to high cobble content of mixed lithologies including flint, quartzite, sandstone, mudstone, and siltstone. Sand is fine to coarse. Cobbles are subrounded to rounded of flint and quartzite.
Mercia Mudstone Group Grade IV/V	88.84	2.64	Stiff to very stiff, high to very high strength, reddish brown slightly sandy silty CLAY. Sand is fine to coarse.
Mercia Mudstone Group Grade I/II	NA	NA	Extremely weak to medium strong, very thickly laminated to very thinly bedded, reddish brown MUDSTONE with rare greenish grey reduction spots and rare voids. With rare medium strong to strong thickly laminated to very thinly bedded reddish brown SILTSTONE with rare greenish grey reduction spots and rare voids.

AVAILABLE INVESTIGATION HOLES (as of 4th June 2020 GI cut-off date)

Pavement Core	SCPT	Trial Pit	Window Sample	Cable Percussive	Cable Percussive with Rotary Follow On
	-	**-**	**-**	**2**	**3**

GROUNDWATER

A combination of ground investigation data and BGS mapping indicates that the geology beneath the area from Packington to Pool Wood comprises of superficial deposits (glaciofluvial and glaciolacustrine soils), underlain by weathered and un-weathered Mercia Mudstone.

Between chainages 158+790 to 159+015 (PMA 3.0) the groundwater table becomes deeper (up to around 5m below the ground level in ML158-CR015). This trend is consistent with an increased thickness of glaciofluvial deposits in this area and an expected hydraulic gradient moving further way from the tertiary watercourse at Ch 158+530 (PMA 3.0).

For the detailed design of the Pool Wood Culvert, the Long Term – Ultimate (Maximum) groundwater table has been assumed to be at 97.4m AOD. Please note the identification of a potential risk associated with the proximity of groundwater to the formation level of the culvert which should be controlled by adequate dewatering during construction.

CONTAMINATED GROUND RISK ASSESSMENT

There is no contamination risk captured in the GI data.

DESIGN PARAMETERS & METHODOLOGY

Geotechnical design parameters and the ground profile adopted are presented in the Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions (1MC09-BBV_MSD-GT-REP-NS04_NL10-100022).

This is a Class 2.3 asset, so characteristic parameters have been used adopting an uncertainty factor of 1.05.

The culvert foundation was designed according to Detailed Design - Basis of Design Report - Methodology - Shallow Foundations (1MC08-BBV_MSD-GT-REP-N001-100161).

The foundation was checked for bearing capacity, sliding, and overturning. A settlement assessment was also undertaken.

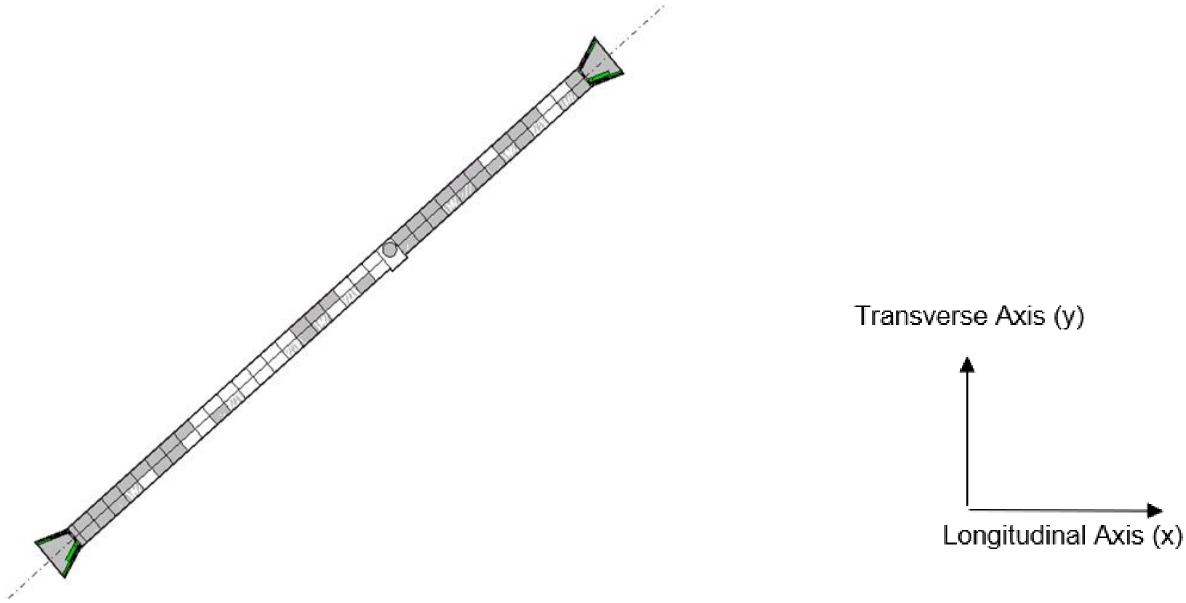
DESIGN GROUND MODEL AND PARAMETERS

The ground model and parameters used in design can be seen below.

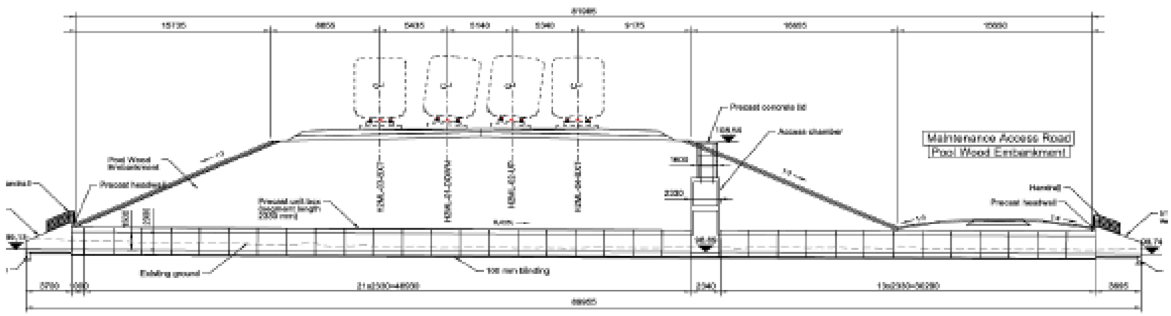
	Glaciofluvial Deposits	Mercia Mudstone Group – Grade IV/V
Depth to base of strata (mAOD)	91.47	88.84
Unit Weight (kN/m^3)	20	20
Undrained Shear Strength (kPa)	-	101
Peak angle of shearing resistance (°)	30	27

Constant volume angle of shearing resistance (°)	28	25
Cohesion (kPa)	0	0
Undrained Young's Modulus @ 0.1% Strain (MPa)	-	44
Drained Young's Modulus @ 0.1% Strain (MPa)	40 for $z \leq 2m$ $40 + 6.6(z – 2)$ capped at 80 for $z > 2m$.	38
Undrained Poisson's Ratio	-	-
Drained Poisson's Ratio	-	-
Overconsolidation Ratio (OCR)	-	5
Coefficient of earth pressure	-	-
Coefficient of Volume Compressibility (m^2/MN)	-	0.03
Coefficient of Consolidation (m^2/year)	-	12.5
Uniaxial Compressive Strength (MPa)	-	-
Rock mass Modulus of deformation (MPa)	-	-
FOUNDATION DESIGN – SPREAD FOOTINGS		

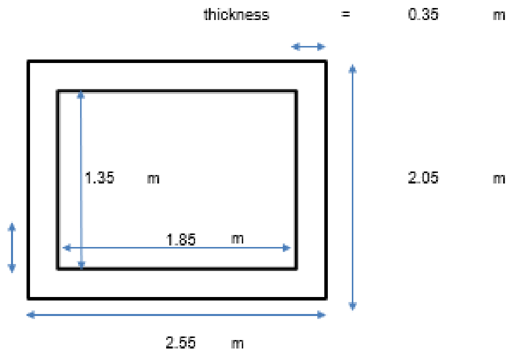
Plan Layout



Elevation



Cross section



SHALLOW FOUNDATION - SUMMARY OF DESIGN

STRUCTURE ELEMENT	FOUNDING LEVEL (m AOD)	FOUNDING STRATUM	FOOTING DIMENSIONS (m) Width-Length-Depth	ALLOWABLE BEARING PRESSURE (kN/m²)
Culvert	98.5	GFD	2.55 – 90 – 2.05	108.4

FOUNDATION DESIGN - PILES

N/A

PILED FOUNDATION – SUMMARY OF DESIGN

STRUCTURE ELEMENT	APPROX. PILE HEAD LEVEL (mAOD)	APPROX. TOE LEVEL (mAOD)	FOUNDING STRATUM	PILE LENGTH/ ROCK SOCKET LENGTH (3) (m)	PILE DIA (4) (mm)	PILE ARRANGMENT & SPACING (5) (m)	CRITICAL PILE AXIAL LOAD (kN) (6)
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

DESIGN CONSIDERATIONS

Design Standards and Documents:

The design is undertaken following the requirements of the following documents:

- Detailed Design - Basis of Design Report - Methodology - Shallow Foundations (1MC08-BBV_MSD-GT-REP-N001-100161).
- Detailed Design - Basis of Design for Geotechnics, Earthworks and Retaining Structures, Document no: 1MC08-BBV_MSD-GT-REP-N001-100157;
- 1MC08 & 1MC09 Sector N1 & N2 Basis of Design Culverts, Document no.: 1MC08-BBV_MSD-BR-REP-N001-100031;
- HS2 Phase 1 Seismic Design Methodology Report (SDMR) Document no.: 1MC08-BBV-GT-NOT-N001-100004;
- Detailed Design Technical Note on Ground Conditions – Packington Embankment to Pool Wood Embankment, Document no.: 1MC09-BBV_MSD-GT-REP-NS04_NL10-100022;
- Approval in Principle, Document no.: 1MC09-BBV_MSD-BR-AGR-NS04_NL10-100013;

Loads/Reactions:

The foundation of Pool Wood Culvert has been designed based on loads (reactions) provided by the structural engineering team. Upon receipt of the foundation loads the spread foundation design was performed in Excel. All of the load cases provided are reviewed and an assessment of those which are likely to be critical for the spread foundation design is carried out. Bearing capacity has been checked against the higher vertical stress acting on the culvert.

Structural Design:

Bending moment and shear force envelopes along the spread foundation length for Set B (DA1-C1), Set C (DA1-C2), SLS, dynamic and accidental case have been provided for the design of the foundation reinforcement included in Calculation note – Static Analysis – Pool Wood Culvert 1MC09-BBV_MSD-ST-REP-NS04_NL10-158901.

Factors of Safety:

All Factors of Safety / partial factors follow UK National Annex to BS EN 1997-1: 2004. DA1-C1 and DA1-C2.

Differential settlement criteria:

Settlement limits have been considered in accordance with Annex H of BS EN 1997-1. Differential settlement of 5mm will be considered.

Geotechnical Risk:

Refer to Appendix D where the snapshots of the geotechnical risk register are presented. In addition, a summary of the risks is presented in Table 2.6.

Construction Stages:

Ground excavation

Construction of lean concrete layer

Laying of precast elements of culvert

Making concrete in situ inlet and outlet

Waterproofing

Backfilling

Concrete grade: C40/50

HIGHWAY APPROACHES

N/A

CHEMICAL ANALYSIS

Very limited data is available For Pool Wood Culvert which made it inappropriate to determine an asset specific chemical analysis. According to the Sub Lot 5 and 6 Scheme Consolidation Geoenvironmental Report (1MC09-BBV_MSD-EV-REP-N002-100002) at Detailed Design the AC and DS classes for each soil type should be provided within the GIR. GIR Annex E2 for Diddington Lane Embankment to Coleshill N°2 Embankment (1MC09-BBV_MSD-GT-REP-NS04_NL10-100014) give concrete aggressivity classes of AC-1 and DS-1 for Glaciofluvial Deposits.

Based on the results and Table C2 of the BRE Special Digest 1 (2005), Pool Wood Culvert has been assigned a Design Sulphate Class of DS-2 and an Aggressive Chemical Environment for Concrete Class of AC-2.

VERIFICATION GROUND INVESTIGATION RECOMMENDED

See proposed Schedule 2 1MC08-BBV_MSD-GT-SCH-N001-100004.

New unique exploratory hole references (PMI #25)	Hole Type (as per HS2 hole type)	Scheduled depth (m)	Geotechnical Target	Particular Geotechnical In situ sampling/ Testing Requirements	Instrument installations	Particular Geotechnical Laboratory Testing
ML158-CR408	CR	20	Pool Wood culvert	SPT/permeability Testing	Standard Standpipe to adequate Level	Not over and above standard recommendations. Where encountered STRENGTH - Superficials Granular: PSD/Shear Box - Superficials Cohesive: UU Triax/ PL IP LL - Rock: UCS Testing or equivalent STIFFNESS - Superficials and weathered rock: 1D consolidation. Addition of concrete aggressivity testing to BRE SD1 suite D.
ML158-CR406	CR	20	Required to determine weathering profile, drainage path length and stiffness characteristics for settlement analysis. Also determine superficial thickness and whether any ground treatment is required to accelerate settlements	SPT	Superficials / Mercia Mudstone Group. Response zones not to cross multiple horizons of differing permeability	Not over and above standard recommendations. Where encountered STRENGTH - Superficials Granular: PSD/Shear Box - Superficials Cohesive: UU Triax/ PL IP LL - Rock: UCS Testing or equivalent STIFFNESS - Supercials and weathered rock: 1D consolidation.

5 STRENGTHENED EARTHWORKS

5.1 Details of Strengthened Earthworks

There are no strengthened earthworks that fall within this area.

6 DRAINAGE

6.1 General

This section covers the geotechnical drainage design for Pool Wood Embankment.

6.2 Geotechnical Drainage

Land drainage comprises of two ditches around the western perimeter of the earthwork. It has been designed to collect external catchments and embankment flow runoff before out falling into Pool Wood culvert by gravity.

There is a gravity draining system to the east of the embankment to convey water directly from the embankment into existing highway drainage systems to the east of the embankment. If the pipe / culvert blocks or its capacity is exceeded, ponding is not likely to occur at the low points with water expected to drain by gravity back into the watercourse. Figure 6-1 shows drainages details in Pool Wood Embankment.

Figure 6-1 Drainage details in Pool Wood Embankment

7 FORMATION DESIGN

7.1 Track Support System

Asset specific design was not undertaken for the track support system. The track support system does not deviate from the generic HS2 design.

7.2 Frost Protection Requirements

The HS2 railway earth structure performance standards do not permit any track movement (for both ballasted track and slab track) as a result of frost heave (refer to Table 4.2/1 of the HS2 Earthworks Technical Standard, HS2-HS2-Gt-STD-000-000001).

Frost protection requirements have been determined based on the guidance provided in Transport and Road Research Laboratory Research Report 45; the UK Department for DMRB Volume 7, Section 2, Part 3, HD26/06, Clause 3.1; and UIC Code 719, in particular Fig.16.

A key parameter for determining frost protection requirements is the Mean Annual Frost Index (MAFI). The MAFI has been obtained from the UK Met Office for three weather stations near the HS2 N1/N2 alignment. The approximate locations of the weather stations and the corresponding MAFI values are shown on Figure 7-1. It can be seen that the MAFI was less than 50 for all three weather stations. The MAFI values are based on the findings of Transport and Road Research Laboratory, Research Report 45.

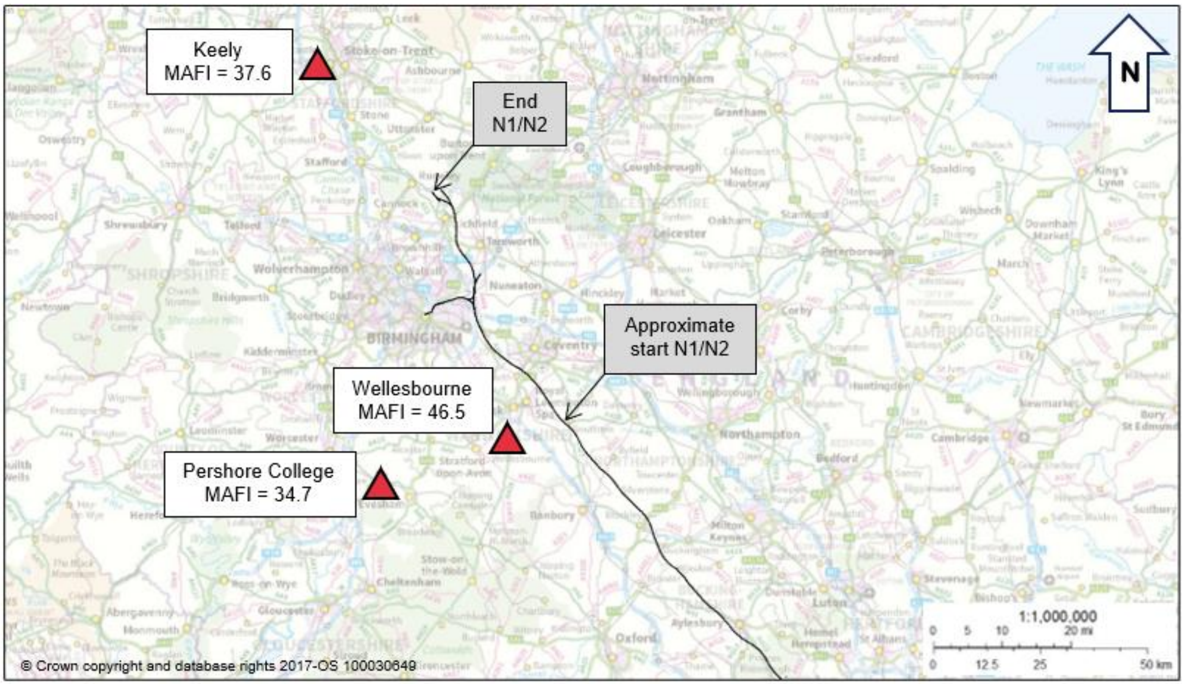


Figure 7-1 Approximate locations of weather stations for which Mean Annual Frost Index values are obtained

The materials used for trackbed layers must not be susceptible to frost. Based on the assessment no special measures are required for frost protection for the Pool Wood Embankment area.

7.3 Pavement Design, Subgrade and Capping

The pavement design of HS2 vehicular access shall follow the standard details shown in HS2 Highways Standard Detail Drawings Access Tracks (Document no: HS2-CSI-HW-DDE-000-000724-FD_P01 and HS2-CSI-HW-DDE-000-000725-FD_P01).

For the purposes of the design it is assumed that all formations (cuttings in existing ground or embankments of engineered fill) achieve not less than 3% CBR. Where in-situ testing of exposed formation indicated lesser values, the sub-base depths shall be re-evaluated, and the depths of construction amended accordingly.

Further details on typical granular construction can be found in Table 7.1 and the Highway design drawings.

Table 7.1 Typical Granular Construction

Foundations Minimum 3% CBR achieved at all formation levels.	
	Preparation and Surface treatment of formation to SHW Clause 616
Geotextile	Geotextile separation membrane to SHW Clause 609
Sub-base	250mm Granular Sub-Base Type 1

8 ASSESSMENT OF POTENTIAL CONTAMINATION

8.1 Pool Wood Embankment

8.1.1 General

A geo-environmental report has been produced which captures the Pool Wood Embankment asset (1MC09-BBV_MSD-EV-REP-N001-100002). This report presents a summary contamination risk assessment for the asset.

The asset is identified to be located east of Environment Statement Land Quality site Birmingham Business Park (24-46) and to the north of Environment Statement Land Quality site Brackenlands Farm Landfill (24-44). An additional potential land contamination site has been identified associated with former brick works and an infilled pond (at approximate Chainage 159+345).

Contamination was identified at the infilled pond associated with TPH identified within Made Ground (ML159-CP003) beneath the trace and included leachate exceedance for metals. Another small hotspot was identified associated with TPH within Topsoil at ML159-CP018 40m west of the trace which also included leachate exceedance for metals.

ML158-WS016 is located in a proposed area of highway works north of the BIS Triangle which are assumed to be undertaken by the EWC. The data shows that the leachate exceedances are encountered in a deep area of Made Ground supporting a current highway roundabout.

Groundwater monitoring data for the asset records notable poor groundwater quality, with exceedances of organic contaminants as well as metal contaminants. A potential source of groundwater contamination in ML158-CP020 and ML158-CO021 may be Brackenlands Farm landfill to the south of the two groundwater locations. In addition, LQ site 24-41 Packington Landfill is to the east of the route from ch.157+295 to 158+395; it is beyond the LOD. Currently, there are no proposed temporary or permanent works at Brackenlands Farm landfill. Any remediation requirements arising from future works will be the responsibility of the EWC.

For ML158-CR018 which is located between LQ site Birmingham Business Park and Coleshill Pool, within a wooded area, the location is not near areas of Made Ground and the borehole log reports topsoil overlying natural ground material. A source of the contaminants is not clear, and may be reflective of a wider, poor quality groundwater body due to general historical development of the region. This is similar for exploratory hole ML159-CR019 which is within a group of agricultural fields and is not near areas of Made Ground and therefore may also be reflective of a wider, poor quality groundwater body due to general historical development and agricultural activities in the region.

8.1.2 Summary of Commitments

Phase 1 of the assessment of the scheme and individual assets was undertaken during the Environmental Statement, which identified land quality (ES LQ) sites with the potential to be contaminated and assigned a preliminary risk. Phase 2 involved the ground investigation, screening and generic quantitative risk assessment of the scheme including targeted investigation of ES LQ sites identified as medium risk or greater. The results of Phase 2, relevant to Pool Wood

Embankment, are summarised in the report (1MC09-BBV_MSD-EV-REP-N001-100002) alongside a conceptual site model (CSM).

A generic quantitative risk assessment (GQRA) is presented in report 1MC09-BBV_MSD-EV-REP-N002-100002 and highlights exceedances arising from analysis of data made available up to 7th August 2019. Risks are described qualitatively to HS2 standards (HS2-HS2-EV-STD-000-000010; CT-001-000/2, Annex F).

Where material is excavated to facilitate the design requirements and unacceptable components in excavated material will require removal through physical screening / sorting to allow re-use as an acceptable earthwork's material class under the Earthworks Specification (HS2-HS2-CV-SPE-000-010600).

In order to determine the suitability of the material for re-use within earthworks and landscaping one soil sample will be required for every 500m^3 of potentially contaminated excavated material to confirm earthworks treatment requirements to render arisings as acceptable earthworks classes in accordance with the Earthworks Specification (HS2-HS2-CV-SPE-000-010600). The GI data will also provide an opportunity to review the existence of unexpected contamination. Should unexpected contamination be encountered a CSM will need to be developed and the requirement for a Remediation Strategy to address risks will be determined in liaison with the District Council and Environment Agency.

Waste recovery will be demonstrated through compliance with the Materials Management Plan developed in accordance with the HS2 Material Management Framework Technical Standard (HS2-HS2-EV-STD-000-000006) and CL:AIRE (2012) DoWCoP.

8.1.3 Summary of Risk Assessment and Remedial Approach

Based on the available information it is not envisaged that remediation will be required for Pool Wood associated with the pond backfill material sampled within ML159-CP003 to address potential risks from TPH and metals to controlled water. A risk register item has been added associated with the removal and remediation of Made Ground in highway embankment fill at the southern end of Pool Wood Embankment to address risks from leachates to controlled waters. Further ground investigation is proposed to better establish risks from made ground to controlled waters within the scheme footprint.

Reference should be made to the Sublot 5&6 Geo-environmental report (1MC09-BBV_MSD-EV-REP-N002-100002) from scheme design

8.2 Pool Wood Culvert

There is no contamination risk captured in the GI data for Pool Wood Culvert. Since the asset is within Pool Wood Embankment, please refer to Section 8.1 for further information about potential contamination.

9 GROUND TREATMENT

9.1 General

The sections below set out the anticipated improvements for different zones within Pool Wood embankment.

For specifications of the rigid inclusions designed for the zone from Ch 159+015 to Ch 159+695, refer to 1600 Piling and embedded retaining walls-Pool Wood Embankment Rigid Inclusions (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100009).

9.2 Pool Wood Embankment

Ground improvements within Pool Wood Embankment are presented below.

Please note that up to the date of producing this report, no geogrid installation sub-contractor has yet been defined by the Contractor. For this reason, the geogrid tensile strengths given in this report are for long term situation. The short-term strengths and properties associated with the material type of the geogrid are not considered in this calculation note.

Ch 158+386 to Ch 158+775:

- Made Ground exists in the beginning of Pool Wood Embankment from Ch 158+386 to Ch 158+545 to a depth of up to 8m, around 4m of which are above the surrounding natural ground level and 4m are below that level. The Made Ground seems to be associated with the highway's embankment for the A452/A446 Roundabout. This Made Ground should be removed due to uncertainties and high level of data scatter/ variation associated with this soil.
- There is a considerable lack of GI in this area till Ch 158+755. Ground improvement requirements will need to be reviewed after the arrival of the Stage 2 Scheduled GI.

Ch 158+775 to Ch 159+015:

- Ground improvement should be undertaken by excavation of 2m of the Glaciofluvial Deposits between Ch 158+855 and Ch 159+015 and replacement with cohesive foundation treatment material. There is a local patch of cohesive Glaciofluvial Deposits with a thickness of up to 2m around Pool Wood Culvert. The undrained shear strength of that local patch is below 50 kPa which necessitates a ground improvement. Due to the locality (extent) of this cohesive GFD and low undrained shear strength it has, no parameter derivation has been performed for the top 2m of the GFD. It should be mentioned that after carefully reviewing the log descriptions, the local soft spot was deemed to extend to around Ch 158+945. Due to lack of GI at the top 2m of the area between Ch 158+945 and Ch 159+015, the dig out and replace was needed to be extended to the start of the rigid inclusions.
- Ground improvement under the landscape bund from Ch 158+920 to Ch 159+015 is subject to review on site. During undertaking the ground improvement under the trace embankment, the ground under the landscape bund should be inspected to check if there is an extension of the soft GFD layer. If the ground is found to be soft, the dig-out and replace of the top 2m of the cohesive GFD should be undertaken for the landscape area.
- The new GI data (arrived after June 4th 2020) showed that the extent of the soft Glaciolacustrine Deposits (GLLD) to the south of Ch 159+015 is possible to extend to a depth of up to 3m bgl. It is therefore proposed that the ground should be inspected on site and if the depth of the soft GLLD is found to be deeper, the extent of the dig out and replace should be increased to up to 3m bgl.

Ch 159+015 to Ch 159+695

Due to the existence of soft Glaciolacustrine Deposits in this zone, rigid inclusions are proposed to improve the ground. The details of the rigid inclusions and their associated designs are presented below.

Rigid inclusion dimensions and design requirements

Table 9.1 Rigid inclusion dimensions and design requirements

Section	Diameter (m)	Length (m, from EGL)	Grid dimension under platform (m)	Grid dimension under east slope (m)	Requirements
159+015 to 159+070	0.36	9.0	1.5 × 1.5	2.5 × 2.5	The pile tip to remain within GFD, at least 1m above the top of MMG IV/V.
159+070 to 159+195	0.36	13.5	1.5 × 1.5	2.5 × 2.5	The pile tip to penetrate the bedrock.
159+195 to 159+405	0.36	15.0	1.7 × 1.7	2.5 × 2.5	
159+405 to 159+445	0.36	10.0	1.5 × 1.5	2.5 × 2.5	The pile tip to remain within GFD, at least 1m above the top of MMG IV/V.
159+445 to 159+495	0.36	8.0	1.8 × 1.8	2.5 × 2.5	
159+495 to 159+595	0.36	9.0	1.7 × 1.7	2.5 × 2.5	
159+595 to 159+645	0.36	9.0	1.3 × 1.3	2.5 × 2.5	
159+645 to 159+695	0.36	8.0	1.3 × 1.3	2.5 × 2.5	

Note: The influence zone under the embankment platform should be transferred in a 1:1 slope to the Load Transfer Platform to the east of the embankment. This is reflected by the setting out locations within the issued drawings.

Load Transfer Platform and Geogrid reinforcement requirements

A Load Transfer Platform (LTP) is designed be constructed at the bottom of the embankment – on top of the Rigid Inclusions. The overall thickness is 0.75m consisting of 0.60m in accordance of the BoD for Earthworks Integration and 0.10m to 0.15m of material associated with the construction of the working platform from which the rigid inclusions protrude to the bottom of the stated 0.60m. The friction angle of the LTP material (6F5) is assumed to at least be 38°.

Profile	Under the platform and west slope (kN/m)				Under east slope (kN/m)				Reinforcement bond	
	Transverse		Longitudinal		Transverse		Longitudinal		Transverse (BS8006)	Longitudinal, m (BS8006)
	SLS	ULS	SLS	ULS	SLS	ULS	SLS	ULS		
159+015 to 159+070	780	890	440	440	740	760	690	690	Periphery trench needed, as in BS8006, Section 8.3.3.12	4.5
159+070 to 159+195	1210	1350	810	820	830	860	760	770	Periphery trench needed, as in BS8006, Section 8.3.3.12	7.5
159+195 to 159+405	860	950	580	580	650	670	610	620	Periphery trench needed, as in BS8006, Section 8.3.3.12	6.5
159+405 to 159+445	590	660	360	370	570	580	530	540	Periphery trench needed, as in BS8006, Section 8.3.3.12	4.5
159+445 to 159+495	730	790	550	560	480	490	460	460	Periphery trench needed, as in BS8006, Section 8.3.3.12	8.0

Profile	Under the platform and west slope (kN/m)				Under east slope (kN/m)				Reinforcement bond	
	Transverse		Longitudinal		Transverse		Longitudinal		Transverse (BS8006)	Longitudinal, m (BS8006)
	SLS	ULS	SLS	ULS	SLS	ULS	SLS	ULS		
159+495 to 159+595	800	890	550	560	610	630	570	580	Periphery trench needed, as in BS8006, Section 8.3.3.12	6.5
159+595 to 159+645	620	720	280	280	740	760	690	690	Periphery trench needed, as in BS8006, Section 8.3.3.12	3.0
159+645 to 159+695	660	780	290	290	780	810	720	730	Periphery trench needed, as in BS8006, Section 8.3.3.12	3.0

Notes:

1. Up to the date of producing this report, no geogrid installation sub-contractor has yet been defined by the Contractor. For this reason, the geogrid tensile strengths given in this report are for long term situation. The short-term strengths and properties associated with the material type of the geogrid are not considered in this calculation note.
2. Two layers of Geogrid will be required to be installed in the Load Transfer Platform in accordance with the Detailed Design - Basis of Design - Earthworks Integration (1MC08-BBV_MSD-GT-REP-N001-100164), Section 7.3.7. The upper geogrid layer is proposed to be placed 150mm below the top of the LTP, and the second layer is 150mm below the upper layer. Furthermore, the lower geogrid layer with its optimal strength should be positioned in the transverse direction and conversely, the upper geogrid layer running along the centreline direction.

Steel reinforcement for rigid inclusions

1B40 steel bar shall be placed at the centre of each rigid inclusion.

It is worth noting that rigid inclusions were modelled as embedded beam row in PLAXIS 2D in order to estimate their induced shear forces and bending moments. The simulation of the rigid inclusions consisted of two stages. In the first stage, a single rigid inclusion was calibrated with a stress-displacement curve produced using the Fleming's method, and the stiffness parameters of the single rigid inclusion were changed in an iterative process till the PLAXIS results matched the Fleming's results. The estimated stiffness parameters were then used in the second stage to model the global soil-foundation system.

Concrete grade requirement

The compressive strength class of concrete used for the rigid inclusion shall be C35/45 LH as per Specification for Civil Engineering Works – Contract Specific Appendices - Series 1700 Structural Concrete (1MC08-BBV_MSD-MN-SPE-N001-101700).

Additional design requirements

The existing ground investigation data captured zones of very soft soil, ponds and localised landfills from Ch 159+150 to around Ch 159+400. SPT *N* values in the range of 2 and 4 are reported. It is therefore a design requirement that these very soft zones and any other such soft areas encountered during site inspection must be excavated and replaced with suitable fill that has a remoulded undrained shear strength of at least 35kPa for excavation depths within 3m bgl. A granular fill of 6F5 may be required for depths beyond 3m bgl subject to visual inspection on site by a suitably qualified geotechnical engineer.

For backfilling the areas where the existing ground level is below the Load Transfer Platform (LTP) level, a suitable fill of a remoulded undrained shear strength of 35kPa shall be used to set the level of the LTP. Backfilling and the compaction shall be in accordance with clause 612 of Series 0600 HS2 Specification for civil engineering works (HS2-HS2-CV-SPE-000-010600). The upfill material should be compacted in accordance with Method 6 of Table 6/4 of the Series 600 HS2 specification. If the site derived upfill material has a significant cohesive element, then this shall be reverted to method 1 or 2 and should be supervised and determined on site by a suitably qualified geotechnical engineer.

Construction sequence of the staged earthworks

A summary of the construction sequence of the staged landscape bund and the trace embankment is presented below. Please refer to drawings 1MC09-BBV_MSD-GT-DSC-NS04_NL10-218303, 1MC09-BBV_MSD-GT-DSC-NS04_NL10-218304, and 1MC09-BBV_MSD-GT-DSC-NS04_NL10-218305 for detailed and illustrative information on the construction sequence.

1. Undertake site survey and establish working boundaries / Limit of Deviation (LOD).
2. Do the site Clearance (trees, vegetation/overgrowth).
3. Identify all known buried services and clearly mark them out onsite. Full overhead line survey to be provided and traffic routes coordinated to traverse under cables at designated crossing points.
4. Strip topsoil and excavate/fill to top ground reinstatement surface.
5. Construct auxiliary ground improvement systems (Working platform/Draining Layer).

6. Construct Temporary Drainage Ditch.
7. Construct Rigid Inclusions according to design depth, diameter and reinforcement from working platform.
8. Trim concrete and replace it by Load Transfer Platform (LTP) material once rigid inclusions are completed (SB3 methods). Complete the construction of the LTP.
9. Construct Band Drains according to design depth and size from draining layer.
10. Undertake lifting of the trace embankments (without the landscape bund) to a maximum of 4m.
11. Undertake lifting of the landscape bund to a level of 4m, then hold it for 2 months.
12. Undertake lifting of the trace embankment additional 3.5m (max), to a level of 7.5m or to Final Prepared Subgrade Level if the embankment height is within 7.5m.
13. Lift the landscape bund additional 3.5m, to a level of 7.5m, then hold it for 2 months.
14. Construct the Track Drainage, and complete main embankment to the final level as required.
15. Undertake lifting of the landscape bund additional 3.0m, to a level of 10.5m, then hold it for 2 months.
16. Complete the landscape bund to the final level in a monitored and controlled fashion. This represents the highest and most onerous situation geotechnically and will require careful monitoring to ensure that adequate consolidation has occurred in the previous stage.

Ch 159+695 to 159+800:

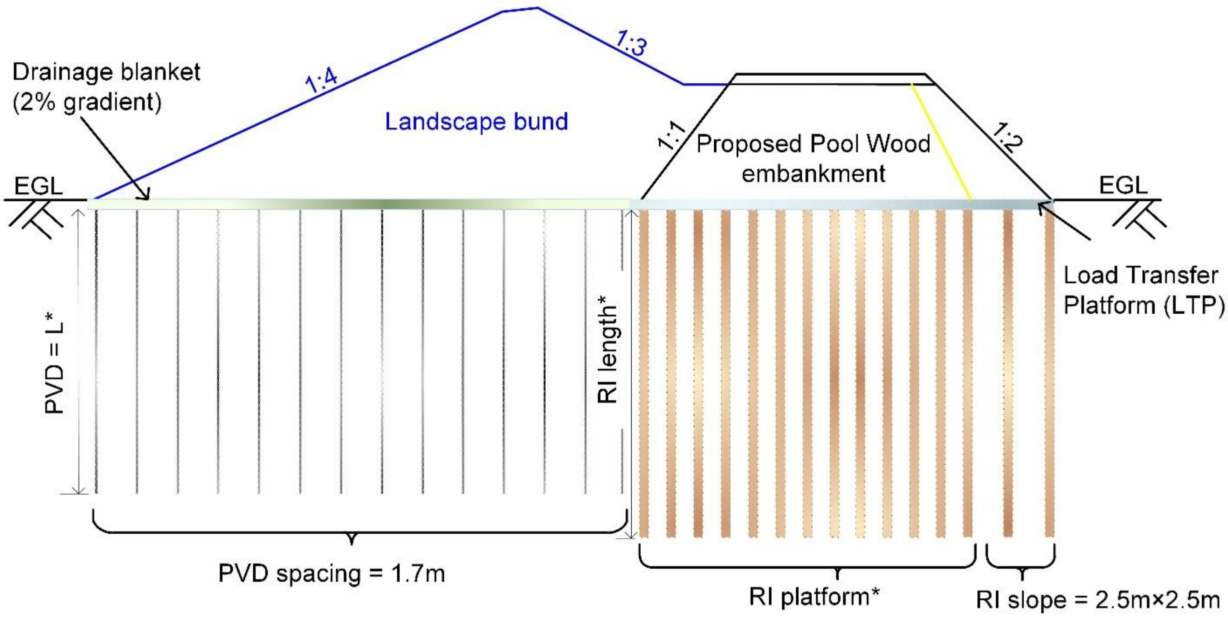
- Ground improvement by excavation of 2.5m and replacement with cohesive foundation treatment material within the trace embankment is required for the top ground layer (Glaciolacustrine Deposits between Ch 159+695 to Ch 159+715, and Glaciofluvial Deposits between Ch 159+715 and Ch 159+800) due to the existence of a soft material. The excavation and replacement is required to extend to the landscape bund area from Ch 159+695 to Ch 159+760. The replacement material under the landscape bund to be untreated landscape fill with an undrained shear strength of 100kPa.

Landscape bund

- Landscape bund runs from Ch 158+920 to Ch 159+760 to the west side of Pool Wood Embankment. The maximum height of the landscape bund is 14m and it is founded on GFD (from Ch 158+920 to 159+015 & Ch 159+715 to Ch 159+760) and on GLLD (from Ch 159+015 to Ch 159+715). A staged construction with prefabricated vertical drains is designed to ensure that the undrained shear strength of the foundation soil will reaches the required value.
- Four stages have been designed for the construction of the landscape bund. Each stage is followed by a two month holding period.
- The prefabricated vertical drains are designed to have a square grid spacing of 1.7m by 1.7m.
- A 0.75m drainage blanket is to be constructed from a clean granular material (6F5 containing less than 5% of material with grain size < 0,06 mm, subject to inspection on site) at the base of the staged embankment to allow flow from the vertical drains to a freely drain to the west of the landscape bund. The drainage path through the blanket should have a gradient of at least 2% whilst conforming with other gradient requirements previously discussed herein within this report.
- A geotextile layer should be added between the drainage blanket and the landscape bund fill.
- The lengths of the PVDs, according to the available ground model based on the current ground investigation data, are summarised below.

Table 9.2 – Indicative lengths of prefabricated vertical drains

Profile	PVD length (m)
Ch 159+015 to Ch 159+245	6.5
Ch 159+245 to Ch 159+470	10.0
Ch 159+470 to Ch 159+595	8.0
Ch 159+595 to Ch 159+695	5.5
Ch 159+695 to Ch 159+725	Excavation of the GLLD up to 2.5m



Section	PVD length, L* (m)
Ch 159+015 to 159+245	6.5
Ch 159+245 to 159+475	10.0
Ch 159+475 to 159+600	8.0
Ch 159+600 to 159+695	5.5

Section	RI length*, (m)	RI platform*, m
Ch 159+015 to 159+070	9.0	1.5 x 1.5
Ch 159+070 to 159+195	13.5	1.5 x 1.5
Ch 159+195 to 159+405	15.0	1.7 x 1.7
Ch 159+405 to 159+445	10.0	1.5 x 1.5
Ch 159+445 to 159+495	8.0	1.8 x 1.8
Ch 159+495 to 159+595	9.0	1.7 x 1.7
Ch 159+595 to 159+645	9.0	1.3 x 1.3
Ch 159+645 to 159+695	8.0	1.3 x 1.3

Figure 9-1 – Rigid inclusions designed for Pool Wood Embankment – elevation (not to scale)

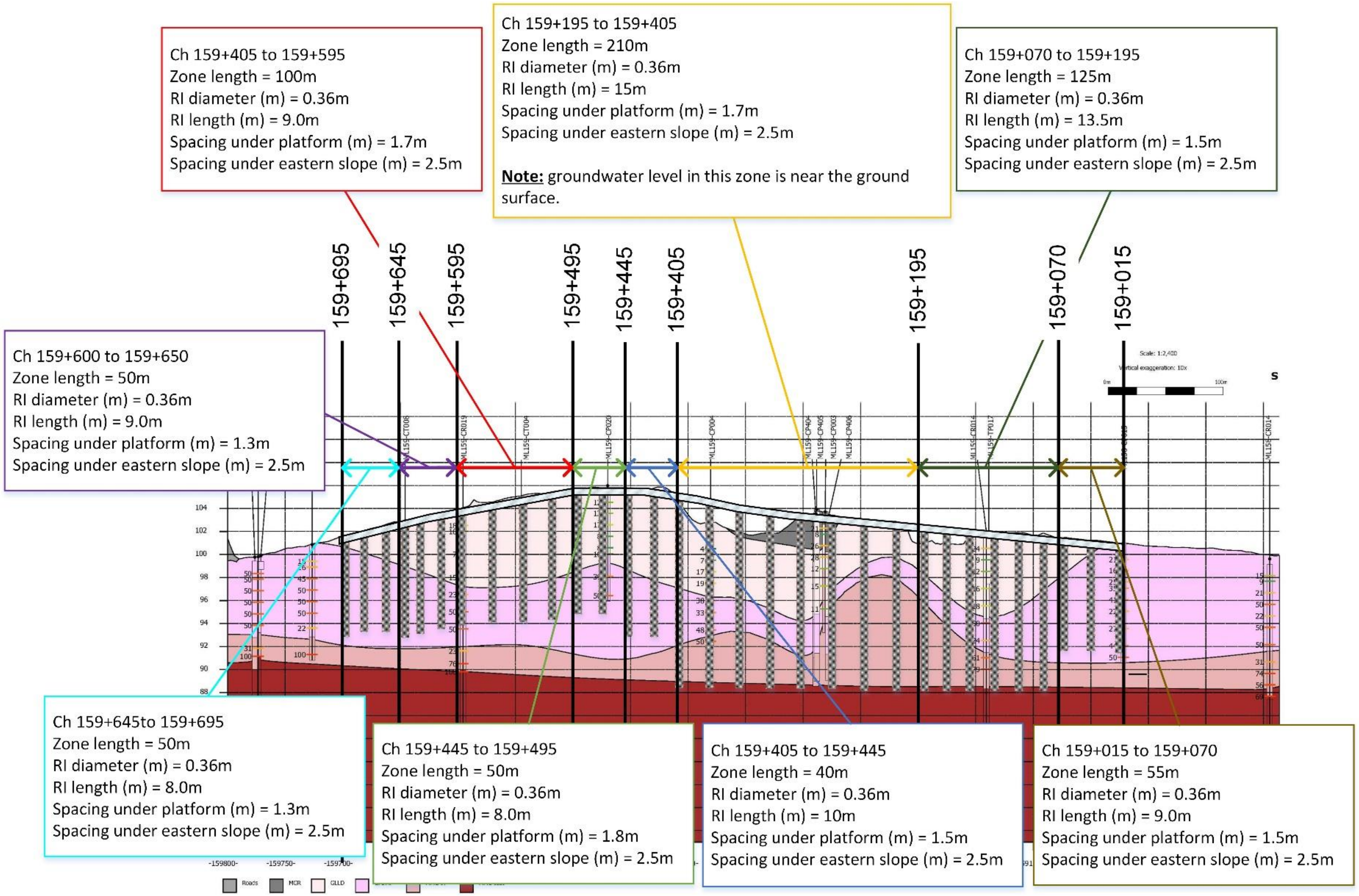


Figure 9-2 – Rigid inclusions designed for Pool Wood Embankment – Long profile (not to scale)

9.3 Groundwater effects

- Due to the possibility of a high groundwater level and lack of monitoring data between Ch 158+386 to Ch 158+795 beneath Pool Wood Embankment, it has been determined that this asset is considered to be within a wet area and so a layer of selected material (Class 6C, damp and flood compensation material, as per N1 & N2 Earthworks Geotechnical Design Report (eGDR), 1MC08-BBV_BBV-GT-REP-N001-100001) is required to be constructed at the base of the embankment. The layer thickness must be 0.6m above OGL. This has been calculated based upon the requirements for embankments in wet areas that have been specified in section 7.3.8 within the Detailed Design Basis of Design for Earthworks Integration (1MC08-BBV_MSD-GT-REP-N001-100164). The granular layer should be separated from the main embankment by a geotextile layer.
- Due to a high groundwater level between Ch 159+205 to Ch 159+415 beneath Pool Wood Embankment, it is considered that the asset is within a wet area and therefore a layer of 6C granular material (0.75m in thickness above OGL) should be placed to protect the embankment. This is in accordance with the Detailed Design Basis of Design for Earthworks Integration (1MC08-BBV_MSD-GT-REP-N001-100164). Upon request from the Contractor, an alternative material comprising 6F5 granular soil was considered for usage for the draining layer. The drainage capacity of the 6F5 material is slightly lower than that of the 6C material. Therefore, an additional permeable layer will be placed beneath the LTP that will further prevent the groundwater from entering the embankment.

9.4 Transition zones

9.4.1 Transition zone with M42 Motorway Box Structure

The south of Pool Wood Embankment interfaces with the M42 Motorway Box Structure. This requires the construction of a transition zone over a distance of at least 20m from the structure, as illustrated in Detailed Design – Basis of Design for Geotechnics, Earthworks and Retaining Structures (1MC08-BBV_MSD-GT-REP-N001-100157). Refer to 1MC08-BBV_MSD-GT-DSE-N001-100300-S4-C01 for the standard details of the transition zone between an embankment and a box structure.

The transition zone starts from the edge of the structure to approximately Ch 158+390 at the centreline of the railway alignment. Note that M42 Motorway Box Structure is skewed, and the chainages will change at the east (Ch 158+431) and west side (Ch 158+354) of the abutment. The transition zone should extend from the edge of the structure to at least Ch 158+451 to the east side, and to at least Ch 158+374 to the west side. Settlement assessment of the transition zone has not been undertaken since M42 Motorway Box Structure is a Batch 2 asset and is not designed yet. Furthermore, the asset specific drawings and BIM models are not produced at this stage since they are not part of the accelerated program; they will be submitted at a later stage within the main asset submissions.

9.4.2 Transition zone with Pool Wood Culvert

Pool Wood Embankment interfaces with the Pool Wood Culvert at Ch 158+875. This requires the construction of transition zones over a distance of at least 20m from either side of the structure, as illustrated in Detailed Design – Basis of Design for Geotechnics, Earthworks and Retaining Structures (1MC08-BBV_MSD-GT-REP-N001-100157). Refer to 1MC08-BBV_MSD-GT-DSE-N001-100322-S4-C01 for the standard details of the transition zone between an embankment and a culvert.

The transition zone to the south of the culvert starts from approximately 158+854 to the edge of the structure at approximately Ch 158+874, and to the north of the culvert starts at the edge of the structure at approximately Ch 158+878 to around Ch 158+898, at the centerline of the railway alignment. Note that Pool Wood Culvert is skewed. On the west side, the transition zone is approximately from Ch 158+847 to Ch 158+893, and on the east side it is approximately from Ch 158+859 to Ch 158+905. The differential settlement between the embankment and Pool Wood Culvert is 7.1mm which exceeds the criterion of 5mm limit in transition zones. This will require therefore a holding period of 3 months in order to reduce the differential settlement to 5mm.

It is worth noting that the asset specific drawings and BIM models for the transition zone are not part of the accelerated program and will be submitted at a later stage within the main asset submissions.

9.4.3 Transition zone with Coleshill Heath Road Underbridge

The north of Pool Wood Embankment interfaces with Coleshill Heath Road Underbridge. This requires the construction of transition zone over a distance of at least 20m from the structure, as illustrated in Detailed Design – Basis of Design for Geotechnics, Earthworks and Retaining Structures (1MC08-BBV_MSD-GT-REP-N001-100157). Refer to 1MC08-BBV_MSD-GT-DSE-N001-100300-S4-C01 for the standard details of the transition zone between an embankment and a box structure.

The transition zone starts from Ch 159+772 to the edge of the structure to approximately Ch 159+792 at the centreline of the railway alignment. Note that the Coleshill Heath Road Underbridge is skewed and the chainages will change at the east (Ch 159+798) and west side (Ch 159+784) of the abutment. The transition zone should extend from at least Ch 159+778 to the east side, and from at least Ch 159+764 to the west side to the edge of the structure.

According to the S3 design of the Coleshill Heath Road Underbridge (submitted within DD Geotechnical Design Report for Packington Embankment to Pool Wood Embankment, 1MC09-BBV_MSD-GT-REP-NS04_NL10-100033), the ground differential settlements at the transition zone are within 5mm. Please note that the Coleshill Heath Road Underbridge is undergoing a redesign due to an increase in the bridge span in order to preserve rather than divert existing utilities. This will require a reassessment of the transition zone settlements at a later stage.

9.4.4 Rigid Inclusion and Dig out and Replacement interface area

Although the area in the interface of rigid inclusions and dig out and replacement is not considered as transition zone, due to the sudden change in ground stiffness, a differential settlement assessment has been undertaken. The ground settlement on the south (Ch 158+995) and north (Ch 159+715) of rigid inclusions area, is presented in Table 11.8 and Table 11.9, respectively. The ground settlement within the rigid inclusions area on the south and the north of it is presented in Table 11.28, 15.5mm and 11.4mm, respectively. For the south interface area, the differential settlement is 15.5mm – 4.8mm = 10.7mm > 5mm. For the north interface area, the differential settlement is 11.4mm – 4.4mm = 7mm > 5mm. There will be significant arching effects throughout the overlying earthworks material, likely reducing these differentials to minimal values at track level with correspondingly low associated angular distortions, within tolerable ranges. This will however be assessed at a later stage with the main asset submissions.

10 PROPOSED TESTING AND VERIFICATION PLAN

10.1 Earthworks Control and Verification Requirements

Earthwork control and verification have been developed by the Designer in accordance with HS2 Technical Standard – Earthworks (HS2-HS2-GT-STD-000-0001).

10.2 Instrumentation and Monitoring

Instrumentation will be required prior to construction of the earthwork and landscape bund underlain by the rigid inclusions. Instrumentation does therefore not form part of this submission, and will be submitted as part of the main GDR.

10.3 Use of Observational Methods/Controls

N/A

10.4 Site Testing

Inspections and verification testing shall be undertaken in accordance with the HS2 earthworks specification.

10.5 Ground Investigation Required to Verify/ Validate Design

- 34 boreholes and Trial Pits (ML158-CP403, ML158-CR405, ML158-CR406, ML159-CR407, ML158-HP401, ML159-CR414, ML158-CR408, ML159-CT408, ML158-CT407, ML158-CP415, ML158-RC401, ML159-CR419, ML159-CR421, ML159-CR422, ML158-TP414, ML158-TP415, ML158-TP416, ML158-TP417, ML158-TP418, ML158-CT401, ML159-TP401, ML159-TP402, ML159-TP403, ML159-CR418, ML159-CP407, ML159-CP406, ML159-CP405, ML159-CP404, ML159-CP403, ML159-CR420, ML159-CP408, ML159-CP409, ML159-CR412 and ML159-CR413) have been scheduled for Pool Wood Embankment.
- At the time of writing, 17 locations (ML158-TP417, ML158-TP418, ML158-CT401, ML159-CP403, ML159-CP404, ML159-CP405, ML159-CP406, ML159-CP407, ML159-CP408, ML159-CP409, ML159-CR412, ML159-CR413, ML159-CR418, ML159-CR419, ML159-CR420, ML159-CR421 and ML159-CR422) are available within the August 2021 AGS data provided to the DJV.
- Two boreholes (ML158-CR406 and ML158-CR408) have also been scheduled for Pool Wood Culvert.

Ground investigations required to verify / validate design has been discussed in GI Schedule 2 1MC08-BBV_MSD-GT-SCH-N001-100004, and they are presented in the following figures:

Note: The green holes and trial pits on the figures below have been completed. They are included here, as they are in the GI Schedule 2. The red locations are still outstanding.

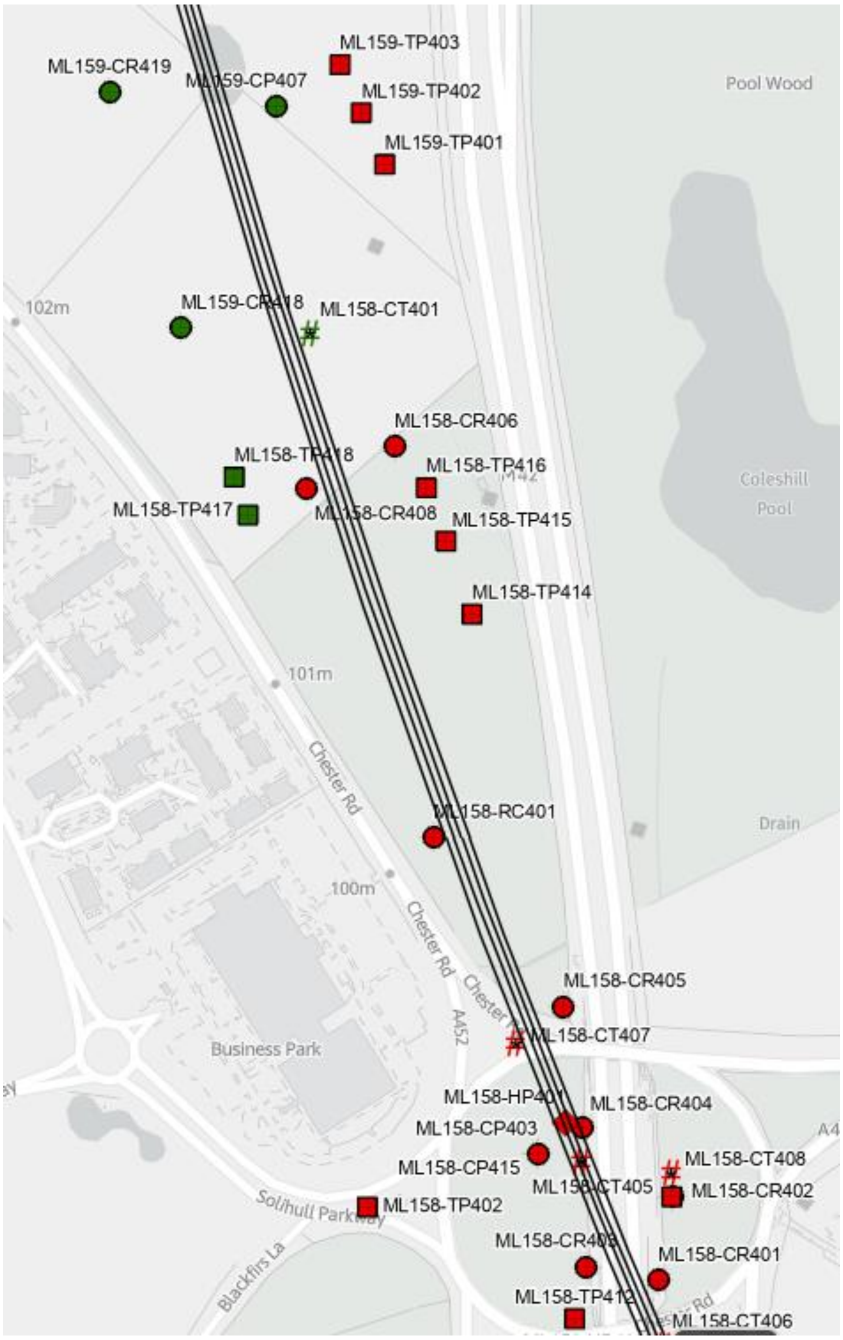


Figure 10-1 – Additional Geotechnical Investigations for Pool Wood Embankment (from Ch 158+391 to Ch 159+300)

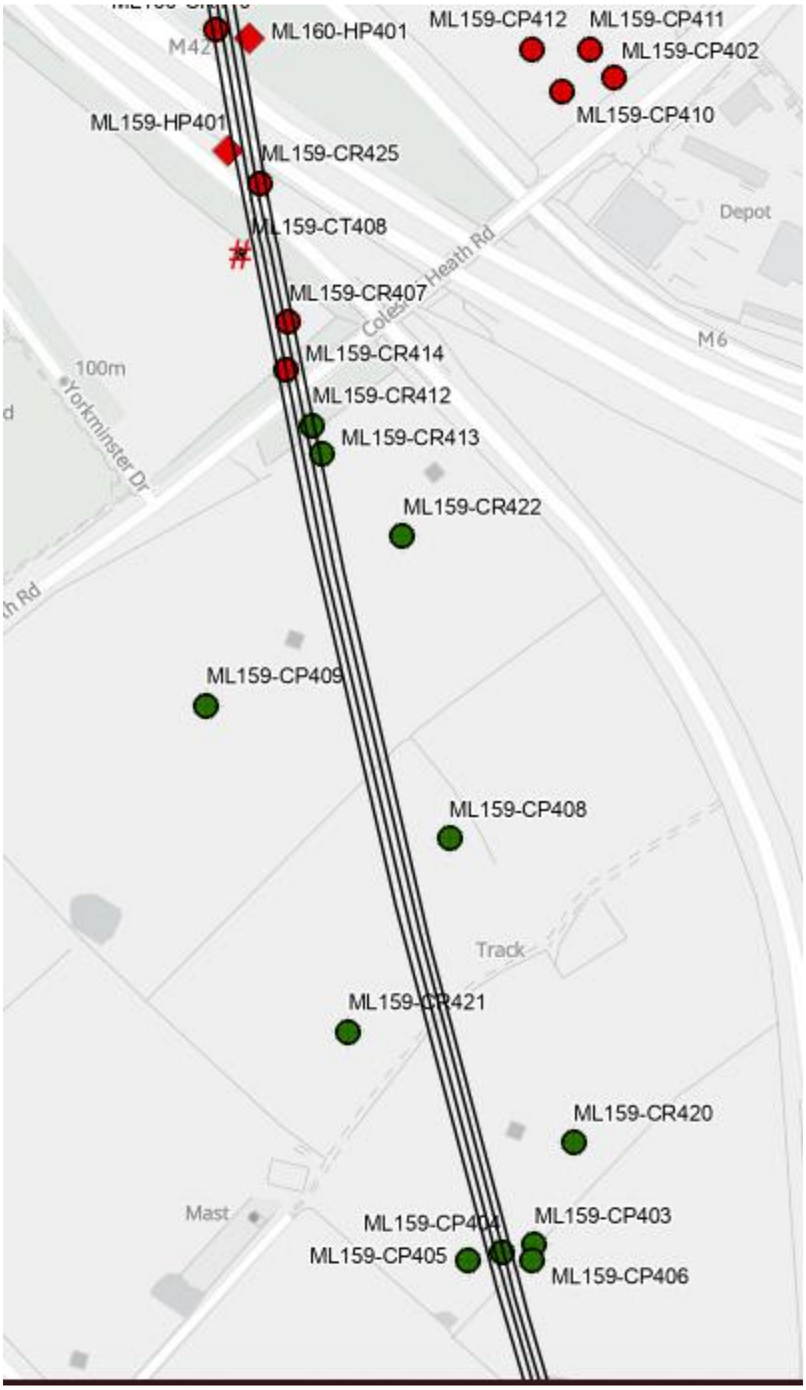


Figure 10-2 – Additional Geotechnical Investigations for Pool Wood Embankment (from Ch 159+300 to Ch 159+805)

11 SPECIFICATION APPENDICES

No departures from the HS2 earthworks specification are proposed for Pool Wood Embankment. HS2 Earthworks Specification Appendices for Pool Wood Embankment are included in document no. 1MC09-BBV_MSD-GT-SPE-NS04_NL10-100004.

12 SUMMARY – EARTHWORKS DESIGN

12.1 Pool Wood Embankment

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

Asset Name: **Pool Wood Embankment**			Design Stage:	Detailed Design
			Revision:	Rev P02
			Date:	14.09.2021
Tranche score (ref MUGC)	3	GI Class (1-5) (ref MUGC)	2.4	
EC7 Geotechnical Category	III	Stage 2 Check Level	CAT III	
Design Life	120 yrs	Design Uncertainty Factor	UF = 1.05	

GEOMETRY		
ASSET GEOMETRY	LEFT SIDE (i.e. west)	RIGHT SIDE (i.e. east)
Chainage (PMA 3.0)	Ch 158+320 to Ch 159+790	Ch 158+430 to Ch 159+800
Embankment height (to proposed top of protection layer) (m)	Maximum: 11	Maximum: 11
Gradient	1V:2H from Ch 158+386 to 159+015 1V:1H from Ch 159+000 to 159+730 (at the interface with the landscape bund) 1V:2H from Ch 159+755 to 159+800	Slope: 1V:2H
Landscape bund	Ch 158+920 to Ch 159+760 Maximum height (m): approx. 14 Interior slope: 1V:3H Exterior slope: 1V:4H	N/A
Total Embankment height (m)	Maximum height: 11	Maximum height: 11
GROUND CONDITIONS		
A summary description of ground conditions can be found in the Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions (1MC09-BBV_MSD-GT-REP-NS04_NL10-100022).		

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

AVAILABLE INVESTIGATION HOLES

A total of 42 exploratory holes were available for Pool Wood Embankment to the cut-off date of June 4th, 2020, as presented below. It is worth noting that the available incoming AGS that was undertaken after the cut-off date, up to the March 2021 submission, was also used to optimise the Pool Wood ground models. The formal review and acceptance of this data will be undertaken via the issue of a validation note, as previously commented.

Cable Percussion Boreholes (CP)	Cone Penetration Tests (CPT)	Inspection Pits with Cable Percussion and Rotary Coring (IP+CP+RC)	Trial Pits (TP)	Surface water monitoring (SW)	Windowless Sample Boreholes (WLS)
10	5	13	9	1	4
ML158-CP015	ML159-CT002	ML158-CR003	ML158-TT007	ML159-SW001	ML158-WS013
ML158-CP018	ML159-CT004	ML158-CR007	ML159-TP002		ML158-WS014
ML159-CP003	ML159-CT007	ML158-CR014	ML159-TP004		ML158-WS015
ML159-CP004	ML159-CT008	ML158-CR015	ML159-TP005		ML158-WS016
ML159-CP007	ML159-CT009	ML158-CR018	ML159-TP009		
ML159-CP010		ML159-CR013	ML159-TP017		
ML159-CP018		ML159-CR014	ML159-TP022		
ML159-CP020		ML159-CR015	ML158-TP208		
ML158-CR407		ML159-CR016	ML158-TP209		
WFD-GW2-0006-BH3		ML159-CR017			
		ML159-CR019			
		ML159-CR026			
		ML159-CR408			

GROUND MODEL

The ground profile of Pool Wood Embankment, according to the available GI data, is summarised below.

Ch 158+386 to Ch 158+775

Strata	Typical depths to base (m AOD)	Approximate thickness (m)	Typical description
Made Ground (from Ch 158+391 to Ch 158+525)	95.5 - 97.92	0 - 5.3	Made Ground at former brick kiln/ nickel leachate hotspot: Soft to firm brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of mixed lithologies including flint and quartzite with rare brick

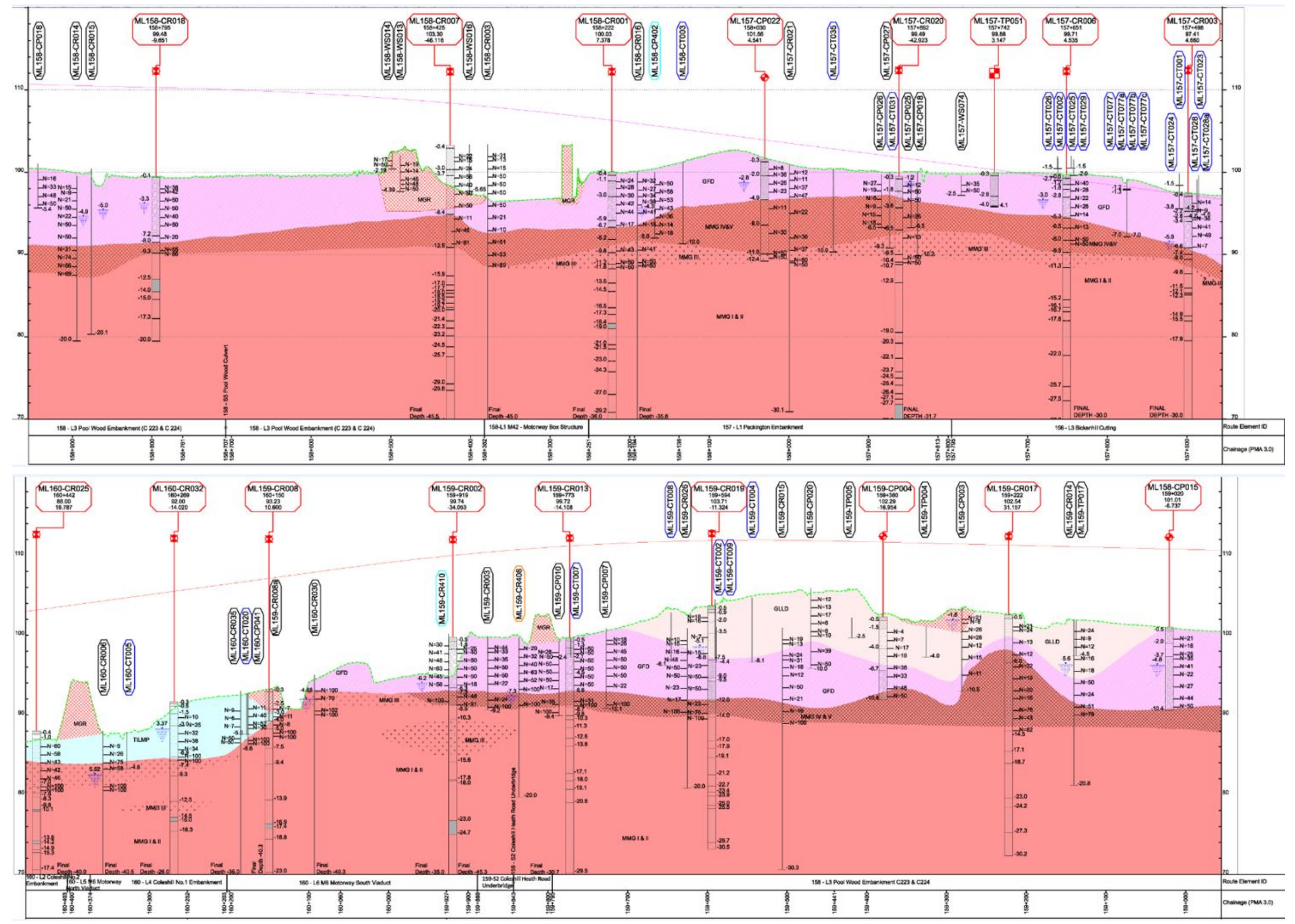
Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

Glaciofluvial deposits	91.93 - 92.8	6.8 - 7.61	Medium dense to very dense, orangish brown to reddish brown, slightly silty clayey gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded of mixed lithologies including flint, quartzite, sandstone, siltstone and mudstone.
Mercia Mudstone Grade IV	89.5	2.39 - 3.8	Soft to very stiff, medium to very high strength, reddish brown slightly gravelly sandy, silty CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of mudstone.
Mercia Mudstone Grade I/II	N/A	N/A	Extremely weak to medium strong occasionally blocky very thinly laminated to thinly bedded, reddish brown MUDSTONE with occasional greenish grey reduction spots, rare small voids and rare pockets of calcite
Ch 158+775 to Ch 159+015			
Strata	Typical depths to base (m bgl)	Approximate thickness (m)	Typical description
Glaciofluvial deposits	90.91 - 91.61	8.84 - 9.79	Medium dense to very dense, orangish brown to reddish brown, slightly silty clayey gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded of mixed lithologies including flint, quartzite, sandstone, siltstone and mudstone.
Mercia Mudstone Grade IV	90.91 - 91.61	2.25 - 2.6	Soft to very stiff, medium to very high strength, reddish brown slightly gravelly sandy, silty CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of mudstone.
Mercia Mudstone Grade I & II	N/A	N/A	Extremely weak to medium strong occasionally blocky very thinly laminated to thinly bedded, reddish brown MUDSTONE with occasional greenish grey reduction spots, rare small voids and rare pockets of calcite
Ch 159+015 to Ch 159+800			
Strata	Typical depths to base (m bgl)	Approximate thickness (m)	Typical description
Glaciolacustrine Deposits	95.56 - 102.16	0.9 - 7.8	Soft to stiff reddish brown mottled light grey to black silty sandy gravelly CLAY. The sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of mixed lithologies including flint and quartzite

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

Glaciofluvial deposits	92.87 - 100.2	1.7 - 8.84	Medium dense to very dense, orangish brown to reddish brown, slightly silty clayey gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded of mixed lithologies including flint, quartzite, sandstone, siltstone and mudstone.
Mercia Mudstone Grade IV	88.49 - 90.8	2.25 - 11.5	Soft to very stiff, medium to very high strength, reddish brown slightly gravelly sandy, silty CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of mudstone.
Mercia Mudstone Grade I & II	N/A	N/A	Extremely weak to medium strong occasionally blocky very thinly laminated to thinly bedded, reddish brown MUDSTONE with occasional greenish grey reduction spots, rare small voids and rare pockets of calcite

GEOLOGICAL LONG SECTION



Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

UTILITIES AND ASSETS

STATUTORY UTILITIES

A WPD cable (CN0-158-005) at Ch 158+875, will be diverted at Ch 158+903, 2m bgl, laid in a 160mm (OD) PE duct.

A WPD duct (CNO-159-001) at Ch 159+220, will be diverted alongside the west side of the embankment.

A WPD duct (CNO-159-003A) starting at Ch 159+295 and ending at Ch 159+765.

A National Grid overhead line (CNO-158-006 & CNO-160-002) starting at Ch 159+220 and ending at Ch 159+495.

A National Grid tower, transferring OHL CNO-158-006 & CNO-160-002 at Ch 159+220.

GROUNDWATER

A piezometric line was modelled at 98.7m AOD for the zone between Ch 158+386 to 158+745, at 97.4m AOD for the zone between Ch 158+745 to 159+140, at 102.9m AOD for the zone between Ch 159+140 to 159+380, and at 99.6m AOD for the zone between Ch 159+380 to 159+800.

FOUNDATION TREATMENT

Proximity to Switches and Crossings (stricter settlement tolerances apply within 150m of S&C)	No switches and crossings

Mainline Embankment

Chainage	Predicted Settlement (unmitigated)	Requirement for ground improvement:	Treatment Details	Predicted Long-term Settlement (mitigated)
158+386	Unpredictable due to variability in Made Ground	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☒Transition ☒Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Contamination	Made Ground exists to a depth of up to 8m bgl, 4m above and 4m below the surrounding natural ground level. This Made Ground should be removed and replaced with cohesive foundation treatment material.	<5mm

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					
158+386 to Ch 158+795	N/A	☐Rayleigh Waves ☐Settlement (total) ☐Settlement Differential ☐Heave ☐Transition ☐Modulus of Deformation (E_{v2}) ☐Bearing Capacity ☐Contamination ☒Groundwater	A layer of selected material (Class 6C, damp and flood compensation material) with a thickness of 0.6m above OGL to be constructed under the trace embankment. A layer of geotextile to be installed between the granular layer and the LEF	<30mm		
158+855 to 159+015	N/A (ULS situation)	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☒Transition ☒Modulus of Deformation (E_{v2}) ☐Bearing Capacity	Dig out and replace of top 2m of Glaciofluvial Deposits between Ch 158+860 and Ch 159+015 due to existence of soft spots around Pool Wood Culvert area.	<5mm		

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

159+015 to 159+070	78mm	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☐Transition ☒Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Slope stability	RI inclusion is required: Diameter: 0.36m. RI length from the existing ground level: 9m subject to the condition of the pile tip remaining within GFD, at least 1m above the top of MMG IV/V. Square mesh: 1.5m x 1.5m under platform and 2.5m x 2.5m under slope. Load transfer platform (LTP): 0.75m of thickness, materials class 6F5. Steel reinforcement and concrete grade: refer to 1600 Piling and embedded retaining walls - Pool Wood Embankment Rigid Inclusions (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100009). Geogrid strength under platform: Tr> 440kN/m for longitudinal direction and Tr> 890KN/m for transversal direction. Under the east slope: Tr> 690kN/m for longitudinal direction and Tr> 760KN/m for transversal direction. A periphery trench is required to be constructed under the slope edge, parallel to the embankment centerline, to anchor the geogrid, as detailed in section 8.3.3.12 of BS 8006-1. A minimum anchorage length of 4.5m is required for the longitudinal direction.	<60mm

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

159+070 to 159+195	78mm	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☐Transition ☒Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Slope stability	RI inclusion is required: Diameter: 0.36m. RI length from the existing ground level: 13.5m subject to the condition of the pile tip penetrating into the bedrock. Square mesh: 1.5m x 1.5m under platform and 2.5m x 2.5m under slope. Load transfer platform (LTP): 0.75m of thickness, materials class 6F5. Steel reinforcement and concrete grade: refer to 1600 Piling and embedded retaining walls - Pool Wood Embankment Rigid Inclusions (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100009). Geogrid under the platform: Tr> 820kN/m for longitudinal direction and Tr> 1350KN/m for transversal direction. Under the east slope: Tr> 770kN/m for longitudinal direction and Tr> 860KN/m for transversal direction. A periphery trench is required to be constructed under the slope edge, parallel to the embankment centerline, to anchor the geogrid, as detailed in section 8.3.3.12 of BS 8006-1. A minimum anchorage length of 7.5m is required for the longitudinal direction.	<60mm

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

159+195 to 159+405	243mm	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☐Transition ☒Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Slope stability	RI inclusion is required: Diameter: 0.36m. RI length from the existing ground level: 15m subject to the condition of the pile tip penetrating into the bedrock. Square mesh: 1.7m x 1.7m under platform and 2.5m x 2.5m under slope. Load transfer platform (LTP): 0.75m of thickness, materials class 6F5. Steel reinforcement and concrete grade: refer to 1600 Piling and embedded retaining walls - Pool Wood Embankment Rigid Inclusions (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100009). Geogrid under the platform: Tr> 580kN/m for longitudinal direction and Tr> 950KN/m for transversal direction. Under the east slope: Tr> 620kN/m for longitudinal direction and Tr> 670KN/m for transversal direction. A periphery trench is required to be constructed under the slope edge, parallel to the embankment centerline, to anchor the geogrid, as detailed in section 8.3.3.12 of BS 8006-1. A minimum anchorage length of 6.5m is required for the longitudinal direction.	<60mm

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

159+405 to 159+445	243mm	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☐Transition ☒Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Slope stability	RI inclusion is required: Diameter: 0.36m. RI length from the existing ground level: 10m subject to the condition of the pile tip remaining within GFD, at least 1m above the top of MMG IV/V. Square mesh: 1.5m x 1.5m under platform and 2.5m x 2.5m under slope. Load transfer platform (LTP): 0.75m of thickness, materials class 6F5. Steel reinforcement and concrete grade: refer to 1600 Piling and embedded retaining walls - Pool Wood Embankment Rigid Inclusions (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100009). Geogrid under the platform: Tr> 370kN/m for longitudinal direction and Tr> 660KN/m for transversal direction. Under the east slope: Tr> 540kN/m for longitudinal direction and Tr> 580KN/m for transversal direction. Under the east slope: Tr> 620kN/m for longitudinal direction and Tr> 670KN/m for transversal direction. A periphery trench is required to be constructed under the slope edge, parallel to the embankment centerline, to anchor the geogrid, as detailed in section 8.3.3.12 of BS 8006-1. A minimum anchorage length of 4.5m is required for the longitudinal direction.	<60mm

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

159+445 to 159+495	177mm	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☐Transition ☒Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Slope stability	RI inclusion is required: Diameter: 0.36m. RI length from the existing ground level: 8m subject to the condition of the pile tip remaining within GFD, at least 1m above the top of MMG IV/V. Square mesh: 1.8m x 1.8m under platform and 2.5m x 2.5m under slope. Load transfer platform (LTP): 0.75m of thickness, materials class 6F5. Steel reinforcement and concrete grade: refer to 1600 Piling and embedded retaining walls - Pool Wood Embankment Rigid Inclusions (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100009). Geogrid under the platform: Tr> 560kN/m for longitudinal direction and Tr> 790KN/m for transversal direction. Under the east slope: Geogrid: Tr> 460kN/m for longitudinal direction and Tr> 490KN/m for transversal direction. A periphery trench is required to be constructed under the slope edge, parallel to the embankment centerline, to anchor the geogrid, as detailed in section 8.3.3.12 of BS 8006-1. A minimum anchorage length of 8.0m is required for the longitudinal direction.	<60mm

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

159+495 to 159+595	177mm	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☐Transition ☒Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Slope stability	RI inclusion is required: Diameter: 0.36m. RI length from the existing ground level: 9m subject to the condition of the pile tip remaining within GFD, at least 1m above the top of MMG IV/V. Square mesh: 1.7m x 1.7m under platform and 2.5m x 2.5m under slope. Load transfer platform (LTP): 0.75m of thickness, materials class 6F5. Steel reinforcement and concrete grade: refer to 1600 Piling and embedded retaining walls - Pool Wood Embankment Rigid Inclusions (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100009). Geogrid under the platform: Tr> 560kN/m for longitudinal direction and Tr> 890KN/m for transversal direction. Under the east slope: Tr> 580kN/m for longitudinal direction and Tr> 630KN/m for transversal direction. A periphery trench is required to be constructed under the slope edge, parallel to the embankment centerline, to anchor the geogrid, as detailed in section 8.3.3.12 of BS 8006-1. A minimum anchorage length of 6.5m is required for the longitudinal direction.	<60mm

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

159+595 to 159+645	177mm	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☐Transition ☒Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Slope stability	RI inclusion is required: Diameter: 0.36m. RI length from the existing ground level: 9m subject to the condition of the pile tip remaining within GFD, at least 1m above the top of MMG IV/V. Square mesh: 1.3m x 1.3m under platform and 2.5m x 2.5m under slope. Load transfer platform (LTP): 0.75m of thickness, materials class 6F5. Steel reinforcement and concrete grade: refer to 1600 Piling and embedded retaining walls - Pool Wood Embankment Rigid Inclusions (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100009). Geogrid under the platform: Tr> 280kN/m for longitudinal direction and Tr> 720KN/m for transversal direction. Under the east slope: Tr> 690kN/m for longitudinal direction and Tr> 760KN/m for transversal direction. A periphery trench is required to be constructed under the slope edge, parallel to the embankment centerline, to anchor the geogrid, as detailed in section 8.3.3.12 of BS 8006-1. A minimum anchorage length of 3.0m is required for the longitudinal direction.	<60mm

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

159+645 to 159+695	177mm	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☐Transition ☒Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Slope stability	RI inclusion is required: Diameter: 0.36m. RI length from the existing ground level: 8m subject to the condition of the pile tip remaining within GFD, at least 1m above the top of MMG IV/V. Square mesh: 1.3m x 1.3m under platform and 2.5m x 2.5m under slope. Load transfer platform (LTP): 0.75m of thickness, materials class 6F5. Steel reinforcement and concrete grade: refer to 1600 Piling and embedded retaining walls - Pool Wood Embankment Rigid Inclusions (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100009). Geogrid under the platform: Tr> 290kN/m for longitudinal direction and Tr> 780KN/m for transversal direction. Under the east slope: Tr> 730kN/m for longitudinal direction and Tr> 810KN/m for transversal direction. A periphery trench is required to be constructed under the slope edge, parallel to the embankment centerline, to anchor the geogrid, as detailed in section 8.3.3.12 of BS 8006-1. A minimum anchorage length of 3.0m is required for the longitudinal direction.	<60mm
159+695 to 159+800	5.3mm	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☒Transition ☒Modulus of Deformation (E_{v2}) ☐Bearing Capacity ☐Slope stability	Dig out and replace of top 2.5m of Glaciolacustrine Deposits (between Ch 159+695 to Ch 159+715) and of Glaciofluvial Deposits (between Ch 159+715 and Ch 159+800) due to existence of soft material (GLLD and cohesive GFD).	<5mm

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

<u>Landscape bund</u>

Chainage	Predicted Settlement (unmitigated)	Requirement for ground improvement:	Treatment Details	Predicted Long-term Settlement (mitigated)
159+015 to 159+245	-	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☐Transition ☐Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Slope stability	PVD length: 6.5m PVD spacing: 1.7m x 1.7m A 0.75m drainage blanket is to be constructed from a clean granular material (6F5 containing less than 5% of material with grain size < 0,06 mm, subject to inspection on site) at the base of the staged embankment to allow flow from the vertical drains to a freely drain to the west of the landscape bund. The drainage path through the blanket should have a gradient of at least 2%. A geotextile layer should be added between the drainage blanket and the landscape bund fill.	-
159+245 to 159+470	-	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☐Transition ☐Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Slope stability	PVD length: 10.0m PVD spacing: 1.7m x 1.7m A 0.75m drainage blanket is to be constructed from a clean granular material (6F5 containing less than 5% of material with grain size < 0,06 mm, subject to inspection on site) at the base of the staged embankment to allow flow from the vertical drains to a freely drain to the west of the landscape bund. The drainage path through the blanket should have a gradient of at least 2%. A geotextile layer should be added between the drainage blanket and the landscape bund fill.	-

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

159+470 to 159+595	-	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☐Transition ☐Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Slope stability	PVD length: 8.0m PVD spacing: 1.7m x 1.7m A 0.75m drainage blanket is to be constructed from a clean granular material (6F5 containing less than 5% of material with grain size < 0,06 mm, subject to inspection on site) at the base of the staged embankment to allow flow from the vertical drains to a freely drain to the west of the landscape bund. The drainage path through the blanket should have a gradient of at least 2%. A geotextile layer should be added between the drainage blanket and the landscape bund fill.	-
159+595 to 159+695	-	☐Rayleigh Waves ☒Settlement (total) ☒Settlement Differential ☐Heave ☐Transition ☐Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☒Slope stability	PVD length: 5.5m PVD spacing: 1.7m x 1.7m A 0.75m drainage blanket is to be constructed from a clean granular material (6F5 containing less than 5% of material with grain size < 0,06 mm, subject to inspection on site) at the base of the staged embankment to allow flow from the vertical drains to a freely drain to the west of the landscape bund. The drainage path through the blanket should have a gradient of at least 2%. A geotextile layer should be added between the drainage blanket and the landscape bund fill.	-
159+695 to 159+760	N/A	☐Rayleigh Waves ☐Settlement (total) ☐Settlement Differential ☐Heave ☐Transition ☐Modulus of Deformation (E_{v2}) ☒Bearing Capacity ☐Slope stability	Dig out and replace of top 2.5m of Glaciolacustrine Deposits and Glaciofluvial Deposits.	-

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

EARTHWORKS DRAINAGE

Land drainage comprises of two ditches around the western perimeter of the earthwork. It has been designed to collect external catchments and embankment flow runoff before out falling into Pool Wood culvert by gravity.

There is a gravity draining system to the east of the embankment to convey water directly from the embankment into existing highway drainage systems to the east of the embankment. If the pipe/culvert blocks or its capacity is exceeded, ponding is not likely to occur at the low points, with water expected to drain by gravity back into the watercourse. For further details refer to Section 6.2.

EARTHWORK DESIGN (INCLUDING PROTECTION LAYER)

	Protection Layer	Prepared Subgrade	Upper Embankment Fill	Lower Embankment Fill	Groundwater Protection Layer
Thickness (mm)	220mm (min)	400mm (min)	5000mm	Below UEF	600mm (min from Ch 158+386 to Ch 158+795 750mm (min from Ch 159+205 to Ch 159+415
Material	120MPa (min) E_{v2} Min 100% MDD Max 8% Air Voids	60-500MPa E_{v2} Min 100% MDD Max 8% Air Voids	Treated cohesive 95% MDD (min) 5% AV (max)	Treated cohesive 95% MDD (min) 5% AV (max)	Class 6C, damp and flood compensation material,

HOLD PERIOD:

(1) Differential settlements at the transition zones with Pool Wood Culvert exceed 5mm. A 3 month holding period of the embankment is required in order to reduce the settlements to the allowable range.

(2) The construction of the landscape bund as well as the embankment within the zone of rigid inclusions will be in four stages, each stage having a two month hold period.

INSTRUMENTATION AND MONITORING

Parameters to be Monitored	Construction Monitoring Proposals	Construction Monitoring Frequency	Post construction Monitoring Proposals	Post Construction Monitoring frequency		
				Months 0-3	Months 3-6	Months 6-12

Instrumentation will be required prior to construction of the earthwork and landscape bund underlain by the rigid inclusions. Instrumentation does therefore not form part of this submission, and will be submitted as part of the main GDR for Pool Wood Embankment.

CONTAMINATION:

A geo-environmental report has been produced which captures the Pool Wood Embankment asset (1MC09-BBV_MSD-EV-REP-N001-100002). This report presents a summary contamination risk assessment for the asset.

The asset is identified to be located east of Environment Statement Land Quality site Birmingham Business Park (24-46) and to the north of Environment Statement Land Quality site Brackenlands Farm Landfill (24-44). An additional potential land contamination site has been identified associated with former brick works and an infilled pond (at approximate Chainage 159+345).

Contamination was identified at the infilled pond associated with TPH identified within Made Ground (ML159-CP003) beneath the trace and included leachate exceedance for metals. Another small hotspot was identified associated with TPH within Topsoil at ML159-CP018 40m west of the trace which also included leachate exceedance for metals.

ML158-WS016 is located in a proposed area of highway works north of the BIS Triangle which are assumed to be undertaken by the EWC. The data shows that the leachate exceedances are encountered in a deep area of Made Ground supporting a current highway roundabout.

Groundwater monitoring data for the asset records notable poor groundwater quality, with exceedances of organic contaminants as well as metal contaminants. A potential source of groundwater contamination in ML158-CP020 and ML158-CO021 may be Brackenlands Farm landfill to the south of the two groundwater locations. In addition, LQ site 24-41 Packington Landfill is to the east of the route from ch.157+295 to 158+395; it is beyond the LOD. Currently, there are no proposed temporary or permanent works at Brackenlands Farm landfill. Any remediation requirements arising from future works will be the responsibility of the EWC.

For ML158-CR018 which is located between LQ site Birmingham Business Park and Coleshill Pool, within a wooded area, the location is not near areas of Made Ground and the borehole log reports topsoil overlying natural ground material. A source of the contaminants is not clear, and may be reflective of a wider, poor quality groundwater body due to general historical development of the region. This is similar for exploratory hole ML159-CR019 which is within a group of agricultural fields and is not near areas of Made Ground and therefore may also be reflective of a wider, poor quality groundwater body due to general historical development and agricultural activities in the region.

Phase 1 of the assessment of the scheme and individual assets was undertaken during the Environmental Statement, which identified land quality (ES LQ) sites with the potential to be contaminated and assigned a preliminary risk. Phase 2 involved the ground investigation, screening and generic quantitative risk assessment of the scheme including targeted investigation of ES LQ sites identified as medium risk or greater. The results of Phase 2, relevant to Pool Wood Embankment, are summarised in the report (1MC09-BBV_MSD-EV-REP-N001-100002) alongside a conceptual site model (CSM).

A generic quantitative risk assessment (GQRA) is presented in report 1MC09-BBV_MSD-EV-REP-N002-100002 and highlights exceedances arising from analysis of data made available up to 7th August 2019. Risks are described qualitatively to HS2 standards (HS2-HS2-EV-STD-000-000010; CT-001-000/2, Annex F).

Where material is excavated to facilitate the design requirements and unacceptable components in excavated material will require removal through physical screening / sorting to allow re-use as an acceptable earthwork's material class under the Earthworks Specification (HS2-HS2-CV-SPE-000-010600).

Legacy Asset ID	158-L2 & 158-L3	Chainage: (Snake grid)	From:	Approx. 158+386 (PMA 3.0)	To:	Approx. 159+800 (PMA 3.0)
HS2 ID	HS2-000001162					

In order to determine the suitability of the material for re-use within earthworks and landscaping one soil sample will be required for every 500m^3 of potentially contaminated excavated material to confirm earthworks treatment requirements to render arisings as acceptable earthworks classes in accordance with the Earthworks Specification (HS2-HS2-CV-SPE-000-010600). The GI data will also provide an opportunity to review the existence of unexpected contamination. Should unexpected contamination be encountered a CSM will need to be developed and the requirement for a Remediation Strategy to address risks will be determined in liaison with the District Council and Environment Agency.

Waste recovery will be demonstrated through compliance with the Materials Management Plan developed in accordance with the HS2 Material Management Framework Technical Standard (HS2-HS2-EV-STD-000-000006) and CL:AIRE (2012) DoWCoP.

Based on the available information it is not envisaged that remediation will be required for Pool Wood associated with the pond backfill material sampled within ML159-CP003 to address potential risks from TPH and metals to controlled water. A risk register item has been added associated with the removal and remediation of Made Ground in highway embankment fill at the southern end of Pool Wood Embankment to address risks from leachates to controlled waters. Further ground investigation is proposed to better establish risks from made ground to controlled waters within the scheme footprint.

Reference should be made to the Sublot 5&6 Geo-environmental report (1MC09-BBV_MSD-EV-REP-N002-100002) from scheme design.

CHEMICAL ANALYSIS

The Sub Lot 5 and 6 Scheme Consolidation Geo-environmental Report (1MC09-BBV_MSD-EV-REP-N002-100002) states that the AC and DS concrete classes for individual lithologies shall be determined within the GIR at Stage 2 Detailed Design. It should be noted that at the time of writing the aforementioned report is being amended for Detailed Design by the Sub Lot 5 and 6 Scheme Detailed Design Geo-environmental Report (1MC09-BBV_MSD-EV-REP-N002-100042). The Detailed Design GIR Annex E2 (1MC09-BBV_MSD-GT-REP-NS04_NL10-100014) provides a DS and AC class of DS-1 / AC-1 for the Glaciofluvial Deposits, MMG IV/V and MMG I/II. Made Ground was considered to be too variable across the extent of GIR Annex E2 to assign specific parameters, there was no available test data for Glaciofluvial Deposits across the area with regards to concrete aggressivity.

Limited asset specific ground investigation information is available to determine the concrete class as per BRE Special Digest: 2005. Overall, the data provides a DS and AC class for Glaciofluvial Deposits, MMG IV/V and MMG I/II of DS-1 / AC-1. Regarding Made Ground, there is limited data available to determine the concrete class, however, the limited data indicates a class of DS-2 / AC-2. There is no available data for Glaciolacustrine Deposits.

Based on the above information and Table C2 of the BRE Special Digest 1 (2005), Pool Wood Embankment (Rigid Inclusions) has been assigned a Design Sulphate Class of DS-3 and an Aggressive Chemical Environment for Concrete Class of AC-3. There remains an opportunity via soil sampling post site strip and incoming Stage 2 Detailed Design scheduled GI to reduce the ACEC and DS class both to DS-1 and AC-1 except for areas containing Made Ground. Sampling should be supervised via a professionally qualified geotechnical engineer on site. Alternatively, the contractor may construct with the aforementioned recommended concrete classification of DS-3 / AC-3.

13 LIST OF ACRONYMS AND ABBREVIATIONS

Acronym/ Abbreviation	Definition
AOD	Above Ordnance Datum
ACEC	Aggressive Chemical Environment for Concrete
BBV	Balfour Beatty VINCI
BIM	Building Information Modelling
BIS	Birmingham Interchange Station
bgl	Below ground level
BoD	Basis of Design
BS	British Standards
CAT III	Category 3
CBGM	Cement-bound Granular Material
CBR	California Bearing Ratio
CFA	Continuous Flight Auger
Ch.	Chainage
CSM	Conceptual Site Model
DA	Design Approach
DD	Detailed Design
DJV	Design Joint Venture
DMRB	Design Manual for Roads and Bridges
DoWCoP	Definition of Waste: Development Industry Code of Practice
DS	Design Sulphate
DWS	Drinking Water Standard
EC7	Eurocode 7
eGDR	Earthworks GDR
EQS	Environmental Quality Standards
ES	Environmental Statement
EWC	Early Works Contractor
FoS	Factor of safety
GDR	Geotechnical Design Report

GFD	Glaciofluvial Deposits
GI	Ground investigation
GIR	Ground Investigation Report
GLLD	Glaciolacustrine Deposits
GQRA	Generic Quantitative Risk Assessment
GRR	Geotechnical Risk Register
H&S	Health & Safety
HS2	High Speed Two Limited, also referred to as "HS2" or "EMPLOYER"
km	Kilometres
kN/m^2	Kilonewtons per metre squared
kPa	Kilopascals
LLAU	Limit of land to be acquired or used
LOD	Limits of deviation
LQ	Land Quality
LTP	Load Transfer Platform
m	metre/s
MAFI	Mean Annual Frost Index
mAOD	Metres above ordnance datum
mbgl	Meters below ground level
MDD	Maximum dry density
m^2	Metres squared
mm	Millimetres
MGR	Made Ground
MMG	Mercia Mudstone Group
MPa	Megapascals
m/s	Metres per second
MUGC	Management of Uncertainty in Ground Conditions
MWCC	Main Works Civils Contract
N/A	Not Applicable
N1	HS2 Area N1
N2	HS2 Area N2
OD	Outer Diameter
OGL	Original Ground Level
PE	Polyethylene

PLP	Precise Levelling Point
RI	Rigid Inclusion
SAA	Shape Accel Array
SCEW	Specification for Civil Engineering Works
S&C	Switch & Crossing
SG	Snake Grid
SLS	Serviceability Limit State
SPT	Standard Penetration Test
TPH	Total Petroleum Hydrocarbons
UCS	Uniaxial Compressive Strength
UF	Uncertainty Factor
UK	United Kingdom
Wmids	West Midlands
WPD	Western Power Distribution

Symbol	**Definition**
γ	Bulk unit weight
°	Degrees
φ'_{peak}	Effective angle of shearing resistance (peak)
φ'_{cv}	Effective angle of shearing resistance (constant volume)
c_u	Undrained Shear Strength
c’	Effective cohesion
r_u	Porewater Pressure Ratio
E_u	Young’s Modulus (undrained)
E’	Young’s Modulus (drained)
E_{v2}	Modulus of Deformation

14 REFERENCES

Document Title	Document Number
HS2 Technical Standard - Earthworks	HS2-HS2-GT-STD-000-000001, P07
HS2 Technical Standard – Civil Engineering Instrumentation and Monitoring	HS2-HS2-CV-STD-000-000004, P04
HS2 Specification for Civil Engineering Works Series 4500 – Instrumentation and Monitoring	HS2-HS2-CV-SPE-000-014500, P01
HS2 Specification for Civil Engineering Works Series 0600 Earthworks	HS2-HS2-CV-SPE-000-010600, P04
DD BoD - Geotechnics, Earthworks and Retaining Structures	1MC08-BBV_MSD-GT-REP-N001-100157
DD Design Methodology – Earthworks	1MC08-BBV_MSD-GT-REP-N001-100159
Eurocode 7 – Geotechnical Design: Part 1 - General Rules. British Standards Institution, 2004	BS EN 1997-1
UK Department for Transport Design Manual for Roads and Bridges	DMRB
Winter Air Temperatures in Relation to Frost Damage in Roads	Transport and Road Research Laboratory, Research Report 45
Earthworks and track bed for railways, 3rd edition, February 2008.	UIC Code 719
CL:AIRE (2012): The Definition of Waste: Development Industry Code of Practice	-
GIR E2 - Detailed Design Ground Investigation Report – Annex E2 Diddington Lane Embankment to Coleshill N°2 Embankment	1MC09-BBV_MSD-GT-REP-NS04_NL10-100014
GiDR 22 (Packington Embankment to Pool Wood Embankment Ch 157+795 to Ch 159+915)	1MC09-BBV_MSD-GT-REP-NS04_NL10-100003 C02
Earthworks Geotechnical Design Report (eGDR)	1MC08-BBV-GT-REP-N001-100020, P01
1MC08 & 1MC09, Sector N1 & N2 Durability Assessment Report	1MC09-BBV_MSD-EV-REP-N001-100002

Appendix A Drawings List

Table A 1 List of design drawings

Title	Reference
Models	
Federated model for Pool Wood Embankment	1MC09-BBV_MSD-DS-DMB-NS04_NL10-158301
Federated model for Pool Wood Culvert	1MC09-BBV_MSD-DS-DMB-NS04_NL10-158700
Geotechnical Plan and Profile Drawings	
Plan and Geological Long Sections for Packington Embankment to Pool Wood Embankment (Refer to Appendix E)	1MC09-BBV_MSD-GT-DPP-NS04_NL10-100003
	1MC09-BBV_MSD-GT-DPP-NS04_NL10-100004
Ground Improvement - Advanced Works - Long Section through Control Line (H2ML-01)	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218701
Ground Improvement - Advanced Works - Section A	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218301
Ground Improvement - Advanced Works - Section B	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218302
Ground Improvement - Advanced Works - Section C	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218303
Ground Improvement - Advanced Works - Section D	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218304
Ground Improvement - Advanced Works - Section E	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218702
Ground Improvement - Advanced Works - Section F	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218703
Ground Improvement - Advanced Works - Section G	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218704
Ground Improvement - Advanced Works - Section H	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218705
Ground Improvement - Advanced Works - Section I	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218706
Ground Improvement - Advanced Works - Section J	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218707
Ground Improvement - Advanced Works - Section K	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218708
Ground Improvement - Advanced Works - Section L	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218709
Ground Improvement - Advanced Works - Section M	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218710

Title	Reference
Ground Improvement - Advanced Works - Section N	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218711
Ground Improvement - Advanced Works - Section O	1MC09-BBV_MSD-GT-DSE-NS04_NL10-218712
Design Drawings	
Ground Improvement - Advanced Works - Band Drain - Setting Out Plan - Sheet 1 of 4	1MC09-BBV_MSD-GT-DSO-NS04_NL10-118701
Ground Improvement - Advanced Works - Band Drain - Setting Out Plan - Sheet 2 of 4	1MC09-BBV_MSD-GT-DSO-NS04_NL10-118801
Ground Improvement - Advanced Works - Band Drain - Setting Out Plan - Sheet 3 of 4	1MC09-BBV_MSD-GT-DSO-NS04_NL10-118901
Ground Improvement - Advanced Works - Band Drain - Setting Out Plan - Sheet 4 of 4	1MC09-BBV_MSD-GT-DSO-NS04_NL10-119001
Ground Improvement - Advanced Works - Drawing Index	1MC09-BBV_MSD-GT-DSH-NS04_NL10-218300
Ground Improvement - Advanced Works - External Reference List	1MC09-BBV_MSD-GT-DSC-NS04_NL10-218310
Ground Improvement - Advanced Works - General Notes – Sheet 1 of 2	1MC09-BBV_MSD-GT-DSC-NS04_NL10-218300
Ground Improvement - Advanced Works - General Notes – Sheet 2 of 2	1MC09-BBV_MSD-GT-DSC-NS04_NL10-218301
Ground Improvement - Advanced Works - Model Export Register	1MC09-BBV_MSD-GT-DSC-NS04_NL10-218703
Ground Improvement - Advanced Works - Rigid Inclusion - Setting Out Plan - Sheet 1 of 4	1MC09-BBV_MSD-GT-DSO-NS04_NL10-118700
Ground Improvement - Advanced Works - Rigid Inclusion - Setting Out Plan - Sheet 2 of 4	1MC09-BBV_MSD-GT-DSO-NS04_NL10-118800
Ground Improvement - Advanced Works - Rigid Inclusion - Setting Out Plan - Sheet 3 of 4	1MC09-BBV_MSD-GT-DSO-NS04_NL10-118900
Ground Improvement - Advanced Works - Rigid Inclusion - Setting Out Plan - Sheet 4 of 4	1MC09-BBV_MSD-GT-DSO-NS04_NL10-119000
Ground Improvement - Advanced Works - Roll plot along entire asset	1MC09-BBV_MSD-GT-DLO-NS04_NL10-218300
Ground Improvement - Advanced Works - Setting Out Plan - 1 of 5	1MC09-BBV_MSD-GT-DSO-NS04_NL10-218300

Title	Reference
Ground Improvement - Advanced Works - Setting Out Plan - 2 of 5	1MC09-BBV_MSD-GT-DSO-NS04_NL10-218500
Ground Improvement - Advanced Works - Setting Out Plan - 3 of 5	1MC09-BBV_MSD-GT-DSO-NS04_NL10-218700
Ground Improvement - Advanced Works - Setting Out Plan - 4 of 5	1MC09-BBV_MSD-GT-DSO-NS04_NL10-218900
Ground Improvement - Advanced Works - Setting Out Plan - 5 of 5	1MC09-BBV_MSD-GT-DSO-NS04_NL10-219100
Ground Improvement - Advanced Works - Temporary Drainage Ditch - Plan and Profile	1MC09-BBV_MSD-GT-DPP-NS04_NL10-218751
Ground Improvement - Advanced Works - Typical Setting Out Details	1MC09-BBV_MSD-GT-DSC-NS04_NL10-218302

Appendix B Geotechnical Interpretation

Table B-1 – List of Technical Notes

Title	Reference
Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions	1MC09-BBV_MSD-GT-REP-NS04_NL10-100022

Snapshots are presented below:

1 INTRODUCTION

1.1 Terms of Reference

This Technical Note summarises interpreted ground conditions and geotechnical parameters for consideration in the detailed design of Packington Embankment (157+790 to 158+253), Pool Wood embankment (158+386 to 159+800) and Pool Wood Culvert (158+897) excluding the Coleshill Heath Road Underbridge and Retaining Walls (158+800 to 159+910). It should be noted that Coleshill Heath Road Underbridge and Retaining Walls are sub-assets of Pool Wood Embankment; however, a separate technical note is prepared for them, which can be accessed through 1MC09-BBV_MSD-GT-REP-NS04_NL10-100019.

It also worth mentioning that the asset M42 Motorway Box Structure is outside the scope of this report.

Ground characterisation has been interpreted from ground investigation and monitoring information available up to and including 4th June 2020.

This Technical Note refers to the following documents:

- Consolidation Design – Geotechnical Interpretative and Design Report 22 (1MC09-BBV_MSD-GT-REP-NS04_NL10-100003)
- Detailed Design – Ground Investigation Report Annex E2 (1MC09-BBV_MSD-GT-REP-NS04_NL10-100014)
- Detailed Design – Basis of Design Report for Geotechnics, Earthworks and Retaining Structures – (1MC08-BBV_MSD-GT-REP-N001-100157)
- Detailed Design - Basis of Design Report - Methodology – Earthworks (1MC08-BBV_MSD-GT-REP-N001-100159)
- Detailed Design – Basis of Design Report – Methodology – Deep Foundations (1MC08-BBV_MSD-GT-REP-N001-100160)
- Detailed Design – Basis of Design Report – Methodology – Shallow Foundations (1MC08-BBV_MSD-GT-REP-N001-100161)
- Detailed Design – Basis of Design Report – Methodology – Earthworks Temporary Case for Permanent Cutting Slopes (1MC08-BBV_MSD-GT-REP-N001-100168)

1.2 Scope and Objectives

The objective of this Technical Note is to summarise ground models, geotechnical parameters and groundwater assumptions to be considered in the detailed design of the assets identified in Table 1-1. This information shall take precedence over previous scheme design documents and will inform the subsequent Geotechnical Design Report.

Table 1-1: Detailed Design assets covered by this Technical Note

Stage 2 Programme Asset Name	Asset Name (P15)	Unique Asset ID (UAID)	Chainage From	Chainage To
Packington Embankment (157-L1)	Packington Embankment (157-L1)	HS2-000001159	157+790	158+253
Pool Wood Embankment (158-L2 & 158-L3)	Pool Wood Embankment (158-L2 & 158-L3)	HS2-000001162	158+386	159+800*
Pool Wood Culvert (158-S5)	Pool Wood Culvert (158-S5)	HS2-000020023	158+897	158+897

*The Pool Wood Embankment asset ends at Ch 159+910; however, this technical note only covers the area between Ch 158+386 and 159+800. This excludes Coleshill Heath Road Underbridge (Ch 159+800 to Ch 159+910). Please refer to the document 1MC09-BBV_MSD-GT-REP-NS04_NL10-100019 for Coleshill Heath Road Underbridge and Retaining Walls.

1.3 GI Classification – Managing Uncertainty in Ground Conditions

An assessment of uncertainty due to ground conditions has been undertaken in accordance with the Basis of Design Report for Geotechnics, Earthworks and Retaining Structures (1MC08-BBV_MSD-GT-REP-N001-100157). This assessment aims to classify each asset based on the ground information available, such that the risk associated with uncertainty in the ground conditions can be managed. Generally, this risk is managed either by the assumption of conservative conditions for design, which tends to lead to more robust but costly engineering solutions; or, scheduling additional ground investigation and monitoring to reduce the level of uncertainty.

Each asset is classified based on data availability to inform the type and location of stratigraphy, geotechnical parameters for ULS and SLS design, the variability of groundwater, potential for contamination and construction issues.

A summary of the GI classification for the assets from Packington Embankment to Pool Wood Embankment is provided in Table 1-2. The classification rationale is outlined below.

Table 1-2: GI Classification by Asset

Stage 2 Programme Asset Name	Chainage	Design Zones (See following sections)	Stratigraphy	ULS	SLS	Groundwater	GI Class
Packington Embankment	157+790 to 158+253	2.2.1	1*	1*	1*	1*	1*
Pool Wood Embankment	158+386 to 159+800	2.2.2, 2.2.3, 2.2.4	2.4	2.4	2.4	2.4	2.4
Pool Wood Culvert	158+897	2.3	2.3	2.3	2.3	2.3	2.3

Based on the residual risks identified for stratigraphy, Packington Embankment has been classified as Class 1*, Pool Wood Embankment as Class 2.4, and Pool Wood Culvert as Class 2.3 for detailed design. GI class of 2.4 for Pool Wood Embankment is due to the area of limited GI from Ch 158+386 to Ch 158+775. However, please note that a Class of 2.3 has been chosen for the earthworks outside of the zone of missing GI and is deemed acceptable by the designer. The key risks involve uncertainty regarding the stratigraphy, groundwater regime, ULS and SLS parameters. Any residual risks outside the zone of missing GI will be managed by validation ground investigation prior to construction and verification during construction. For the zone of missing GI the design is undertaken based on the assumption that the Schedule 2 GI will be arrived prior to the final submission of geotechnical designs for Pool Wood Embankment main asset.

1.4 Structure of the Report

This Technical note is structured as follows:

- Section 1: Introduction – Provides an overview of what is covered by this Technical Note including and assessment of the asset classification in terms of available GI data;
- Section 2: Design Ground Models – Presents the chosen representative ground models for the assets together with the design groundwater pressure profiles;
- Section 3: Groundwater – Presents hydrological setting information and tables of design groundwater profiles;
- Section 4: Geotechnical Parameters – Presents tables of geotechnical parameters for the assets for use in detailed design;

- Section 5: Geotechnical Data Plots – Presents plots of the factual data used to derive the geotechnical parameters and groundwater profiles to be used in design;
- Appendix A: Geological sections;
- Appendix B: Derivation of Geotechnical Parameters for Packington Embankment.
- Appendix C: Derivation of Geotechnical Parameters for Pool Wood Embankment.
- Appendix D: Derivation of Geotechnical Parameters for Pool Wood Culvert.

1.5 Limits and Exclusions

Key limitations and exclusions for this Technical Note are listed below:

- this note implements a data freeze date of 4th June 2020. Any data made available after this has not been considered;
- ground contamination is outside of the scope of this Technical Note. Further information on contamination risks for the Packington to Pool Wood Embankment area can be found 1MC09-BBV-EV-REP-N002-100009.

2 DESIGN GROUND MODELS

2.1 Introduction

This section presents ground model profiles for detailed design of the assets covered by this Technical Note.

Ground models have been determined for sections of each of the assets to capture the variability in ground conditions and key structural interfaces along the high-speed rail alignment.

Where required, this section also presents design groundwater pressure profiles applicable to each design ground model section.

The geology in the area of Packington to Pool Wood Embankment as per Table 2-1. Further details of the geological setting of the Packington to Pool Wood area are provided in the Ground Investigation Report Annex E2 (1MC09-BBV_MSD-GT-REP-NS04_NL10-100014).

Table 2-1: Geology formation in the area

Period	Group	Formation	Typical Description
Packington Embankment			
Quaternary	Glaciofluvial Deposits	Mid- Pleistocene and Devensian Glacial Soils	Medium dense to very dense orangish brown slightly silty slightly clayey gravelly fine to coarse SAND with low cobble content. Gravel is fine to coarse subrounded to rounded of mixed lithologies including sandstone, siltstone, mudstone, quartzite, flint, chert and dolerite. Cobbles are subrounded to rounded of sandstone, quartzite and dolerite. With rare zones of medium to very dense orangish brown to brown silty sandy fine to coarse, subrounded to rounded GRAVEL of mixed lithologies including quartzite, mudstone, sandstone and chert with low cobble content. Sand is fine to coarse. Cobbles are rounded of chert. With rare soft to stiff orangish brown to reddish brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to rounded of flint, quartzite, sandstone, siltstone and mudstone.
Triassic	Mercia Mudstone Group (Grade IV/V)	Branscombe Mudstone Formation; Sidmouth Mudstone Formation; Arden Sandstone Formation	Firm to very stiff low to high plasticity reddish brown mottled greenish grey slightly gravelly slightly sandy slightly silty CLAY. Gravel is fine to medium, angular to subrounded lithorelicts of extremely weak mudstone. Sand is fine to coarse.
Triassic	Mercia Mudstone Group (Grade III)	Branscombe Mudstone Formation; Sidmouth Mudstone Formation; Arden Sandstone Formation	Stiff to very stiff low to intermediate plasticity reddish brown sandy silty gravelly CLAY. Sand is fine to coarse. Coarse sand and fine to coarse angular to subangular gravel is lithorelicts of extremely weak mudstone.
Triassic	Mercia Mudstone Group (Grade I/II)	Branscombe Mudstone Formation; Sidmouth Mudstone Formation; Arden Sandstone Formation	Extremely weak to very weak thickly laminated to medium bedded reddish brown MUDSTONE with occasional lenses and vugs containing gypsum and calcite. Frequently recovered as sandy clayey gravel. Gravel is fine to coarse, subangular to angular lithorelicts of mudstone. Frequently interbedded with extremely weak to weak, very thickly laminated to medium bedded, reddish brown mottled greenish grey SILTSTONE.
Pool Wood Embankment			

Period	Group	Formation	Typical Description
Quaternary	Made Ground		Made Ground at former brick kiln/ nickel leachate hotspot: Soft to firm brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of mixed lithologies including flint and quartzite with rare brick. With rare (focused on ML159-CP003) dark brown slightly gravelly clayey fine to coarse SAND. Gravel is angular to subrounded fine to coarse of mixed lithologies including flint and quartzite with occasional glass, metal, pottery fragments, ash, slag, brick, rope plastic wood. Note: Made Ground at A446/A452 Roundabout is recovered as soft to firm dark reddish brown to brown sandy gravelly CLAY with rootlets and frequent brick, wood, ash and pottery. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of mixed lithologies including flint, quartzite, chert, brick and pottery fragments. With frequent medium dense reddish brown slightly silty clayey gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded of mixed lithologies including flint, quartzite and brick. With frequent medium to very dense reddish brown slightly silty sandy fine to coarse angular to rounded GRAVEL of mixed lithologies including flint, chert and quartzite, with frequent brick, ash, clinker and concrete with medium cobble content. Sand is fine to coarse. Cobbles are angular to subrounded of mixed lithologies including flint, chert and quartzite.
Quaternary	Glaciolacustrine Deposits	Devensian Glacial Soils	Soft to stiff reddish brown mottled light grey to black silty sandy gravelly CLAY. The sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of mixed lithologies including flint and quartzite. With occasional loose to medium dense orangish brown to reddish brown slightly silty clayey gravelly fine to coarse SAND. Gravel is fine to coarse subangular to subrounded of mixed lithologies including flint and quartzite. With very rare reddish brown clayey sandy fine to coarse subangular to subrounded GRAVEL of mixed lithologies including flint and quartzite with low cobble content. Sand is fine to coarse. Cobbles are rounded of mixed lithologies including flint and quartzite.
Quaternary	Glaciofluvial Deposits	Devensian Glacial Soils	Medium dense to very dense, orangish brown to reddish brown, slightly silty clayey gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded of mixed lithologies including flint, quartzite, sandstone, siltstone and mudstone. With very frequent medium dense to very dense, brown to reddish brown slightly clayey silty sandy fine to coarse subangular to rounded GRAVEL of mixed lithologies including quartzite, flint and chert, with low to high cobble content. Sand is fine to coarse, cobbles are subrounded to rounded of mixed lithologies including quartzite, flint and chert. With very occasional lenses of soft to stiff reddish brown slightly silty sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to rounded of mixed lithologies including flint, siltstone, mudstone and quartzite.
Triassic	Mercia Mudstone Group (Grade IV/V)	Branscombe Mudstone Formation; Sidmouth Mudstone Formation; Arden Sandstone Formation	Soft to very stiff, medium to very high strength, reddish brown slightly gravelly sandy, silty CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of mudstone. Predominantly fully weathered description indicative of MMG IVb.

Period	Group	Formation	Typical Description
Triassic	Mercia Mudstone Group (Grade I/II)	Branscombe Mudstone Formation; Sidmouth Mudstone Formation; Arden Sandstone Formation	Extremely weak to medium strong occasionally blocky very thinly laminated to thinly bedded, reddish brown MUDSTONE with occasional greenish grey reduction spots, rare small voids and rare pockets of calcite. With rare interbeds of medium strong to strong thinly laminated to thickly bedded greenish grey to reddish brown SILTSTONE with frequent randomly orientated calcite veins, occasional greenish grey reduction spots and rare voids. With rare interbeds of weak to medium strong thickly laminated to thinly bedded greenish grey to reddish brown fine to medium grained SANDSTONE.
Pool Wood Culvert			
Quaternary	Glaciofluvial Deposits	Devensian Glacial Soils	Cohesive (the top 2m): Soft to firm reddish brown slightly sandy slightly gravelly CLAY. The sand is fine. Gravel is fine to coarse subangular to subrounded of flint, mudstone, siltstone and quartzite Granular: Medium dense to dense reddish brown, slightly clayey sandy fine to coarse subangular to rounded GRAVEL with low to high cobble content of mixed lithologies including flint, quartzite, sandstone, mudstone and siltstone. Sand is fine to coarse. Cobbles are subrounded to rounded of flint and quartzite.
Triassic	Mercia Mudstone Group (Grade IV/V)	Branscombe Mudstone Formation; Sidmouth Mudstone Formation; Arden Sandstone Formation	Stiff to very stiff, high to very high strength, reddish brown slightly sandy silty CLAY. Sand is fine to coarse.
Triassic	Mercia Mudstone Group (Grade I/II)	Branscombe Mudstone Formation; Sidmouth Mudstone Formation; Arden Sandstone Formation	Extremely weak to medium strong, very thickly laminated to very thinly bedded, reddish brown MUDSTONE with rare greenish grey reduction spots and rare voids. With rare medium strong to strong thickly laminated to very thinly bedded reddish brown SILTSTONE with rare greenish grey reduction spots and rare voids.

Packington Embankment is 463m in length. Ground conditions are approximately similar except some changes in the thickness of the ground layers. As such, for detailed design, this asset has been considered to have one ground model (Ground Model 1 in Figure 1) along the main alignment. It has been identified on the basis of the interpretation of the available ground investigation for Packington Embankment between chainages 157+790 and 158+253, with cut-off date of 4th June 2020. The entire Packington Embankment area ground investigation, covering from chainage 157+790 to 158+253, consists of 52 exploratory holes.

Pool Wood Embankment is 1414m in length. Ground conditions vary along the asset. From Ch 158+386 to Ch 158+775 (Ground Model 2 in Figure 1), there is a significant lack of GI data which necessitates using worst credible parameters from the Global Design Parameters Report. There are also two more models (Model 3 and Model 4 in Figure 1) to capture different geological profiles within the asset. This has been identified on the basis of the interpretation of the available ground investigation for Pool Wood Embankment between chainages 158+386 and 159+800, with cut-off date of 4th June 2020. The entire Pool wood Embankment area ground investigation consists of 42 exploratory holes.

There is one ground model (Ground Model 5 in Figure 1) for Pool Wood Culvert at Ch 158+897. This model has been identified on the basis of the interpretation of the available ground investigation for Pool Wood Culvert within 80m of Ch 159+897, with cut-off date of 4th June 2020. The ground investigation in the area surrounding the culvert consists of 5 exploratory holes.

Document Title: Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions
Document Number: 1MC09-BBV_MSD-GT-REP-NS04_NL10-100022
Revision: P01
Handling Instructions: Produced by BBV for project use only

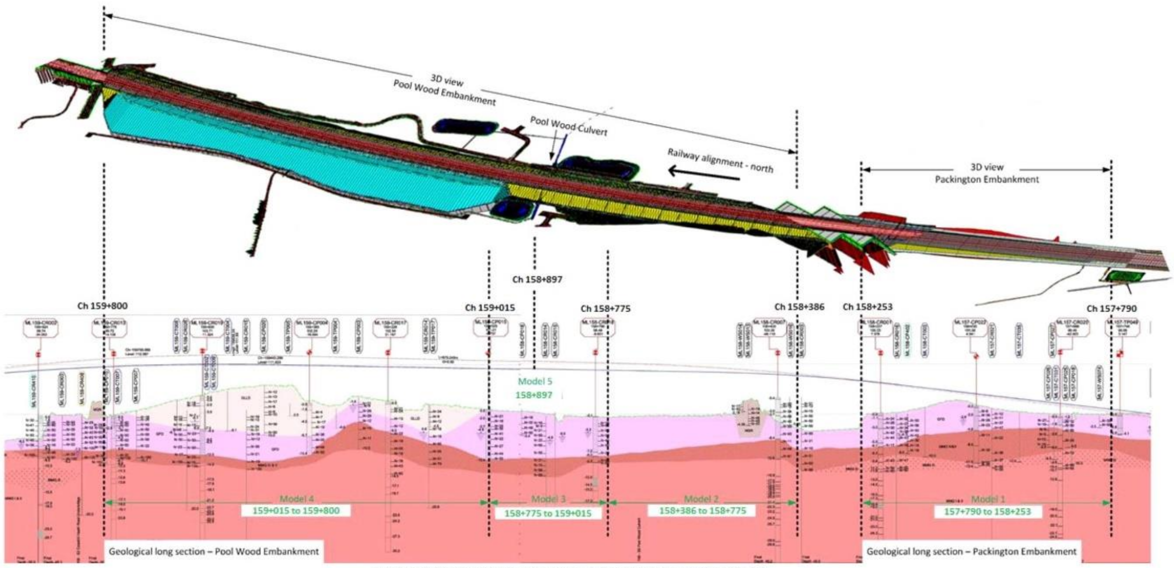


Figure 1 Location of Ground Models for Design – Packington to Pool Wood Embankment

1MC08_09-IBBV-QY-TEM-N000-000007	Procedure & Management Plan Template	Rev P08	Date of Rev 06/04/2020	Page **14** of **134**

2.2 Design Ground Model Sections – Earthworks

There are five design ground models defined for the Packington to Pool Wood Embankment area, which cover from Ch 157+790 to 158+253, and Ch 158+386 to Ch 159+800. A maximum embankment height of 11m is encountered at around Ch 159+770. The proposed track level is approximately between 108.4m AOD (south of the asset) and 112m AOD (north of the asset).

2.2.1 Ground Model 1– Packington Embankment

Table 2-2: Stratigraphy for Design Ground model 1 - Packington Embankment

Strata	Asset Height (m bgl)	Thickness (m)*	Depth to base of strata (m AOD)*	Depth 20 m WEST from the alignment(mAOD)	Depth 20 m EAST from the alignment(mAOD)
Glaciofluvial deposits	6.50 (max)	1.92 - 7.6	98.50 - 92.5	93.29 - 98.05	92.55 - 97.8
Mercia Mudstone Grade IV		2.35 - 8.15	90.33 - 92.24	90.41 - 92.40	90.3 - 91.81-
Mercia Mudstone Grade III		0.62 - 2.91	89.44 - 89.7	89.22 - 89.7	89.24 - 89.8
Mercia Mudstone Grade I & II		N/A	N/A	N/A	N/A

2.2.2 Ground Model 2 – Pool Wood Embankment

Table 2-3: Stratigraphy for Design Ground model 2 – Pool Wood Embankment

Strata	Asset Height (m bgl)	Thickness (m)*	Depth to base of strata (m AOD)*	Depth 20 m WEST from the alignment(mAOD)	Depth 20 m EAST from the alignment(mAOD)
Made Ground (from Ch 158+391 to Ch 158+525)	10.6 (max)	0 - 5.3	95.5 - 97.92	95.75 - 99.91	95.25 - 99.72
Glaciofluvial deposits		6.8 - 7.61	91.93 - 92.8	91.8 - 93.38	92.23 - 94
Mercia Mudstone Grade IV		2.39 - 3.8	89.5	89.4	89.5 - 89.8
Mercia Mudstone Grade I & II		N/A	N/A	N/A	N/A

2.2.3 Ground Model 3 – Pool Wood Embankment

Table 2-4: Stratigraphy for Design Ground model 3 - Pool Wood Embankment

Strata	Asset Height (m bgl)	Thickness (m)*	Depth to base of strata (m AOD)*	Depth 20 m WEST from the alignment(mAOD)	Depth 20 m EAST from the alignment(mAOD)
Glaciofluvial deposits	12 (max)	8.84 - 9.79	90.91 - 91.61	90.77 - 91.66	91.15 - 92
Mercia Mudstone Grade IV		2.25 - 2.6	90.91 - 91.61	88.07 - 89.28	88.67 - 89.9

Strata	Asset Height (m bgl)	Thickness (m)*	Depth to base of strata (m AOD)*	Depth 20 m WEST from the alignment(mAOD)	Depth 20 m EAST from the alignment(mAOD)
Mercia Mudstone Grade I & II		N/A	N/A	N/A	N/A

2.2.4 Ground Model 4 – Pool Wood Embankment

Table 2-5: Stratigraphy for Design Ground model 4 - Pool Wood Embankment

Strata	Asset Height (m bgl)	Thickness (m)*	Depth to base of strata (m AOD)*	Depth 20 m WEST from the alignment(mAOD)	Depth 20 m EAST from the alignment(mAOD)
Glaciolacustrine Deposits	11.5 (max)	0.9 - 7.8	95.56 - 102.16	96.23 - 102.10	97.05 - 102.6
Glaciofluvial deposits		1.7 - 8.84	92.87 - 100.2	90.89 - 101.24	91.2 - 99.71
Mercia Mudstone Grade IV		2.25 - 11.5	88.49 - 90.8	88.34 - 90.56	88.67 - 90.93
Mercia Mudstone Grade I & II		N/A	N/A	N/A	N/A

2.3 Design Ground Model Sections – Culverts

Table 2-6: Stratigraphy for Design Ground model – Pool Wood Culvert

Strata	Asset Height (m bgl)	Thickness (m)*	Depth to base of strata (m AOD)*	Depth 20 m WEST from the alignment(mAOD)	Depth 20 m EAST from the alignment(mAOD)
Glaciofluvial deposits - Cohesive	12 (max)	2	98.37	98.57	98.2
Glaciofluvial deposits - Granular		6.9	91.47	91.67	91.3
Mercia Mudstone Grade IV		2.64	88.84	89.38	88.28
Mercia Mudstone Grade I & II		N/A	N/A	N/A	N/A

3 GROUNDWATER

3.1 Hydrological Setting

A combination of ground investigation data and BGS mapping indicates that the geology beneath the area from Packington to Pool Wood comprises of superficial deposits (glaciofluvial and glaciolacustrine soils), weathered Mercia Mudstone and in-situ Mercia Mudstone

Between chainages 158+295 and 158+795 there is a lack of groundwater monitoring within 130 metres either side of the alignment. An unnamed tertiary watercourse/drain is present at Ch 158+535 and the Coleshill Pool/marsh is adjacent to this. It is uncertain if this is in hydraulic continuity with the groundwater system. The presence of this river may suggest the groundwater should be near or at ground level between these chainages, perched within the Glaciofluvial Deposits. However, there is no surface water sampling in this location to provide any elevation data. It is recommended that further monitoring of water levels is undertaken both of surface and groundwater. The risk associated with the limited data set has been recorded within the risk register. However, for design purposes a conservative design assumption of water levels has been made.

Between chainages 158+795 to 159+015 the groundwater table starts to decrease in height and becomes deeper (up to around 5m below the ground level in ML158-CR015). This trend is consistent with an increased thickness of glaciofluvial deposits in this area and an expected hydraulic gradient moving further way from the tertiary watercourse at Ch 158+535.

Between chainages 159+020 and 159+755 a groundwater strike occurred at 7.1 and 7.68 m bgl in boreholes ML159-CR014 and ML159-CR019 respectively within Glaciofluvial Deposits. However, the water levels in these boreholes are recorded to have reached 5.63 and 5.08 metres respectively within glaciolacustrine clays. This suggests that the glaciofluvial aquifer unit has been confined between the clays of the glaciolacustrine deposits and MMG IV/V, creating a piezometric surface up to 2 metres above the top of the glaciofluvial deposits. Full saturated thickness of the glaciofluvial deposits is therefore assumed between these chainages.

3.2 Design Groundwater Profiles

To meet HS2 requirements for groundwater consideration in design, and in accordance with the Consolidation – Basis of Design – Climate Change/Resilience Appendix A (1MC08-BBV_MSD-EV-REP-N001-100016), the following groundwater design assumptions have been determined:

- Short-term (for construction) characteristic: represents baseline groundwater conditions for an area derived from best fit of reliable data from closest monitoring locations.
- Long-term (for 120-year design life):
  - Characteristic: Minimum and maximum prediction from recorded data (representing the potential range of groundwater levels / pressures of an area derived from trends seen in the available monitoring data.
  - Ultimate: Minimum and maximum (incorporating a 1m fall or rise in groundwater levels as climate change allowance). Long-term Ultimate groundwater profiles are capped by the ground level.

Table 3-1 summarises design pressure assumptions.

Table 3-1: Summary of Groundwater pore water pressure profiles - Design Sections

Section	Short-term Characteristic	Long term – Ultimate (Maximum)
Ground Model 1 – Packington Embankment (Ch 157+790 to Ch 158+253)	Hydrostatic from 98.5 mAOD	Hydrostatic from 99.7 mAOD
Ground Model 2 – Pool Wood Embankment (Ch 158+386 to Ch 158+745)	Hydrostatic from 96.5 mAOD	Hydrostatic from 98.7 mAOD
Ground Model 3 – Pool Wood Embankment (Ch 158+745 to Ch 159+015)	Hydrostatic from 96.0 mAOD	Hydrostatic from 97.4 mAOD
Ground Model 4 – Pool Wood Embankment (Ch 159+015 to Ch 159+800)	Hydrostatic from 96.0 mAOD between Ch 159+015 and Ch 159+140	Hydrostatic from 97.4 mAOD between Ch 159+015 and Ch 159+140
	Hydrostatic from 101.0 mAOD between Ch 159+140 and Ch 159+380	Hydrostatic from 102.9 mAOD between Ch 159+140 and Ch 159+380
	Hydrostatic from 96.0 mAOD between Ch Ch 159+380 and Ch 159+800	Hydrostatic from 99.6 mAOD between Ch Ch 159+380 and Ch 159+800
Ground Model 5 – Pool Wood Culvert (Ch 158+897)	Hydrostatic from 96.0 mAOD	Hydrostatic from 97.4 mAOD

4 GEOTECHNICAL PARAMETERS

4.1 Parameter Tables

The parameters presented in this report have been determined using GI data available up to 4th June 2020, which is specific to the Packington to Pool Wood Embankment area.

Discussion on parameter selection is presented in Appendix B, Appendix C and Appendix D of this Technical Note.

Document Title: Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions
Document Number: 1MC09-BBV_MSD-GT-REP-NS04_NL10-100022
Revision: P01
Handling Instructions: Produced by BBV for project use only

Table 4-2: Geotechncial Parameters – Earthworks for Pool Wood Embankment from Ch 158+386 to 158+775 (Ground Model 2)

Geotechnical Parameters			Made Ground (from Ch 158+386 to Ch 158+520)	Glaciofluvial Deposits	Mercia Mudstone IV/V	Mercia Mudstone I/II
Unit Weight	γ	kN/m^3	19	19	20	20
Undrained Shear Strength	S_u	kPa	100 + 20 (z – 3) capped at 200 kPa for z > 3m	-	30 + 10z capped at 70 kPa	-
Peak angle of shearing resistance	φ'_{pk}	°	28	30	23	36 for low confining stress 26 for high confining stress
Constant volume angle of shearing resistance	φ'_{cv}	°	26	28	21	-
Cohesion	c'	kPa	0	0	0	18.5 for low confining stress 40 for high confining stress
Undrained Young's Modulus @ 0.1% Strain	E_u	MPa	30 for z ≤ 3m 30 + 7.2(z – 3) capped at 66 for z > 3m	-	15.6 + 5.2z capped at 36.4 MPa	-
Drained Young's Modulus @ 0.1% Strain	E'	MPa	25 z ≤ 3m 25 + 6 (z – 3) capped at 55 for z > 3m	10 + 1.6z	13.4 + 4.5z capped at 31.3 MPa	-
Undrained Poisson's Ratio	v_u	-	0.5	-	0.5	-
Drained Poisson's Ratio	v'	-	0.25	0.25	0.3	-
Overconsolidation Ratio (OCR)	OCR	-	5	-	5	-
Coefficient of Volume Compressibility	m_v	m^2/MN	0.064 for z ≤ 3m 0.064 – (z – 3) / 150 capped at 0.031	-	1/E'	-
Coefficient of Consolidation	c_v	$m^2/year$	35	-	-	-
Uniaxial Compressive Strength, UCS	UCS	MPa	-	-	-	1.2
Geological Strength Factor	GSI	-	-	-	-	40
Rock mass Modulus of deformation	E_{rm}	MPa	-	-	-	616

1MC08_09-IBBV-QY-TEM-N000-000007	Procedure & Management Plan Template	Rev P08	Date of Rev 06/04/2020	Page **22** of **134**

Geotechnical Parameters			Made Ground (from Ch 158+386 to Ch 158+520)	Glaciofluvial Deposits	Mercia Mudstone IV/V	Mercia Mudstone I/II
Material constant	m_i	-	-	-	-	7
Disturbance Factor	*D*	-	-	-	-	0

Table 4-3: Geotechncial Parameters – Earthworks for Pool Wood Embankment from Ch 158+775 to 159+015 (Ground Model 3)

Geotechnical Parameters			Glaciofluvial Deposits	Mercia Mudstone IV/V	Mercia Mudstone I/II
Unit Weight	γ	kN/m^3	19	20	20
Undrained Shear Strength	S_u	kPa	-	80 kPa for z ≤ 6.5m 80 + 10(z – 6.5) capped at 135 kPa for z > 6.5m	-
Peak angle of shearing resistance	φ'_{pk}	°	34	28	36 for low confining stress 26 for high confining stress
Constant volume angle of shearing resistance	φ'_{cv}	°	32	26	-
Cohesion	c'	kPa	0	0	18.5 for low confining stress 40 for high confining stress
Undrained Young's Modulus @ 0.1% Strain	E_u	MPa	-	27.5 for z ≤ 6.5m 27.5 + 4(z – 6.5) capped at 49.5 MPa for z > 6.5m	-
Drained Young's Modulus @ 0.1% Strain	E'	MPa	40 for z ≤ 2m 40 + 6(z – 2) capped at 88 for z > 2m.	24 z ≤ 6.5m 24 + 3.5(z – 6.5) capped at 43 for z > 6.5m	-
Undrained Poisson's Ratio	ν_u	-	-	-	-
Drained Poisson's Ratio	ν'	-	-	-	-
Overconsolidation Ratio (OCR)	OCR	-	-	5	-
Coefficient of Volume Compressibility	m_v	m^2/MN	-	0.072 for z ≤ 6.5m 0.072 – (z – 6.5) / 140 capped at 0.033	-
Coefficient of Consolidation	c_v	m^2/year	-	29	-
Uniaxial Compressive Strength, UCS	UCS	MPa	-	-	1.2
Geological Strength Factor	GSI	-	-	-	40
Rock mass Modulus of deformation	E_{rm}	MPa	-	-	616
Material constant	m_i	-	-	-	7
Disturbance Factor	*D*	-	-	-	0

Table 4-4: Geotechncial Parameters – Earthworks for Pool Wood Embankment from Ch 159+015 to 159+800 (Ground Model 4)

Geotechnical Parameters			Glaciolacustrine deposits	Glaciofluvial Deposits	Mercia Mudstone IV/V	Mercia Mudstone I/II
Unit Weight	γ	kN/m³	20.5	19	20	20
Undrained Shear Strength	S_u	kPa	16+5.7Z capped at 50kPa	-	80 kPa for z ≤ 6.5m 80 + 10(z – 6.5) capped at 135 kPa for z > 6.5m	-
Peak angle of shearing resistance	φ'_{pk}	°	27	34	28	36 for low confining stress 26 for high confining stress
Constant volume angle of shearing resistance	φ'_{cv}	°	26	32	26	-
Cohesion	c'	kPa	0	0	0	18.5 for low confining stress 40 for high confining stress
Undrained Young's Modulus @ 0.1% Strain	E_u	MPa	13	-	27.5 for z ≤ 6.5m 27.5 + 4(z – 6.5) capped at 49.5 MPa for z > 6.5m	-
Drained Young's Modulus @ 0.1% Strain	E'	MPa	11	40 for z ≤ 2m 40 + 6(z – 2) capped at 88 for z > 2m.	24 z ≤ 6.5m 24 + 3.5(z – 6.5) capped at 43 for z > 6.5m	-
Undrained Poisson's Ratio	v_u	-	0.5	-	-	-
Drained Poisson's Ratio	v'	-	0.25	-	-	-
Overconsolidation Ratio (OCR)	OCR	-	2.4	-	5	-
Coefficient of Volume Compressibility	m_v	m²/MN	0.133	-	0.072 for z ≤ 6.5m 0.072 – (z – 6.5) / 140 capped at 0.033	-
Coefficient of Consolidation	c_v	m²/year	22	-	29	-
Uniaxial Compressive Strength, UCS	UCS	MPa	-	-	-	1.2
Geological Strength Factor	GSI	-	-	-	-	40
Rock mass Modulus of deformation	E_m	MPa	-	-	-	616

Geotechnical Parameters			Glaciolacustrine deposits	Glaciofluvial Deposits	Mercia Mudstone IV/V	Mercia Mudstone I/II
Material constant	m_i	-	-	-	-	7
Disturbance Factor	D	-	-	-	-	0

Table 4-5: Geotechncial Parameters – Earthworks for Pool Wood Culvert at Ch 158+897

Geotechnical Parameters			Glaciofluvial Deposits	Mercia Mudstone IV/V	Mercia Mudstone I/II
Unit Weight	γ	kN/m^3	20	20	-
Undrained Shear Strength	S_u	kPa	-	101	-
Peak angle of shearing resistance	φ'_{pk}	°	30	27	-
Constant volume angle of shearing resistance	φ'_{cv}	°	28	25	-
Cohesion	c'	kPa	0	0	-
Undrained Young's Modulus @ 0.1% Strain	E_u	MPa	-	44	-
Drained Young's Modulus @ 0.1% Strain	E'	MPa	40 for $z \leq 2$m 40 + 6.6(z – 2) capped at 80 for z > 2m.	38	-
Undrained Poisson's Ratio	v_u	-	-	-	-
Drained Poisson's Ratio	v'	-	-	-	-
Overconsolidation Ratio (OCR)	OCR	-	-	5	-
Coefficient of Volume Compressibility	m_v	m^2/MN	-	0.03	-
Coefficient of Consolidation	c_v	m^2/year	-	12.5	-
Uniaxial Compressive Strength, UCS	UCS	MPa	-	-	-
Geological Strength Factor	GSI	-	-	-	-
Rock mass Modulus of deformation	E_{rm}	MPa	-	-	-
Material constant	m_i	-	-	-	-
Disturbance Factor	*D*	-	-	-	-

Notes:

- z refers to m bgl.
- For Mercia Mudstone IV and III, effective cohesion, c', is capped at 1 kPa in the vadose zone.
- All parameters have been derived for the permanent works only.
- Pre-existing shear surfaces may be present in head deposits leading to lower effective angle of friction. This will be managed in the geotechnical risk register.

5 GEOTECHNICAL DATA PLOTS

5.1 Introduction

The following section presents the factual geotechnical data used to derive the geotechnical parameters in Section 4. A discussion on the interpretation of this information is detailed in in Appendix B, Appendix C and Appendix D. The geotechnical data is plotted in the following figures.

5.1.2 Pool Wood Embankment

Table 5-2 Summary of geotechnical data plots

Plot	Material	Figure	Geotechnical Data Plot
1	Made Ground	Figure 6	Material Composition
2			Standard Penetration Test (SPT N_{60})
3			Plasticity Limits
4			Drained Young's modulus
5	Glaciolacustrine Deposits	Figure 7	Material Composition
6			Bulk Unit Weight
7			Standard Penetration Test (SPT N_{60})
8			Plasticity Limits
9			Drained Young's Modulus
10	Glaciofluvial Deposits	Figure 8	Material Composition
11			Unit Weight
12			Standard Penetration Test (SPT N_{60})
13			Peak Shear Strength
14			Residual Shear Strength
15	Mercia Mudstone (Grade IV/V)	Figure 9	Material Composition
16			Bulk Unit Weight
17			Standard Penetration Test (SPT N_{60})
18			Undrained Shear Strength
19			Plasticity Limits
20			Drained Young's Modulus
21	Mercia Mudstone (Grade I/II)	Figure 10	Uniaxial Compressive Strength

Made Ground

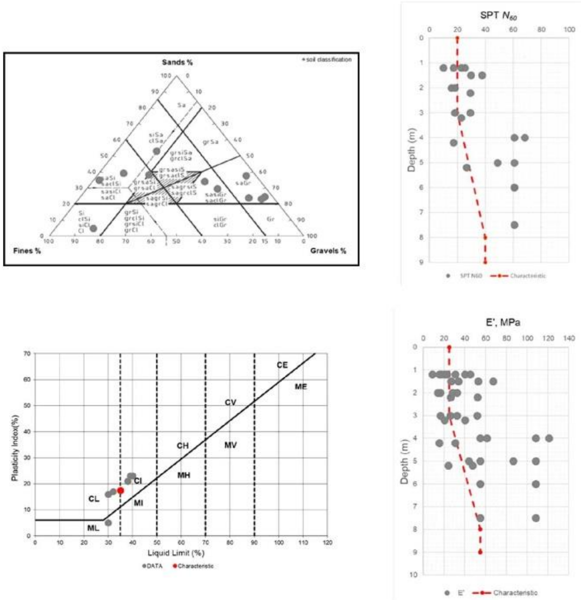


Figure 6 Geotechnical Plots 1 to 4: Made Ground

Glaciolacustrine Deposits

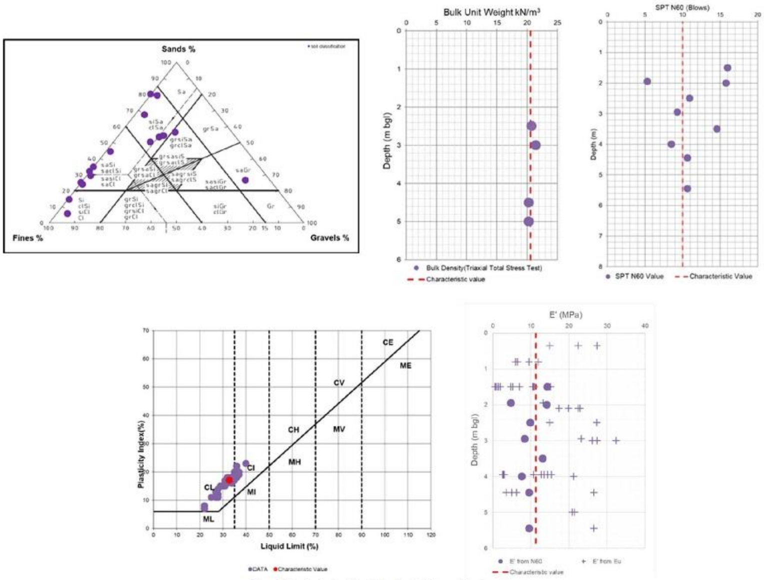


Figure 7 Geotechnical Plots 5 to 9: Glaciolacustrine Deposits

Glaciofluvial Deposits

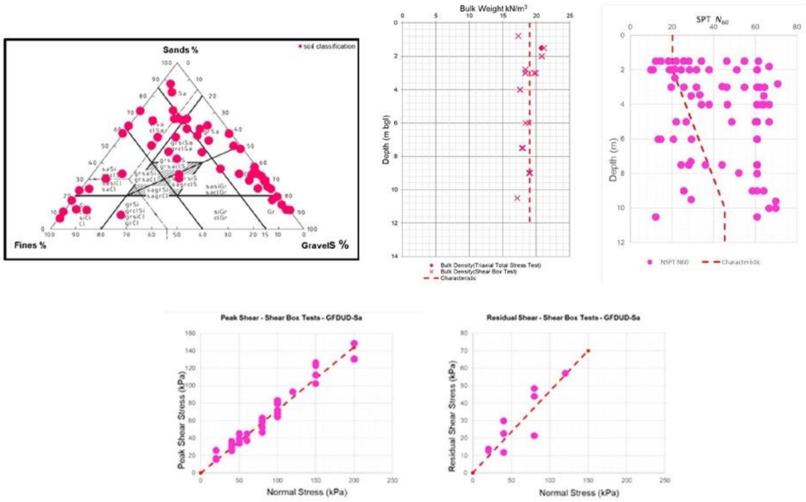


Figure 8 Geotechnical Plots 10 to 14: Glaciofluvial Deposits

Mercia Mudstone Group – Grade IV

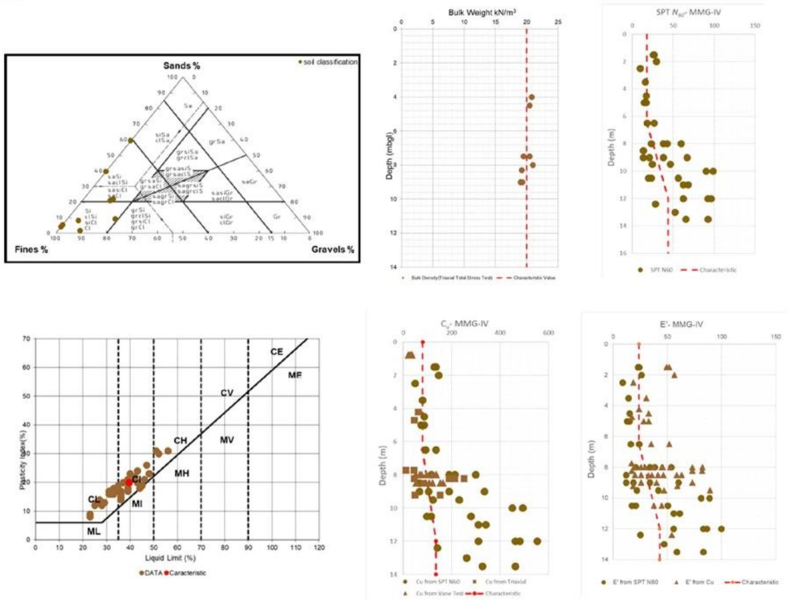


Figure 9 Geotechnical Plots 15 to 20: Mercia Mudstone Group – Grade IV

Mercia Mudstone Group – Grades I/II

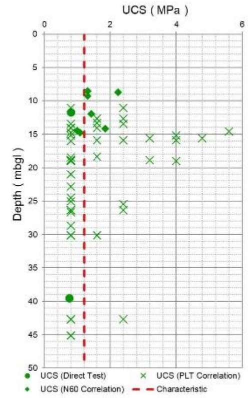


Figure 10 Geotechnical Plot 21: Mercia Mudstone Group – Grade I/II

5.1.3 Pool Wood Culvert

Table 5-3 Summary of geotechnical data plots

Plot	Material	Figure	Geotechnical Data Plot
1	Glaciofluvial Deposits	Figure 11	Material Composition
2			Unit Weight
3			Standard Penetration Test (SPT N_{60})
4			Peak Shear Strength
5			Residual shear strength
6	Mercia Mudstone (Grade IV/V)	Figure 12	Material Composition
7			Bulk Unit Weight
8			Standard Penetration Test (SPT N_{60})
9			Plasticity Limits
10			Undrained Shear Strength
11			Drained Young's Modulus

Glaciofluvial Deposits

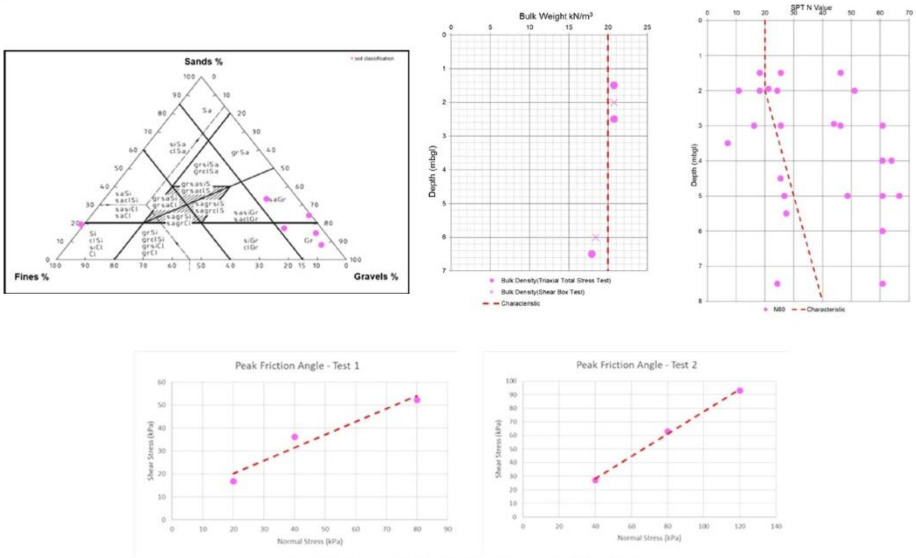


Figure 11 Geotechnical Plots 1 to 5: Glaciofluvial Deposits at Pool Wood Culvert

Mercia Mudstone Group – Grades IV/V (MMG IV/V)

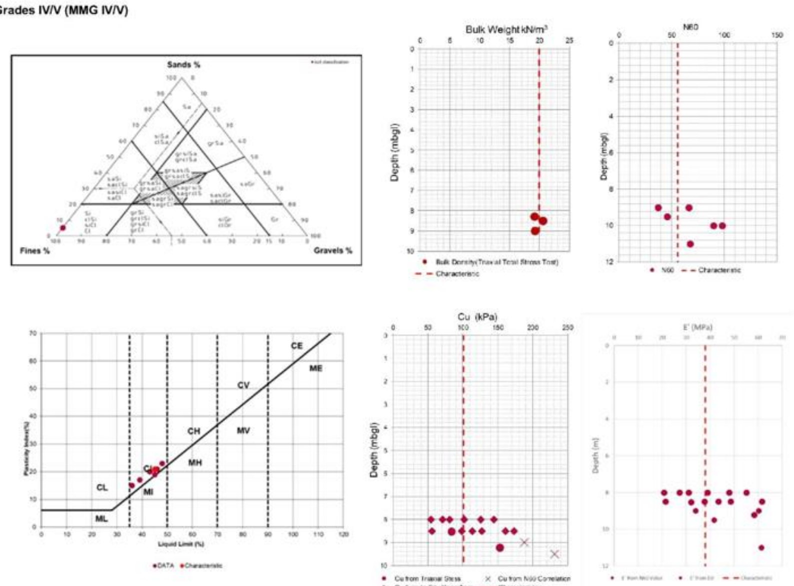


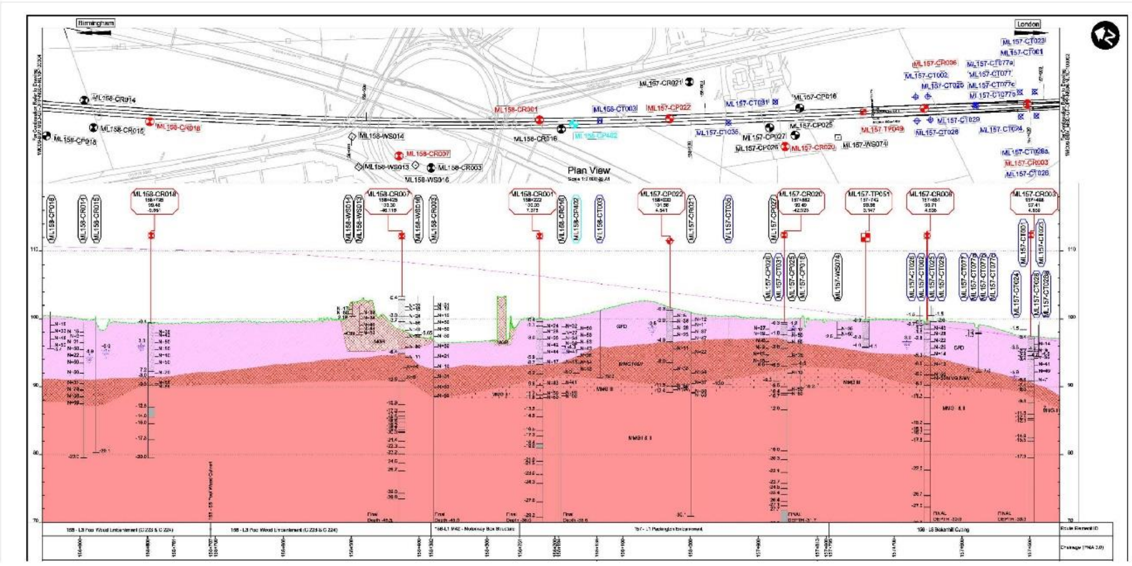
Figure 12 Geotechnical Plots 6 to 10: Mercia Mudstone Group – Grades IV/V at Pool Wood Culvert

Appendix A GEOLOGICAL SECTIONS

Mainline - Plan And Geological Long Section - Chainage: - 157+460 - 158+960 - Sheet 01: 1MC09-BBV_MSD-GT-DPP-NS04_NL10-100003

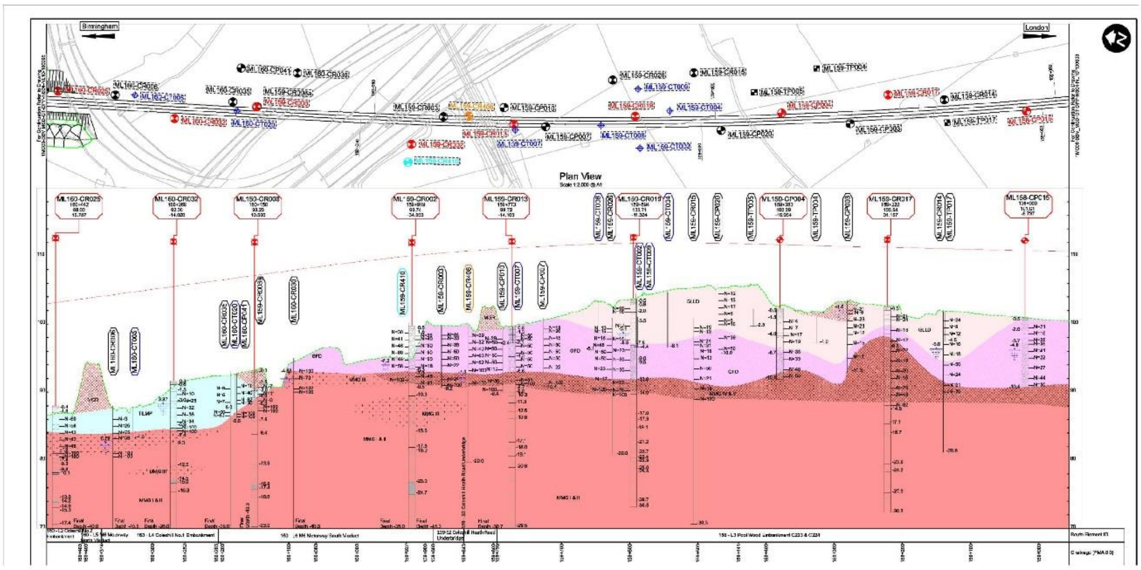
Mainline - Plan And Geological Long Section - Chainage: - 158+960 - 160+460 - Sheet 01: 1MC09-BBV_MSD-GT-DPP-NS04_NL10-100004

Document Title: Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions
Document Number: 1MC09-BBV_MSD-GT-REP-NS04_NL10-100022
Revision: P01
Handling Instructions: Produced by BBV for project use only



1MC08_09-IBBV-QY-TEM-N000-000007 | Procedure & Management Plan Template | Rev P08 | Date of Rev 06/04/2020 | Page 43 of 134

Document Title: Detailed Design Packington Embankment to Pool Wood Embankment – Technical Note on Ground Conditions
Document Number: 1MC08-BBV_MSD-GT-REP-NS04_NL10-100022
Revision: P01
Handling instructions: Produced by BBV for project use only



1MC08_09-IBBV-QY-TEM-N000-000007	Procedure & Management Plan Template	Rev P08	Date of Rev 06/04/2020	Page 44 of 134

Appendix C Derivation of Geotechnical Parameters for Pool Wood Embankment

C1. Introduction

This section presents a discussion of the geotechnical parameters derived in Section 4. It highlights the properties that are key for the design of geotechnical structures being considered and provides characteristic values for these materials based on the data available.

It is worth noting that there is no GI data from Ch 158+386 to 158+775 except for the Made ground. As such, worst credible parameters from the lower bounds given in the Global Design Parameters Reports will be used for the zone between those two chainages.

C2. Made Ground (MGR)

Made Ground exists in the beginning of Pool Wood Embankment (from the south) to a depth of up to 8m bgl, 4m above and 4m below the surrounding natural ground level as this is part of the highways embankment for the A452/A446 Roundabout. Ground investigation data is available to some extent for the Made Ground and parameters are derived in the sections below; however, it is suggested that the Made Ground should be removed due to uncertainties and high level of data scatter/variation associated with this soil. Consequently, Made Ground is not taken into consideration in the calculations of bearing resistance, settlement assessment and slope stability.

Material Composition

- Test data:
  - 11No. Particle Size Distribution (PSD) within the Made Ground (MGR) have been used to determine the classification of the soil. The Made Ground encountered in Pool Wood Embankment is a mixture of fine and granular materials. The PSD results are shown in the following figure.

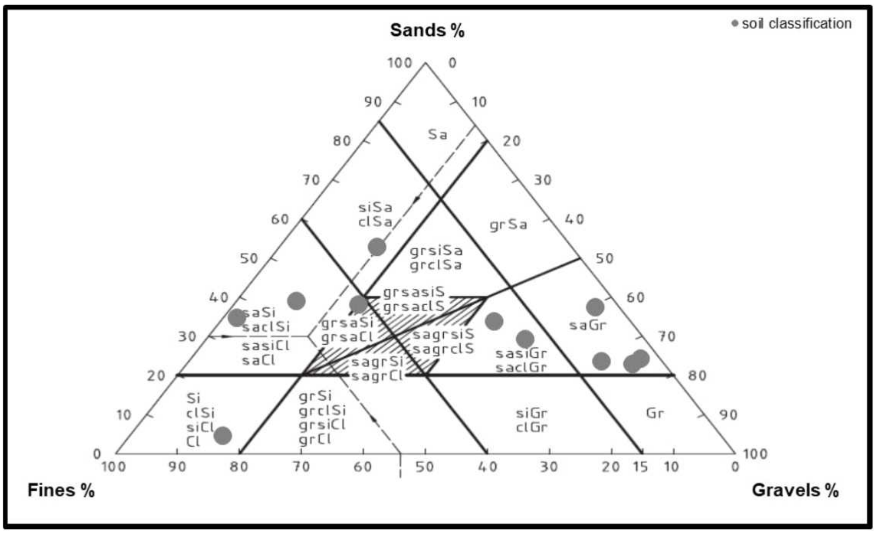


Figure C- 1 Particle Size Distribution (PSD) for MGR at Pool Wood Embankment

- The percentage of fines, gravels, and sands according to the limited available GI data is 30.2%, 39.1% and 30.7%, respectively through the whole assets. This content of fines which scattered around the deterministic boundary line (35% fine content) allows classification of the material as granular or cohesive in terms of its geotechnical behaviour. Although the parentage of fines is below 35% in the limited existing GI data for MGR, for conservatism reasons, the soil is assumed to be cohesive and cohesion has been considered in the calculation of geotechnical parameters.

Bulk Unit Weight

- Test data:
  - There is no data available for the bulk unit weight of the Made Ground encountered across Pool wood Embankment.
  - According to the engineer's log descriptions, the Made Ground mainly consists of clayey sandy GRAVEL and gravelly sandy CLAY.
  - SPT N values of this soil (presented in the following section) show relatively high values. Based on this, a bulk unit weight of 19kN/m^3 can be assumed.
- Design Values:
  - Based on the above, a characteristic bulk unit weight of 19kN/m^3 is recommended for the design.

Standard Penetration Tests (SPT N60)

- Test data

- 21 SPT *N* values were recorded for the Made Ground along Pool Wood Embankment. These have been converted to N_{60} value and plotted against depth in the Figure below. Statistical information for SPT N_{60} values is presented in the Table below.

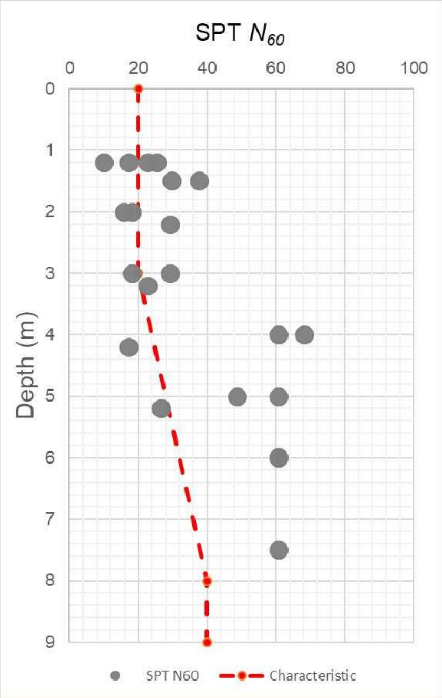


Figure C- 2: SPT N_{60} values of MGR in Pool Wood Embankment

Table C- 1: Statistical information on SPT N_{60} values of MGR in Pool Wood Embankment

Feature	Value (N_{60})
Number of test points	21
Min	10
Max	68
Standard Deviation (S_d)	19.2 (whole data) 8 (for z ≤ 3m) 19 (for z > 3m)
Average line	23 for z ≤ 3m 23 + 5(z – 3) capped at 48 for z > 3m
Characteristic value (Average – 0.37 x S_d)*	20 for z ≤ 3m 20 + 4(z – 3) capped at 40 for z > 3m

*Calculated based on the approach proposed by Bond (2011)

- Design Values:
  - A value of SPT N_{60} = 20 for z ≤ 3m and SPT N_{60} = 20 + 4(z – 3) capped at 40 for z > 3m is chosen for the design.

Plasticity Limits

- Test data:
  - Index property data from 6 tests are available for MGR in Pool Wood Embankment. The Figure below presents the summary of liquid limit and plasticity index properties of MGR. Statistical information about the plasticity index (PI) and liquid limits (LL) is given in following Tables, respectively.
  - Testing data indicates that the material is generally low to intermediate plasticity.

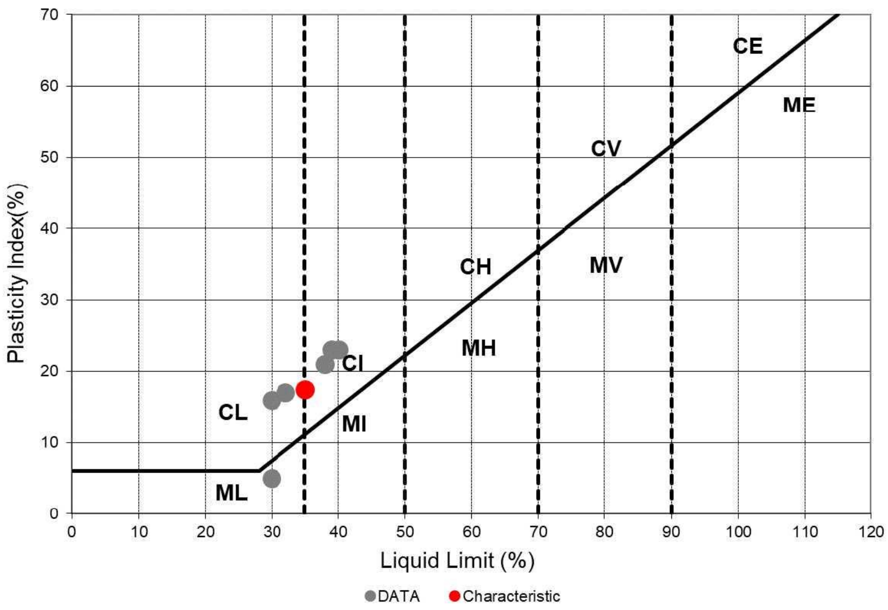


Figure C- 3: Liquid Limit vs plasticity index for MGR in Pool Wood Embankment

- When the sample number is less than 13, a pure statistical approach is too pessimistic to be of practical value. A simple way to estimate the characteristic value from limited knowledge of the ground properties is to assume the following equation (Bond, A., Harris, A. (2006). Decoding Eurocode 7. London: CRC Press, pg.157) based on Schneider method.

$$X_k = m_X \mp \frac{s_X}{2} \approx \left(\frac{X_{min} + 4X_{mode} + X_{max}}{6} \right) \mp \frac{1}{2}(X_{max} - X_{min})$$

where m_X and s_X are the mean and standard deviation of X; X_{min} and X_{max} are the estimated minimum and maximum values of X; and X_{mode} is the most likely value of X. The term for s_X

assumes that X_{max} and X_{min} are three standard deviations above and below the mean value m_X, and hence are extreme values not normally measured in field or laboratory tests.

Table C- 2: Statistical information on PI data of MGR in *Pool Wood* Embankment

Feature	Plasticity Index (PI)
Number of test points	6
Min (%)	5
Max (%)	23
Standard Deviation (S_d) (%)	2.7
Average (%)	17.5
Characteristic value (Average + 0.5xS_d)* (%)	19

*Calculated based on the approach proposed by Bond (2011)

Table C- 3: Statistical information on LL data of MGR in *Pool Wood* Embankment

Feature	Liquid limit (LL)
Number of test points	6
Min (%)	30
Max (%)	40
Standard Deviation (S_d) (%)	4.6
Average (%)	34.8
Characteristic value (Average + 0.5xS_d)* (%)	37

*Calculated based on the approach proposed by Bond (2011)

- Design Values:
  - Based on the above information, a characteristic Plasticity Index of 19% and a characteristic Liquid Limit of 37% is adopted for the design.

Drained Shear Strength

Test data:
- No direct test data is available.

Correlations / published data:
- Constant volume effective angle of shearing resistance for the MGR can be determined from plasticity index (PI) value using the correlation shown below from BS 8002: 2015.

$$\phi_{cv} = (42 - 12.5 * \log_{10} \mathrm{PI}) \qquad \text{for } 5\% < \mathrm{PI} < 100\%$$

The peak angle of friction is proposed to be 2° higher than constant volume angle of friction. BS8002:2015 suggests that the peak angle of shearing resistance is typically in the range of 0º to 4º higher than the constant volume, accounting for dilation of the soil. A constant volume effective angle of shearing resistance value of 26º was determined from the aforementioned correlation, which results in a peak friction angle of 28°.

- Design Values:
  - Based on the above, values of ϕ'_{pk} = 28°, $\phi'_{residual}$ = 26° and c' = 0kPa are chosen for the design.

Undrained Shear Strength

- Test data:
  - No test data is available for MGR in Pool Wood Embankment.
- Correlation / published data:
  - Undrained shear strength values obtained from correlations from SPT N_{60} are presented in the Figure below. Strengths obtained from SPT N_{60} are calculated using $c_u = f_1 \times N_{60}$ where f_1 a coefficient proposed by Stroud (1988). The Table below shows the statistical analysis of the data for MGR.
  - Using f_1 = 5.1, results from SPT N_{60} correlations lead to undrained shear values of c_u = 100kPa for z ≤ 3m, and c_u = 100 + 20(z – 3) capped at 200kPa for z > 3m.

- Design Values:
  - Based on the above data, a characteristic value of c_u = 100kPa for z ≤ 3m and c_u = 100 + 20(z – 3) capped at 200kPa for z > 3m is adopted for the design.

Overconsolidation Ratio

- Made Ground in Pool Wood Embankment is not expected to be overconsolidated, however, the GI data indicates that the soil has previously undergone a significant compaction process. In order to calculate stiffness parameters and emulate the likely behaviour associated with the stringent compaction to which this soil has clearly been historically subjected, an overconsolidated calculation has been undertaken in accordance with the method proposed by J.P. Magnan (1985) for the estimation of the maximum past stress.

- The overconsolidation ratio (OCR) can be calculated as OCR = σ_p'/σ_{v0}', where σ_p' is the maximum past stress, and σ_{v0}' is the existing insitu soil stress. σ_p' can be obtained from J.P. Magnan (1985) proposed relationship using Plasticity Index.

$$\frac{C_u}{\sigma_p'} = 0.25 + 0.0024 \cdot \mathrm{PI}$$

  - For an undrained shear strength of 200 kPa at a base depth of 8m, and a plasticity index of 19%, σ_p' can be calculated to be σ_p' = 676kPa.
  - σ_{v0}' can be calculated at z = 8m, the base depth of MGR, which results in σ_{v0}' = 152kPa.
  - Using the equation from J.P. Magnan (1985), an OCR ratio of 4.5 can be obtained.

- Design Values:
  - A characteristic value of OCR = 5 was chosen for the design.

Stiffness

Drained stiffness, E'

- Test data:
  - No test data is available.

- Correlations / published data:
  - CIRIA Report R143 provides a correlation of Drained Young's Modulus and SPT N_{60} where: E' = 0.9 x SPT N_{60} for cohesive soil.
  - The drained Young's Modulus can also be calculated from the undrained Young's Modulus and the undrained shear strength using the Jamiolkowski et al. (1979)'s graph (figure presented below). For PI = 19% and OCR = 5, $E_u = 420 \times c_u$. Then E' is calculated using the following equation. For $v_u = 0.5$ and $v' = 0.25$, the drained Young's modulus becomes $E' = 0.83E_u$.

$$E' = \frac{1+\nu'}{1+\nu_u} E_u$$

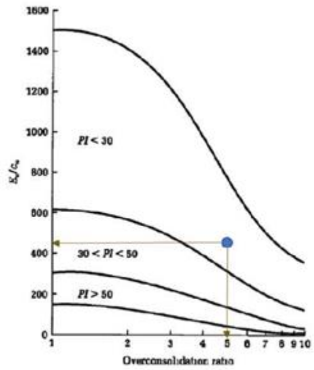


Figure C- 4: Jamiolkowski et al. (1979) graph for the calculation of E_u/c_u for MGR in Pool wood Embankment

  - Values of drained Young's Modulus calculated from SPT N_{60} and E_u and their corresponding statistical information are presented in the figure and table below, respectively.

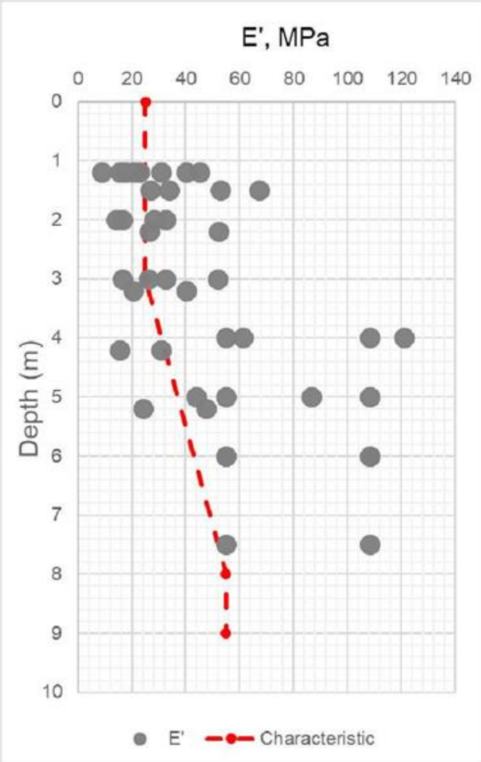


Figure C- 5: Drained Young's Modulus of MGR in Pool Wood Embankment

Table C- 4: Statistical analysis of the drained Young's Modulus for MGR in Pool Wood Embankment

Feature	Drained Young's Modulus (E', MPa)
Number of test points	42
Min	9
Max	121
Standard Deviation (S_d)	31 (the whole data) 15.2 (for z ≤ 3m) 34.2 (for z > 3m)
Average	30 for z ≤ 3m 30 + 7(z – 3) capped at 65 MPa for z > 3m
Characteristic value (Average - 0.26xS_d)*	25 MPa z ≤ 3m 25 + 6(z – 3) capped at 55 MPa for z > 3m

*Calculated based on the approach proposed by Bond (2011)

Undrained stiffness, E_u

- The undrained Young's Modulus can be calculated from the drained Young's Modulus using E_u = 1.2E'. This results in an undrained value of E_u = 30MPa for z ≤ 3m and E_u = 30 + 7.2(z – 3) capped at 66MPa for z > 3m.

- Design Values:
  - The recommended characteristic values for the drained and undrained Young's Modulus for the design are: E' = 25MPa z ≤ 3m and E' = 25 + 6(z – 3) capped at 55MPa for z > 3m, and E_u = 30MPa for z ≤ 3m and E_u = 30 + 7.2(z – 3) capped at 66MPa for z > 3m.

Compressibility

Coefficient of Volume Compressibility, m_v

- Test data
  - There is no test data available for the MGR in Pool Wood Embankment.

- Correlations / published data
  - The volume compressibility coefficient (m_v) can be calculated as: $m_v = 1/E'$.
  - The coefficient of volume compressibility (m_v) can also be obtained using the Stroud and Butler (1975) formula: $m_v = 1/(f_2.N_{60})$, f_2 obtained from the figure below. For PI = 19%, a value of f_2 = 0.57 can be obtained (shown in figure below).

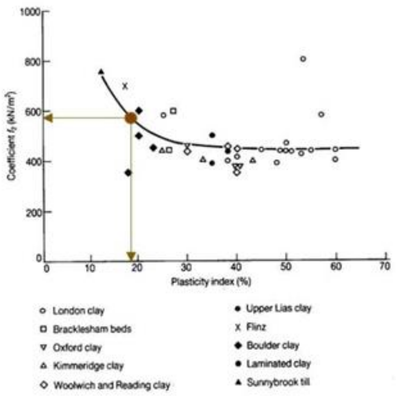


Figure 41 *Correlation between coefficient f_2 (= N/m$_v$) and plasticity index (after Stroud and Butler, 1975)*

Figure C- 6: Stroud and Butler (1975) curve for the calculation of coefficient f_2 from plasticity index

  - An average value can be calculated for m_v from the methods given above, which gives m_v = 0.064m²/MN for z ≤ 3m, and m_v = 0.064 – (z – 3)/150 capped at 0.031m²/MN.
- Design values:
  - A value of m_v = 0.064m²/MN for z ≤ 3m, and m_v = 0.064 – (z – 3)/150 capped at 0.031m²/MN is chosen for the design.

Coefficient of Consolidation, c_v

- Test data
  - There is no test adata available for the MGR in Pool Wood Embankment.

- Correlations
  - The coefficient of consolidation (c_v) can be calculated using following equations proposed by US Navy DM-7.01 (1986). An average value between the normally consolidated and overconsolidated soils was considered, which resulted in a value of c_v = 35m^2/year for a liquid limit of 37%.

$$c_v = \frac{80}{LL^{2.8}} \times 31.536 \times 10^2 \ \left(m^2/year\right) \qquad \text{for normally consolidated soil}$$

$$c_v = \frac{25000}{LL^{3.9}} \times 31.536 \times 10^2 \ \left(m^2/year\right) \qquad \text{for overconsolidated soil}$$

- Design values:
  - A value of C_v = 35m^2/year is chosen for the design.

C3. Glaciolacustrine Deposits (GLLD)

Material Composition

- Test data:
  - Sixteen (16) Particle Size Distribution (PSD) tests within the Glaciolacustrine Deposits (GLLD) have been used to determine the classification of the deposits. The engineer's log describes the material to predominantly contain CLAY with considerable amount of SAND. The PSD results are provided in Figure C- 7.

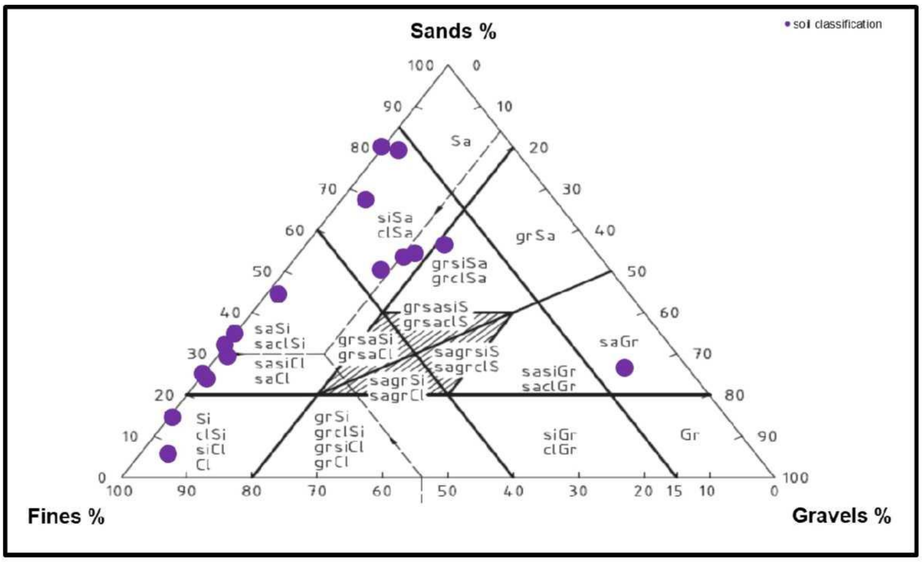


Figure C- 7 Particle Size Distribution (PSD) for GLLD at Pool Wood Embankment

- Based on the above, the Particle Size Distribution (PSD) of GLLD from 16 samples has been used to classify whether the GLLD is cohesive or granular. The percentage of fines, gravels and sands is 48.4%, 9.5% and 42.1%, respectively. The GLLD is largely described as a fine-grained material and cohesion should be considered in the calculation of geotechnical parameters.

Bulk Unit Weight

- Test data:
  - Undrained triaxial testing was undertaken on six undisturbed samples of GLLD and found initial bulk unit weights ranging between 20.3 and 21.5kN/m^3.
  - The results and their statistical information are shown in the Figure C- 8 and Table C- 5.

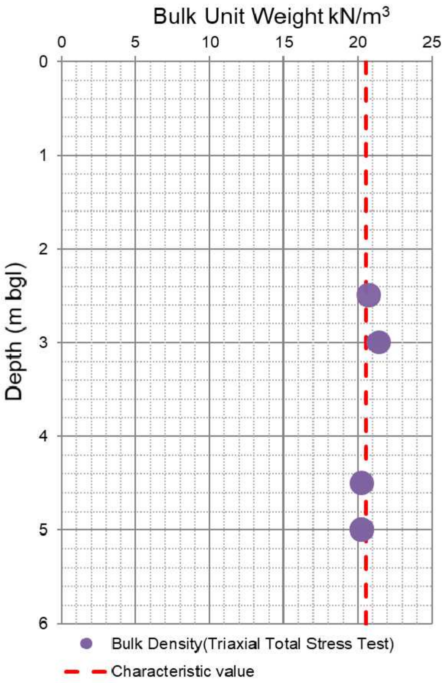


Figure C- 8 Bulk unit weight vs depth for GLLD at Pool Wood Embankment

Table C- 5: Statistical Information on bulk unit weight for GLLD at Pool Wood Embankment

Feature	Bulk Unit Weight (kN/m^3)
Number of tests	6
Min.	20.3
Max.	21.5
Average	20.6

- Correlations / published data:
  - The HS2 N1 and N2 Global Parameters Design Report- Route Wide- Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143) provides a typical value of 20.5kN/m^3.
- Design Values:
  - Based on the above, a characteristic bulk unit weight of 20.5kN/m^3 is recommended for the design.

Standard Penetration Tests (SPT N_{60})

- Test data:
  - 21 SPT *N* values were recorded for the Glaciolacustrine Deposits. These have been converted to N_{60} values which ranged between 5.3 to 50.7.
  - There is an explicit soft layer of soil extending through the GLLD in Pool Wood Embankment. The soft zone is encircled in red in the figure below.

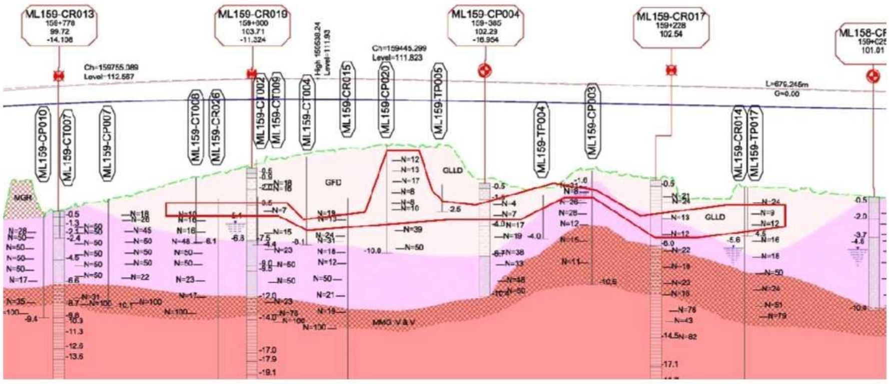


Figure C- 9: existence of a soft soil layer within GLLD showing SPT N_{60} values lower than 15

  - Because of the presence of the soft layer, SPT N_{60} values greater than 16 were considered too high to be representative of the GLLD in the area and thus, they have not been used for the calculation of the characteristic value. Statistical information for SPT N_{60} values is presented in the Table below.
  - When the sample number is less than 13, a pure statistical approach is too pessimistic to be of practical value. A simple way to estimate the characteristic value from limited knowledge of the ground properties is to assume the following equation (Bond, A., Harris, A. (2006). Decoding Eurocode 7. London: CRC Press, pg.157) based on Schneider method.

$$X_k = m_X \mp \frac{s_X}{2} \approx \left(\frac{X_{min} + 4X_{mode} + X_{max}}{6} \right) \mp \frac{1}{2}(X_{max} - X_{min})$$

where m_X and s_X are the mean and standard deviation of X; X_{min} and X_{max} are the estimated minimum and maximum values of X; and X_{mode} is the most likely value of X. The term for s_X assumes that X_{max} and X_{min} are three standard deviations above and below the mean value m_X, and hence are extreme values not normally measured in field or laboratory tests.

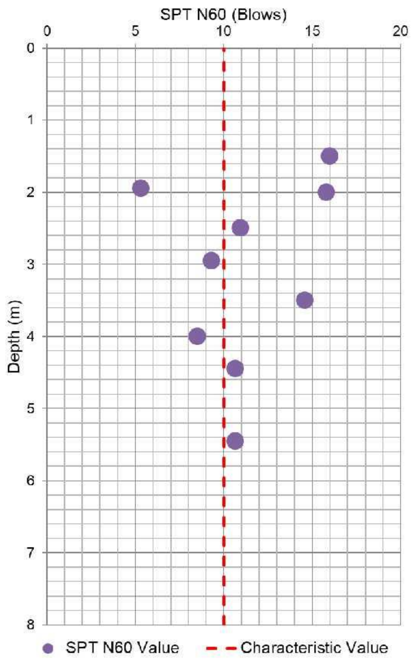


Figure C- 10: SPT N_{60} values for GLLD at Pool Wood Embankment

Table C- 6: Statistical information on SPT N_{60} values for GLLD at Pool Wood Embankment

Feature	Values (N_{60})
Number of test points	9
Min.	5.3
Max.	16
Standard Deviation (S_d)	3.6
Average	11.3
Characteristic Value (Average – 0.50 × S_d)*	9.5

*Calculated based on the approach proposed by Schneider

- Design Values:
  - A characteristic SPT N_{60} value of 10 is recommended for the design.

Index Properties

- Test data:

- Atterberg limit test data from 31 samples were available for the Glaciolacustrine Deposits within Pool Wood Embankment. Testing indicates that the material ranges from low to medium plasticity, as shown in the figure below.
- The statistical analysis for the Plasticity Index and Liquid Limit are presented in the tables below, respectively.

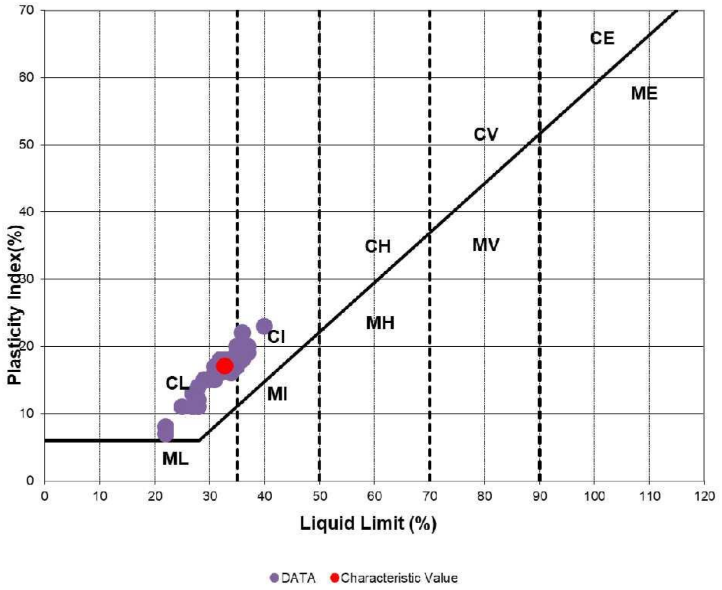


Figure C- 11 Liquid Limit vs Plasticity Index for GLLD

Table C- 7: Statistical features for PI data for GLLD at Pool Wood Embankment

Feature	Plasticity Index (PI)
Number of test points	31
Min. (%)	7.0
Max. (%)	23.0
Standard Deviation (S_d) (%)	3.89
Average (%)	15.9
Characteristic Value (Average + 0.30 × S_d)* (%)	17.0

*Calculated based on the approach proposed by Bond (2011)

Table C- 8: Statistical features for LL data for GLLD at Pool Wood Embankment

Feature	Liquid Limit (LL)
Number of test points	31
Min. (%)	22.0
Max. (%)	40.0
Standard Deviation (S_d) (%)	4.42
Average (%)	31.5
Characteristic Value (Average + 0.30 × S_d)* (%)	32.8

*Calculated based on the approach proposed by Bond (2011)

- Correlations / published data:
  - The HS2 N1 and N2 Global Parameters Design Report- Route Wide- Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143) provides a range for Plasticity Index of 8 to 40% and a typical value of 25%.

- Design Values:
  - Based on the above information, a characteristic Plasticity Index and Liquid Limit of 17% and 33% is recommended for the design, respectively.

Drained Shear Strength

Test data:

- No direct test data is available.

Correlations / published data:

- Constant volume effective angle of shearing resistance for cohesive GLLD can be determined from plasticity index (PI) value using the correlation shown below from BS 8002: 2015.

  $$\phi_{cv} = (42 - 12.5 * log_{10}\,\mathrm{PI}) \quad \text{for } 5\% < \mathrm{PI} < 100\%$$

  The peak angle of friction is proposed to be 2° higher than constant volume angle of friction. BS8002:2015 suggests that the peak angle of shearing resistance is typically in the range of 0º to 4º higher than the constant volume, accounting for dilation of the soil. A constant volume effective angle of shearing resistance value of 26º was determined from the aforementioned correlation, which resulted in a peak friction angle of 28°.
- Area North Detailed Design Ground Investigation Report – Annex E2 Diddington Lane Embankment to Coleshill N°2 Embankment (Ch 154+525 to 160+990) (1MC09-BBV_MSD-GT-REP-NS04_NL10-100014) provides the following values for the GLLD: ϕ'_{pk} = 27 to 31° and $\phi'_{residual}$ = 25 to 29°.
- HS2 N1 and N2 Global Parameter Design Report for Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143) provides the following parameters from shear box tests, consolidated triaxial tests and relationships between shearing resistance and plasticity:

Table C- 9: Summary of proposed drained shear strength parameters in the Global Parameter Design Report

Peak angle of shearing resistance, Φ_{pk} (°)		Cohesion, c' kN/m^2	
Typical	Global range	Typical	Global range
27	22 - 33	1	0 – 5

Design Values:

- Based on the above, values of ϕ'_{pk} = 27°, $\phi'_{residual}$ = 25° and c' = 0kPa are chosen for the design.

Undrained Shear Strength

- Test data:
  - Undrained triaxial and field vane shear tests were undertaken in the GLLD material that determined undrained shear strengths of between 1.3 and 197kPa. Due to the existence of the soft soil layer explained earlier for SPT N_{60} values, values greater than 70kPa were determined to be outliers and not considered in the calculations.

- Correlation / published data:
  - The undrained shear strength can also be obtained from SPT N_{60} using $c_u = f_1 \times N_{60}$ where f_1 a coefficient proposed by Stroud (1988). Using the characteristic Plasticity Index value of 17% and Figure 31 of CIRIA R143 (1995), an f_1 value of 6.0 is determined. This f_1 value was limited to 5.0, in accordance with the HS2 N1 and N2 Global Parameter Design Report for Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143). Using these values undrained shear strength can be estimated to range between 26.7 and 80kPa. 3No. of the correlated results gave value higher than 70kPa which was considered not representative of the GLLD in the area and, thus, they were discarded.
  - Undrained shear strength values and their corresponding statistical analyses are presented in the figure and table below, respectively.

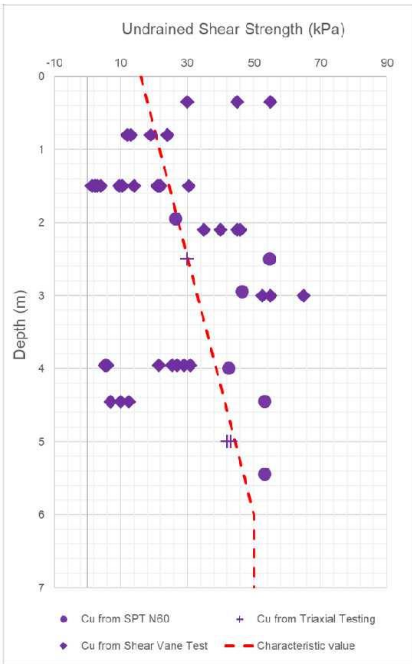


Figure C- 12 Undrained Shear Strength vs Depth for GLLD

Table C- 10: Statistical features for Cu data for GLLD in the Pool Wood Embankment area

Feature	Undrained shear strength (cu), kPa
Number of test points	54
Min	1.3
Max	65
Standard Deviation (Sd)	17.8
Average	20+5.7Z capped at 54kPa
Characteristic value (Average - 0.22 x Sd) *	16+5.7Z capped at 50kPa

*Calculated based on the approach proposed by Bond (2011)

- Design Values:
  - A characteristic value of Cu = 16+5.7Z, capped at 50kPa is recommended for the design.

Overconsolidation Ratio

- The overconsolidation ratio (OCR) can be calculated as OCR = σp'/ σv0', where σp' is the maximum past stress, and σv0' is the existing insitu soil stress. σp' can be obtained from J.P. Magnan (1985) proposed relationship using Plasticity Index.

$$\frac{C_u}{\sigma'_p} = 0.25 + 0.0024 \cdot \mathrm{PI}$$

  - For an undrained shear strength of 30kPa at an average base depth of 2.5m, and a plasticity index of 17%, σ_p' can be calculated to be σ_p' = 124.6kPa.
  - σ_{v0}' can be calculated at z = 2.5m, average base depth of GLLD, which results in σ_{v0}' = 51.3kPa.
  - Using the equation from J.P. Magnan (1985), an OCR ratio of 2.4 can be obtained.

- Correlations / published data:
  - HS2 N1 and N2 Global Parameter Design Report for Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143) reports an average of 4 to 5 for OCR of GLLD.

- Design Values:
  - The value calculated from the equation of J.P. Magnan (1985) leads to an OCR for GLLD of 2.4.

Stiffness

Drained stiffness, E'

- Test data:
  - No test data is available.

- Correlations / published data:
  - CIRIA Report R143 provides a correlation of Drained Young's Modulus and SPT N_{60} where: E' = 0.9 x SPT N_{60} for cohesive soil.
  - The drained Young's Modulus can also be calculated from the undrained Young's Modulus and the undrained shear strength using the Jamiolkowski et al. (1979)'s graph (shown below). For PI = 17% and OCR = 2.4, E_u = 880 × c_u. However, this value was considered too high to be representative of the GLLD and was capped at E_u = 600 × c_u, in accordance with the HS2 N1 and N2 Global Parameter Design Report for Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143). Then E' is calculated using the following equation. For v_u = 0.5 and v' = 0.25, the drained Young's modulus becomes E' = 0.83 x E_u.

$$E' = \frac{1+v'}{1+v_u}E_u$$

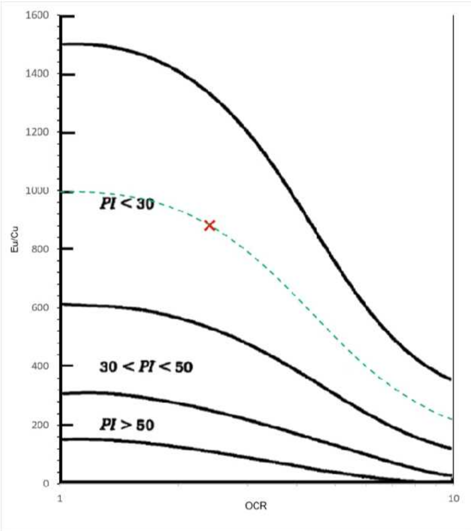


Figure C- 13 Jamiolkowski et al. (1979) graph for the calculation of E_u/c_u ratio for GLLD

- Values of drained Young's Modulus calculated from SPT N_{60} and C_u and their corresponding statistical information are presented in the figure and table below, respectively.

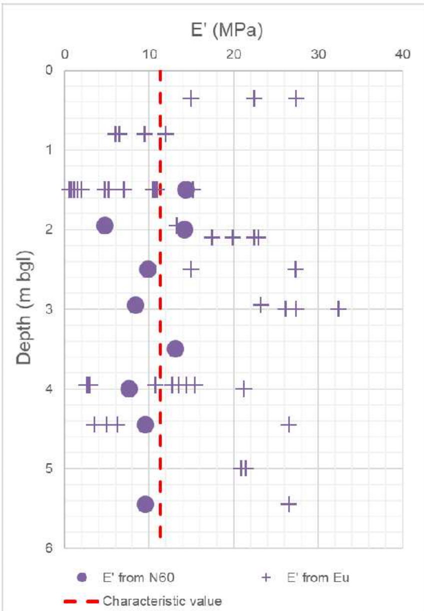


Figure C- 14 Drained stiffness vs depth for GLLD

Table C- 11: Statistical features for drained stiffness data for GLLD in the Pool Wood Embankment area

Feature	Drained Young's Modulus (E', MPa)
Number of test points	63
Min	0.6
Max	32.4
Standard Deviation (Sd)	8.4
Average	13
Characteristic (Average - 0.2x Sd)*	11

*Calculated based on the approach proposed by Bond (2011)

- Design Values:
    - For the GLLD, a characteristic drained Young's Modulus value of 11MPa is recommended for the design.

Undrained stiffness, E_u

- Test data:
    - No direct test data is available for undrained stiffness in this area.

- Correlations / published data:
    - Undrained Young's Modulus can be calculated from drained Young's Modulus using:

$$Eu = \frac{E'.(1 + v_u)}{(1 + v')}$$

Where v_u is assumed to be 0.5 and v' for the material is 0.25, this gives a correlation of E_u = 1.2E'.

    - HS2 N1 and N2 Global Parameter Design Report for Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143) gives a typical value of $E_u = 600c_u$ for undrained Young's Modulus of GLLD.

- Design Values:
    - A characteristic value of E_u = 13MPa was chosen for the design.

<u>Compressibility</u>

Coefficient of Volume Compressibility, mv

- Test data:
    - There is consolidation data for GLLD from one testing hole (ML159-CR014), which is presented in the table below.

Table C- 12: Consolidation test results (m_v) for GLLD

Stress range (kPa)	mv (m2/MN)
40	0.52
80	0.14
120	0.11
80	0.034
40	0.053
40	0.52

- Correlations / published data:
  - The volume compressibility coefficient (m_v) can be calculated as: $m_v = 1/E'$. For a value of E' = 11MPa, this gives m_v= 1/ (11) = 0.09m^2/MN.
  - The coefficient of volume compressibility (m_v) can also be obtained using the Stroud and Butler (1975) formula, $m_v = 1/ (f_2 \times N_{60})$, with f_2 obtained from the figure below. For PI = 17% and f_2 = 0.6MN/m^2, m_v = 0.175m^2/MN.

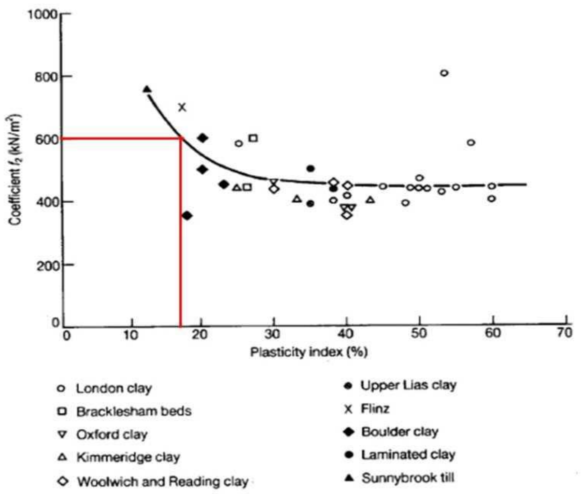


Figure 41 ***Correlation between coefficient f_2 (= N/m) and plasticity index (after Stroud and Butler, 1975)***

Figure C- 15: Stroud and Butler (1975) curve for the calculation of coefficient f_2 from plasticity index

  - An average of these two calculated values of m_v gives a final characteristic value of 0.133m^2/MN. This value is comparable with those from the consolidation test results for a stress range of 80KPa to 120KPa within the loading range.

- Design Values:
  - A value of m_v = 0.133m²/MN is chosen for design.

Coefficient of Consolidation, cv

- Test data:
  - There is consolidation data for the GLLD from one testing hole (ML159-CR014), which is presented in the table below.

Table C- 13: Consolidation test results (c_v) for GLLD

Stress range (kPa)	cv (m2/year) – Root time method	cv (m2/year) – Log time method
40	9	-
80	3.2	-
120	4.4	-

- Correlations / published data:
  - The coefficient of consolidation (c_v) can be calculated using the US Navy (1982) correlations (shown below). An average value between the normally consolidated and overconsolidated soils was considered, which resulted in a value of c_v = 34.5m²/year for a liquid limit of 33%.

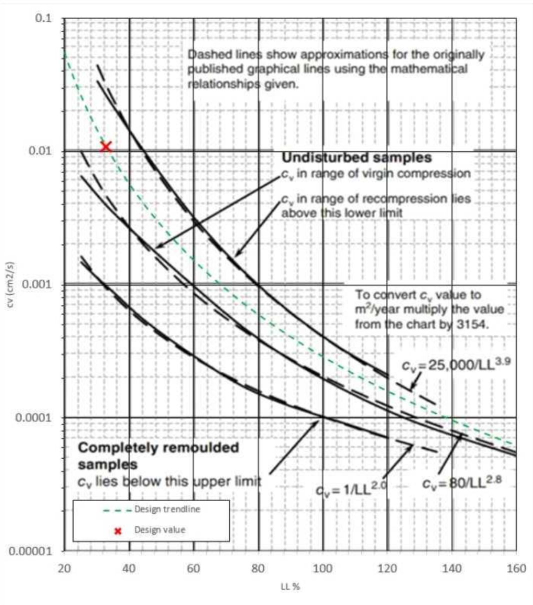


Figure C- 16 US Navy (1982) LL vs c_v correlation

- The values obtained from correlations cannot be compared to the test data due to incompatibility in their methodologies. However, due to obtaining a high value of C_v from correlations, an average between the correlated coefficient with that obtained from laboratory for a stress of 120kPa is preferred.
- The average between the correlated and the laboratory values of C_v results in a coefficient of consolidation of $C_v = 22m^2/year$.

- Design values:
  - A value of $c_v = 22m^2/year$ is chosen for the design.

C4. Glaciofluvial Deposits (GFD)

Material Composition

- Test data:
  - 57 No. Particle Size Distribution (PSD) within the Glaciofluvial Deposits (GFD) have been used to determine the classification of the soil. The PSD results are provided in the figure below.

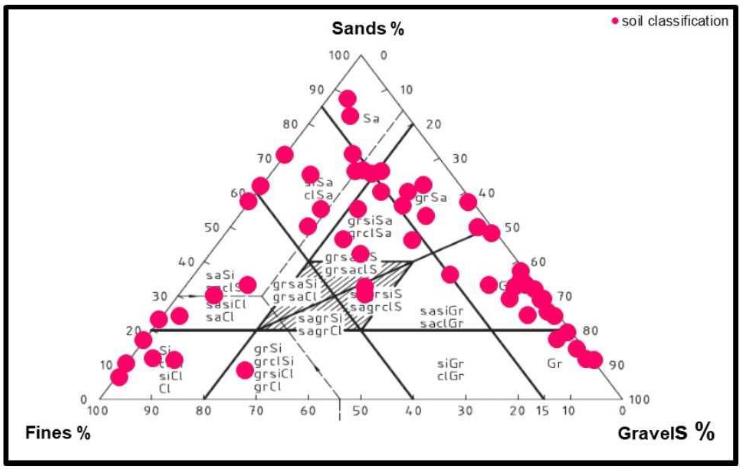


Table C- 14: Particle Size Distribution (PSD) for GFD in Pool Wood embankment

- The percentage of fines, gravels, and sands is 25%, 35% and 40%, respectively through the whole assets. This content of fine material is not high enough to allow the soil to be classified as a cohesive material. As such, the GFDs are classified as granular in Pool Wood Embankment, and cohesion is not considered in the calculation of geotechnical parameters.
- It should be noted that there is an increased percentage of the fine material from Ch 159+000 to Ch 159+800 due to the existence of a layer of cohesive Glaciolacustrine Deposits on top of the GFDs within the mentioned chainages. The proportion of fines, gravels and sands becomes 28%, 35% and 37%, respectively.

Bulk Unit Weight

- Test Data
  - Laboratory testing was undertaken on one Triaxial and 36 Shear Box samples for GFD, that determined the initial bulk unit weights of between 17.0 to 21kN/m^3. The results and their statistical information are shown in the Figure and the Table below, respectively.

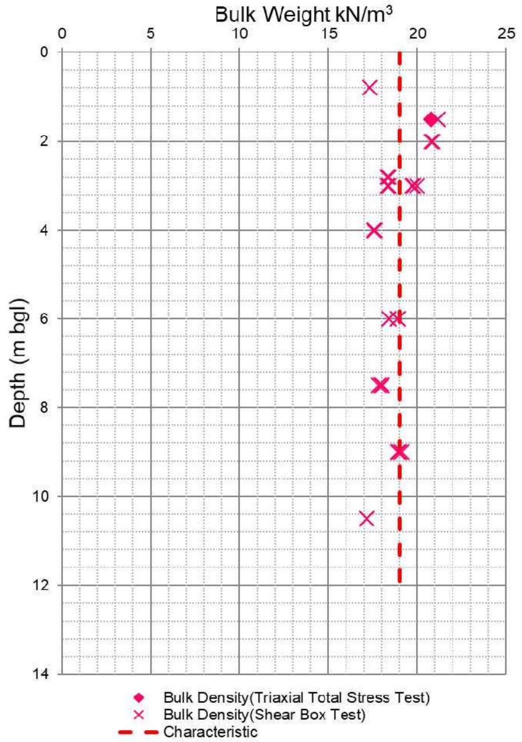


Table C- 15: Bulk unit weight of GFD in Pool Wood Embankment

Table C- 16: Statistical information on bulk unit weight of GFD in Pool Wood Embankment

Feature	Bulk unit weight (kN/m^3)
Number of tests	37
Min	17.2
Max	21.2
Standard deviation	1.3
Average	18.8

- Correlations / Published Data

- The HS2 N1 and N2 Global Parameters Design Report- Route Wide- Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143) indicates a typical unit weight for Glaciofluvial Deposits of 20kN/m^3 and a global range from 18 to 22kN/m^3.

- Design Values:
  - Based on the above information, a characteristic unit weight value of 19kN/m^3 is recommended.

Standard Penetration Tests (SPT N60)

- Test data
  - 100 SPT *N* values were recorded for the Glaciofluvial Deposits. These have been converted to N_{60} value and plotted against depth in the Figure below. Statistical information for SPT N_{60} values is presented in the Table below.

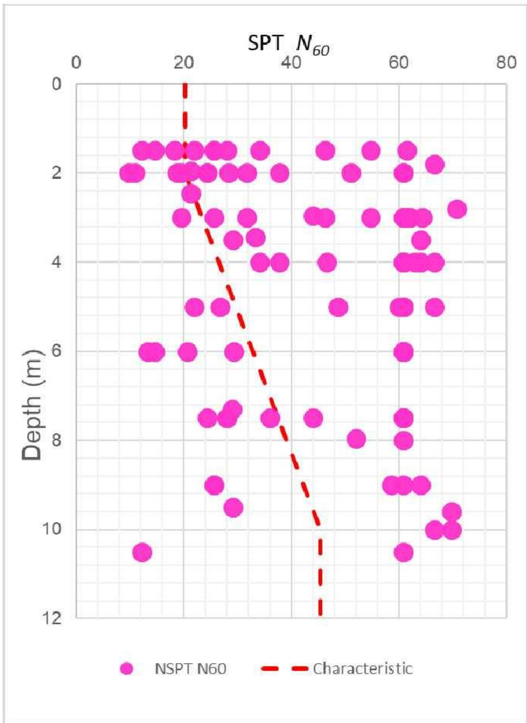


Figure C- 17: SPT N_{60} values of GFD in Pool Wood Embankment

Table C- 17: Statistical information on SPT N_{60} values of GFD in Pool Wood Embankment

Feature	Value (N_{60})
Number of test points	100
Min	10

Feature	Value (N_{60})
Max	71
Standard Deviation (S_d)	19
Average line	23 for z ≤ 2m 23 + 3(z – 2) capped at 47 for z > 2m
Characteristic value (Average – 0.14 x S_d)*	20 for z ≤ 2m 20 + 3(z – 2) capped at 44 for z > 2m

*Calculated based on the approach proposed by Bond (2011)

- Design Values:
  - A value of SPT N_{60} = 20 for z ≤ 2m and SPT N_{60} = 20 + 3(z – 2) capped at 44 for z > 2m is chosen for the design.

Plasticity Limits

- Not applicable since the GFD are interpreted to be granular.

Drained Shear Strength

- Test data:
  - There are 12 peak friction angles and 3 residual friction angles from shear box tests. The best fit of the peak and residual angles are presented below. A peak friction angle of 34° and a residual angle of 25° have been obtained.

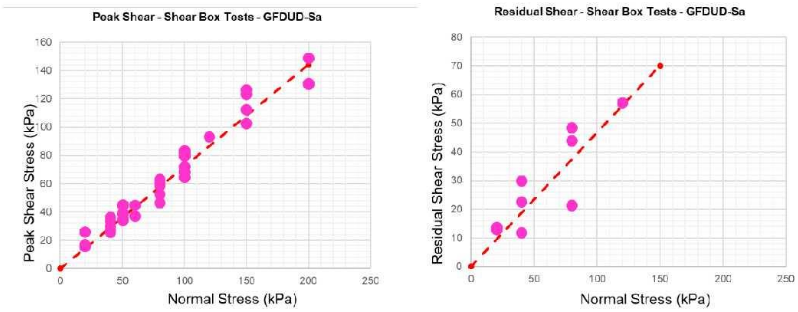


Figure C- 18: Peak friction angle of GFD in Pool Wood Embankment

- Correlations / published data:
  - The angle of internal friction for granular GFD can be determined from PSDs and the density index using section 4.3.1.3 of BS 8002: 2015, shown below.

$$\phi'_{pk} = 30 + \phi'_{ang} + \phi'_{PSD} + \phi'_{dil}$$

Table C- 18: Parameters for the estimation of friction angles for granular soils (BS 8002: 2015)

Soil property	Determined from	Classification	Parameter [D)]
Angularity of particles [A)]	Visual description of soil	Rounded to well-rounded	$\varphi'_{ang} = 0°$
		Sub-angular to sub-rounded	$\varphi'_{ang} = 2°$
		Very angular to angular	$\varphi'_{ang} = 4°$
Uniformity coefficient, C_U [B)]	Soil grading	$C_U < 2$ (evenly graded)	$\varphi'_{PSD} = 0°$
		$2 \leq C_U < 6$ (evenly graded)	$\varphi'_{PSD} = 2°$
		$C_U \geq 6$ (medium to multi graded)	$\varphi'_{PSD} = 4°$
		High C_U (gap graded), with C_U of fines < 2 [E)]	$\varphi'_{PSD} = 0°$
		High C_U (gap graded), with $2 \leq C_U$ of fines < 6[E)]	$\varphi'_{PSD} = 2°$
Density index, I_D [C)]	Standard penetration test blow count, corrected for energy rating and overburden pressure $(N_1)_{60}$	$I_D = 0\%$	$\varphi'_{dil} = 0°$
		$I_D = 25\%$	$\varphi'_{dil} = 0°$
		$I_D = 50\%$	$\varphi'_{dil} = 3°$
		$I_D = 75\%$	$\varphi'_{dil} = 6°$
		$I_D = 100\%$	$\varphi'_{dil} = 9°$

[A)] Terms for defining particle shape can be found in BS EN ISO 14688-1.
[B)] The uniformity coefficient C_U is defined in BS EN ISO 14688-2.
[C)] The density index I_D is defined in BS EN ISO 14688-2. Density terms may be estimated from the results of field tests (e.g. Standard Penetration Test, Cone Penetration Test) using correlations given in BS EN 1997-2.
[D)] Values of φ'_{dil} are appropriate for siliceous sands and gravels reaching failure at a mean effective stress up to 400 kPa. For non-siliceous sands, see *The strength and dilatancy of sands* [11].
[E)] "Fines" refers to that fraction of the soil whose particle size is less than 0.063 mm.

- According to the field descriptions, GFD is predominantly described to be sub-rounded to rounded. A value of $Ø'_{ang}$ = 0° is an appropriate selection for the GFD in Packington Embankment.
- There is no data available for CU (Coefficient of Uniformity). Hence, it is considered that $Ø'_{PSD}$ = 0°.
- An average characteristic value of $(N_1)_{60}$ for GFD is 41, which is related to a density index of 65% to 85% (dense) with reference to Table F.1 of Annex F of BS EN 1997-2. This gives $Ø'_{dil}$ = 6°.
- $Ø'_{pk}$ can now be calculated: $Ø'_{pk}$ = 30 + 0 + 0 +6= 36°.
- The HS2 N1 and N2 Global Parameters Design Report- Route Wide- Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143) gives a typical friction angle of $Ø'_{pk}$ = 34° with a range of 30° to 37°, and a cohesion of c' = 0kPa.

- Design Values:
  - Values of $Ø'_{pk}$ = 34°, $Ø'_{residual}$ = 25° and c' = 0kPa are chosen for the design.

Undrained Shear Strength

- Not applicable since the GFD are interpreted to be granular.

Overconsolidation Ratio

- Overconsolidation ratio not needed since the GFD are granular.

Stiffness

Drained stiffness, E'

- Test data:

- No test data is available.

- Correlations / published data:
  - CIRIA Report R143 provides a correlation of Drained Young's Modulus and N_{60} where: E' = 2 x N_{60}. Based on the N_{60} values presented earlier for GFD, a value of E' = 40MPa for z ≤ 2m and E' = 40 + 6(z – 2) capped at 88MPa for z > 2m can be calculated.
  - The HS2 N1 and N2 Global Parameters Design Report- Route Wide- Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143) provides a typical value of 40 + 2Z (MPa) with global range of 10 + 1.6z and 80 + 2.4z.

Undrained stiffness, E_u

- Not applicable since the GFD are interpreted to be granular

- Design Values:
  - The design value chosen for GFD in Pool Wood Embankment is E' = 40MPa for z ≤ 2m and E' = 40 + 6(z – 2) capped at 88MPa for z > 2m.

Compressibility

Coefficient of Volume Compressibility, m_v

- Coefficient of volume compressibility does not need to be calculated since GFD are interpreted to be granular.

Coefficient of Consolidation, c_v

- Coefficient of consolidation is not applicable since GFD are granular in Pool Wood Embankment.

C5. Mercia Mudstone Group – Grade IV/V (MMG IV/V)

Material Composition

- Test data
  - Nine Particle Size Distribution (PSD) within the MMG IV/V have been used to determine whether the MMG IV/V might be classified as cohesive or granular. The engineer's log described the material to be a slightly sandy silty CLAY. The PSD results are provided in the figure below.

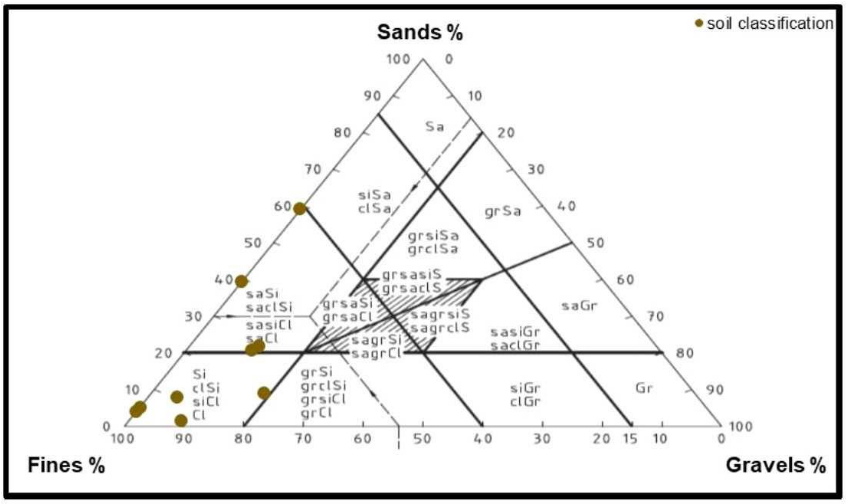


Table C- 19: Particle Size Distribution (PSD) for MMG IV/V in Pool Wood embankment

  - The percentage of fines, gravels and sands is 75.1%, 6.2% and 18.7%, respectively. The MMG IV/V is largely described as a fine-grained material and cohesion should be considered in the calculation of geotechnical parameters.

Bulk Unit Weight

- Test Data
  - Undrained Triaxial testing was undertaken on eight undisturbed samples of MMG IV/V that determined the initial bulk unit weights of between 19.0 to 20.9kN/m^3. The results and their statistical information are shown in the Figure and the Table below, respectively.

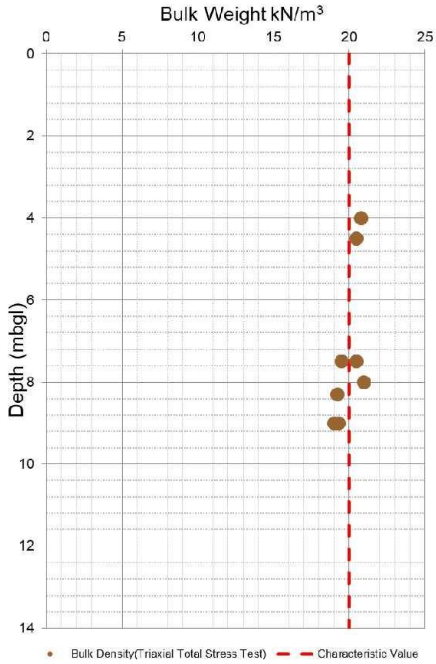


Table C- 20: Bulk unit weight of Mercia Mudstone IV/V (MMG IV/V) in Pool Wood Embankment

Table C- 21: Statistical information on bulk unit weight of MMG IV/V in Pool Wood Embankment

Feature	Bulk unit weight (kN/m^3)
Number of tests	8
Min	19
Max	20.9
Standard deviation	78
Average	20

- Correlations / Published Data
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) provides a global range between 18.5 and 21.5kN/m3 and a typical value of 20kN/m^3.

- Design Values:
  - Based on the above information, a characteristic unit weight value of 20kN/m^3 is recommended.

Standard Penetration Tests (SPT N_{60})

- Test data
  - 36 SPT *N* values were recorded for MMG IV/V. These have been converted to N_{60} value and plotted against depth in the Figure below. Statistical information for SPT N_{60} values is presented in the Table below. SPT *N* values above 100 considered as outliers and removed from the calculations.

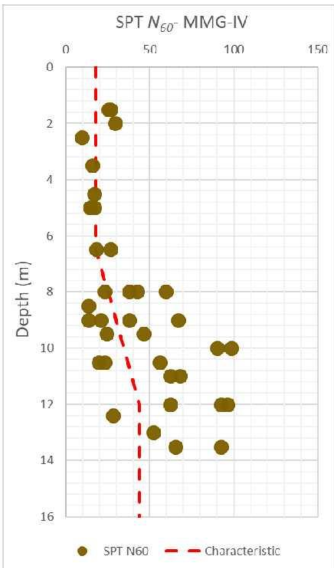


Figure C- 19: SPT N_{60} values of MMG IV/V in Pool Wood Embankment

Table C- 22: Statistical information on SPT N_{60} values of MMG IV/V in Pool Wood Embankment

Feature	Value (N_{60})
Number of test points	36
Min	10
Max	99
Standard Deviation (S_d)	27.5 (whole data) 6.4 (for z ≤ 6.5m) 27.6 (for z > 6.5m)
Average line	20 for z ≤ 6.5m 20 + 5.6(z – 6.5) for z > 6.5m capped at 51
Characteristic value (Average – 0.46 x S_d)*	18 for z ≤ 6.5m 18 + 4.7(z – 6.5) for z > 6.5m capped at 44

*Calculated based on the approach proposed by Bond (2011)

- Design Values:
  - A value of SPT N_{60} = 18 for z ≤ 6.5m and SPT N_{60} = 18 + 4.7(z – 6.5) for z > 6.5m capped at 44 is chosen for the design.

Plasticity Limits

- Test data:
  - Index property data from 40 tests are available for MMG IV/V in Pool Wood Embankment. The Figure below presents the summary of liquid limit and plasticity index properties of MMG IV/V. Statistical information about the plasticity index (PI) and liquid limits (LL) is given in following Tables, respectively.

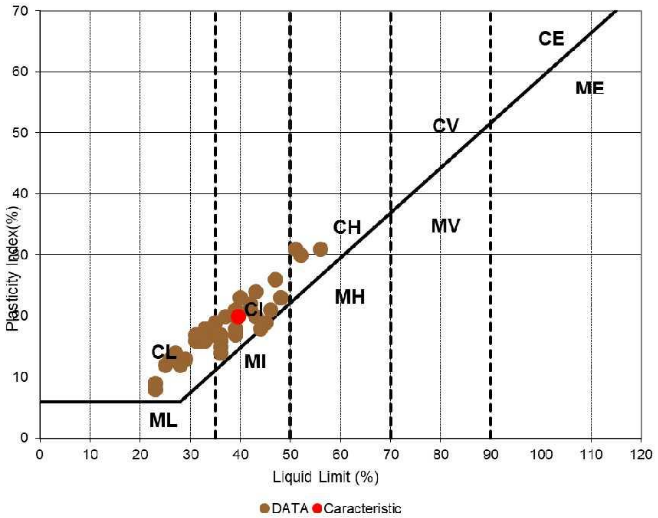


Figure C- 20: Liquid Limit vs plasticity index for MMG IV/V in Pool Wood Embankment

Table C- 23: Statistical information on PI data of MMG IV/V in *Pool Wood* Embankment

Feature	Plasticity Index (PI)
Number of test points	40
Min (%)	8
Max (%)	31
Standard Deviation (S_d) (%)	5.3
Average (%)	18.6
Characteristic value (Average + 0.26xS_d)* (%)	20

*Calculated based on the approach proposed by Bond (2011)

Table C- 24: Statistical information on LL data of MMG IV/V in *Pool Wood* Embankment

Feature	Liquid limit (LL)
Number of test points	40
Min (%)	23
Max (%)	56
Standard Deviation (S_d) (%)	8.2
Average (%)	37
Characteristic value (Average + 0.26xS_d)* (%)	39

*Calculated based on the approach proposed by Bond (2011)

- Correlations / published data
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) gives a typical value of 21% for the plasticity index, and a range of 35% to 60% for liquid limit of MMG IV.

- Design Values:
  - Based on the above information, a characteristic Plasticity Index of 20% and a characteristic Liquid Limit of 39% is adopted for the design.

Drained Shear Strength

- Test data:
  - No test data is available.
- Correlations / published data:
  - The constant volume angle of shearing resistance in cohesive soils can be estimated from the following formula from BS 8002:2015:

$$\phi'_{cv} = (42° - 12.5 log_{10} I_p)$$

    For a plasticity index of 20%, this would provide a ϕ_{cv} of 26º.
    BS8002:2015 suggests that the peak angle of shearing resistance is typically in the range of 0º to 4º higher than the constant volume, accounting for dilation of the soil. Mercia Mudstone Grade IV material is considered as overconsolidated material and therefore an increase of 2° is considered appropriate giving a peak angle of shearing resistance of 28º.
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) gives a typical friction angle of $\emptyset'_{pk}$ = 29° with a range of 24° to 33°, and a typical cohesion of c' = 3kPa with a rage of 0 to 15kPa.
- Design Values:
  - Based on the above, the recommended parameters for the drained strength are: ϕ'_{pk} = 28°, ϕ'_{cv} = 26°, c' = 0kPa.

Undrained Shear Strength

- Test data:
  - Undrained shear strength values obtained from triaxial tests, field vane shear and correlations from SPT N_{60} are presented in the Figure below. Strengths obtained from SPT N_{60} are calculated using $c_u = f_1 \times N_{60}$ where f_1 a coefficient proposed by Stroud (1988). The Table below shows the statistical analysis of the data for MMG IV/V.
  - c_u data within 1m bgl are removed from the calculations since around the alignment, MMG IV is deeper than 1m bgl. Furthermore, c_u values greater than 400kPa were deemed to be outliers and hence, removed from the calculations.

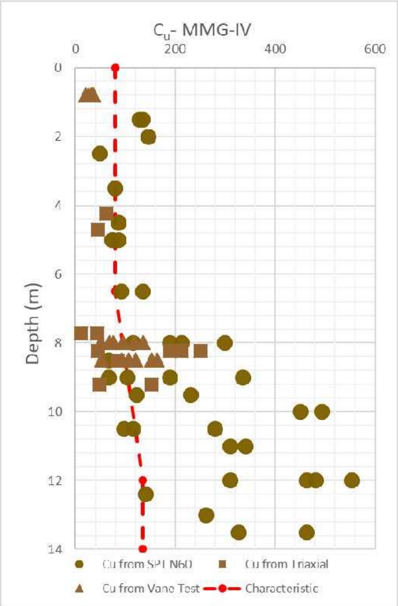


Figure C- 21: Undrained shear strength of MMG IV/V in Pool Wood Embankment

Table C- 25: Statistical features for undrained shear strength of MMG IV/V in Pool Wood Embankment

Feature	Undrained shear strength (c_u), kPa
Number of test points	53
Min	44
Max	341
Standard Deviation (S_d)	86.6 (whole data) 34 (for z ≤ 6.5m) 92 (for z > 6.5m)
Data fit	90 kPa for z ≤ 5m 90 + 12(z – 6.5) capped at 156kPa for z > 6.5m
Characteristic value (Average - 0.22xS_d)*	80 kPa for z ≤ 6.5m 80 + 10(z – 6.5) capped at 135kPa for z > 6.5m

*Calculated based on the approach proposed by Bond (2011)

- Correlations / published data:
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) gives a range of c_u = 30+10z (a limiting value 70kPa) to c_u = 100+37.5z (a limiting value 250kPa) with a typical value of c_u = 50+25z (a limiting value 150kPa).
- Design Values:
  - Based on the above data, a characteristic value of c_u = 80kPa for z ≤ 6.5m and c_u = 80 + 10(z – 6.5) capped at 135kPa for z > 6.5m is adopted for the design.

Overconsolidation Ratio

- The overconsolidation ratio (OCR) can be calculated as OCR = σ_p'/σ_{v0}', where σ_p' is the maximum past stress, and σ_{v0}' is the existing insitu soil stress. σ_p' can be obtained from J.P. Magnan (1985) proposed relationship using Plasticity Index.

$$\frac{C_u}{\sigma_p'} = 0.25 + 0.0024 \cdot \mathrm{PI}$$

  - For an undrained shear strength of 125kPa at an average base depth of 11m, and a plasticity index of 20%, σ_p' can be calculated to be σ_p' = 419kPa.
  - σ_{v0}' can be calculated at z = 11m, average base depth of MMG IV/V, which results in σ_{v0}' = 211kPa.
  - Using the equation from J.P. Magnan (1985), an OCR ratio of 2.0 can be obtained.

- Correlations / published data:
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) reports a range of 5 to 10 for OCR of MMG IV/V.

- Design Values:
  - The value calculated from the equation of J.P. Magnan (1985) leads to very low OCR for MMG IV/V which is not representative for this type of soil. As such, a characteristic value of OCR = 5 from the Global Parameters Design Report was chosen for the design.

Stiffness

Drained stiffness, E'

- Test data:
  - No test data is available.

- Correlations / published data:
  - CIRIA Report R143 provides a correlation of Drained Young's Modulus and SPT N_{60} where: E' = 0.9 x SPT N_{60} for cohesive soil.
  - The drained Young's Modulus can also be calculated from the undrained Young's Modulus and the undrained shear strength using the Jamiolkowski et al. (1979)'s graph (figure presented

below). For PI = 20% and OCR = 5, $E_u = 450 \times c_u$. Then E' is calculated using the following equation. For $v_u = 0.5$ and $v' = 0.3$, the drained Young's modulus becomes $E' = 0.86E_u$.

$$E' = \frac{1 + \nu'}{1 + \nu_u} E_u$$

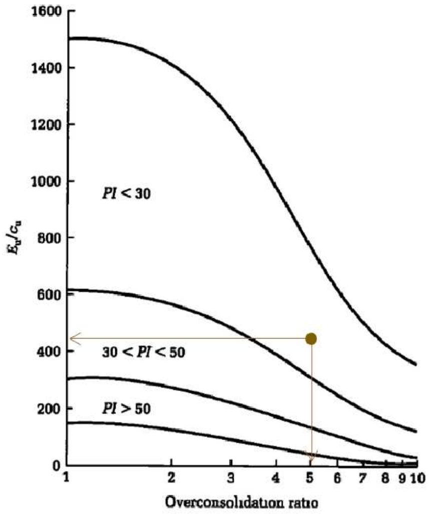


Figure C- 22: Jamiolkowski et al. (1979) graph for the calculation of E_u/c_u for MMG IV/V in Pool wood Embankment

- Values of drained Young's Modulus calculated from SPT N_{60} and E_u and their corresponding statistical information are presented in the figure and table below, respectively.

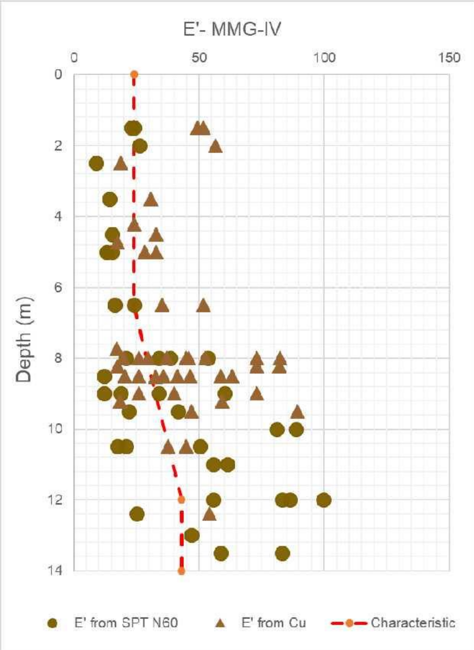


Figure C- 23: Drained Young's Modulus of MMG IV/V in Pool Wood Embankment

Table C- 26: Statistical analysis of the drained Young's Modulus for MMG IV/V in Pool Wood Embankment

Feature	Drained Young's Modulus (E', MPa)
Number of test points	81
Min	8.8
Max	99.6
Standard Deviation (S_d)	23 (the whole data) 13.6 (for z ≤ 6.5m) 23.5 (for z > 6.5m)
Average	27 for z ≤ 6.5m 27 + 3.6(z – 6.5) capped at 47MPa for z > 6.5m
Characteristic value (Average - 0.17xS_d)*	24 MPa z ≤ 6.5m 24 + 3.5(z – 6.5) capped at 43MPa for z > 6.5m

*Calculated based on the approach proposed by Bond (2011)

Undrained stiffness, E_u

- The undrained Young's Modulus can be calculated from the drained Young's Modulus using E_u = 1.15E'. This results in an undrained value of E_u = 27.5MPa for z ≤ 6.5m and E_u = 27.5 + 4(z – 6.5) capped at 49.5MPa for z > 6.5m.

- Correlations/published data
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) gives a typical value of E_u = 26 + 13z (limiting value of 78MPa) with a lower bound of E_u = 15.6 + 5.2z (limiting value of 36.4MPa) and an upper bound of E_u = 80 + 20z (limiting value of 200MPa) for the undrained Young's Modulus of MMG IV/V.

- Design Values:
  - The recommended characteristic values for the drained and undrained Young's Modulus for the design are: E' = 24MPa z ≤ 6.5m and E' = 24 + 3.5(z – 6.5) capped at 43MPa for z > 6.5m, and E_u = 27.5MPa for z ≤ 6.5m and E_u = 27.5 + 4(z – 6.5) capped at 49.5MPa for z > 6.5m.

Compressibility

Coefficient of Volume Compressibility, m_v

- Test data
  - There is consolidation data for MMG IV/V from the exploratory holes ML159-CP003 (depth of 10m bgl), ML159-CR015 (depth of 7.5m bgl), and ML159-CP017 (depth of 10m bgl).
  - Recorded values of volume compressibility coefficient (m_v, m^2/MN) are presented in Table below.

Table C- 27: Consolidation test results (c_v) for MMG IV/V

Stress range (kPa)	ML159-CP003 (10m bgl)	ML159-CR015 (7.5m bgl)	ML159-CP017 (10m bgl)
50	0.5	-	0.34
100	0.13	0.27	0.14
150	0.11	0.12	0.1
200	-	0.11	-
150	-	0.56	-
100	0.064	0.0022	0.03
50	0.061	-	0.011

- Correlations / published data
  - The volume compressibility coefficient (m_v) can be calculated as: m_v = 1/E'.
  - The coefficient of volume compressibility (m_v) can also be obtained using the Stroud and Butler (1975) formula: $m_v = 1/(f_2.N_{60})$, f_2 obtained from the figure below. For PI = 20%, a value of f_2 = 0.54 can be obtained (shown in figure below).

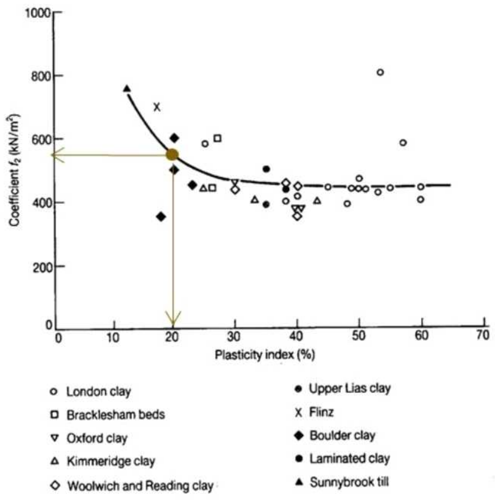


Figure 41 *Correlation between coefficient f_2 (= N/m_v) and plasticity index (after Stroud and Butler, 1975)*

Figure C- 24: Stroud and Butler (1975) curve for the calculation of coefficient f_2 from plasticity index

- An average value can be calculated for m_v from the methods given above, which gives m_v = 0.072m²/MN for z ≤ 6.5m, and m_v = 0.072 – (z – 6.5)/140 capped at 0.033m²/MN.

- Design values:
  - A value of m_v = 0.072m²/MN for z ≤ 6.5m, and m_v = 0.072 – (z – 6.5)/140 capped at 0.033m²/MN is chosen for the design.

Coefficient of Consolidation, c_v

- Test data
  - There is consolidation data for MMG IV/V from the exploratory holes ML159-CP003 (10m bgl), ML159-CR015 (7.5m bgl), and ML159-CP017 (10m bgl). The data is in (m²/year) and is from Root time method.

Table C- 28: Consolidation test results (c_v) for MMG IV/V

Stress range (kPa)	ML159-CP003 (10m bgl)	ML159-CR015 (7.5m bgl)	ML159-CP017 (10m bgl)
50	10	-	4.5
100	1.6	3.4	4.7
150	2.1	4.4	0.75
200	-	1.5	-

- Correlations
  - The coefficient of consolidation (c_v) can be calculated using following equations proposed by US Navy DM-7.01 (1986). An average value between the normally consolidated and overconsolidated soils was considered, which resulted in a value of c_v = 29m^2/year for a liquid limit of 50%.

$$c_v = \frac{80}{LL^{2.8}} \times 31.536 \times 10^2 \ \left({m^2}/{year}\right) \qquad \text{for normally consolidated soil}$$

$$c_v = \frac{25000}{LL^{3.9}} \times 31.536 \times 10^2 \ \left({m^2}/{year}\right) \qquad \text{for overconsolidated soil}$$

- Design values:
  - The value of c_v = 29m^2/year calculated from US Navy DM-7.01 (1986) seems to be significantly higher than the test data. As such, a value of 10m^2/year (the upper bound of the test data) is chosen for the design.

C6. Mercia Mudstone Grade I/II

Unit Weight

- Test data:
  - There is only one sample of bulk unit weight from triaxial test for MMG I/II in Pool Wood Embankment. The value is 19.8kN/m^3 at a depth of 35.7m bgl.
- Correlations/published data
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) indicates a typical unit weight for MMG I/II of 22kN/m^3 and a global range from 19.5 to 23.5kN/m^3
- Design Values:
  - A bulk unit weight of 20kN/m^3 is adopted.

Intact Rock Strength

- Test data:
  - 77 unconfined compressive strength results from UCS, SPT and point load (PLT) tests were completed on samples of MMG I/II. The UCS results are plotted in the following Figure. The statistical information of the data is presented in the table below.
  - Values of PLT Is(50) were converted to UCS using the correlation UCS = 8×Is(50). SPT N_{60} values were converted to UCs using UCS = 10×N_{60}.
  - The samples were taken at a depth range of 8.5m bgl to 45.1m bgl. The strength values varied from 0.76MPa to 5.6MPa.

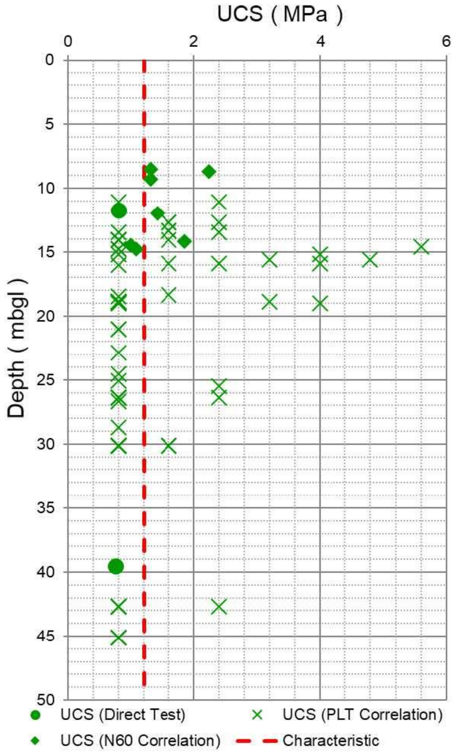


Figure C- 25: UCS values for MMG I/II in Pool Wood Embankment

Table C- 29: Statistical analysis of UCS values for MMG I/II in Pool Wood Embankment

Feature	Drained Young's Modulus (E', MPa)
Number of test points	77
Min	0.76
Max	5.6
Standard Deviation (S_d)	1.03
Average	1.4
Characteristic value (Average - 0.19xS_d)*	1.2

*Calculated based on the approach proposed by Bond (2011)

- Correlations / published data:
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) gives a typical value of 2MPa with a global range of 0.6MPa to 6MPa for the UCS of MMG I/II.

- Design Value
  - A value of 1.2MPa is chosen for UCS of MMG I/II in Pool wood Embankment.

Rock Mass Strength

Geological Strength Index, GSI

- Field data:
  - There is field data available from only one borehole, which was used for the calculation of a GSI value from the following correlation.
- Correlations / published data:
  - The method proposed by Hoek et al. (2013) is used for the determination of GSI using the following Equation.

$$\mathrm{GSI} = 1.5\mathrm{JCond}_{89} + \mathrm{RQD}/2$$

where JCond_{89} is the Joint Condition rating and RQD is the Rock Quality Designation.
  - The above equation results in a value of GSI = 44 in Pool Wood Embankment.

- Design Values:
  - Since there is not sufficient data for calculating a representative GSI value for the MMG I/II within Pool Wood Embankment, a value of 44 from a single borehole was deemed unreliable to be hosen. Considering the areas surrounding Pool wood Embankment, a characteristic value of GSI = 40 is chosen for the design.

Rockmass stifness

- Correlations / published data:
  - The equation proposed by Hoek and Brown (1998) is used to calculate the Young's modulus of MMG I/II from UCS and GSI. The equation gives a stiffness value of E_{rm} = 616MPa.

$$\mathrm{E_{rm}} = \sqrt{\frac{\mathrm{UCS}}{100}} \times 10^{\left(\frac{\mathrm{GSI}-10}{40}\right)} \quad \text{for UCS} < 100\mathrm{MPa}$$

- Design Values:
  - Based on the above, a characteristic value of E_{rm} = 616MPa is chosen for the design.

RocLab Strength Parameters

Rock mass strength parameters obtained from RocLab are presented in the table below.

RocLab parameters			
Hoek-Brown Classification			
GSI	Hoek-Brown constant, m_i	Disturbance factor, D	Intact Modulus, E_i - GPa
40	7	0	-

RocLab parameters		
Hoek-Brown Criterion		
m_b	s	a
0.821	0.00013	0.511
Mohr-Coulomb Fit (low confining stress)		
Cohesion (kPa)	Friction angle (°)	
18.5	36	
Mohr-Coulomb Fit (high confining stress)		
Cohesion (kPa)	Friction angle (°)	
40	26	

Appendix D Derivation of Geotechnical Parameters for Pool Wood Culvert

D1. Introduction

This section presents a discussion of the geotechnical parameters derived in Section 4. It highlights the properties that are key for the design of geotechnical structures being considered and provides characteristic values for these materials based on the data available.

It is worth noting that Pool Wood Culvert is located at a place where there is a local patch of cohesive Glaciofluvial Deposits with a thickness of up to 2m. The undrained shear strength of that local patch is below 50 kPa which necessitates a ground improvement. Due to the locality (extent) of this cohesive GFD and low undrained shear strength it has, no parameter derivation has been performed for the top 2m of the GFD and it is assumed that an excavation of 2m of the top GFD will be performed in advance of the culvert and embankment constructions.

D2. Glaciofluvial Deposits (GFD)

Material Composition

- Test data:
  - 8 No. Particle Size Distribution (PSD) within the Glaciofluvial Deposits (GFD) have been used to determine the classification of the soil. The PSD results are provided in the figure below.

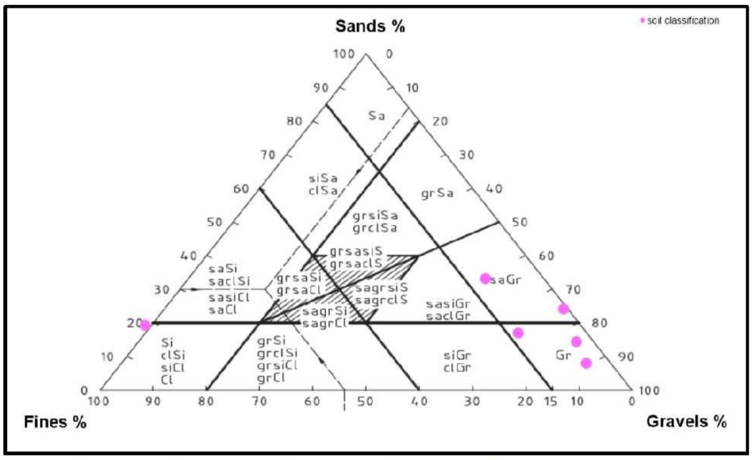


Figure D 1: Particle Size Distribution (PSD) for GFD in Pool Wood Culvert

  - The data shows the granular nature of the GFD. The content of fine material is minimal which allows the GFD to be classified as granular in Pool Wood Culvert. Hence, cohesion is not considered in the calculation of geotechnical parameters.

Bulk Unit Weight

- Test Data
  - Laboratory testing was undertaken on three Triaxial and two Shear Box samples for GFD, that determined the initial bulk unit weights of between 17.9 to 20.8kN/m^3. The results and their statistical information are shown in the Figure and the Table below, respectively.

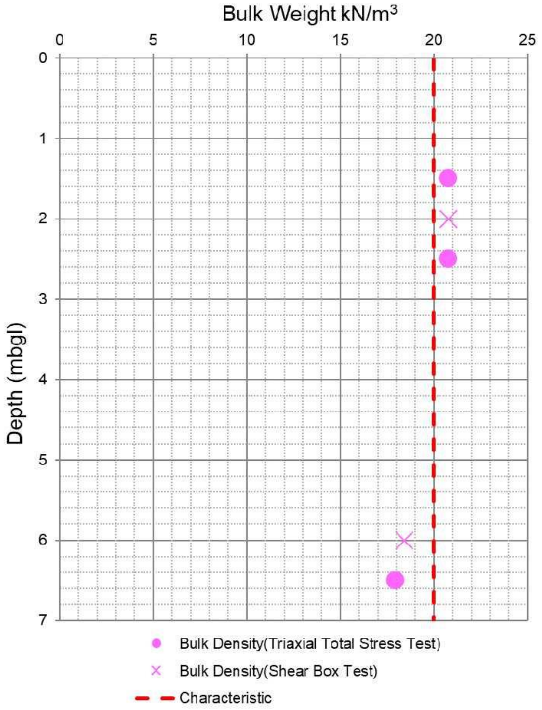


Figure D 2: Bulk unit weight of GFD in Pool Wood Culvert

Table D 1: Statistical information on bulk unit weight of GFD in Pool Wood Culvert

Feature	Bulk unit weight (kN/m^3)
Number of tests	5
Min	17.9
Max	20.8
Standard deviation	1.4
Average	19.7

- Correlations / Published Data

- The HS2 N1 and N2 Global Parameters Design Report- Route Wide- Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143) indicates a typical unit weight for Glaciofluvial Deposits of 20kN/m^3 and a global range from 17 to 22kN/m^3.

- Design Values:
  - Based on the above information, a characteristic unit weight value of 20kN/m^3 is recommended.

Standard Penetration Tests (SPT N60)

- Test data
  - 30 SPT *N* values were recorded for the Glaciofluvial Deposits. These have been converted to N_{60} value and plotted against depth in the Figure below. Statistical information for SPT N_{60} values is presented in the Table below.

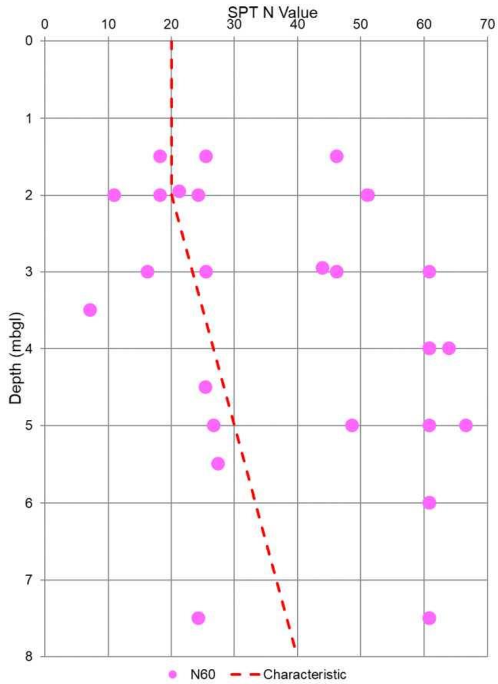


Figure D 3: SPT N_{60} values of GFD in Pool Wood Culvert

Table D 2: Statistical information on SPT N_{60} values of GFD in Pool Wood Culvert

Feature	Value (N_{60})
Number of test points	30

Feature	Value (N_{60})
Min	7.1
Max	66.7
Standard Deviation (S_d)	19.5 14.2 (for z ≤ 2m) 18.7 (for z > 2m)
Average line	27 for z ≤ 2m 27 + 3.8(z – 2) capped at 50 for z > 2m
Characteristic value (Average – 0.31x S_d)*	20 for z ≤ 2m 20 + 3.3(z – 2) capped at 40 for z > 2m

*Calculated based on the approach proposed by Bond (2011)

- Design Values:
  - A value of SPT N_{60} = 20 for z ≤ 2m and SPT N_{60} = 20 + 3.3(z – 2) capped at 40 for z > 2m is chosen for the design.

Plasticity Limits

- Not applicable since the GFD are interpreted to be granular.

Drained Shear Strength

- Test data:
  - Two peak friction angles were determined from shear box tests. The best fit of the peak angles are presented below. Peak friction angles of 29.5° and 39.5° were obtained, giving an average of 34.5°.

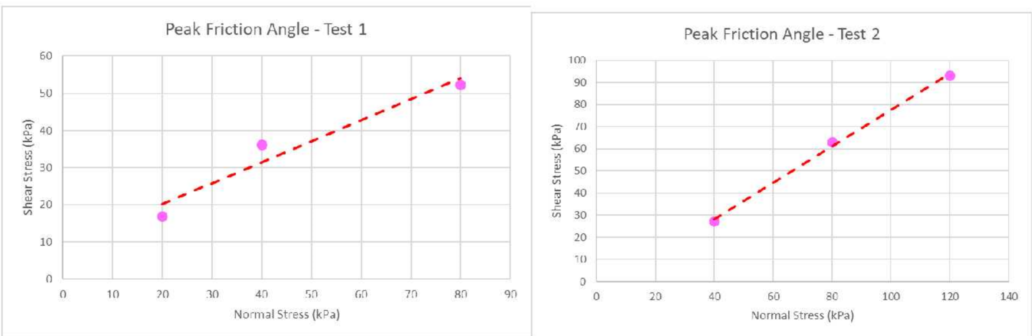


Figure D 4: Peak friction angle of GFD in Pool Wood Culvert

- Correlations / published data:

- The angle of internal friction for granular GFD can be determined from PSDs and the density index using section 4.3.1.3 of BS 8002: 2015, shown below.

$$\emptyset'_{\mathrm{pk}} = 30 + \emptyset'_{\mathrm{ang}} + \emptyset'_{\mathrm{PSD}} + \emptyset'_{\mathrm{dil}}$$

Table C- 30: Parameters for the estimation of friction angles for granular soils (BS 8002: 2015)

Soil property	Determined from	Classification	Parameter [D)]
Angularity of particles [A)]	Visual description of soil	Rounded to well-rounded	$\varphi'_{ang} = 0°$
		Sub-angular to sub-rounded	$\varphi'_{ang} = 2°$
		Very angular to angular	$\varphi'_{ang} = 4°$
Uniformity coefficient, C_U [B)]	Soil grading	$C_U < 2$ (evenly graded)	$\varphi'_{PSD} = 0°$
		$2 \le C_U < 6$ (evenly graded)	$\varphi'_{PSD} = 2°$
		$C_U \ge 6$ (medium to multi graded)	$\varphi'_{PSD} = 4°$
		High C_U (gap graded), with C_U of fines < 2 [E)]	$\varphi'_{PSD} = 0°$
		High C_U (gap graded), with $2 \le C_U$ of fines < 6 [E)]	$\varphi'_{PSD} = 2°$
Density index, I_D [C)]	Standard penetration test blow count, corrected for energy rating and overburden pressure $(N_1)_{60}$	$I_D = 0\%$	$\varphi'_{dil} = 0°$
		$I_D = 25\%$	$\varphi'_{dil} = 0°$
		$I_D = 50\%$	$\varphi'_{dil} = 3°$
		$I_D = 75\%$	$\varphi'_{dil} = 6°$
		$I_D = 100\%$	$\varphi'_{dil} = 9°$

[A)] Terms for defining particle shape can be found in BS EN ISO 14688-1.
[B)] The uniformity coefficient C_U is defined in BS EN ISO 14688-2.
[C)] The density index I_D is defined in BS EN ISO 14688-2. Density terms may be estimated from the results of field tests (e.g. Standard Penetration Test, Cone Penetration Test) using correlations given in BS EN 1997-2.
[D)] Values of φ'_{dil} are appropriate for siliceous sands and gravels reaching failure at a mean effective stress up to 400 kPa. For non-siliceous sands, see *The strength and dilatancy of sands* [11].
[E)] "Fines" refers to that fraction of the soil whose particle size is less than 0.063 mm.

- According to the field descriptions, GFD is predominantly described to be sub-rounded to rounded. A value of $Ø'_{ang}$ = 0° is an appropriate selection for the GFD in Pool Wood Culvert.
- There is no data available for CU (Coefficient of Uniformity). Hence, it is considered that $Ø'_{PSD}$ = 0°.
- An average characteristic value of $(N_1)_{60}$ for GFD is 27.6, which is related to a density index of 65% to 85% (dense) with reference to Table F.1 of Annex F of BS EN 1997-2. This gives $Ø'_{dil}$ = 6°.
- $Ø'_{pk}$ can now be calculated: $Ø'_{pk}$ = 30 + 0 + 0 +6= 36°.
- The HS2 N1 and N2 Global Parameters Design Report- Route Wide- Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143) gives a typical friction angle of $\emptyset'_{pk}$ = 34° with a range of 30° to 37°, and a cohesion of c' = 0kPa.

- Design Values:
  - Due to insufficient GI being available for the drained strength of the GFD in Pool Wood Culvert, the lower bound values from the HS2 N1 and N2 Global Parameters Design Report- Route Wide- Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143) are selected as worst-credible parameters. As such, values of $\emptyset'_{pk}$ = 30°, $\emptyset'_{residual}$ = 28° and c' = 0kPa are chosen for the design.

Undrained Shear Strength

- Not applicable since the GFD are interpreted to be granular.

Overconsolidation Ratio

- Overconsolidation ratio not needed since the GFD are granular.

Stiffness

Drained stiffness, E'

- Test data:
    - No test data is available.

- Correlations / published data:
    - CIRIA Report R143 provides a correlation of Drained Young's Modulus and N_{60} where: E' = 2 x N_{60}. Based on the N_{60} values presented earlier for GFD, a value of E' = 40MPa for z ≤ 2m, and E' = 40 + 6.6(z – 2) capped at 80MPa can be calculated.
    - The HS2 N1 and N2 Global Parameters Design Report- Route Wide- Glacial Soils (1MC08-BBV_MSD-GT-REP-N001-100143) provides a typical value of 40 + 2Z (MPa) with global range of 10 + 1.6z and 80 + 2.4z.

Undrained stiffness, E_u

- Not applicable since the GFD are interpreted to be granular

- Design Values:
    - The design value chosen for GFD in Pool Wood Culvert is E' = 40MPa for z ≤ 2m, and E' = 40 + 6.6(z – 2) capped at 80MPa for z > 2m.

Compressibility

Coefficient of Volume Compressibility, m_v

- Coefficient of volume compressibility does not need to be calculated since GFD are interpreted to be granular.

Coefficient of Consolidation, c_v

- Coefficient of consolidation is not applicable since GFD are granular in Pool Wood Culvert.

D3. Mercia Mudstone Group – Grade IV/V (MMG IV/V)

Material Composition

- Test data
  - One Particle Size Distribution (PSD) within the MMG IV/V has been used to determine whether the MMG IV/V might be classified as cohesive or granular. The engineer's log described the material to be a slightly sandy silty CLAY. The PSD results are provided in the figure below.

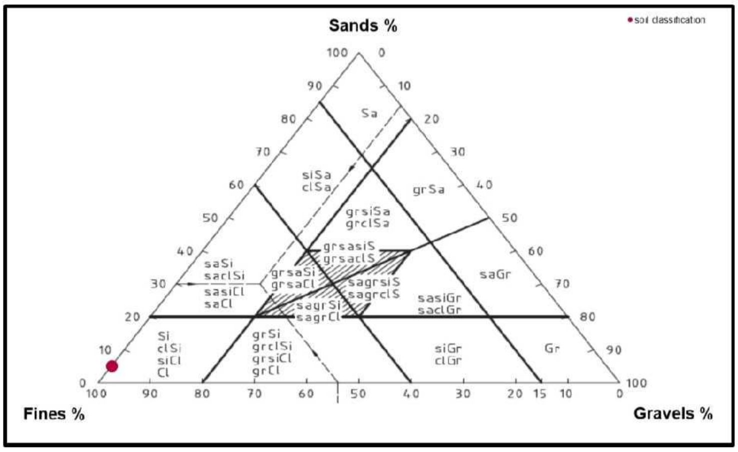


Figure D 5: Particle Size Distribution (PSD) for MMG IV/V in Pool Wood Culvert

  - The MMG IV/V is largely described as a fine-grained material and cohesion should be considered in the calculation of geotechnical parameters.

Bulk Unit Weight

- Test Data
  - Undrained Triaxial testing was undertaken on three undisturbed samples of MMG IV/V that determined the initial bulk unit weights of between 19.2 to 20.7kN/m^3. The results and their statistical information are shown in the Figure and the Table below, respectively.

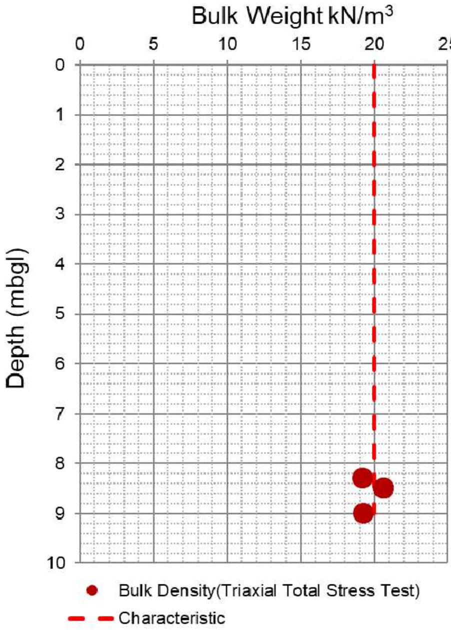


Figure D 6: Bulk unit weight of Mercia Mudstone IV/V (MMG IV/V) in Pool Wood Culvert

Table D 3: Statistical information on bulk unit weight of MMG IV/V in Pool Wood Culvert

Feature	Bulk unit weight (kN/m^3)
Number of tests	3
Min	19.2
Max	20.7
Standard deviation	0.8
Average	19.7

- Correlations / Published Data
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) provides a global range between 18.5 and 21.5kN/m3 and a typical value of 20kN/m^3.

- Design Values:
  - Based on the above information, a characteristic unit weight value of 20kN/m^3 is recommended.

Standard Penetration Tests (SPT N_{60})

- Test data
  - Six SPT *N* values were recorded for MMG IV/V. These have been converted to N_{60} value and plotted against depth in the Figure below. Statistical information for SPT N_{60} values is presented in the Table below. SPT *N* values above 100 considered as outliers and removed from the calculations.

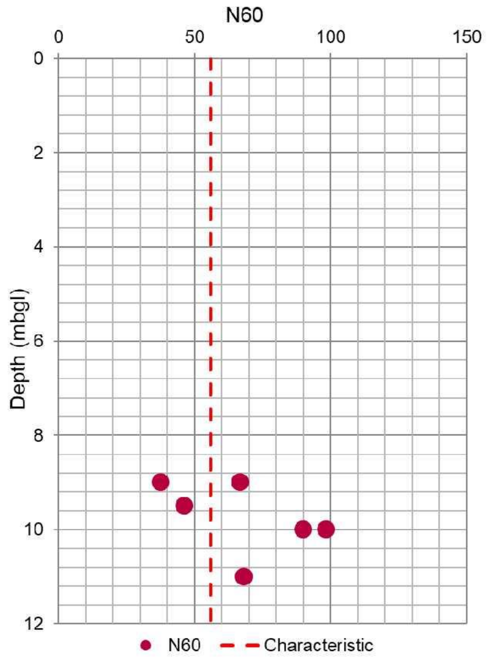


Figure D 7: SPT N_{60} values of MMG IV/V in Pool Wood Culvert

Table D 4: Statistical information on SPT N_{60} values of MMG IV/V in Pool Wood Culvert

Feature	Value (N_{60})
Number of test points	6
Min	37.7
Max	98.6
Standard Deviation (S_d)	23.7
Average	67.9
Characteristic value (Average – 0.5 x S_d)*	56

*Calculated based on the approach proposed by Bond (2011)

- Design Values:
  - A value of SPT N_{60} = 56 is chosen for the design.

Plasticity Limits

- Test data:
  - Index property data from six tests are available for MMG IV/V in Pool Wood Culvert. The Figure below presents the summary of liquid limit and plasticity index properties of MMG IV/V. Statistical information about the plasticity index (PI) and liquid limits (LL) is given in following Tables, respectively.

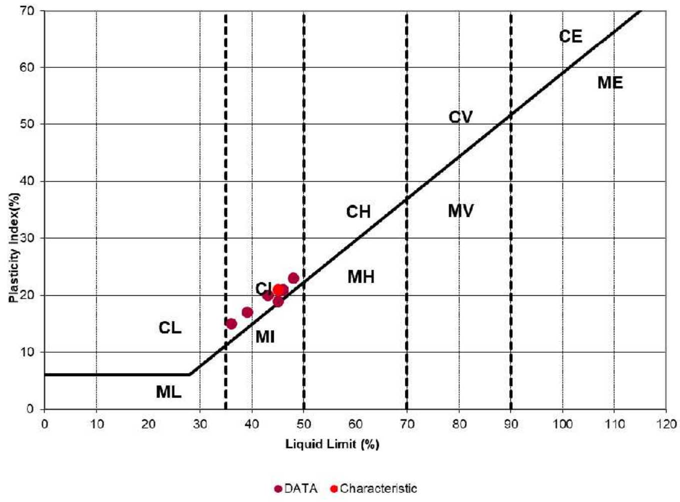


Figure D 8: Liquid Limit vs plasticity index for MMG IV/V in Pool Wood Culvert

Table D 5: Statistical information on PI data of MMG IV/V in *Pool Wood* Culvert

Feature	Plasticity Index (PI)
Number of test points	6
Min (%)	15
Max (%)	23
Standard Deviation (S_d) (%)	2.9
Average (%)	19.2
Characteristic value (Average + 0.5 x S_d)* (%)	21

*Calculated based on the approach proposed by Bond (2011)

Table D 6: Statistical information on LL data of MMG IV/V in *Pool Wood* Culvert

Feature	Liquid limit (LL)
Number of test points	6
Min (%)	36
Max (%)	48
Standard Deviation (S_d) (%)	4.5
Average (%)	42.8
Characteristic value (Average + 0.5 x S_d)* (%)	45

*Calculated based on the approach proposed by Bond (2011)

- Correlations / published data
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) gives a typical value of 21% for the plasticity index, and a range of 35% to 60% for liquid limit of MMG IV.

- Design Values:
  - Based on the above information, a characteristic Plasticity Index of 21% and a characteristic Liquid Limit of 45% is adopted for the design.

Drained Shear Strength

- Test data:
  - No test data is available.
- Correlations / published data:
  - The constant volume angle of shearing resistance in cohesive soils can be estimated from the following formula from BS 8002:2015:

$$\phi'_{cv} = (42° - 12.5 log_{10} I_p)$$

    For a plasticity index of 21%, this would provide a ϕ_{cv} of 25°.
    BS8002:2015 suggests that the peak angle of shearing resistance is typically in the range of 0° to 4° higher than the constant volume, accounting for dilation of the soil. Mercia Mudstone Grade IV material is considered as overconsolidated material and therefore an increase of 2° is considered appropriate giving a peak angle of shearing resistance of 27°.
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) gives a typical friction angle of $\emptyset'_{pk}$ = 29° with a range of 24° to 33°, and a typical cohesion of c' = 3kPa with a rage of 0 to 15kPa.

- Design Values:
  - Based on the above, the recommended parameters for the drained strength are: ϕ'_{pk} = 27°, ϕ'_{cv} = 25°, c' = 0kPa.

Undrained Shear Strength

- Test data:
  - Undrained shear strength values obtained from triaxial tests, field vane shear and correlations from SPT N_{60} are presented in the Figure below. Strengths obtained from SPT N_{60} are calculated using $c_u = f_1 \times N_{60}$ where f_1 a coefficient proposed by Stroud (1988). The Table below shows the statistical analysis of the data for MMG IV/V.
  - c_u values greater than 300kPa were deemed to be outliers and hence, removed from the calculations.

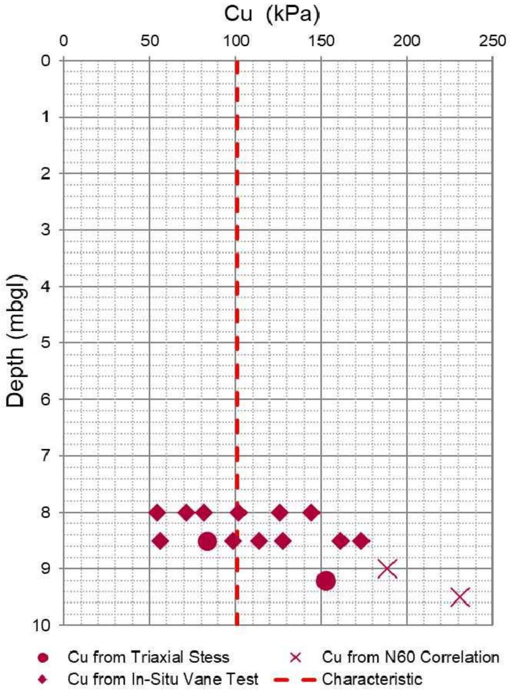


Figure D 9: Undrained shear strength of MMG IV/V in Pool Wood Culvert

Table D 7: Statistical features for undrained shear strength of MMG IV/V in Pool Wood Culvert

Feature	Undrained shear strength (c_u), kPa
Number of test points	16
Min	54.4
Max	231
Standard Deviation (S_d)	50
Average	123
Characteristic value (Average - 0.45 x S_d)*	101

*Calculated based on the approach proposed by Bond (2011)

- Correlations / published data:
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) gives a range of c_u = 30+10z (a limiting value 70kPa) to c_u = 100+37.5z (a limiting value 250kPa) with a typical value of c_u = 50+25z (a limiting value 150kPa).

- Design Values:
  - Based on the above data, a characteristic value of c_u = 101kPa is adopted for the design.

Overconsolidation Ratio

- The overconsolidation ratio (OCR) can be calculated as OCR = σ_p'/σ_{v0}', where σ_p' is the maximum past stress, and σ_{v0}' is the existing insitu soil stress. σ_p' can be obtained from J.P. Magnan (1985) proposed relationship using Plasticity Index.

$$\frac{C_u}{\sigma_p'} = 0.25 + 0.0024 \cdot \mathrm{PI}$$

  - For an undrained shear strength of 101kPa at an average layer depth of 9m, and a plasticity index of 21%, σ_p' can be calculated to be σ_p' = 403kPa.
  - σ_{v0}' can be calculated at z = 9m, average layer depth of MMG IV/V, which results in σ_{v0}' = 131kPa.
  - Using the equation from J.P. Magnan (1985), an OCR ratio of 3.0 can be obtained.

- Correlations / published data:
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) reports a range of 5 to 10 for OCR of MMG IV/V.

- Design Values:
  - The value calculated from the equation of J.P. Magnan (1985) leads to very low OCR for MMG IV/V which is not representative for this type of soil. As such, a characteristic value of OCR = 5 from the Global Parameters Design Report was chosen for the design.

Stiffness

Drained stiffness, E'

- Test data:
  - No test data is available.

- Correlations / published data:
  - CIRIA Report R143 provides a correlation of Drained Young's Modulus and SPT N_{60} where: E' = 0.9 x SPT N_{60} for cohesive soil.
  - The drained Young's Modulus can also be calculated from the undrained Young's Modulus and the undrained shear strength using the Jamiolkowski et al. (1979)'s graph (figure presented below). For PI = 21% and OCR = 5, $E_u = 440 \times c_u$. Then E' is calculated using the following equation. For v_u = 0.5 and v' = 0.3, the drained Young's modulus becomes E' = $0.86E_u$.

$$E' = \frac{1+\nu'}{1+\nu_u} E_u$$

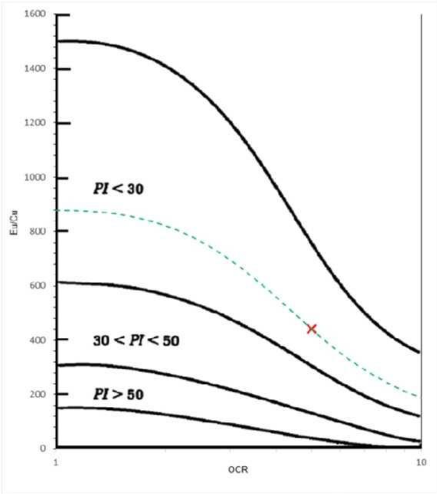


Figure D 10: Jamiolkowski et al. (1979) graph for the calculation of E_u/c_u for MMG IV/V in Pool wood Culvert

- Values of drained Young's Modulus calculated from SPT N_{60} and E_u and their corresponding statistical information are presented in the figure and table below, respectively.

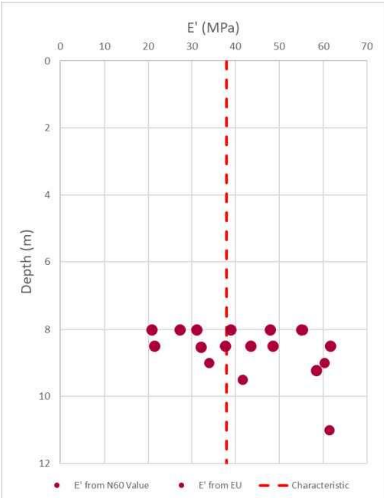


Figure D 11: Drained Young's Modulus of MMG IV/V in Pool Wood Culvert

Table D 8: Statistical analysis of the drained Young's Modulus for MMG IV/V in Pool Wood Culvert

Feature	Drained Young's Modulus (E', MPa)
Number of test points	18
Min	20.7
Max	66
Standard Deviation (S_d)	14.4
Average	44
Characteristic value (Average - 0.41 x S_d)*	38

*Calculated based on the approach proposed by Bond (2011)

Undrained stiffness, E_u

- The undrained Young's Modulus can be calculated from the drained Young's Modulus using E_u = 1.15E'. This results in an undrained value of E_u = 44MPa.

- Correlations/published data
  - HS2 N1 and N2 Global Parameters Design Report Mercia Mudstone (1MC08-BBV_MSD-GT-REP-N001-100147) gives a typical value of $E_u = 26 + 13z$ (limiting value of 78MPa) with a lower bound of $E_u = 15.6 + 5.2z$ (limiting value of 36.4MPa) and an upper bound of $E_u = 80 + 20z$ (limiting value of 200MPa) for the undrained Young's Modulus of MMG IV/V.

- Design Values:
  - The recommended characteristic values for the drained and undrained Young's Modulus for the design are: E' = 38MPa and E_u = 44MPa.

Compressibility

Coefficient of Volume Compressibility, m_v

- Test data
  - There is no consolidation data for MMG IV/V in this area.

- Correlations / published data
  - The volume compressibility coefficient (m_v) can be calculated as: $m_v = 1/E'$.
  - The coefficient of volume compressibility (m_v) can also be obtained using the Stroud and Butler (1975) formula: $m_v = 1/(f_2.N_{60})$, f_2 obtained from the figure below. For PI = 21%, a value of f_2 = 0.53 can be obtained (shown in figure below).

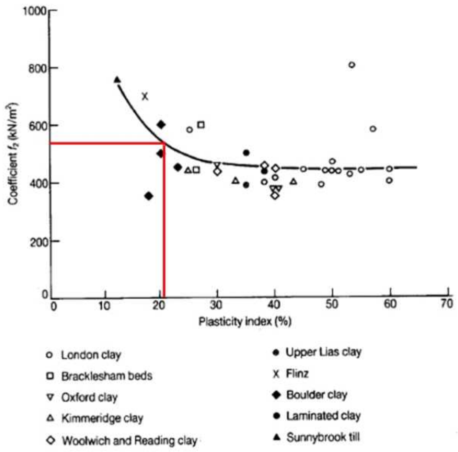


Figure 41 *Correlation between coefficient f_2 (= N/m$_v$) and plasticity index (after Stroud and Butler, 1975)*

Figure D 12: Stroud and Butler (1975) curve for the calculation of coefficient f_2 from plasticity index

- An average value can be calculated for m_v from the methods given above, which gives m_v = 0.03m²/MN.
- Design values:
  - A value of m_v = 0.03m²/MN is chosen for the design.

Coefficient of Consolidation, c_v

- Test data

  There is no consolidation data for MMG IV/V in this area.

- Correlations
  - The coefficient of consolidation (c_v) can be calculated using following equations proposed by US Navy DM-7.01 (1986). An average value between the normally consolidated and overconsolidated soils was considered, which resulted in a value of c_v = 12.5m²/year for a liquid limit of 45%.

$$c_v = \frac{80}{LL^{2.8}} \times 31.536 \times 10^2 \ \left(m^2/_{year}\right) \qquad \text{for normally consolidated soil}$$

$$c_v = \frac{25000}{LL^{3.9}} \times 31.536 \times 10^2 \ \left(m^2/_{year}\right) \qquad \text{for overconsolidated soil}$$

- Design values:
  - The value of C_v = 12.5m²/year calculated from US Navy DM-7.01 (1986) is chosen for the design.

Appendix C Calculations List

Table C-1 List of Calculation Notes

Title	Reference
Detailed Design Calculation Note – Pool Wood Embankment – Slope stability and ground treatment	1MC09-BBV_MSD-GT-REP-NS04_NL10-100041
Calculation note – Static Analysis – Pool Wood Culvert	1MC09-BBV_MSD-ST-REP-NS04_NL10-158901

Notes: List of calculations is provided for information only. The calculations notes do not form part of the detailed design submission.

Appendix D Geotechnical Risk

- Pool Wood Embankment

Risk ID	Originator	LOT	Sublot	Date (YYYYMMDD)	Status	Classification	Hazard description	Impact description(description of the impact if the hazard is realised)	Proposed mitigation action(s)	Residual risk owner	Start Chainage	End Chainage
2523	J Foster	N2	["5"]		Unmitigated	Detailed design	ES assumes CFA piling (which is not a significant source of vibration) throughout Wmids (except one location at Bromford Tunnel & at NEC lake). Local ground conditions may dictate other methods of piling. ES based on specific assumptions regarding the size/type/scale and location of compaction works involving vibratory rollers, changes may be required as contractor appointed and design progresses. (Transferred from C224-ARP-PC-REG-040-000002.xlsx)	Potential to identify new effects requiring mitigation or changes to construction works	Ensure Sec 61 applications/.assessments started as soon as possible after contractor appointed to finalise insulation/temp rehousing requirements, plus ensure adequate time in the programme to carry out works	["HS2"]	158+391	159+915
2499	Ilias Manolakis	N2	["5"]	23 April 2021	Unmitigated	Detailed design	Significant leachate exceedance of nickel and high TPH soil concentrations within former infilled pond (ML159-CP003)	Potential risk to underlying controlled waters.	Contractor to refer removal of fill material within this area, and stabilisation of material prior to recovery in accordance with MMP. Refer to 1MC09-BBV_MSD-EV-REP-NS04-100007 Pool Wood Embankment DQRA and Remediation Strategy covering a small localised hotspot within an infilled pond at approximate Chainage 159+350 associated with former brickworks.	["BBV","HS2"]	159+150	159+380
2500	Ilias Manolakis	N2	["5"]	23 April 2021	Unmitigated	Detailed design	Moderate leachate contamination of metals in deep Made Ground associated with highways (ML158-WS016).	Potential risk to underlying controlled waters.	Risk register item: Removal of contaminated Made Ground and stabilisation prior to recovery in accordance with MMP. Refer to 1MC09-BBV_MSD-EV-REP-NS04-100007 Pool Wood Embankment DQRA and Remediation Strategy.	["BBV","HS2"]	158+391	158+550
2505	Ilias Manolakis	N2	["5"]	23 April 2021	Unmitigated	Construction	Failure of earthworks due excessive surcharge Loadings.	Slope failure	In line with the Detailed Design – Basis of Design Report Methodology – Earthworks (1MC08-BBV-MSD-GT-REP-N001-100159); for: Embankment: Designed to accommodate a 50kPa live surcharge loading 3.0m from the crest of the embankment slope in the long-term condition. Designed to accommodate a 50kPa live surcharge loading 3.0m from the crest of the slope in the short-term construction situation. Contractor to note a maximum of 50kPa construction plant loading is considered and allowed in the design of the construction phase.	["BBV","HS2"]	158+391	159+805
2506	Ilias Manolakis	N2	["5"]	23 April 2021	Unmitigated	Operation	Failure of earthworks due excessive surcharge Loadings.	Slope failure	In line with the Detailed Design – Basis of Design Report Methodology – Earthworks (1MC08-BBV-MSD-GT-REP-N001-100159); for: Embankment: Designed to accommodate a 50kPa live surcharge loading 3.0m from the crest of the embankment slope in the long-term condition. Designed to accommodate a 50kPa live surcharge loading 3.0m from the crest of the slope in the short-term construction situation. Contractor to note a maximum of 50kPa construction plant loading is considered and allowed in the design of the construction phase.	["BBV","HS2"]	158+391	159+805

2517	Ilias Manolakis	N2	["5"]	23 April 2021	Unmitigated	Detailed design	11 kv buried electricity line	Cable trench backfill results in localised soft ground potentially affecting slope stability. Water ingress produces soft spot or localised erosion to affect slope stability.	Removal/diversion of cables. Remediation of cable trench in permanent slope. Providing water drainage for the slope.	["HS2","BBV"]	158+820 (existing chainage, will be diverted to 158+908)	
2518	Ilias Manolakis	N2	["5"]	23 April 2021	Unmitigated	Detailed design	Western Power buried electricity line	Cable trench backfill results in localised soft ground potentially affecting slope stability. Water ingress produces soft spot or localised erosion to affect slope stability.	Removal/diversion of cables. Remediation of cable trench in permanent slope. Providing water drainage for the slope.	["BBV","HS2"]	159+220	
2496	Ilias Manolakis	N2	["5"]	23 April 2021	Unmitigated	Construction	Lack of GI data from Ch 158+391 to Ch 158+800.	High uncertainty associated with the ground model, geotechnical parameters and groundwater level. The actual values may be worse than the ones assumed in the design.	Based on the requirement of the Basis of design report for Geotechnics, Earthworks and Retaining Structures, worst credible parameters were used for the detailed design with reference to the Global Parameters Design Report. A layer of selected material (0.75m thickness) to be constructed at the base of the embankment to protect from groundwater ingress. The area to be inspected by a competent engineer on site.	["HS2","BBV"]	158+391	158+800
3315	Ilias Manolakis	N2	["5"]	23 April 2021	Unmitigated	Detailed design	Clash of trace embankment with highways embankment from Ch 158+250 to Ch 158+825.	Differences in material properties between the highways and the trace embankments, and the possibility of drainage construction could result in the slope failure of the trace embankment.	An agreement with Highways England should be sought. Current proposal is either a minor retaining feature to deal with the clash, or avoid the clash via a slight raise in the toe of both embankment with a shared specification for the underlying ground in accordance with the minimum requirements for both Series 0600 Earthworks Specification for Highways and the HS2 approved SCEW documentation.	["BBV","HS2"]	158+250	158+825
3316	Ilias Manolakis	N2	["5"]	23 April 2021	Unmitigated	Construction	Clash of trace embankment with highways embankment from Ch 158+250 to Ch 158+825	Differences in material properties between the highways and the trace embankments, and the possibility of drainage construction could result in the slope failure of the trace embankment.	An agreement with Highways England should be sought. Current proposal is either a minor retaining feature to deal with the clash, or avoid the clash via a slight raise in the toe of both embankment with a shared specification for the underlying ground in accordance with the minimum requirements for both Series 0600 Earthworks Specification for Highways and the HS2 approved SCEW documentation.	["BBV","HS2"]	158+250	158+825
3321	Ilias Manolakis	N2	["5"]	23 April 2021	Unmitigated	Detailed design	Existence of a cohesive layer of soft Glaciofluvial deposits (from Ch 158+875 to Ch 159+020)	The existence of a cohesive layer could lead to the slope failure of the trace embankment.	Ground treatment by excavation and replacement of 2m is required for the Glaciofluvial deposits between Ch 158+875 and Ch 159+020 due to the existence of a soft cohesive layer.	["HS2","BBV"]	158+875	159+020
3322	Ilias Manolakis	N2	["5"]	23 April 2021	Unmitigated	Construction	Groundwater ingress into earthworks/excavations from Ch 158+875 to Ch 159+020.	The ingress of groundwater could damage the ground improvement under the embankment, and potentially impact the trace embankment.	Contractor to provide safe system of work and drain groundwater when needed. A pre-construction inspection to be undertaken to check the groundwater level and if needed the contractor to consider the construction of a layer of selected material (0.6m in thickness) above the original ground level to protect the trace embankment from ingress of groundwater.	["BBV","HS2"]	158+875	159+020
3323	Ilias Manolakis	N2	["5"]	23 April 2021	Unmitigated	Construction	Groundwater ingress into earthworks/excavations from Ch 159+700 to Ch 159+805	The ingress of groundwater could damage the ground improvement under the embankment, and potentially impact the trace embankment.	Contractor to provide safe system of work and drain groundwater when needed. A pre-construction inspection to be undertaken to check the groundwater level and if needed the contractor to consider the construction of a layer of selected material (0.6m in thickness) above the original ground level to protect the trace embankment from ingress of groundwater.	["BBV","HS2"]	159+700	159+805

2509	Ilias Manolakis	N2	["5"]	29 April 2021	Unmitigated	Construction	Unforeseen ground conditions	Slope failure due to incompetent founding stratum of the embankment	The founding stratum of the embankment should be inspected by a competent geotechnical engineer to ensure that the ground conditions are consistent with those assumed in the design. Specific requirements are presented in the HS2 Earthworks Specification Appendix Series 0600: Pool Wood Embankment. Ref. 1MC09-BBV_MSD-GT-SPE-NS04_NL10-100004	["BBV","HS2"]	158+391	159+805
3576	Ilias Manolakis	N2	["5"]	05 May 2021	Unmitigated	Operation	Possibility of existence of very soft or highly organic subsoil to a depth of 1m below the topsoil.	Risk of damage and failure to the embankment.	The subsoil of 1m below the topsoil to be inspected by a competent engineer. If it is found to be very soft or high in organic content it should be excavated and replaced with suitable embankment fill.	["BBV","HS2"]	158+391	159+805
3577	Ilias Manolakis	N2	["5"]	05 May 2021	Unmitigated	Construction	Possibility of existence of very soft or highly organic subsoil to a depth of 1m below the topsoil.	Risk of damage and failure to the embankment.	The subsoil of 1m below the topsoil to be inspected by a competent engineer. If it is found to be very soft or high in organic content it should be excavated and replaced with suitable embankment fill.	["BBV","HS2"]	158+391	159+805
2504	Ilias Manolakis	N2	["5"]	05 May 2021	Part-mitigated	Construction	Buried or overhead services	Striking buried or overhead services during works resulting injury to workforce. Damage of buried services due to surcharge from the embankment	Buried services and cables to be identified, diverted, removed or protected by the contractor prior to the commencement of work . Contractor to use safe system of work, including checking buried and overhead service records, CAT scanning and issuing permits to dig prior to any ground breaking work. Contractor to undertake risk assessment and agree to the working and protection requirement in Work Package Plan with HS2.	["BBV"]	158+391	159+915
3889	Ilias Manolakis	N2	["5"]	26 July 2021	Unmitigated	Construction	Rigid inclusions clash with the existing mast (ZF108) foundations.	The clash will either cause obstruction to the construction of rigid inclusions if the foundations are not removed, or impose the risk of local bearing failure to the rigid inclusions if the depth of the removed soil exceeds the length of the negative skin friction assumed in the design of rigid inclusions. This could potentially cause stability issues and failure to the embankment.	Contractor to ensure that the existing mast foundations will be removed. Any excavation beyond 3m depth must be backfilled with granular fill (6F5).	["BBV"]	159+350	159+350
3888	Ilias Manolakis	N2	["5"]	26 July 2021	Unmitigated	Construction	Rigid inclusions clash with the existing mast (ZF107) foundations.	The clash will either cause obstruction to the construction of rigid inclusions if the foundations are not removed, or impose the risk of local bearing failure to the rigid inclusions if the depth of the removed soil exceeds the length of the negative skin friction assumed in the design of rigid inclusions. This could potentially cause stability issues and failure to the embankment.	Contractor to ensure that the existing mast foundations will be removed. Any excavation beyond 3m depth must be backfilled with granular fill (6F5).	["BBV"]	159+675	159+675
2498	Ilias Manolakis	N2	["5"]	26 July 2021	Unmitigated	Construction	Ground Movements induced by proposed works affecting a diverted pylon at approximate chainage 159+220.	This could lead to serviceability issues, potential collapse of the pylon, or H&S risks.	A Plaxis analysis was undertaken for that area, which showed possibility of ground heave induced by embankment loads around the pylon. Instrumentation and monitoring is proposed to monitor the ground movements around the pylon during and after construction. In case of any pylon stability issues, contractor to consider stabilising the pylon by means of anchoring or potential relocation of the pylon.	["BBV"]	159+220	159+220
4089	Ilias Manolakis	N2	["5"]	11 August 2021	Unmitigated	Construction	According to new ground investigation data for Pool Wood Embankment, there is possibility that the extent of soft GLLD could extend further to the south of RIs zone (i.e. beyond Ch 159+015 to the south).	If the depth of soft GLLD is found to exceed the 2m depth assumed for dig-out and replacement, there is a risk of potential instability or failure to the embankment.	A dig out and replacement of 2m of the top ground layer is designed for this zone. A further depth of up to 1m beyond the bottom of the dig out and replacement to be inspected prior to the construction of the embankment. If the depth of soft ground extends beyond the 2m depth of dig out and replacement, an extra 1m of soft ground to be excavated and replaced with the cohesive embankment fill.	["BBV"]	158+970	159+015

3318	Ilias Manolakis	N2	["5"]	11 August 2021	Unmitigated	Detailed design	Possibility of deep Made Ground layer existing around 159+300 beneath the landscape bund.	The existence of deep Made Ground layer existing around 159+300 could lead to the bearing failure of the landscape bund.	A staged construction with band drains is designed to improve the ground stability. Monitoring to be undertaken on site to ensure that the required undrained shear strength is developed in the foundation soil to support the landscape bund. Refer to the detailed design Earthworks Specifications (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100004) and Instrumentation and Monitoring Plan (1MC09-BBV_MSD-GT-REP-NS04_NL10-100039). Localised dig-out and replacement may be required in this area. Alternatively, the observational method could be undertaken by competent geotechnical personnel during the phase construction with the understanding that some localised remediation could be required if the Made Ground remains in-situ.	["BBV"]	159+245	159+365
3317	Ilias Manolakis	N2	["5"]	11 August 2021	Unmitigated	Detailed design	The existence of Glaciolacustrine deposits (GLLD; soft soil) beneath the landscape bund.	The existence of a landscape bund with a height up to 14m, founded on the soft Glaciolacustrine materials, which may result to bearing failure and slope stability failure of the landscape bund.	A staged construction with band drains is designed to improve the ground stability. Monitoring to be undertaken on site to ensure that the required undrained shear strength is developed in the foundation soil to support the landscape bund. Refer to the detailed design Earthworks Specifications (1MC09-BBV_MSD-GT-SPE-NS04_NL10-100004) and Instrumentation and Monitoring Plan (1MC09-BBV_MSD-GT-REP-NS04_NL10-100039).	["BBV"]	159+015	159+725
4090	Ilias Manolakis	N2	["5"]	10 September 2021	Unmitigated	Construction	Use of 6F5 material for the construction of the combined layer of Load Transfer Platform (LTP) and floodplain zone. In case of an unexpected rise of groundwater, if the draining capacity of the LTP layer (6F5) is exceeded, groundwater will potentially enter the embankment.	Potential failure of the embankment slopes.	BBV to confirm that a permeable layer will be designed by the temporary contractor and be placed at the base of the working platform that will mitigate this risk and prevent groundwater ingress into the embankment.	["BBV"]	159+015	159+695
2514	Ilias Manolakis	N2	["5"]	14 September 2021	Unmitigated	Detailed design	Lack of groundwater monitoring within 150m either side of the alignment between chainages 158+300 and 158+795 (PMA 3.0) near an unnamed tertiary watercourse/drain.	Uncertainty as to whether the unnamed tertiary watercourse/drain is in hydraulic continuity with groundwater system- groundwater table may be higher than previously anticipated.	Consider groundwater monitoring from wells beyond 150m either side of the alignment to determine the groundwater system in this area. Contractor to carry out further groundwater monitoring near this location within 150m of the alignment and potential water surface sampling. A 0.6m thick drainage layer from granular fill 6C should be constructed at the base of the embankment from Ch 158+386 to Ch 158+795 (PMA 3.0). Note this is outside the area of rigid inclusions.	["BBV","HS2"]	158+300	158+795
2494	Ilias Manolakis	N2	["5"]	14 September 2021	Unmitigated	Construction	Compressible Ground.	Risk of bearing capacity failure and settlement of the embankment due to the presence of Glaciolacustrine deposits.	Rigid inclusions are designed for earthworks to mitigate possible failures. The base of the rigid inclusions must not be founded within Glaciolacustrine deposits or MMG IV/V. This design requirement should be strictly followed by the contractor during the construction. Should any ground variations be found during the installation of the rigid inclusion, designer to be consulted.	["BBV"]	159+015	159+695

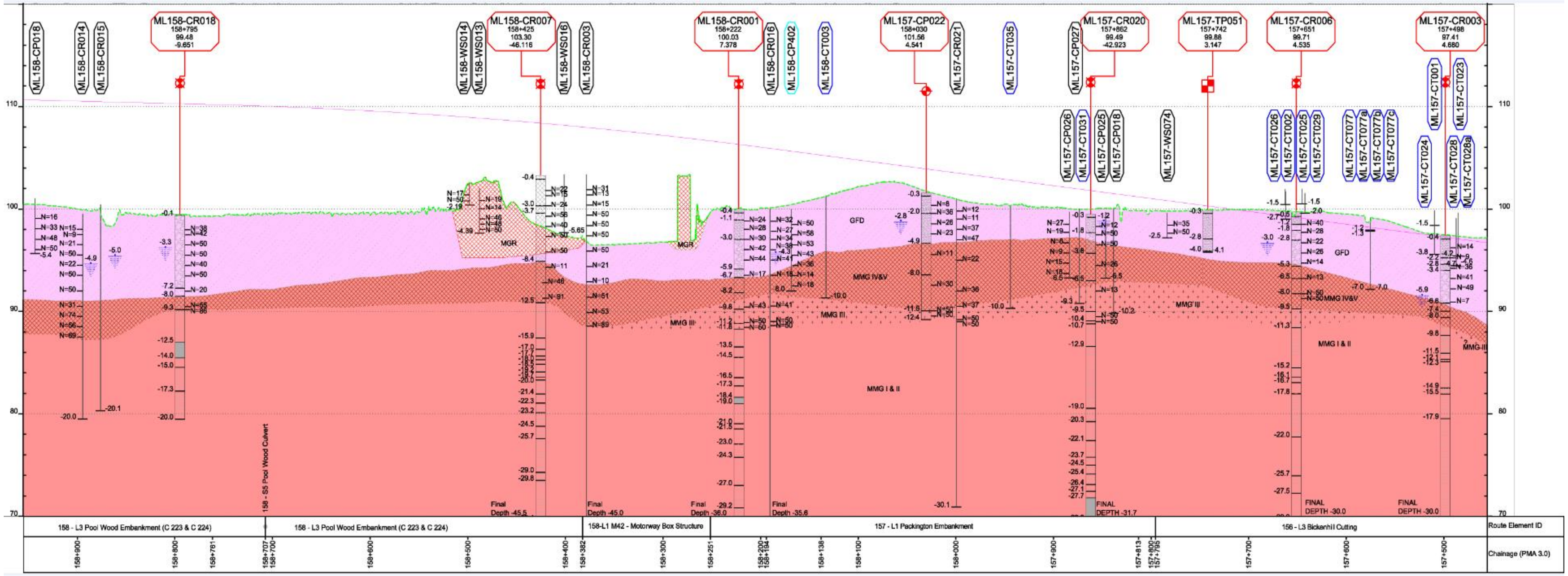
Balfour Beatty VINCI Working on behalf of HS2

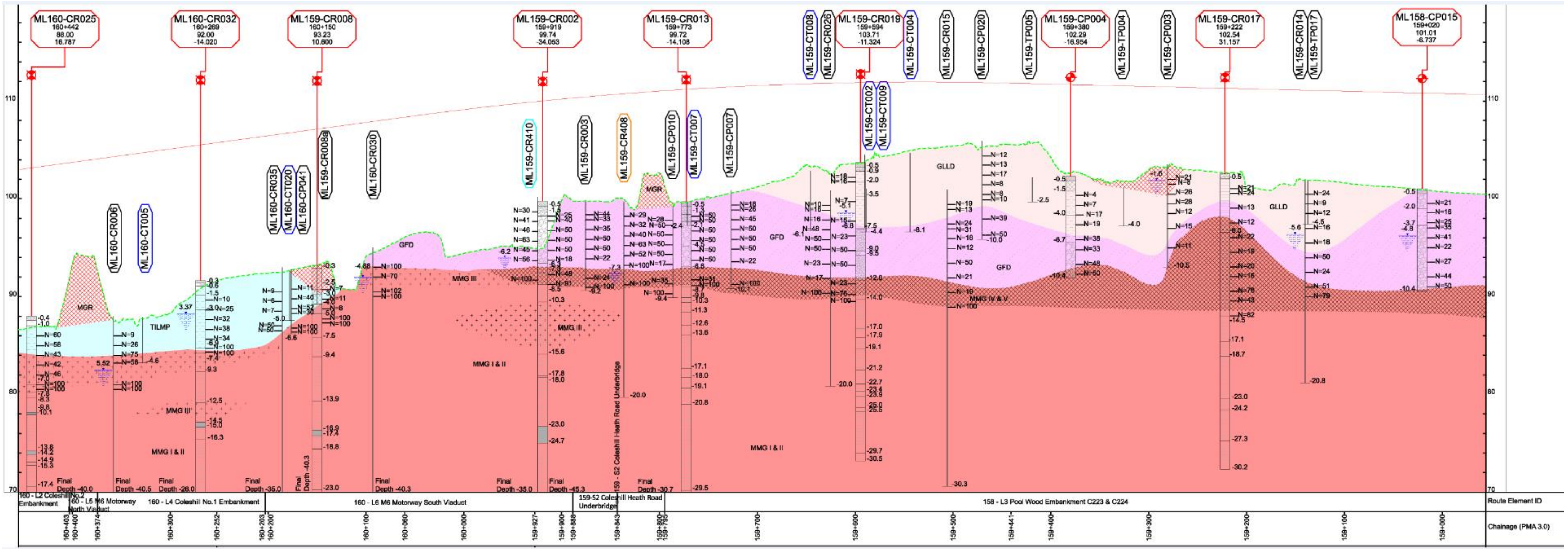
2495	Ilias Manolakis		["5"]	14 September 2021	Unmitigated	Construction	Existing Pond at this location.	Proposed earthworks on existing pond may result excessive settlements, embankment bearing failure and potential for contamination.	Pond relocation and ground inspection for potential contamination is required at this location. Rigid inclusions are designed for this area. Additional dig out and replace may be required subject to site inspection.	["BBV"]	159+140	159+225
2511	Ilias Manolakis	N2	["5"]	14 September 2021	Unmitigated	Operation	Ingress of groundwater into the embankment from Ch 159+210 to Ch 159+420.	Slope failure of the embankment.	Rigid inclusions have a Load Transfer Platform (LTP) layer which is constructed from granular material (6F5) and will help with draining the potentially rising groundwater. This will reduce the possibility of the groundwater ingress into the embankment. Although, there is a residual risk of insufficient draining capacity of the LTP which is unable to be mitigated. Contractor to provide safe system of work and drain groundwater when needed. Contractor to confirm that a permeable layer will be constructed under the Load Transfer Platform (LTP) to eliminate the risk of groundwater ingress into the embankment.	["BBV","HS2"]	159+210	159+420
2510	Ilias Manolakis	N2	["5"]	14 September 2021	Unmitigated	Construction	Ingress of groundwater into the embankment from Ch 159+210 to Ch 159+420	Slope failure of the embankment.	Rigid inclusions have a Load Transfer Platform (LTP) layer which is constructed from granular material (6F5) and will help with draining the potentially rising groundwater. This will reduce the possibility of the groundwater ingress into the embankment. Although, there is a residual risk of insufficient draining capacity of the LTP which is unable to be mitigated. Contractor to provide safe system of work and drain groundwater when needed. Contractor to confirm that a permeable layer will be constructed under the Load Transfer Platform (LTP) to eliminate the risk of groundwater ingress into the embankment.	["BBV","HS2"]	159+210	159+420
	Ilias Manolakis	N2	["5"]	14 October 2021	Unmitigated	Construction	There is insufficient ground investigation for reliable Cv values to be assigned to ground layers. There is a risk that should lower Cv values be encountered than assumed in the design then greater post-construction settlement will occur.	There could be an extended 'hold period' delaying construction for primary settlement to occur.	An observation and monitoring approach to be used during construction to monitor the primary settlement and only cast the track slab when primary settlement is substantially complete.	["BBV"]	159+015	159+695

- Pool Wood Culvert

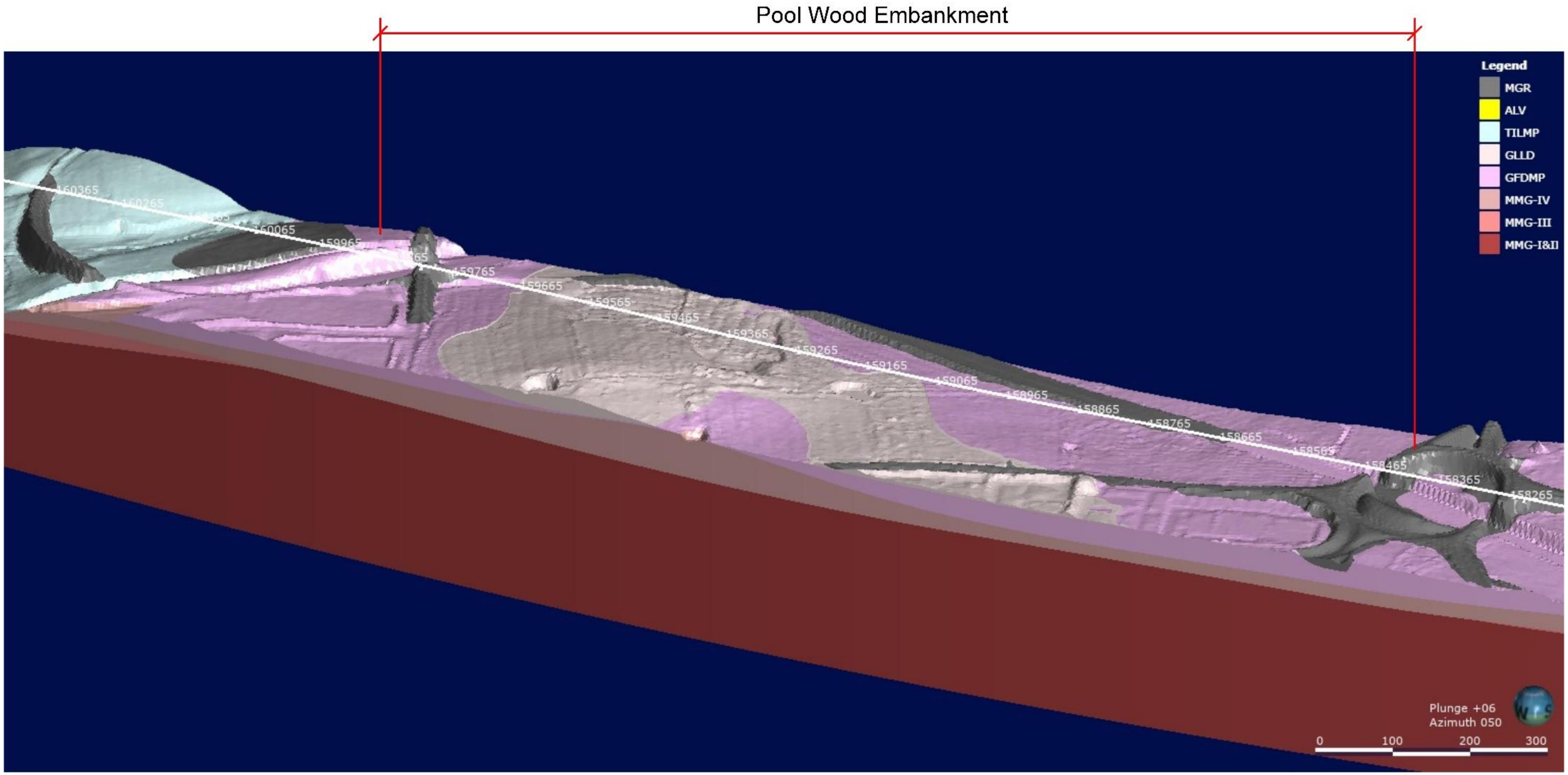
Risk ID	Originator	LOT	Sublot	Status	Classification	Hazard description	Impact description(description of the impact if the hazard is realised)	Proposed mitigation action(s)	Residual risk owner	Start Chainage	End Chainage
3252	Ilias Manolakis	N2	["5"]	Unmitigated	Operation	Lack of GI data within the foundation area of the culvert. Insufficient bearing capacity of founding stratum.	Bearing failure	Dig out and replace of top 2m of Glaciofluvial deposits is required for the area where the culvert is to be constructed. A competent engineer to inspect the ground for any soft spots or discrepancies with the geotechnical parameters assumed for the design. Validation GI is scheduled for the culvert area.	["BBV","HS2"]	158+875	158+875
3253	Ilias Manolakis	N2	["5"]	Unmitigated	Construction	Lack of GI data within the foundation area of the culvert. Insufficient bearing capacity of founding stratum.	Bearing failure	Dig out and replace of top 2m of Glaciofluvial deposits is required for the area where the culvert is to be constructed. A competent engineer to inspect the ground for any soft spots or discrepancies with the geotechnical parameters assumed for the design. Validation GI is scheduled for the culvert area.	["BBV","HS2"]	158+875	158+875
2487	Ilias Manolakis	N2	["5"]	Unmitigated	Detailed design	High sulphate content of ground conditions, particularly in any unforeseen Made Ground and Mercia Mudstone	Degradation of buried concrete, compromising the compressive strength	Existing chemical test information for the site is limited and it is recommended that additional chemical testing is to be undertaken as part of scheduled validation ground investigation for Stage 2 Detailed Design, to classify the sulphate content of the ground. An appropriate grade of concrete should be selected based on the sulphate content.	["BBV","HS2"]	158+875	158+875
3324	Ilias Manolakis	N2	["5"]	Unmitigated	Operation	Existence of a soft cohesive layer (2m thickness) around the culvert from Ch 158+875 to Ch 159+020.	The cohesive layer could lead to bearing capacity failure and differential or excessive settlements of the culvert and the embankment.	Ground treatment by excavation and replacement of 2m is required for the Glaciofluvial deposits between Ch 158+875 and Ch 159+020 due to the existence of a soft cohesive layer around the Pool Wood Culvert area.	["BBV","HS2"]	158+875	158+875

Appendix E Geological Long Section




ML160-CR025
ML160-CR032
ML159-CR008
ML159-CR002
ML159-CR013
ML159-CR019
ML159-CP004
ML159-CR017
ML158-CP015
MGR
TILMP
GFD
GLLD
MMG III
MMG II
MMG I & II
MMG IV & V
160 - L2 Coleshill No.2 Embankment
160 - L5 M6 Motorway North Viaduct
160 - L4 Coleshill No.1 Embankment
160 - L6 M6 Motorway South Viaduct
159-S2 Coleshill Heath Road Underbridge
158 - L3 Pool Wood Embankment C223 & C224
Route Element ID
Chainage (PMA 3.0)

3D geological View of Pool Wood Embankment



Appendix F Assumption Register

- Pool Wood Embankment

Assumption ID	Owner	Subject	Assumption/Exclusion	Rationale	Date Raised1
ASM-GT-2610	Twana Haji	Pool Wood Embankment - Landscape bund	It is assumed that the landscape bund in Pool Wood Embankment will be built in a staged construction with Prefabricated Vertical Drains. This assumption was agreed upon with BBV.	The ground under the landscape bund is soft soil. Rigid inclusions were designed to support the embankment of the landscape bund in the Consolidation Design Stage. The replacement of the Rigid Inclusions with Prefabricated Vertical Drains will reduce the carbon footprint and is more cost effective.	12/10/2020
ASM-GT-3039	Ilias Manolakis	Pool Wood Embankment - Made Ground	Made Ground associated with highways embankment for the M42/A452 Roundabout at the southern end of Pool Wood Embankment is assumed to be dug out and replaced.	The Made Ground should be removed due to uncertainties and a high level of data scatter/variation associated with this soil. Furthermore, the excavation of this Made Ground conforms with geo environmental recommendations requiring the removal of contaminated material. It should be mentioned that the Made Ground is likely to be removed due to leachate exceedances of water quality standards for arsenic, boron, cadmium and vanadium recorded in ML158-WS016, also recommended by HS2 Geo-environmental Report for Sublots 5 and 6 (1MC09-BBV_MSD-EV-REP-N002-100002). the Made Ground is also likely to be removed as part of the M42/A452 Roundabout removal.	21/04/2021
ASM-GT-3040	Ilias Manolakis	Pool Wood Embankment - Pond	It is assumed that the pond under Pool Wood embankment (around Ch 159+150 to Ch 159+230) will be relocated and any associated contamination will be remediated.	This is in accordance with the Geo-environmental recommendation due to the contamination identified within the surrounding area.	26/04/2021
ASM-GT-3042	Ilias Manolakis	Pool Wood Embankment - Made Ground	Geotechnical parameters of the soft GLLD were assumed for the MGR that exists around 159+300	Unavailability of geotechnical parameters of the MGR	21/04/2021
ASM-GT-3043	Ilias Manolakis	Pool Wood Embankment	2m of the top ground layer layer from Ch 158+860 to 159+020 to be excavated and replaced with treated embankment fill.	Existence of a cohesive layer of soft Glaciofluvial deposits.	28/05/2021

ASM-GT-3124	Ilias Manolakis	Pool Wood Embankment	2.5m of the top ground layer from Ch 159+700 to 159+805 to be excavated and replaced with treated embankment fill.	Existence of Glaciolacustrine deposits and a cohesive layer of soft Glaciofluvial deposits.	28/05/2021
ASM-GT-3190	Ilias Manolakis	Pool Wood Embankment - Existing masts foundations	There are existing pylon foundations (ZF107 and ZF108) at Ch 159+675 and Ch 159+350, respectively. At these pylon locations, the associated foundation bases should be fully excavated to depth. In general the excavation can be later replaced with compacted site won material. Should the excavation for the foundation removal extend beyond 3.0mbgl, then the resulting void below that 3.0m level should be backfilled with a compacted granular material conforming to 6F5 criteria as stipulated with the defined Specification for Civil Engineering Works Series 600: Earthworks (ref: 1MC08-BBV_MSD-GT-SPE-N000_100001). Above this 3.0m level site won compacted material may be utilised. The site won material itself in general should be inspected and it is assumed it will be of reasonably manageable consistency and not excessively soft or high in organic content.	The removal of the mast foundations is required to avoid the clash with rigid inclusions and cause obstruction to the construction process. The stipulation of use of granular material below the 3.0m level is to avoid undue negative skin friction being induced upon the rigid inclusions subsequently to be installed in the area. In addition to these above conditions, the removal of the foundations and replacement process should be supervised by a suitably qualified geotechnical engineer.	27/07/2021
ASM-GT-3204	Ilias Manolakis	Pool Wood Embankment - Load Transfer Platform	The longitudinal gradient of the Load Transfer Platform (LTP) is assumed to be up to 3%.	A gradient of up to 3% is required for Pool Wood Embankment rigid inclusion zone in order to obtain a reasonable cut to fill balance.	21/07/2021

	Ilias Manolakis	Pool Wood Embankment - Load Transfer Platform	The friction angle of 6F5 for the construction of the load transfer platform for Pool Wood Embankment rigid inclusions must at least be 38°.	A minimum of 38° is required for the load transfer platform to eliminate punching of the rigid inclusions through the load transfer platform.	14/10/2021
	Ilias Manolakis	Pool Wood Embankment - Load Transfer Platform	It is a design assumption that the geogrid in the load transfer platform of the rigid inclusions will be anchored sufficiently at each end to mobilise the full tensile design strength between all the rigid inclusions.	This is a design requirement in accordance with BS 8006.	14/10/2021
	Ilias Manolakis	Pool Wood Embankment - Load Transfer Platform	The upfill material to set the level of the load transfer platform is assumed to have an undrained shear strength of at least 35kPa subject to site verification.	An undrained strength of 35kPa is required to reduce settlements and eliminate bearing capacity failure of the ground in between rigid inclusions.	14/10/2021

- Pool Wood Culvert

Assumption ID	Assumption/Exclusion	Rationale	Owner	Date Raised	Closure	Closure
ASM-GT-3044	2m of the top ground layer at the location of Pool Wood culvert from Ch 158+855 to Ch 159+015 to be excavated and replaced with treated embankment fill.	Existence of a soft cohesive layer of Glaciofluvial deposits.	Ilias Manolakis	21 May 2025	OPEN	

Appendix G CDM Risk Register

- Pool Wood Embankment

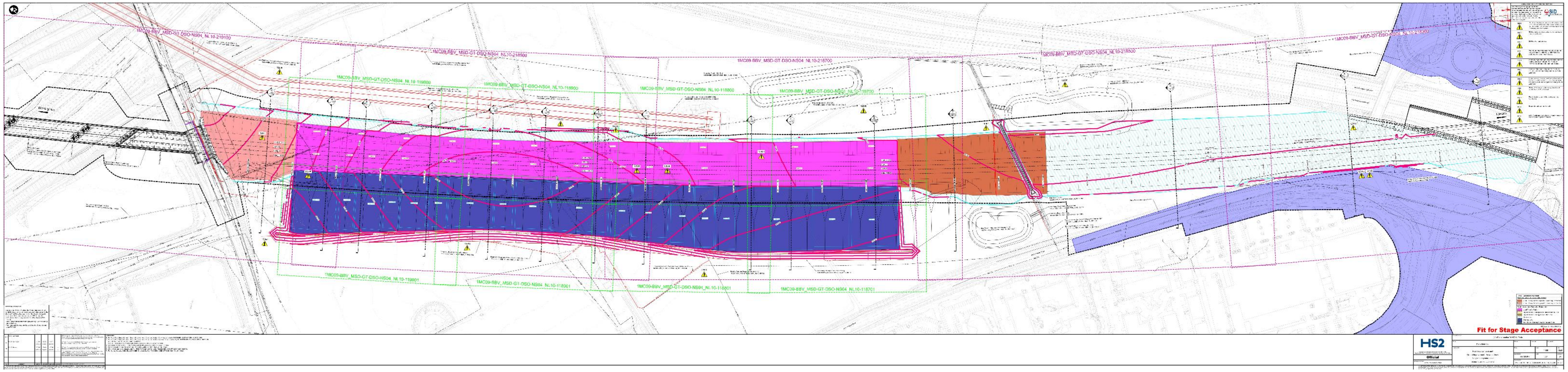
ID	cdmSite	cdmPWStructure	cdmStage	cdmHazardType	cdmHazardDescription	cdmRiskDescription	cdmMitigationDescription	cdmInitialRiskScore	cdmStageMitigationSuggestion	cdmResidualRiskScore
12888	SL5	Pool Wood Embankment	Construction	Safety	Excessive ground Movements induced by proposed works affecting different pylons at approximate chainage 159+200, could lead to either serviceability or H&S risks.	There is a low likelihood since the embankment is supported by rigid inclusions. The impact could be moderate.	Unable to mitigate the risk as far as reasonably practical.	6	Contractor to allow monitoring of the pylons and to consult with the third parties.	6
12889	SL5	Pool Wood Embankment	Construction	Health	Significant leachate exceedance of nickel and high TPH soil concentrations within former infilled pond (ML159-CP003) could lead to contamination of the underlying controlled waters.	There is a high likelihood of finding contamination around the former infilled pond. The impact could be moderate, however sufficient GI around the pond is not available.	Rigid inclusions are designed for this area to satisfy SLS and ULS design requirements. However, the designer was unable to mitigate the contamination related risk as far as reasonably practical.	12	Contractor to refer removal of fill material within former pond, and stabilisation of material prior to recovery in accordance with MMP. Refer to 1MC09-BBV_MSD-EV-REP-NS04-100007 Pool Wood Embankment DQRA and Remediation Strategy covering a small localised hotspot within an infilled pond at approximate Chainage 159+350 associated with former brickworks.	12
12891	SL5	Pool Wood Embankment	Construction	Safety	Failure of earthworks due to excessive surcharge loadings. This could lead to slope failure, increasing the risk of damage and injury to the workforce. (Note: coordinates represent a point close to the centre of the area covered by this risk).	There is a moderate likelihood of failure of earthworks due to excessive surcharge loadings. Mitigation actions should be taken, as the impact of the risk could be critical.	The design loads will be added to the drawing notes for the construction stage. The designer was unable to mitigate the residual risk as far as reasonably practical.	15	In line with the Detailed Design – Basis of Design Report Methodology – Earthworks (1MC08-BBV-MSD-GT-REP-N001-100159); for: Embankment: Designed to accommodate a 50kPa live surcharge loading 3.0m from the crest of the embankment slope in the long-term conditions. Designed to accommodate a 50kPa live surcharge loading 3.0m from the crest of the slope in the short-term construction situation. Contractor to note a maximum of 50kPa construction plant loading is considered and allowed in the design of the construction phase.	10
12892	SL5	Pool Wood Embankment	Construction	Safety	Failure of earthworks due to insufficient compaction of fill material. This could lead to slope failure, causing injuries to the workforce. (Note: coordinates represent a point close to the centre of the area covered by this risk).	There is a low likelihood of failure of earthworks due to insufficient compaction of fill material. Mitigation actions should be taken, as the impact of the risk could be critical.	Unable to mitigate the risk as far as reasonably practical.	8	Earthworks to be constructed by a competent contractor in accordance with an earthworks specification that is based on the geotechnical design. Construction refer to 1MC09-BBV_MSD-GT-SPE-NS04_NL10-100004 HS2 Earthworks Specification Appendix Series 0600: Pool Wood Embankment.	8
12893	SL5	Pool Wood Embankment	Construction	Safety	Unforeseen ground conditions potentially leading to slope and bearing failure and presenting a risk of injury to personnel. (Note: coordinates represent a point close to the centre of the area covered by this risk).	Since locally there are zones of insufficient available GI, there is a moderate likelihood of slope and bearing failure due to unforeseen ground conditions. Mitigation actions should be taken, as the impact of the risk could be critical.	Unable to mitigate the risk as far as reasonably practical.	12	The founding stratum of the embankment should be inspected by a competent geotechnical engineer to ensure that the ground conditions are consistent with those assumed in the design. Specific requirements are presented in the HS2 Earthworks Specification Appendix Series 0600: Pool Wood Embankment. Ref. 1MC09-BBV_MSD-GT-SPE-NS04_NL10-100004.	12
12896	SL5	Pool Wood Embankment	Construction	Safety	Striking unexploded ordnance leading to injuries or fatalities. (Note: coordinates represent a point close to the centre of the area covered by this risk).	The likelihood of the risk is low, as the area is categorised as a low risk zone from UXO. The impact of striking unexploded ordnance could be catastrophic for the safety of the workforce.	An Unexploded Ordnance Desk Study (Document No 0615-ZET-GT-REP-000-000001) was carried out and this summarises that the site is at low risk from UXO. The designer was unable to mitigate the risk as far as reasonably practical.	5	null	5
12897	SL5	Pool Wood Embankment	Construction	Health	Potential contact with contaminated soils due to lack of GI from Ch 158+391 to 158+780. This could lead to human health issues. (Note: coordinates represent a point close to the centre of the area covered by this risk).	There is a moderate likelihood of potential contact with contaminated soils. Mitigation actions need to be taken to moderate the risk impact.	Unable to mitigate the risk as far as reasonably practical.	9	Adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.	9
12898	SL5	Pool Wood Embankment	Construction	Safety	The presence of construction plants near the existing and proposed OLE mast near Ch 158+840, 159+030, 159+225, 159+500 and 159+750, during the embankment construction could lead to electrocution, resulting in severe damage to the construction plants and fatal injuries to the site personnel.	The likelihood of electrocution is quite high. Mitigation actions should be taken, as the impact of the risk could be critical.	Unable to mitigate the risk as far as reasonably practical.	16	Contractor's work package plan to detail the work arrangement during the embankment construction. Contractor to determine the safety exclusion zone between the construction plants (e.g. excavator, crane) and the OLE mast, and agree the work arrangement with the OLE utility company.	16
12899	SL5	Pool Wood Embankment	Construction	Health	Inhalation of potential ground gases from adjacent landfill, especially from Ch 159+150 to Ch 159+400, could lead to human health issues.	The risk likelihood is high, and mitigation actions should be taken to moderate the potential risk impact.	Unable to mitigate the risk as far as reasonably practical.	12	Adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.	12
12902	SL5	Pool Wood Embankment	Maintenance	Safety	Failure of earthworks due to excessive surcharge loading during maintenance of the railway by HS2. This could lead to slope failure, increasing the risk of damage and injury to the workforce. (Note: coordinates represent a point close to the centre of the area covered by this risk).	There is a moderate likelihood of failure of earthworks due to excessive surcharge loading during maintenance of the railway by HS2. Mitigation actions should be taken, as the impact of the risk could be critical.	Unable to mitigate the risk as far as reasonably practical.	12	Pool Wood Embankment is designed to accommodate a 50kPa live surcharge loading in accordance with the Detailed Design – Basis of Design Report Methodology – Earthworks (1MC08-BBV-MSD-GT-REP-N001-100159). Apart from the 50 kPa surcharge loading, no additional plant loading has been considered.	12
12910	SL5	Pool Wood Embankment	Maintenance	Health	Potential contact with contaminated soils due to lack of GI from Ch 158+391 to 158+780. This could lead to human health issues. (Note: coordinates represent a point close to the centre of the area covered by this risk).	There is a moderate likelihood of potential contact with contaminated soils. Mitigation actions need to be taken to moderate the risk impact.	Unable to mitigate the risk as far as reasonably practical.	9	Adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.	9
12911	SL5	Pool Wood Embankment	Maintenance	Health	Inhalation of potential ground gases from adjacent landfill, especially from Ch 159+150 to Ch 159+400, could lead to human health issues. (Note: coordinates represent a point close to the centre of the area covered by this risk).	The risk likelihood is high, and mitigation actions should be taken to moderate the potential risk impact.	Unable to mitigate the risk as far as reasonably practical.	6	Adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.	6
13893	SL5	Pool Wood Embankment	Construction	Safety	Temporary slope stability issues in the short term when installing drainage at the toe of the landscape bund. Slope failure can lead to risk of damage and injury to the workforce. (Note: coordinates represent a point close to the centre of the area covered by this risk).	The likelihood and the impact of the risk is moderate.	Unable to mitigate the risk as far as reasonably practical.	9	Contractor's responsibility to provide temporary works. Contractor to monitor ground conditions as excavation proceeds. The temporary slope stability to be assessed and designed by competent engineers.	9

13906	SL5	Pool Wood Embankment	Construction	Safety	#Geotechnical	Falling into the pond (from Ch 159+150 to Ch 159+200) can lead to damage and injury to the workforce. (Note: coordinates represent a point close to the centre of the area covered by this risk).	The likelihood of the risk is low, but the impact could be high.	Unable to mitigate the risk as far as reasonably practical.	8	Contractor to ensure safe working conditions close to the existing pond. Suitable PPE to be provided to workforce working in proximity to the pond. Remediation to be performed prior to the construction works.	8
13907	SL5	Pool Wood Embankment	Construction	Safety	#Geotechnical	Moderate leachate contamination of metals in deep Made Ground associated with highways (ML158-WS016) can increase the risk of contamination to underlying controlled waters. (Note: coordinates represent a point close to the centre of the area covered by this risk).	The risk likelihood and impact can be described as moderate.	Unable to mitigate the risk as far as reasonably practical	9	Risk register item: Removal of contaminated Made Ground and stabilisation prior to recovery in accordance with MMP. Refer to 1MC09-BBV_MSD-EV-REP-NS04-100007 Pool Wood Embankment DQRA and Remediation Strategy.	9
13908	SL5	Pool Wood Embankment	Construction	Safety	#Geotechnical	Groundwater ingress into earthworks/excavations from Ch 159+200 to Ch 159+450 (zone of Rigid Inclusions) could lead to injuries or damage to the workforce.	The risk likelihood can be described as moderate and its impact as critical.	Rigid inclusions have a Load Transfer Platform (LTP) layer which is constructed from granular material (6F5) which will help with reducing groundwater ingress into the embankment. Although, there is a residual risk of insufficient draining capacity of the LTP which is unable to be mitigated as afar as reasonably practical.	12	Contractor to provide safe system of work and drain groundwater when needed. Contractor to confirm that an permeable layer will be placed under the Load Transfer Platform (LTP) to drain excess water and to eliminate the groundwater ingress into the embankment.	8
13913	SL5	Pool Wood Embankment	Construction	Safety	#Geotechnical	Earthworks instability due to adverse groundwater conditions. This could lead to slope failure, increasing the risk of damage and injury to the workforce. (Note: coordinates represent a point close to the centre of the area covered by this risk).	The likelihood of the risk is low. However, mitigation actions are needed to moderate the risk.	A layer of selected material is designed to protect the embankment from groundwater ingress in the zones where groundwater level is close to the ground surface. There is still residual risk associated with uncertainties within the available GI data.	6	Contractor to inspect the groundwater levels prior the commencement of the construction works.	6
13973	SL5	Pool Wood Embankment	Operation	Safety	#Geotechnical	Earthworks instability due to adverse groundwater conditions. This could lead to slope failure, increasing the risk of damage and injury to the workforce. (Note: coordinates represent a point close to the centre of the area covered by this risk).	The likelihood of the risk is low. However, mitigation actions are needed to moderate the risk.	A layer of selected material is designed to protect the embankment from groundwater ingress in the zones where groundwater level is close to the ground surface. There is still residual risk associated with uncertainties within the available GI data.	8	Contractor to inspect the groundwater levels prior the commencement of the construction works.	8
14205	SL5	Pool Wood Embankment	Construction	Safety	#Geotechnical	Rigid inclusions clash with the existing mast foundations. This clash will cause obstruction to the construction of rigid inclusions, and in turn will impose the risk of bearing failure and slope stability issues to the embankment, increasing the risk of injuries and fatalities to the workforce.	The risk likelihood is high, but the impact is assumed to be low.	Unable to mitigate the risk as far as reasonably practical.	10	Contractor to ensure that the existing mast foundations will be removed. Then the excavated area should be replaced with compacted suitable fill material. Construction works should be in line with the Temporary works design package, the foundations should be removed and the excavated locations should be backfilled. Any depths beyond 3m below ground level must be backfilled with granular soil 6F5.	10
14229	SL5	Pool Wood Embankment	Construction	Safety	#Geotechnical	Plants operation close to the embankment edge during construction. This could lead to plant overturning/fall increasing the risk of injuries and fatalities to the workforce. (Note: coordinates represent a point close to the centre of the area covered by this risk).	The risk likelihood is moderate. However, mitigation actions should be taken as the risk impact could be critical.	Unable to mitigate the risk so far as reasonably practical.	10	Contractor to ensure safe working conditions close to the embankment edge and to properly manage plant movements. Contractor to consider exclusion zones and produce an appropriate Construction Phase Plan (CPP).	10
15518	SL5	Pool Wood Embankment	Construction	Safety	#Geotechnical	Ground Movements induced by proposed works affecting a diverted pylon at approximate chainage 159+220. This could lead to serviceability issues, potential collapse of the pylon, or H&S risks.	The likelihood of the risk is low to medium, although the impact could be critical.	A Plaxis analysis was undertaken for that area, which showed possibility of ground heave induced by embankment loads around the pylon. Instrumentation and monitoring is proposed to monitor the ground movements around the pylon during and after construction. There is a residual risks associated with the construction period and the designer is unable to mitigate so far as reasonably practical.	8	In case of any pylon stability issues contractor to consider stabilising the pylon by means of anchoring or potential relocation of the pylon.	8
16115	SL5	Pool Wood Embankment	Construction	Safety	#Geotechnical	Excavation of Made Ground in the clash area between Pool Wood Embankment and Highways Embankment adjacent to live traffic. This can increase the risk of injuries and fatalities during the embankment construction stage.	The risk likelihood is low, however mitigation actions should be taken as the risk impact could be critical.	The designer was unable to mitigate the risk as far as reasonably practical.	8	Contractor to provide safe system of work to ensure safe working next to live traffic are used. Contractor to provide safety barriers and access exclusion zone during construction.	8
16116	SL5	Pool Wood Embankment	Construction	Safety	#Geotechnical	Excavation of Made Ground in the clash area between Pool Wood Embankment and Highways Embankment. This can undermine the stability of Highways Embankment increasing the risk of injuries and fatalities	The risk likelihood is low, but mitigation measures need to be taken as the impact of the risk could be critical.	The designer was unable to mitigate the risk as far as reasonably practical.	8	Contractor to provide a temporary support solution to Highways Embankment during the excavation of Made Ground.	8
16461	SL5	Pool Wood Embankment	Construction	Safety	#Geotechnical	Risk of encountering UXO during construction works which can lead to a potential for explosions, resulting in serious injury/death of personnel. (Note: coordinates represent a point close to the centre of the area covered by this risk).	Contact with UXOs could pose catastrophic risk to personnel involved. With proper mitigation, however, the likelihood of such an event can be reduced.	Designer has consulted the scheme design UXO desk study (0615-ZET-GT-REP-000-000001) and determined the area of Pool Wood Embankment to have a low potential for UXO hazards.	10	null	5

- Pool Wood Culvert

ID	cdmSite	cdmPWStructure	cdmStage	cdmHazardType	cdmHazardDescription	cdmRiskDescription	cdmMitigationDescription	cdmInitialRiskScore	cdmStageMitigationSuggestion	cdmResidualRiskScore
12869	SL5	Pool Wood Culvert	Construction	Safety	Striking unexploded ordnance leading to injuries or fatalities.	The likelihood of the risk is low, as the area is categorised as a low risk zone from UXO. The impact of striking unexploded ordnance could be catastrophic for the safety of the workforce.	An Unexploded Ordnance Desk Study (Document No 0615-ZET-GT-REP-000-000001) was carried out and this summarises that the site is at low risk from UXO. The designer was unable to eliminate the risk as far as reasonably practical.	5	Contractor to inspect the ground and ensure that no UXO exist on the construction area.	5
12871	SL5	Pool Wood Culvert	Construction	Health	Contamination from Made Ground could lead to health and safety implications for construction workers.	The likelihood of the risk is low, but mitigation actions should be taken to moderate the risk impact.	A contaminated ground risk assessment was carried out for Sublot 5 (1MC09-BBV-EV-REP-N002-100009). The designer was unable to mitigate the risk as far as reasonably practical.	3	Contractor to follow the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.	3
12872	SL5	Pool Wood Culvert	Construction	Health	Inhalation of potential ground gases from adjacent landfill. This could lead to health issues to the site workforce and to the public.	The likelihood of the risk is low, but mitigation actions should be taken to moderate the risk impact.	Unable to mitigate the risk as far as reasonably practical.	2	Contractor to apply the appropriate application of the safety in design provisions required under the CDM Regulations. Contractor to ensure that excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works. A mitigation plan for excavations where manned entry is planned should be produced.	2
14083	SL5	Pool Wood Culvert	Construction	Safety	Insufficient bearing capacity of founding stratum. This could lead to bearing failure resulting in shear and bending failure of the culvert walls (structure damage) and injury to the workforce.	The likelihood of the risk is moderate. However, mitigation actions should be taken as the risk impact could be critical.	Ground improvement by excavation of top 2m of soft cohesive Glaciofluvial deposits and replacement with treated embankment fill has been proposed for the design.	12	Contractor to ensure that a competent geotechnical engineer will inspect the formation. Any soft spots at formation level to be over excavated and replaced with compacted granular fill. Should any discrepancies of soil conditions found at the formation, designer to be consulted.	12
14084	SL5	Pool Wood Culvert	Operation	Safety	Insufficient bearing capacity of founding stratum. This could lead to bearing failure resulting in shear and bending failure of the culvert walls (structure damage) and injury to the workforce.	The likelihood of the risk is moderate. However, mitigation actions should be taken as the risk impact could be critical.	Ground improvement by excavation of top 2m of soft cohesive Glaciofluvial deposits and replacement with treated embankment fill has been proposed for the design.	12	Contractor to ensure that a competent geotechnical engineer will inspect the formation. Any soft spots at formation level to be over excavated and replaced with compacted granular fill. Should any discrepancies of soil conditions found at the formation, designer to be consulted.	10

Appendix H Engineering Earthworks – Plan Drawing



Appendix I Stage 1 Carry Over Comments

Stage 1 CRT deliverable	Stage 1 Deliverable Name	Stage 1 doc reference	Stage `1 doc revision	Stage 1 comment sheet ref	Stage 1 Comment ID#	Stage 1 Comment Code	Original C01 comment	Stage 1 comment summary	Stage 2 CRT deliverable where action to be addressed	Stage 2 deliverable Name	Stage 2 doc reference (if available)	Status	Additional responses to Stage 1 comments
GiDR	GiDR 22: Packington Embankment to Pool Wood Embankment	1MC09-BBV_MSD-GT-REP-NS04_NL10-100003	C02	1MC09-HS2-IM-CMT-NS04_NL10-000057	#11	Code 1	Ground Treatment - It is indicated that ridged inclusions in the form of CFA piles are required between Ch 159+000 - Ch 159+750 to approximate depth of 11m through the Glaciolacustrine deposits. The predicted settlement is showed to be <60mm which means that the settlement is not the main reason for proposing the ground treatment. Can you clarify what is the reason for proposing the rigid inclusions underneath the main embankment as well as why the use of CFA piles as opposed to the CMC is proposed.	Use of rigid inclusions	GDR	DD Geotechnical Design Report for Pool Wood Embankment and Pool Wood Culvert	1MC09-BBV_MSD-GT-REP-NS04_NL10-100048	Open	The main reason for designing rigid inclusions for Pool Wood Embankment is the ULS failure of Glaciolacustrine Deposits in bearing capacity. The strength of the ground is too low to carry the embankment and surcharge loads. Additionally, the new ground investigation data arrived for Pool Wood Embankment showed that the asset also experiences excessive settlements larger than 60mm. Since there are zones of high SPT N values (stiff) within the Glaciolacustrine as well as the underlying Glaciofluvial Deposits, CMCs are difficult to be constructed. For this reason, CFAs are proposed.
GiDR	GiDR 22: Packington Embankment to Pool Wood Embankment	1MC09-BBV_MSD-GT-REP-NS04_NL10-100003	C02	1MC09-HS2-IM-CMT-NS04_NL10-000057	#12	Code 1	Ground treatment - Landscape bunds. The landscape bunds up to 15m in height are proposed between Ch 158+800 - Ch 159+760 on the western side of the railway with 1in 3 internal and 1 in4 external slopes. Clarify if the proposed ground treatment extends underneath the landscape bunds and justify the reason for that. What is a consequence of the settlements and/or slope failure of the external slope? If required, is there an opportunity identified in the Project Risk and Opportunity Register to eliminate/reduce them at the detailed design with the associated costs?	Use of rigid foundations	GDR	DD Geotechnical Design Report for Pool Wood Embankment and Pool Wood Culvert	1MC09-BBV_MSD-GT-REP-NS04_NL10-100048	Open	Rigid inclusions were designed in the Consolidation Stage to support the landscape bund. Although, the design was optimised in the Detailed Design Stage, and a staged construction with band drains was designed for the landscape bund to improve the foundation soil.
GiDR	GiDR 22: Packington Embankment to Pool Wood Embankment	1MC09-BBV_MSD-GT-REP-NS04_NL10-100003	C02	1MC09-HS2-IM-CMT-NS04_NL10-000057	#16	Code 1	Details for transition should be included *Also 4.2, p.147-148*	Details of transitions	GDR	DD Geotechnical Design Report for Pool Wood Embankment and Pool Wood Culvert	1MC09-BBV_MSD-GT-REP-NS04_NL10-100048	Open	Details of the transition zones are included.
GiDR	GiDR 22: Packington Embankment to Pool Wood Embankment	1MC09-BBV_MSD-GT-REP-NS04_NL10-100003	C02	1MC09-HS2-IM-CMT-NS04_NL10-000057	#18	Code 1	Contaminated land risk should be summarised rather than reference to another report	Contaminated land	GDR / EW Specification Appendix	DD Geotechnical Design Report for Pool Wood Embankment and Pool Wood Culvert HS2 Earthworks Specification Appendices for Pool Wood Embankment	1MC09-BBV_MSD-GT-REP-NS04_NL10-100048 1MC09-BBV_MSD-GT-SPE-NS04_NL10-100004	Open	Noted. The contaminated land risks are summarised.

RSK GEOSCIENCES

APPENDIX D2 FIELD CHANGE REQUEST – POOL WOOD EMBANKMENT: PVD REDUCTION (DATED 17/07/2023)

1. BBV CONSTRUCTION / DESIGN MANAGEMENT

KEY INFORMATION	
FCR Document Number	1MC09-BBV-DS-CRR-NS04_NL10-000173
FCR Revision	P01
FCR Title	Field Change Request - Pool Wood Embankment: PVD Reduction
Date Raised	17/07/2023
Date Response Required	31/07/2023
Originator name	Tom BAXENDALE
Originator email address	Tom.baxendale@balfourbeattyvinci.com
Originator company	BBV
Sublot	SL5S
Section	NS04
Lot	NL10
Unique Asset ID of affected asset(s)	HS2-000001162
Design discipline affected	Geotechnics

DESCRIPTION

Description:

Considering the area had been preloaded with stockpiles for approximately 18 months, BBV would like DJV to consider whether the requirement for PVDs is still required.

DJV have provided BBV with some locations of additional GI which will be provided to DJV in due course.

BBV have shared aerial surveys from the last 18 months showing the height of the bunds.

BBV would like DJV to assess whether the PVDs are still required under the landscape bund, or whether there is an opportunity to remove them from the design. A significant amount of cost is associated with the 6C drainage blanket which is 750mm thick. The removal of this blanket would provide the most significant saving in cost.

REFERENCE DRAWINGS / SCHEDULES / SPECIFICATIONS

Number	Revision	Suitability	Title

BBV Design Manager/Coordinator to Approve	**Name:** Tom BAXENDALE
	Email address: tom.baxendale@balfourbeattyvinci.com

2. DJV CONSTRUCTION SUPPORT

KEY INFORMATION	
Construction Support Lead name	Eduardo Paredes
Construction Support Lead email address	eparedes@systra.com

EVALUATION BY DJV CONSTRUCTION SUPPORT				
FCR Category (select one)	**CLARIFICATION** ☐	**MINOR CHANGE** ☐	**MODERATE CHANGE** ☒	**MAJOR CHANGE** ☐
Category definition	Clarify details/notes; Resolve contradictions; Resolve dimensional clashes	Change deviates from an assured design deliverable, but does not have an impact on the "intent" of the design	Change deviates from an assured design deliverable, and does deviate from the "intent" of the design - new design activities required No change to Fit, Form or Function that affects Rail Systems interfaces or approved Consents	Change deviates from an assured design deliverable, and does deviate from the "intent" of the design - new design activities required **&** Change to Fit, Form or Function that affects Rail Systems interfaces or approved Consents
Independently Checked by:	N/A	Cat. 1, Cat. 2 or Cat. 3 Checker (subject to Independent Review below)		
Purpose of submission to HS2	N/A	For Information	For Information	For Acceptance

RESPONSE BY DJV CONSTRUCTION SUPPORT
Information on the stockpiles has been provided to the DJV from month-by-month drone surveys which provide significantly tight point cloud information with respect to the geometry of the aforementioned stockpiles. As BBV have observed, the stockpiles have been placed to the west of the trace over the footprint of the landscape area for a period of 18 months. As is the nature of stockpiles, these are temporary by definition and review of the information both from point cloud drone surveys and associated month-by-month aerial photographs demonstrate that, firstly the stockpiles do not encompass the entirety of the footprint of the landscape area and secondly, that full height (up to around 15 metres occasionally) was not achieved in all areas. As such, although it can be definitively stated that some consolidation will have occurred in this area, it will partial, both spatially and temporally and not encompassing of the area in general. Nonetheless, it is undeniable that heights close to and in some cases beyond those required in the permanent design were achieved whilst ground improvement works were being undertaken to the adjacent trace area. This provides invaluable, previously unavailable, information with regards to the condition of the underlying ground which, to optimise the solution to the benefit of HS2 and the project, can and therefore should be accounted for if possible. An exhaustive review of survey data was undertaken by the DJV. This was cross-correlated with both areas considered most onerous with respect to the underlying geological profile from the 3D geological model and those stockpiles which could be considered to present the highest destabilising forces to the underlying soils (not necessarily in areas of highest stockpile but those where stockpiles were in direct contact with soils of poor consistency).

Plaxis analysis was undertaken to back-analyse these areas with realistic parameters adopted for the stockpile material itself. The analysis in general indicated a significant improvement in short term parameters (for which the PVD solution was originally adopted). These real back-analysed parameters were then feed back into the design model for the area.

The analysis determined an approximate 30% increase in global safety factors for the area both for short term static and seismic scenarios considered fundamental for stable construction of the landscape. This indicates that the landscape should be constructable without the use of PVDs (and associated sequential lifts and hold periods) to achieve final permanent geometry.

Duration of stockpile construction was also observed to attempt to investigate the question; were the soil previously in a consolidated condition or are the determined back-analysed parameters a result of consolidation during the construction of the stockpile itself?

This question is also fundamental to the stable construction of the landscape itself and is inherently difficult to answer. However, what can be said definitely is that the stockpiles, within the duration of their construction, were built without observable failures either locally or globally. Thus, the durations of the stockpile construction should be used conservatively to guide the timeframes for an equally stable construction of the landscape itself. Indications are that most stockpiles were placed to their top levels with a two-month window. Thus, conservatively, the construction of the landscape itself could logically be stated to be achievable with a six-month standardised construction period.

In summary, therefore and accounting for the considerable amassed construction data provided by BBV (for which merit should be assigned) the following conclusion can be drawn as a response to BBVs field change request.

In principle the designer considers that reasonably the PVD's stipulated for the landscape area can be removed, subject to the following conditions:

- That the additional ongoing confirmatory testing is undertaken and reviewed, consisting of an array of CPTs with permeability testing at intervals (uCPTs). Information from which should be reviewed in due course by the DJV to further confirm suitability.
- That the landscape is constructed in no less than 6 months.
- That a hold point is made available prior to construction of the noise bund (representing the highest point of the landscape). This noise bund is a relatively small volume comparatively (perhaps representing 5 percent of the overall landscape volume and could potentially be installed during final topsoiling, subject to programming).
- That monitoring for the landscape as previously stipulated is respected. Consolidation observations will be needed to confirm the performance of the landscape earthwork.
- That the drainage blanket is maintained. Nonetheless the thickness of the blanket can reasonably be reduced (not eliminated) to 350mm to allow any residual water to exit, as originally envisaged in the design. Flows to the western drainage should be as per original design. In principle, given the ground conditions are improved, lower initial pulses of water are anticipated (hence allowing the reduction in thickness), These pulses and the capacity of associated temporary holding ponds must be monitored by the temporary works contractor during the lifting process and, if capacity is at risk of exceedance, lifts should cease temporarily to allow the water to be managed appropriately. Given the reduced thickness of the blanket a geotextile should be incorporated at top and bottom to minimise blockage and fines migration into the blanket.

It should be noted that for the trace itself several non-conformities have been managed with mitigation measures being recommended of additional observations over a potential extended hold period of up to 12 months. Logically the appropriate course of action is to contemporaneously observe the performance of the adjacent landscape to ensure the permanent design geometry and solution is achieved.

ATTACHMENTS PROVIDED IN SUPPORT OF FCR RESPONSE			
Number	**Revision**	**Suitability**	**Title**
None			

DRAWINGS / SCHEDULES / SPECIFICATIONS TO BE UPDATED					
Number	**Revision**	**Suitability**	**Title**	**Updated before FCR closed**	**To be updated at As-built stage**
1MC09-BBV_MSD-GT-REP-NS04_NL10-158324	C02	S4	Pool Wood Embankment - Band Drain - Setting Out Table	☐	☒
1MC09-BBV_MSD-GT-DSO-NS04_NL10-118701	C02	S4	Band Drain - Setting Out Plan - Sheet 01 of 04	☐	☒
1MC09-BBV_MSD-GT-DSO-NS04_NL10-118801	C02	S4	Band Drain - Setting Out Plan - Sheet 02 of 04	☐	☒
1MC09-BBV_MSD-GT-DSO-NS04_NL10-118901	C02	S4	Band Drain - Setting Out Plan - Sheet 03 of 04	☐	☒
1MC09-BBV_MSD-GT-DSO-NS04_NL10-119001	C02	S4	Band Drain - Setting Out Plan - Sheet 04 of 04	☐	☒
Any others as appropriate					

We certify that all reasonable professional skill, care, diligence and prudence as is under the/ Contract has been used in the preparation and verification of the response to this Field Change Request./

DJV Construction Support Endorsement	**Name (Author):** Fatemeh Ardakani	**Position:** Geo Design Engineer	**Date:** 08.08.23
	Name (Cat. 1 Checker): Stephen Cooper	**Position:** Geo Technical Expert	**Date:** 08.08.23

INDEPENDENT REVIEW OF CHECK CATEGORY				
Maximum Check Category that applied to the aspect(s) of design affected by the FCR (Refer to the relevant D&V Certificate(s))	**Reviewer/Checker Statement (select one box and enter associated name/position/date)**			
Cat. 1 Check(s):	No further check required beyond the Cat. 1 Check above.			☐
	Name (Cat. 1 Checker):	**Position:**	**Date:**	
Cat. 2 Check(s), except where noted below:	I have undertaken an independent (Cat. 2) **check** of the proposed FCR response in Section 2 and am satisfied that the proposed change is an acceptable change to the detailed design. I certify that reasonable professional skill and care have been used in checking that the FCR response complies with the Regulatory Requirements, Design Standards, Codes and Methods as defined in the Contract/Works Information.			☐
	Name (Cat. 2 Checker):	**Position:**	**Date:**	

<table>
<tr><td rowspan="4">Cat. 3 Check(s)

OR

Cat. 2 Check(s) but with a Cat. 3 interface (e.g. transition between Cat. 2 earthwork and Cat. 3 structural asset):</td><td colspan="3">I have undertaken an independent <u>review</u> of the FCR query and the proposed FCR response in Section 2, reviewing this against the criteria for determining if the FCR response requires Cat. 3 Checker consultation (as set out in FCR Procedure 1MC08-BBV-DS-PRO-N001-000001 revision C02, section 7.5.5).

I am satisfied that the nature of the FCR query and proposed FCR response do not change the detailed design to the extent that it requires a Cat. 3 or Cat. 2 Check, and that the Cat. 1 Check above is sufficient.</td><td rowspan="2">☒</td></tr>
<tr><td>Name (Cat. 1 or Cat. 2 Checker):
Peter Rutty</td><td>Position:
DJV Cat II check Geo lead</td><td>Date:
09.08.2023</td></tr>
<tr><td colspan="3">The proposed change requires further review and acceptance by the Cat. 3 checker.</td><td rowspan="2">☐</td></tr>
<tr><td>Name (Cat. 1 or Cat. 2 Checker):</td><td>Position:</td><td>Date:</td></tr>
</table>

Justification:

The justification presented above provides good reasons to proceed without band drains. I agree that the stockpiles should have increased soil strengths above those recorded during the GI and provide good empirical evidence that a stable bund can be formed.

However, I believe there are further reasons the proposal can be accepted. Having reviewed the ground investigation data from the site, it appears to me that weaker clay soils only occur adjacent to boundaries with granular soils; this is likely to have resulted in softening (the soils are low plasticity and so prone to soften substantially with small increases of moisture content) during exploratory hole formation and the weak strength is probably not real. In any event, consolidation of weaker clays will occur quickly following initial loading as they are adjacent to drainage boundaries.

There is also one location with anomalous data: Borehole ML159-CP004 at approx. ch159+380.

• Hand vane test results of 4.5kPa to 6kPa with SPT N=7 (which would indicate say 35kPa) at 1.95m depth - both tests cannot be correct -.

• U_{100} blow counts increasing with depth from 13 at 1.5m, 20 at 2.5m, 28 at 3.5m with HVs of respectively 43 to 61kPa, 19 to 21kPa and 2.5kPa to 4.5kPa (the latter at 3.5m depth where overburden stress might have been 70kPa during a period of lower GWL, and hence even normally-consolidated soil strength would be no lower than say 14kPa. My view is that U_{100} blow counts should correlate with undrained strengths, which appears not to be the case.

In these cases, I'm more inclined to believe the true in-situ tests (SPTs and U_{100} blow counts) rather than hand vane testing on samples that may have softened. My conclusion is that the soil will be strong enough to enable construction of the proposed landscaping without accelerating consolidation with PVDs.

I agree with the recommendations: that drainage blanket be maintained with reduced thickness, that monitoring should continue and that a hold point to enable data review be implemented prior to formation of the noise bund. I see no reason to complete construction within 6 months - a longer period would allow additional beneficial consolidation -. CPT testing would avoid the misinterpretation of soil strengths that I consider has occurred by using hand vane testing.

Cat. 3 CHECKER (where required)			
I have undertaken an independent (Cat. 3) **check** of the proposed FCR response in Section 2 and am satisfied that the proposed change is an acceptable change to the detailed design. I certify that reasonable professional skill and care have been used in checking that the FCR response complies with the Regulatory Requirements, Design Standards, Codes and Methods as defined in the Contract/Work Information.			
Company:	**Name (Cat. 3 Checker):**	**Position:**	**Date:**

3. BBV DESIGN MANAGEMENT

DESIGN MANAGER/COORDINATOR	
TEMPORARY WORKS COORDINATOR FEEDBACK (always required)	**OTHER DESIGNER FEEDBACK (where required)**
Confirmation from Temporary Works Coordinator that they are aware of the FCR and either: • **The FCR has no impact on the TW design, or** • **They have initiated any necessary TW design changes** **(evidence of confirmation to be attached below)**	**List of other designers who have provided feedback (evidence of feedback to be attached below):** *e.g. Utilities, Supply Chain*
STAKEHOLDER FEEDBACK (where required)	**HS2 FEEDBACK (where required)**
List of 3rd parties who have provided feedback (evidence of feedback to be attached below): *e.g. Highway authority, Network Rail*	**TQ or Departure number(s) raised with HS2 (Notifications and Replies to be attached below):**

LEAD DESIGNER REPRESENTATIVE (for all Major FCRs only)		
The FCR Response is signed as 'Lead Designer' in accordance with the Lead Designer Execution Plan (1MC08-BBV_MSD-AU-PLN-N001-100002) and the Lead Designer Representative - Strategy for Review of Programme Assets (1MC08-BBV_MSD-AU-PRO-N000-100006). Lead Designer Representative confirms the level of review completed: A: Focussed Review B: High Level Review *<delete as appropriate>*		
Lead Designer Representative	**Name:**	**Date:**

IMPLEMENTATION		
The FCR Response may be implemented in construction (subject to HS2 acceptance if the FCR Category is Major Change).		
BBV Design Manager/Coordinator Endorsement	**Name:**	**Date:**

APPENDIX D3 FIELD CHANGE REQUEST – POOL WOOD EMBANKMENT: PVD REDUCTION (CPT TESTS) (DATED 13/09/2023)

1. BBV CONSTRUCTION / DESIGN MANAGEMENT

KEY INFORMATION	
FCR Document Number	1MC09-BBV-DS-CRR-NS04_NL10-000175
FCR Revision	P01
FCR Title	Field Change Request - Pool Wood Embankment: PVD Reduction (CPT Tests)
Date Raised	13/09/2023
Date Response Required	27/09/2023
Originator name	Tom BAXENDALE
Originator email address	Tom.baxendale@balfourbeattyvinci.com
Originator company	BBV
Sublot	SL5S
Section	NS04
Lot	NL10
Unique Asset ID of affected asset(s)	HS2-000001162
Design discipline affected	Geotechnics

DESCRIPTION

Description:

DJV response on 1MC09-BBV-DS-CRR-NS04_NL10-000173_C01 concerning PVD and drainage blanket removal below Pool Wood Embankment landscape bund is:

"In principle the designer considers that reasonably the PVD's stipulated for the landscape area can be removed, subject to the following conditions:

- *That the additional ongoing confirmatory testing is undertaken and reviewed, consisting of an array of CPTs with permeability testing at intervals (uCPTs). Information from which should be reviewed in due course by the DJV to further confirm suitability.*
- *That the landscape is constructed in no less than 6 months.*
- *That a hold point is made available prior to construction of the noise bund (representing the highest point of the landscape). This noise bund is a relatively small volume comparatively (perhaps representing 5 percent of the overall landscape volume and could potentially be installed during final topsoiling, subject to programming).*
- *That monitoring for the landscape as previously stipulated is respected. Consolidation observations will be needed to confirm the performance of the landscape earthwork.*
- *That the drainage blanket is maintained. Nonetheless the thickness of the blanket can reasonably be reduced (not eliminated) to 350mm to allow any residual water to exit, as originally envisaged in the design. Flows to the western drainage should be as per original design. In principle, given the ground conditions are improved, lower initial pulses of water are anticipated (hence allowing the reduction in thickness), These pulses and the capacity of associated temporary holding ponds must be monitored by the temporary works contractor during the lifting process and, if capacity is at risk of exceedance, lifts should cease temporarily to allow the water to be managed appropriately. Given the reduced thickness of the blanket a geotextile should be incorporated at top and bottom to minimise blockage and fines migration into the blanket.*

It should be noted that for the trace itself several non-conformities have been managed with mitigation measures being recommended of additional observations over a potential extended hold period of up to 12 months. Logically the appropriate course of action is to contemporaneously observe the performance of the adjacent landscape to ensure the permanent design geometry and solution is achieved. "

Additional ongoing confirmatory testing were undertaken. You'll find the results attached to this FCR. Please see the list below:

1/ CPT Report 1230332R2-Pool wood-Soil Engineering.pdf
2/ 1230332-Pool Wood-Standard AGS.ags
3/ 1230332-Pool Wood-Advanced AGS.ags

Pool_Wood_CPT.7z

BBV asks DJV to undertake the review of those results to confirm their above statement.

REFERENCE DRAWINGS / SCHEDULES / SPECIFICATIONS			
Number	**Revision**	**Suitability**	**Title**
CPT Report 1230332R2-Pool wood-Soil Engineering	N/A	N/A	N/A
1230332-Pool Wood-Standard AGS	N/A	N/A	N/A
1230332-Pool Wood-Advanced AGS	N/A	N/A	N/A

BBV Design Manager/Coordinator to Approve	**Name:** Tom BAXENDALE
	Email address: tom.baxendale@balfourbeattyvinci.com

2. DJV CONSTRUCTION SUPPORT

KEY INFORMATION	
Construction Support Lead name	Eduardo Paredes
Construction Support Lead email address	eparedes@systra.com

EVALUATION BY DJV CONSTRUCTION SUPPORT				
FCR Category (select one)	**CLARIFICATION** ☐	**MINOR CHANGE** ☐	**MODERATE CHANGE** ☒	**MAJOR CHANGE** ☐
Category definition	Clarify details/notes; Resolve contradictions; Resolve dimensional clashes	Change deviates from an assured design deliverable, but does not have an impact on the "intent" of the design	Change deviates from an assured design deliverable, and does deviate from the "intent" of the design - new design activities required No change to Fit, Form or Function that affects Rail Systems interfaces or approved Consents	Change deviates from an assured design deliverable, and does deviate from the "intent" of the design - new design activities required **&** Change to Fit, Form or Function that affects Rail Systems interfaces or approved Consents
Independently Checked by:	N/A	Cat. 1, Cat. 2 or Cat. 3 Checker (subject to Independent Review below)		
Purpose of submission to HS2	N/A	For Information	For Information	For Acceptance

RESPONSE BY DJV CONSTRUCTION SUPPORT
The ground investigation confirms that soil strengths are in general higher than those calculated in the analysis of the stockpiles required to allow the construction of the landscape. There is one area associated with test ML159-CT417 (off-set of 70m to the west of chainage 159-200 on the down line) where the test has been undertaken on what appears to be backfill material. This could be fill associated with the stockpiles that appears to behave as a very low strength silty clay. It is recommended that prior to upfilling, once the formation has been prepared, an inspection is undertaken locally to ensure there are not excessive quantities of very soft or organic soils. If these type of soils were encountered, they shall be dig out and replaced. The test results indicate presence of around 2 metres of soft to very soft material. This local potential soft spot does not preclude the removal of PVDs for the landscape so long as the recommendations provided in the previous associated FCR response are implemented. Particular emphasis should be placed on carefully implemented lifts during the extended monitored hold period.

ATTACHMENTS PROVIDED IN SUPPORT OF FCR RESPONSE			
Number	**Revision**	**Suitability**	**Title**
None			

DRAWINGS / SCHEDULES / SPECIFICATIONS TO BE UPDATED					
Number	**Revision**	**Suitability**	**Title**	**Updated before FCR closed**	**To be updated at As-built stage**
1MC09-BBV_MSD-GT-REP-NS04_NL10-158324	C02	S4	Pool Wood Embankment - Band Drain - Setting Out Table	☐	☐

1MC09-BBV_MSD-GT-DSO-NS04_NL10-118701	C02	S4	Band Drain - Setting Out Plan - Sheet 01 of 04	☐	☐
1MC09-BBV_MSD-GT-DSO-NS04_NL10-118801	C02	S4	Band Drain - Setting Out Plan - Sheet 02 of 04	☐	☐
1MC09-BBV_MSD-GT-DSO-NS04_NL10-118901	C02	S4	Band Drain - Setting Out Plan - Sheet 03 of 04	☐	☐
1MC09-BBV_MSD-GT-DSO-NS04_NL10-119001	C02	S4	Band Drain - Setting Out Plan - Sheet 04 of 04	☐	☐
Any others as appropriate					

We certify that all reasonable professional skill, care, diligence and prudence as is under the/ Contract has been used in the preparation and verification of the response to this Field Change Request./			
DJV Construction Support Endorsement	**Name (Author):** Stephen Cooper	**Position:** Geo Tech Expert	**Date:** 23.10.2023
	Name (Cat. 1 Checker): Lola Rodriguez	**Position:** Principal Lead Engineer (Geo)	**Date:** 23.10.2023

INDEPENDENT REVIEW OF CHECK CATEGORY				
Maximum Check Category that applied to the aspect(s) of design affected by the FCR (Refer to the relevant D&V Certificate(s))	**Reviewer/Checker Statement (select one box and enter associated name/position/date)**			
Cat. 1 Check(s):	No further check required beyond the Cat. 1 Check above.			☒
	Name (Cat. 1 Checker): Lola Rodriguez	**Position:** Principal Lead Eng (Geo)	**Date:** 23.10.2023	
Cat. 2 Check(s), except where noted below:	I have undertaken an independent (Cat. 2) **check** of the proposed FCR response in Section 2 and am satisfied that the proposed change is an acceptable change to the detailed design. I certify that reasonable professional skill and care have been used in checking that the FCR response complies with the Regulatory Requirements, Design Standards, Codes and Methods as defined in the Contract/Works Information.			☐
	Name (Cat. 2 Checker):	**Position:**	**Date:**	
Cat. 3 Check(s) **OR** **Cat. 2 Check(s) but with a Cat. 3 interface (e.g. transition between Cat. 2 earthwork and Cat. 3 structural asset):**	I have undertaken an independent **review** of the FCR query and the proposed FCR response in Section 2, reviewing this against the criteria for determining if the FCR response requires Cat. 3 Checker consultation (as set out in FCR Procedure 1MC08-BBV-DS-PRO-N001-000001 revision C02, section 7.5.5). I am satisfied that the nature of the FCR query and proposed FCR response do not change the detailed design to the extent that it requires a Cat. 3 or Cat. 2 Check, and that the Cat. 1 Check above is sufficient.			☐

<table>
<tr><td rowspan="3"></td><td>Name (Cat. 1 or Cat. 2 Checker):
Peter Rutty</td><td>Position:
DJV Cat II check Geo lead</td><td>Date:
09.08.2023</td><td></td></tr>
<tr><td colspan="3">The proposed change requires further review and acceptance by the Cat. 3 checker.</td><td rowspan="2">☐</td></tr>
<tr><td>Name (Cat. 1 or Cat. 2 Checker):</td><td>Position:</td><td>Date:</td></tr>
<tr><td colspan="5">Justification:</td></tr>
</table>

Cat. 3 CHECKER (where required)			
I have undertaken an independent (Cat. 3) **check** of the proposed FCR response in Section 2 and am satisfied that the proposed change is an acceptable change to the detailed design. I certify that reasonable professional skill and care have been used in checking that the FCR response complies with the Regulatory Requirements, Design Standards, Codes and Methods as defined in the Contract/Work Information.			
Company:	**Name (Cat. 3 Checker):**	**Position:**	**Date:**

3. BBV DESIGN MANAGEMENT

DESIGN MANAGER/COORDINATOR	
TEMPORARY WORKS COORDINATOR FEEDBACK (always required)	**OTHER DESIGNER FEEDBACK (where required)**
Confirmation from Temporary Works Coordinator that they are aware of the FCR and either: • **The FCR has no impact on the TW design, or** • **They have initiated any necessary TW design changes** **(evidence of confirmation to be attached below)**	**List of other designers who have provided feedback (evidence of feedback to be attached below):** *e.g. Utilities, Supply Chain*
STAKEHOLDER FEEDBACK (where required)	**HS2 FEEDBACK (where required)**
List of 3rd parties who have provided feedback (evidence of feedback to be attached below): *e.g. Highway authority, Network Rail*	**TQ or Departure number(s) raised with HS2 (Notifications and Replies to be attached below):**

LEAD DESIGNER REPRESENTATIVE (for all Major FCRs only)		
The FCR Response is signed as 'Lead Designer' in accordance with the Lead Designer Execution Plan (1MC08-BBV_MSD-AU-PLN-N001-100002) and the Lead Designer Representative - Strategy for Review of Programme Assets (1MC08-BBV_MSD-AU-PRO-N000-100006). Lead Designer Representative confirms the level of review completed: A: Focussed Review B: High Level Review *<delete as appropriate>*		
Lead Designer Representative	**Name:**	**Date:**

IMPLEMENTATION		
BBV Design Manager/Coordinator Endorsement	**Name:**	**Date:**

APPENDIX E HS2 GEO-ENVIRONMENTAL REPORT– SUB LOTS- 5 AND 6

Contract No. 1MC09

Section N2

HS2 Geo-environmental Report – Sub-Lots 5 and 6

Document No: 1MC09-BBV_MSD-EV-REP-N002-100002

Revision	Author	Reviewed by	Approved by	Date Approved	Reason for revision
P01	V. Sin G. Newman	T. Hodges C. Williams L. Bethell M. Phillips	N. Ballarin	01/05/2020	Updated for Scheme Consolidation S3
P02	M Bickely/ T. Hodges	K Zeghidi	H. Benkhellat	03/12/2020	S4 Addressing BBV/HS2 Comments
C01	M Bickely/ T. Hodges	K Zeghidi	H. Benkhellat E Hallas	12/02/2021	For HS2 Acceptance

Security classification: OFFICIAL

Handling Instructions: uncontrolled when printed

Review Required

Team	Yes / No	Name	Position	Date
Quality				
Health & Safety				
Environment & Sustainability				

Revision History

Revision	Purpose	Date
P01-C01	Previously issued in scheme design under 1MC09-BBV-EV-REP-N002-100009	May 2018
P01	Updated for Scheme Consolidation	01/05/2020
P02	Addressing HS2 Comments	03/12/2020
C01	For HS2 Acceptance	12/02/2021

Contents

List of Tables:

List of Figures:

Executive Summary

Introduction	This report presents a contamination risk assessment for Sub-Lots 5 and 6 of the N2 Phase 1 contract of the proposed High Speed 2 (HS2) railway. Sub-Lot 5 is c.10km long and is located between chainage (ch.) 154+435 (NGR: 421409, 281770) and ch.163+760 (NGR: 419057, 290650). Sub-Lot 6 comprises the Birmingham Spur (BS) and North Chord (NC), c.7.5km long between chainage ch.160+425 BS (NGR: 419250, 287330) to ch.164+505 BS (NGR: 417195, 290502), and ch.000+750 NC (NGR: 419057, 291428) to ch.003+215 NC (NGR: 417200. 290512), respectively. The contamination risk assessment presented in this report has been used to develop outline remediation options for potentially significant source-pathway-receptor contamination linkages, which have been identified from a review of the contamination data from the intrusive ground investigation (GI) commissioned by HS2 Limited and additional GI commissioned by Balfour Beatty Vinci Joint Venture (BBV JV). Recommendations for further investigation and risk assessment are also provided. In accordance with discussions with HS2 in November 2017, this report comprises a Generic Quantitative Risk Assessment (GQRA) only, not a Detailed Quantitative Risk Assessment (DQRA). Sufficient information is not yet available to complete an accurate DQRA and requirements for further risk assessment will be determined when the appropriate level of ground investigation information is available.
Development Proposals	The Proposed Scheme includes the Delta Mainline which begins at Hampton-in-Arden at ch.154+435 heading north towards Coleshill Sewage Treatment Works north-west of Coleshill town, at ch.164+425. It passes through the Birmingham Interchange Station (BIS) Triangle between ch.156+000 and ch.157+700. At ch.160+425 the Birmingham Spur forming Sub-Lot 6 departs from the mainline, and curves north-west between Coleshill and Kingshurst towards Water Orton. The North Chord connects back up to the Delta Mainline from the spur on the south side of Water Orton. The mainline and the Birmingham Spur traverse several assets which include embankments, viaducts, cuttings, retaining walls, culverts, overbridges, underbridges, and the Birmingham Interchange Station.
Site Description	The Proposed Scheme traverses predominantly rural areas east of Birmingham, which become residential, commercial and industrial areas towards the middle and northern end of Sub-Lot 5. It is generally located in gentle topographical landscape largely within the valleys of the Rivers Cole and Tame. Along the length of Sub-Lots 5 and 6, a total of 50 sites were identified in the Environmental Statement as posing a potential contaminative risk to the Proposed Scheme. The risk classification comprised the following indicative proportions: • Class 1 (low risk) – 50%; • Class 2 (medium risk) – 36%; and • Class 2/3 (high risk) – 14%. Class 2/3 sites were all within the BIS Triangle. Within Sub-Lot 5 and 6, Class 1 sites occupy approximately 6.9% of the route, with Class 2 and 2/3 sites occupying 7.9% of the route. Within Sub-Lot 6 North Chord, Class 2 sites occupy 4.2% of the route.

Ground Investigation	A total of 11 ground investigations (GIs) commissioned by HS2 have been undertaken within the Proposed Scheme and within the 250m buffer, namely:
	• Ian Farmer Associates:
	  – BIS & People Mover Area A (ch.158+115 to ch.158+185);
	  – BIS & People Mover Area B (ch.156+000 to ch.157+500); and
	  – BIS & People Mover Area D (ch.157+700 to ch.158+000);
	• Environmental Scientifics Group:
	  – BIS & People Mover Area C (ch.155+900 to ch.158+000); and
	  – Delta Junction Area Z (ch.159+870 to ch.162+460 and ch.163+860 to ch.165+030 and ch.160+425(BS) to ch.164+505(BS), and ch.000+300(NC) to ch.004+940(NC));
	• RPS:
	  – Delta Junction Area A (ch.158+185 to ch.159+870);

	• BAM Ritchies: – North Package A Phase A Addendum (ch.156+300 to ch.157+850); • Soil Engineering Geoservices Limited: – Ufton to BIS Area X (ch.154+435 to ch.155+890); – North Package B Interim No.2 Phase B (ch.162+460 to ch.163+860); – DJV Area B; and – DJV Area C. The scope of GI undertaken to date has comprised: • 144 inspection pits to a maximum depth of 1.2m bgl; • 148 trial-pits to a maximum depth of 4.5m bgl; • 104 cable percussive boreholes to a maximum depth of 25.3m bgl; • 195 cable percussive boreholes with rotary follow-on to a maximum depth of 45.5m bgl; • 126 dynamic (windowless) sample boreholes (including rotary follow-on) to a maximum depth of 30.5m bgl; • 17 rotary coring or open-hole drilling boreholes to a maximum depth of 40.7m bgl; • Installation of 228 monitoring standpipes; and • Post fieldwork ground gas and groundwater level monitoring. This report has reviewed GI data made available up to 7th August 2019 .
Ground Conditions	Ground conditions were typically found to comprise: • Topsoil thickness 0.1 – 0.8m; • Made Ground thickness 0.2 – 2.45m; • Alluvium thickness 0.2 – 5m; • River Terrace Deposits thickness 0.5 – 6m; • Head thickness 0.8m; • Till thickness 0.3 – 16m; • Glaciolacustrine Deposits thickness 0.6 – 15m; • Glaciofluvial Deposits thickness 0.2 – 16.2m; and • Mercia Mudstone Group thickness >30m. Visual and/or olfactory evidence of contamination was recorded in 29 exploratory locations within the Proposed Scheme. Much of the evidence was recorded within the samples of Made Ground, with 15 from samples of Topsoil, Alluvium, River Terrace Deposits, Till, Glaciofluvial Deposits and Mercia Mudstone Group. Asbestos screening was undertaken on 169 samples and identified in nine samples. Identified asbestos included amosite, chrysotile and crocidolite, as free fibres and within asbestos containing material (ACM).
Potential Contaminant Linkages	Based on the information gathered up to 7th August 2019 , the GQRA identified the following potential contaminant linkages to pose a potential significant risk to sensitive site receptors (moderate or greater): • Moderate risk from contaminated soils to construction and maintenance personnel site-wide; • Moderate / Low and Moderate risk from contaminated soils to potable water supply pipes where proposed; • Moderate risk from soil and soil leachate contaminants to controlled water receptors at Pool Wood Embankment and Chattle Hill Box Structure; • Moderate risk from groundwater to controlled water receptors at Diddington Cutting, M42 Motorway Box Structure, Pool Wood Embankment, Coleshill No. 3 Embankment, Chattle Hill Box Structure, and Watton House East and West Viaduct. Within the BIS Triangle, Moderate risk has been assigned to contaminants leaching into groundwater, migration within groundwater, and migration of contaminants in fill to future attenuation pond. A potential risk is also posed by asbestos contaminated soils. Please refer to Appendix H for asbestos risk assessment Within the BIS Triangle, management of asbestos risk shall be in-accordance with management measures included within its remediation strategy report.

	The risk for ground gas to off-site receptors at LQ site 19-17 and 19-25 are considered to be Moderate / Low. The risk at locations within the BIS Triangle has been assessed as Low providing appropriate gas protection measures are incorporated (if required) into proposed buildings and structures (including the interchange station) within the BIS Triangle. Further monitoring will be required during the construction and post construction phases to determine the risks following redistribution of earthworks arisings.
Outline Remedial Measures for Target Costing	Potential remediation options which may mitigate the risk posed by the contaminant linkages identified above are presented below for each asset. **Within the BIS Triangle** Japanese knotweed will be eradicated through vegetation clearance and incineration, followed by excavation and burial. Contamination risks to controlled waters will be addressed through: • The excavation, segregation, treatment and reuse of soils; • Capping Made Ground to limit infiltration; • Localised dewatering and treatment of contaminated groundwater, and long-term monitoring and management; and • Attenuation ponds located in areas of contamination should be protected. Addressing contamination risk to human health will include: • The use of clean cover in areas of soft landscaping; • Clean fill and marker layers in utility corridors through contaminated areas; • Gas protection for new structures, and venting of hardstanding / cover system and drainage over gassing ground; and • Adoption of suitable pipe material where potable water supply pipes are proposed. It is considered that the Remediation Strategy could expose the MWCC to unacceptable risks or uncertainties. Such risks can only be resolved through ongoing engagement with all design stakeholders and the development of an updated strategy and DQRA. Of particular concern are the risks of monitored natural attenuation and the achievement of remediation standards for heavy metals. Further groundwater modelling is required to understand the hydraulic pathways following earthworks at the Middle Bickenhill Landfill. Such modelling would also determine the requirements for, and treatment of, contaminated groundwater drainage. An updated Remediation Strategy would establish a sound basis for detailed design of remediation implementation measures. **Outside of the BIS Triangle** At Pool Wood Embankment fill material within the former infilled pond at ML159-CP003 shall be removed and stabilised prior to recovery. Deep Made Ground associated with highways at ML158-WS016 shall be removed and stabilised prior to recovery. At the M6 Motorway South Viaduct the proposed balancing pond east of the alignment shall be lined with an impermeable geomembrane to minimise leachate generation. At Lichfield Road Embankment the Made Ground used to level the sport pitches at ML163-CR020 shall be excavated and removed for bioremediation / stabilisation prior to recovery. At Coleshill No. 3 Embankment Made Ground at BD161-WS003 shall be removed and stabilised prior to recovery. At Chattle Hill Box Structure the hotspot at ML164-CR030 shall be removed and stabilised prior to recovery. The Made Ground at ML164-CR029 shall be removed and bioremediated / stabilised prior to recovery. At Watton House East and West Viaduct identified groundwater contaminants shall be treated by in-situ advanced chemical oxidation / reduction, or extraction and disposal of contaminated groundwater. At Watton House Embankment contaminated material at ML164-CR013 shall be removed and bioremediated / stabilised prior to recovery. The pumping station at Coleshill No 3 embankment is likely to require gas protection appropriate to a CS-2 (see section 4.5.9) At Water Orton Viaduct the contaminated material at ND000-CR020, ND000-CR001 and ND000-TP035 shall be excavated and stabilised to address soil leachate risks to controlled waters. Made Ground used to level the sport pitches that is beneath the viaduct between ch.1+200 (NC) and 1+500 (NC) shall be removed and stabilised to address soil leachate risks to controlled waters. An alternative is to surface the area with an impermeable material. At Water Orton Cutting contaminated material at BD164-CR011 is likely to be removed by the cutting works.

	The risks to new or modified potable water supply pipes shall be assessed by undertaking UKWIR specific testing for the selection of appropriate water supply pipe material. Where site soils may pose a risk, remedial measures can include remediation of affected soils to reduce contaminant concentrations, replacement of soil with clean fill and geotextile lining for pipe trenching, and selection of appropriate barrier pipe as per UKWIR assessment. The concrete classification of buried structures should be appropriately selected based on the assessed ACEC and DSC in-accordance with BRE Special Digest 1:2005 guidance for each location. Where additional structures are proposed, ground gas protection requirements should be assessed and selected with reference to BS8485:2015+A1:2019 document. Assets where piled foundations are the foundation solution will require a Piling Risk Assessment.
Recommendations	GI and further assessment is recommended where GI has either not been completed or does not meet the minimum hole density requirements in the Land Contamination GI Scoping Strategy (document reference 1MC08-BBV-EV-SUR-N002-1000002) while being targeted at specific contaminative features. The GI should provide further soil, leachate, groundwater and gas data including soil vapour data. The following specific GI requirements have been identified: • Further GI and assessment should be undertaken at locations where limited GI has been undertaken to date, namely: – 20 Group A & B LQ sites not investigated to date; and – Exploratory positions should be located at the spacings recommended in the HS2 guidance, where reasonably practicable. • A specific water supply pipe assessment should be undertaken in accordance with UKWIR guidance where new water supply pipes are proposed. • 77no. existing installations have been scheduled for further groundwater sampling • 39no. existing installations have been scheduled for further gas monitoring Please refer to Appendix H for asbestos risk assessment and recommendations for ACM within the site soils. Site specific remedial measures will need to be assessed at remediation strategy stage upon completion of further GI and further generic and detailed quantitative risk assessment. At the point of excavation, surplus arisings may be classified as waste unless they can be treated to allow re-use as an engineering fill or for the purposes of land restoration / reclamation. The waste recovery process will be managed either through the Definition of Waste: Development Industry Code of Practice (CoP) (CL:AIRE, 2011) or an Environmental Permit. Material Management Plans will be developed to describe the waste recovery process – including measures to mitigate contamination risks at the point of placement. Risk assessment must be undertaken on excavated material relevant to the point of material placement; such a risk assessment is not included in this Geo-Environmental Report. The MMP needs to be consistent with the proposed mass haul strategy which will describe how material will be moved from the point of origin to the location of final placement. The mass haul strategy and MMPs are currently under development. Close liaison with the earthworks designers will be required when undertaking the classification of earthworks materials and assessing the suitability of the fill materials (SCEW Class) in particular Class U1B and U2 fills and in developing the mass haul strategy and MMPs.

1 INTRODUCTION

1.1 Site Referencing Information

This Geo-environmental Report presents a contamination risk assessment for Sub-Lots 5 and 6 of the N2 Phase 1 contract of the proposed High Speed 2 (HS2) railway.

Sub-Lot 5 comprises the proposed section of the line which forms the Delta Mainline, and Sub-Lot 6 comprises the proposed section of the line which forms the western section of the Birmingham Spur (BS) and the North Chord (NC).

Sub-Lot 5 is the section between chainages ch.154+435 to ch.163+760 on the north side of the Birmingham Interchange Station on the Delta Mainline. Sub-Lot 5 includes the following five assets transferred from the N3 lot in the Birmingham Interchange Station (BIS) 'Triangle':

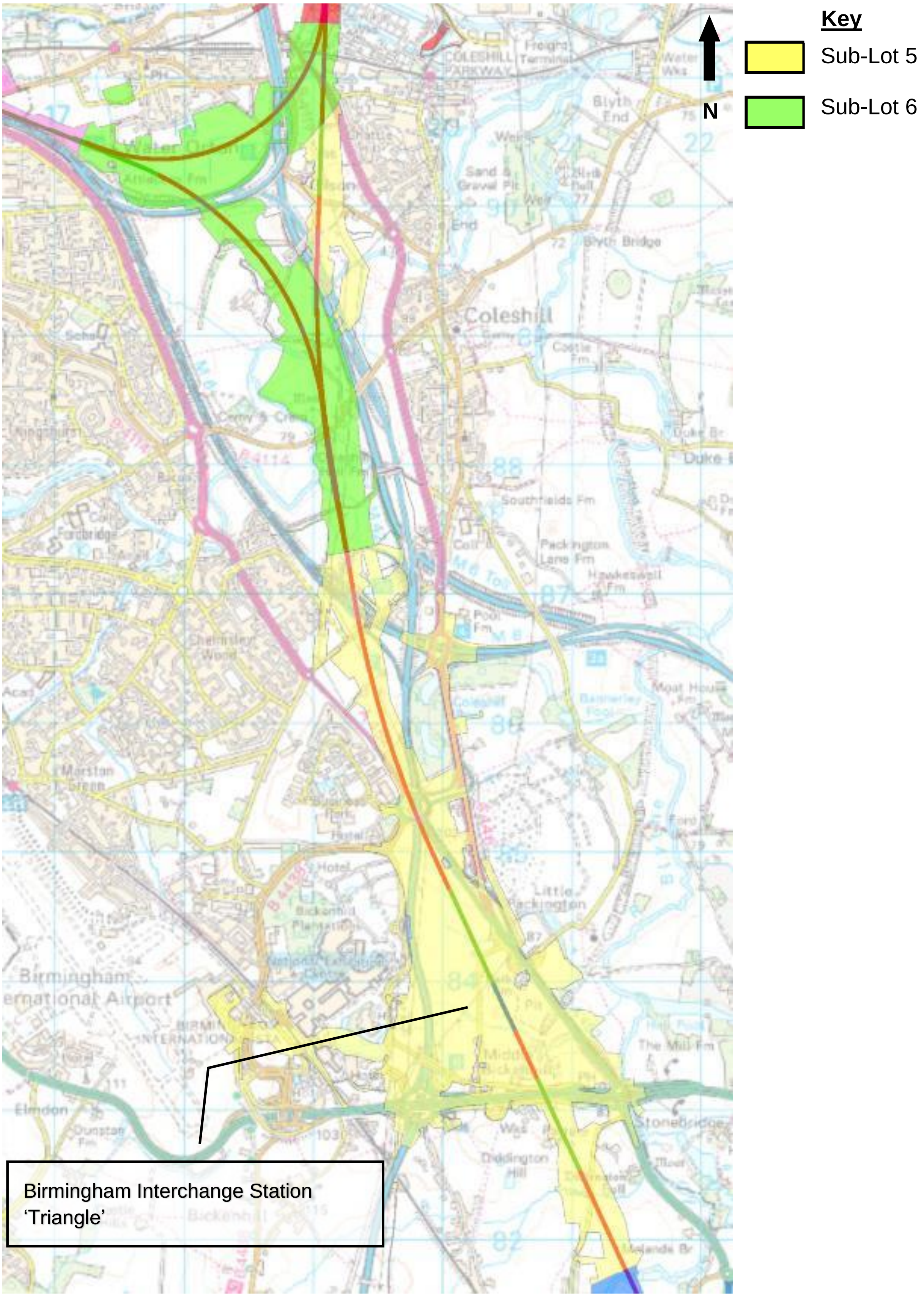
1. Bickenhill Cutting;
2. Bickenhill Embankment;
3. Hollywell Brook Underbridge (including watercourse diversion works);
4. Bickenhill Culvert; and
5. Packington Culvert.

The Delta Mainline is a 13.6km section which passes through the county of Warwickshire towards Coleshill on the east side of Birmingham and then further north towards Middleton.

Sub-Lot 6 comprises the Birmingham Spur and North Chord south of ch.000+750 NC. The Birmingham Spur branches off from the Delta Mainline at chainage ch.160+425 and continues west towards Birmingham and ends at ch.164+505 BS. The North Chord has its own chainage convention and the section considered in this report starts at chainage ch.000+750 NC (corresponding approximately to ch.164+540 on the mainline) to ch.003+215 NC. A Sub-Lot location plan is presented in Figure 1.

This report summarises and interprets the geo-environmental data from intrusive ground investigations (GI) commissioned by HS2 Limited by means of Generic Quantitative Risk Assessment (GQRA). This report concludes with recommendations for further investigations and an outline of remediation strategy options to address potentially significant contaminant linkages in relation to in-situ contamination sources. This report also contains advice on the principles to be adhered to in the selection of materials for re-use in advance of a Materials Management Plan for the Proposed Scheme.

Figure 1: Proposed Scheme Location Plan



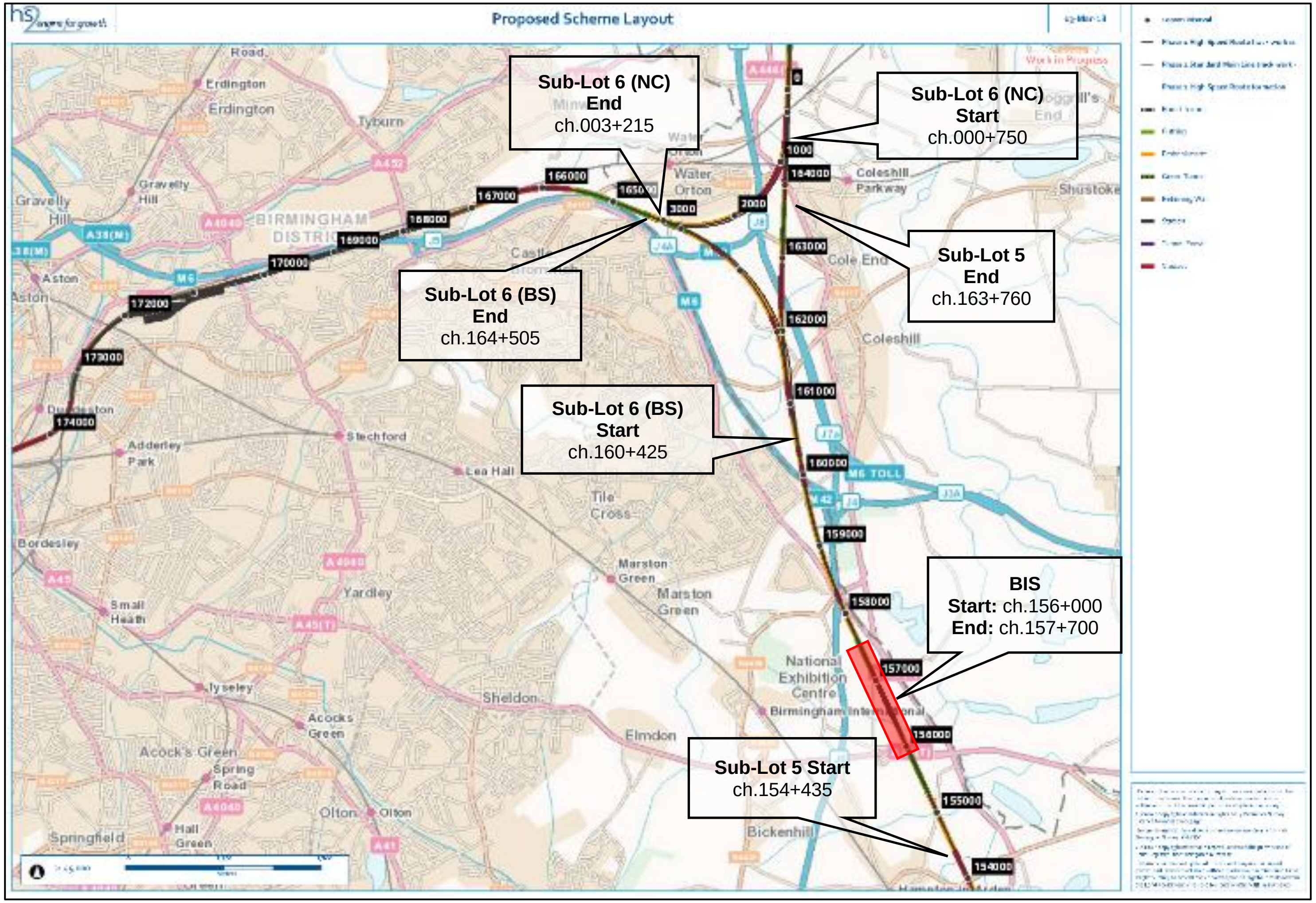
1.2 Development Proposals

Powers for the construction, operation and maintenance of the Route were granted through the passage of a Hybrid Bill through Parliament. The Bill defines Limits of Deviation (LoD) and Limits of Land to be Acquired or Used (LLAU) by HS2 for the Proposed Scheme. The Proposed Scheme layout is presented in Figure 2.

Sub-Lot 5 extents are between Hampton-in-Arden at ch.154+435 heading north towards Coleshill Sewage Treatment Works, north-west of Coleshill town at ch.164+425. This route passes through the BIS between ch.156+000 and ch.157+700.

Sub-Lot 6 comprises the Birmingham Spur and North Chord. The Birmingham Spur departs from the mainline at ch.160+425 and curves north-west between Coleshill and Kingshurst towards Water Orton. The North Chord connects back up to the Delta Mainline from the spur on the south side of Water Orton. This report considers mainline assets south of ch.164+540 and north chord assets south of ch.000+750 NC.

Figure 2: Proposed Scheme Layout Plan



Source: HS2 gViewer

1.3 Proposed Structures and Earthworks

A summary of proposed structures and earthworks assets along the route of Sub-Lots 5 and 6 is provided in Table 1.

Table 1: Assets along the Proposed Route

Asset ID	DES Number	OS Chainage		Name of Asset
		Start	Finish	
Mainline				
HS2-000001155	154-L2	154+435	155+290	Embankment – Diddington Lane Embankment
HS2-000001386	155-S5	155+100	155+100	Underbridge – Shadow Brook Underbridge
HS2-000001156	155-L3	155+290	156+080	Cutting – Diddington Cutting
HS2-000020021	155-S8	155+500	155+500	Overbridge – Diddington Lane Overbridge
TPY-000001564	155-S6	155+900	155+900	Overbridge – A45 Service Road Overbridge
HS2-000001352	155-S4	155+950	155+950	Overbridge – A45 Coventry Road Overbridge
HS2-000001353	155-S7	156+000	156+000	Overbridge – East Way Overbridge
HS2-000020365	156-S1	156+050	156+050	Highway – A45 / M42 Junction 6 Roundabout
HS2-000001157	156-L1	156+080	156+460	Embankment – Bickenhill Embankment
TPY-000001572	156-S15	156+115	156+115	Culvert – Bickenhill Culvert
HS2-000000211	156-S11	156+150	156+150	Building – People Mover Depot
HS2-000001388	156-S2	156+430	156+430	Underbridge – Hollywell Brook Underbridge
HS2-000000013	156-L2	156+460	156+870	Birmingham Interchange Station
TPY-000000339	156-S9	156+700	156+700	People Mover to National Exhibition Centre / Airport
HS2-000020366	156-S10	156+700	156+700	Highway – A452 Chester Road Widening
HS2-000020022	156-S7	156+800	156+800	Building – Interchange Station Car Parks
HS2-00000158	156-L3	156+870	157+700	Cutting – Bickenhill Cutting
HS2-000001389	157-S2	157+260	157+260	Culvert – Packington Culvert
HS2-000001355	157-S9	157+480	157+480	Overbridge – A452 / A446 Roundabout South Overbridge
HS2-000001356	157-S10	157+620	157+620	Overbridge – A452 / A446 Roundabout North Overbridge
HS2-000001159	157-L1	157+700	158+220	Embankment – Packington Embankment
HS2-000000200	157-S7	157+750	157+750	Building – Interchange Autotransformer Station (ATS)
HS2-000020368	157-S4	157+800	157+800	Highway – A452 Chester Road Roundabout Removal
TPY-000001565	157-S6	157+900	157+900	Overbridge – A452 Link Road Overbridge
HS2-000020369	157-S8	157+900	157+900	Highway – M6 Junction 4 Roundabout Widening
HS2-000020370	158-S2	158+150	158+150	Highway – A452 / B4438 Roundabout Works
HS2-000001160	158-L1	158+220	158+350	Viaduct – M42 Motorway Box Structure
HS2-000001161	158-L3	158+350	158+800	Embankment – Pool Wood Embankment (C224)
HS2-000020023	158-S5	158+600	158+600	Culvert – Pool Wood Culvert
HS2-000001162	158-L2	158+800	159+879	Embankment – Pool Wood Embankment (C223)
HS2-000001499	159-S2	159+782	159+782	Underbridge – Coleshill Heath Road Underbridge
HS2-000001163	160-L1	159+900	160+000	Viaduct – M6 Motorway Box Structure
HS2-000001164	160-L6	160+013	160+148	Viaduct – M6 Motorway South Viaduct
HS2-000001165	160-L4	160+148	160+313	Embankment – Coleshill No. 1 Embankment
HS2-000001166	160-L5	160+313	160+404	Viaduct – M6 Motorway North Viaduct
HS2-000001167	160-L2	160+404	160+855	Embankment – Coleshill No. 2 Embankment
HS2-000001168	160-L3	160+855	161+314	Viaduct – Coleshill West Viaduct
HS2-000001169	161-L4	161+314	162+348	Embankment – Coleshill No. 3 Embankment
HS2-000001500	161-S1	161+352	161+352	Underbridge – B4114 Birmingham Road Underbridge
HS2-000020024	162-S1	162+120	162+120	Highway – Manor Drive
HS2-000001170	161-L3	162+348	162+436	Viaduct – M42 Coleshill South Viaduct
TPY-000000332	162-S3	162+390	162+390	River Cole Diversion
HS2-000001171	162-L2	162+436	162+656	Viaduct – M42 Coleshill Box Structure
HS2-000001172	162-L3	162+656	162+939	Viaduct – M42 Coleshill North Viaduct
HS2-000001501	163-S1	162+930	162+930	Highway – B4117 Gilson Road Realignment
HS2-000001173	162-L1	162+939	163+220	Embankment – Gilson Embankment
HS2-000000201	163-S5	163+170	163+170	Building – Gilson Road Autotransformer Station (ATS)

Asset ID	DES Number	OS Chainage		Name of Asset
		Start	Finish	
HS2-000001174	163-L1	163+220	163+760	Cutting – Gilson Cutting
HS2-000001502	163-S2	163+280	163+280	Overbridge – Footpath M62 Overbridge
HS2-000001175	163-L2	163+760	164+035	Embankment – Lichfield Road Embankment
HS2-000001176	164-L1	164+035	164+116	Viaduct – Chattle Hill Box Structure
HS2-000020025	164-L6	164+116	164+327	Viaduct – Watton House West Viaduct
HS2-000001179	164-L7	164+327	164+540	Embankment – Watton House Embankment (incl small section of River Tame East Viaduct south of River Tame)
North Chord				
HS2-000001252	ND-01-L1	000+750 (NC) (section considered by this report)	001+653 (NC)	Viaduct – Water Orton No. 2 & 3 Viaduct
HS2-000001253	NU00-L1	000+750 (NC) (section considered by this report)	001+653 (NC)	Viaduct – Water Orton No. 1 Viaduct
HS2-000001254	NU-01-L2	002+814 (NC)	003+650 (NC)	Embankment – Marsh Lane Embankment
HS2-000001561	NU-01-S2	002+141 (NC)	002+141 (NC)	Culvert – Water Orton Drop Inlet Culvert
Birmingham Spur				
HS2-000001231	BU-161-L5	160+825 (BS)	161+371 (BS)	Viaduct – Coleshill East Viaduct
HS2-000001232	BU-161-L1	161+301 (BS)	161+620 (BS)	Embankment – Coleshill No. 5 Embankment
HS2-000001233	BU-161-L2	161+620 (BS)	161+901 (BS)	Cutting – Coleshill Manor Cutting
HS2-000001560	BU-161-L4	161+901 (BS)	161+990 (BS)	Retaining Wall – Birmingham Spur Diveunder
HS2-000001235	BU-161-L3	162+062 (BS)	162+190 (BS)	Embankment – Manor Drive Embankment
HS2-000001225	BD-161-L4	162+130 (BS)	162+235 (BS)	Viaduct – River Cole West Viaduct
HS2-000001236	BU-161-L6	162+190 (BS)	162+325 (BS)	Viaduct – River Cole East Viaduct
HS2-000001226	BD-162-L1	162+235 (BS)	163+347 (BS)	Embankment – Green Lane Embankment
HS2-000001556	BD-162-S2	162+986 (BS)	162+986 (BS)	Culvert – Coleshill Culvert
HS2-000001227	BD-163-L1	163+347 (BS)	163+505 (BS)	Viaduct – M42 - M6 Motorway Link West Viaduct
HS2-000001237	BU-163-L3	163+362 (BS)	163+520 (BS)	Viaduct – M42 - M6 Motorway Link East Viaduct
HS2-000001557	BD-163-S5	163+830 (BS)	163+830 (BS)	Culvert – Attleboro Culvert
HS2-000001229	BD-164-L2	163+882 (BS)	165+585 (BS)	Cutting – Water Orton Cutting
HS2-000001228	BD-163-L2	163+505 (BS)	163+882 (BS)	Embankment – Attleboro Farm Embankment
HS2-000001238	BU-164-L1	164+140 (BS)	164+355 (BS)	Viaduct – Attleboro Flyover
HS2-000001558	BD-163-S3	164+485 (BS)	164+485 (BS)	Overbridge – Attleboro Lane Overbridge

NC = North Chord **BS = Birmingham Spur**

This report does not consider contamination risks associated with the People Mover to the west of the BIS Triangle. Risks and remediation requirements for the BIS Triangle are summarised from the BIS Triangle Remediation Strategy[vi].

1.4 Historical Reports

The main source of existing information is the HS2 Geotechnical Desk Study[i] for Delta Junction. The report covers Sub-Lots 1b, 3, 4, 5 and 6, from chainage ch.158+800 (including Birmingham Spur and North Chord) to ch.172+400.

GIs were instructed by HS2 Limited to obtain both geotechnical and geo-environmental information to enable the safe and cost-effective design and construction of this section of the HS2 route. GI data received up to the cut-off date of 05/08/2019 have been used in this report. Any subsequent data obtained after this cut-off date have not been used or assessed in this report.

The GI work package areas included in this study are:

- Birmingham Interchange Station and People Mover Area A: GI Code: BIA
- Birmingham Interchange Station and People Mover Area B: GI Code: BIB
- Birmingham Interchange Station and People Mover Area C: GI Code: BIC

- Birmingham Interchange Station and People Mover Area D: GI Code: BID
- Delta Junction Area A: GI Code: DJA
- Delta Junction Area Z: GI Code: DJZ
- BBV – Area B: GI Code: Area B
- BBV – Area C: GI Code: Area C
- North Package Area A Washwood (Phase A Addendum): GI Code: NPA
- North Package Area B: GI Code: NPB
- Ufton to Birmingham Interchange Package X: GI Code: UBX

A detailed breakdown of the AGS and non-AGS factual data including the assurance status of this data is included in Table 12.

1.5 Geo-environmental Assessment Objectives

The objectives of this report are as follows:

- To review available geo-environmental data from desk based and intrusive GIs for the Proposed Scheme;
- To update the contamination conceptual site model (CSM) for the scheme following a GQRA (where data allows);
- To provide high level advice on potential remediation options to address potential contamination linkages that may result in significant adverse effects to the local environment and communities for the purposes of target costing; and
- To identify requirements for further Desk Studies and GI to address gaps in understanding of contamination risks on-site.

This report has been produced in accordance with the HS2 Land Quality Technical Standard[ii], Environmental Minimum Requirements (EMRs)[iii] and the Code of Construction Practice (CoCP) which requires that:

- "*Any site assessment and remediation works required will be based upon the Model Procedures for the Management of Land Contamination (CLR11).*"; and
- "*Where significant contamination is encountered, a remediation options appraisal will be undertaken to define the most appropriate remediation techniques.*"

The Environmental Annex to the EMR requires the nominated undertaker and representatives of the National Environmental Forum to agree to design and construct Phase One of HS2 such that significant environmental impacts are eliminated, controlled or reduced where reasonably practicable.

This report comprises the first stage of quantitative contamination risks for the scheme. CLR11[iv] describes the purpose of GQRA as follows:

- "*…generic quantitative risk assessment [establishes] whether generic assessment criteria and assumptions are appropriate for assessing the risks, and if so, to apply them to establish whether there are actual or potential unacceptable risks. It also determines whether further detailed risk assessment is required.*"

The risk assessment presented herein identifies locations where potentially significant adverse effects / risks may be present with the overall aim of targeting future more intensive Detailed Quantitative Risk Assessment (DQRA), and investigation that will inform the eventual remediation strategies.

Remediation options identified in the report are intended to inform the development of the Stage 1 target cost only.

In-accordance with discussions with HS2 in November 2017, this report comprises a GQRA only, not a DQRA. Sufficient information is not yet available to complete an accurate DQRA and requirements for further risk assessment will be determined when the appropriate level of GI information is available.

1.6 Site Description

The following is only intended to summarise, or supplement information presented in greater detail within the previous reports undertaken for the site. For full details refer to the HS2 Geotechnical Desk Study for Delta Junction[i].

A summary of the existing land use within the Proposed Scheme is presented in Table 2.

Table 2: Current Land Use

Start Chainage	End Chainage	Current Land Use
Delta Mainline		
154+435	156+080	Largely agricultural fields with minor roads crossing. A45 crossing at 155+900.
156+080	157+700	Agricultural land, motorcycle dirt track, quarries.
157+700	159+915	Agricultural fields
159+915	160+740	M6 motorway crossing
160+740	162+385	Agricultural fields
162+385	163+090	M42/M6 toll motorway crossing
163+090	163+650	Agricultural fields
163+650	164+400	Sewage Treatment Works
164+400	168+000	Agricultural fields
Birmingham Spur		
162+200	163+300	Agricultural fields
163+300	163+500	M42/M6 toll motorway crossing
163+500	164+600	Agricultural fields
North Chord		
000+000	000+300	Agricultural fields
000+300	001+000	Sewage Treatment Works
001+000	001+400	Agricultural fields
001+400	001+700	M42/M6 toll motorway crossing
001+700	003+200	Agricultural fields

1.7 Topography

The topography of Sub-Lots 5 and 6 is generally within a gentle topographical landscape largely within valleys of the Rivers Cole and Tame. From the southern extent of this section, the ground level slopes gently towards the north through the River Cole valley, with ground level at approximately 100m above Ordnance Datum (AOD). As the route continues to the north, towards Gilson, the ground level reduces to between 90m and 95m AOD. Further north entering the River Tame valley the ground level reduces to 75m AOD where the route crosses the river at ch.164+600. As the route continues north out of the river valley, the ground level increases up to 100m AOD at Dunton Hall. Further north the topography undulates up to the connection with the end of this section at Leeds Spur.

The North Chord section lies within the River Tame valley which remains relatively flat with the ground level ranging between 75m and 80m AOD.

The Birmingham Spur branches towards Birmingham within the River Cole valley with the ground level between 75m and 80m AOD. The spur approaches the motorway crossing where the ground level increases up to 100m AOD around Parkhall Wood. The spur continues towards Birmingham and enters the River Tame valley where the natural ground level reduces to 80m AOD forming the only significant natural slope within this section.

1.8 Geological Context

A summary of the geological setting of the Proposed Scheme is presented below and is based on the information provided in the HS2 Geotechnical Desk Studies, the HS2 online interactive GIS webmap gViewer, and the Mott MacDonald / Systra design joint venture interactive GIS webmap GiGi. A breakdown of the superficial deposits and bedrock geology along the route is presented in Table 3.

1.8.1 Superficial Deposits

Made Ground is anticipated to be present locally associated with previously developed areas, such as around roads and buildings.

Superficial deposits along the route comprise glacial and fluvial deposits. The river valleys contain Alluvium and River Terrace Deposits of the Holocene and Pleistocene Series (up to 2 million years) which were formed by the various river channels. Alluvium can be encountered as two distinct units comprising cohesive and granular strata. River Terrace Deposits are generally encountered as sand and gravel with lesser amounts of cohesive material. Head is also mapped around the Birmingham Spur, and is generally encountered as sand and clay.

Between the rivers are the older glacial deposits of the Pleistocene Series (up to 2 million years) comprising Glaciofluvial Deposits, Glaciolacustrine Deposits, and Glacial Till formed in ice age conditions. Glaciofluvial Deposits mainly comprise sand and gravel with lesser amounts of cohesive material. Glaciolacustrine Deposits are generally encountered as clay and silt. Glacial Till typically comprises cohesive strata.

The artificial ground and natural superficial deposits mapped in published geological mapping are presented in Figure 46 in Appendix A.

1.8.2 Bedrock Geology

The entirety of both Sub-Lots 5 and 6 is underlain by bedrock geology comprising the Mercia Mudstone Group. This group is made up of various formations generally comprising mudstone, siltstone and sandstone. These rocks were formed in the Triassic Era between approximately 200 and 251 million years ago. The environmental setting was mainly hot, arid conditions with lesser input from fluvial channels, floodplains and rivers. There are three formations of the Mercia Mudstone Group present underlying the route: Branscombe Mudstone Formation (201 to 228 million years) comprising mudstone; Arden Sandstone Formation (228 to 237 million years) comprising sandstone, siltstone and mudstone; and the Sidmouth Mudstone Formation (228 to 250 million years) comprising mudstone.

Published bedrock geology are presented in Figure 47 in Appendix A.

1.9 Summary of Existing Site Uses, Hydrological, Hydrogeological and Sensitive Site Designations

A summary of the existing site use, hydrology, hydrogeology and sensitive site designations is presented in Table 3.

Table 3: Summary of Existing Land Use, Hydrology, Hydrogeology and Sensitive Site Designations

<table>
<tr><th rowspan="2">Chainage</th><th rowspan="2">Existing Land Uses</th><th rowspan="2">Hydrological Features</th><th colspan="2">Geology</th><th colspan="2">Hydrogeology (within 250m)</th><th rowspan="2">Sensitive Site Designations</th></tr>
<tr><th>Superficial Deposits</th><th>Bedrock Geology</th><th>Superficial Aquifer</th><th>Bedrock Aquifer</th></tr>
<tr><td colspan="8">Delta Mainline:</td></tr>
<tr><td>154+435 – 155+100</td><td rowspan="4">Agricultural fields</td><td>-</td><td>None</td><td rowspan="21">Mercia Mudstone Group</td><td>-</td><td rowspan="21">Secondary B Aquifer</td><td rowspan="9">None</td></tr>
<tr><td>155+100 – 155+200</td><td>-</td><td>Alluvium</td><td rowspan="2">Secondary A</td></tr>
<tr><td>155+400 – 155+800</td><td>-</td><td>Glaciofluvial Deposits</td></tr>
<tr><td>155+800 – 156+080</td><td>-</td><td>None</td><td>-</td></tr>
<tr><td>156+080 – 156+460</td><td rowspan="4">Birmingham Interchange Station</td><td>Ponds associated with former quarrying</td><td>None</td><td>-</td></tr>
<tr><td>156+460 – 156+500</td><td>Holywell Brook</td><td>Alluvium</td><td>Secondary A</td></tr>
<tr><td>156+500 – 156+700</td><td>Drainage Ditches</td><td>None</td><td>-</td></tr>
<tr><td>156+700 – 157+700</td><td>-</td><td>Glaciofluvial Deposits</td><td>Secondary A</td></tr>
<tr><td>157+700 – 159+110</td><td rowspan="3">Agricultural fields</td><td>-</td><td>Glaciofluvial Deposits</td><td>Secondary A</td></tr>
<tr><td>159+110 – 159+745</td><td>-</td><td>Glaciolacustrine Deposits</td><td>Unproductive Strata</td><td>Coleshill & Bannerly Pools Site of Special Scientific Interest</td></tr>
<tr><td>159+745 – 159+915</td><td>-</td><td>Glaciofluvial Deposits</td><td>Secondary A</td><td rowspan="11">None</td></tr>
<tr><td>159+915 – 160+000</td><td rowspan="3">M6 Motorway</td><td>-</td><td>None</td><td>-</td></tr>
<tr><td>160+000 – 160+070</td><td>-</td><td>Glaciofluvial Deposits</td><td>Secondary A</td></tr>
<tr><td>160+070 – 160+740</td><td>-</td><td>None</td><td>-</td></tr>
<tr><td>160+740 – 160+800</td><td rowspan="7">Agricultural fields</td><td>-</td><td>None</td><td>-</td></tr>
<tr><td>160+800 – 160+940</td><td>Flood Zone 2</td><td>None</td><td>-</td></tr>
<tr><td>160+940 – 161+025</td><td rowspan="3">River Cole
Flood Zone 2/3</td><td>Alluvium overlying River Terrace Deposits 1</td><td>Secondary A</td></tr>
<tr><td>161+025 – 161+265</td><td>Alluvium (east) River Terrace Deposits 1 (west)</td><td>Secondary A</td></tr>
<tr><td>161+265 – 161+525</td><td>River Terrace Deposits 1</td><td>Secondary A</td></tr>
<tr><td>161+525 – 161+600</td><td>-</td><td>None</td><td>-</td></tr>
<tr><td>161+600 – 162+000</td><td>-</td><td>River Terrace Deposits 2</td><td>Secondary A</td></tr>
</table>

Chainage	Existing Land Uses	Hydrological Features	Geology		Hydrogeology (within 250m)		Sensitive Site Designations
			Superficial Deposits	Bedrock Geology	Superficial Aquifer	Bedrock Aquifer	
162+000 – 162+085		River Cole Flood Zone 2/3	River Terrace Deposits 2 (east), Alluvium (west)		Secondary A		
162+085 – 162+385			Alluvium		Secondary A		
162+385 – 162+625	M42/M6 (Toll) motorway	Flood Zone 2/3	None		-		
162+625 – 162+710			Glaciofluvial Deposits (west)		Secondary A		None
162+710 – 162+845			None		-		
162+845 – 162+890			River Terrace Deposits 1		Secondary A		
162+890 – 163+090		-	None		-		
163+090 – 163+280	Agricultural fields	-	Glaciolacustrine Deposits		Unproductive Strata		
163+280 – 163+480		-	Glaciofluvial Deposits (east), Glaciolacustrine Deposits (west)		Secondary A		
163+480 – 163+650		-	Glaciofluvial Deposits overlying Glaciolacustrine Deposits		Secondary A		
163+650 – 164+080	Partially urbanised and fields	-	Glaciolacustrine Deposits		Unproductive Strata		
164+080 – 164+400		Flood Zone 2/3	River Terrace Deposits 1		Secondary A		
164+400 – 165+040	Sewage Treatment Works	River Tame Flood Zone 2/3	Alluvium		Secondary A		
165+040 – 165+185	Agricultural fields	Flood Zone 2/3	River Terrace Deposits 2		Secondary A		
165+185 – 165+380		-	Glaciolacustrine Deposits		Secondary A		
165+380 – 165+510		-	Glaciofluvial Deposits (east), Glaciolacustrine Deposits (west)		Secondary A		
165+510 – 166+000		-	Glaciolacustrine Deposits		Unproductive Strata		
166+000 – 166+200	Former Quarry	-	Glaciofluvial Deposits (east) overlying Glaciolacustrine Deposits		Secondary A		
166+200 – 166+890	Agricultural fields and roads	-	Glaciolacustrine Deposits		Unproductive Strata		
166+890 – 167+260		-	Glaciofluvial Deposits		Secondary A		
167+260 – 167+400		-	None		-		

Chainage	Existing Land Uses	Hydrological Features	Geology		Hydrogeology (within 250m)		Sensitive Site Designations
			Superficial Deposits	Bedrock Geology	Superficial Aquifer	Bedrock Aquifer	
167+400 – 167+790		-	Head deposits		Secondary B		
167+790 – 167+940		Birmingham and Fazely Canal	River Terrace Deposits 1		Secondary A		
167+940 – 168+250		-	None		-		
168+250 – 168+320		-	River Terrace Deposits 1		Secondary A		None
168+320 – 168+390		Flood Zone 2/3	Alluvium		Secondary A		
168+390 – 168+950			None		-		
168+950 – 169+385			River Terrace Deposits 1		Secondary A		
169+385 – 169+680			River Terrace Deposits 2		Secondary A		
169+680 – 169+750			River Terrace Deposits 1		Secondary A		
169+750 – 170+550			River Terrace Deposits 2		Secondary A		
170+550 – 171+115			None		-		
Birmingham Spur:							
160+740 – 160+800	Agricultural fields	-	None	Mercia Mudstone Group	-	Secondary B Aquifer	None
160+800 – 160+940		Flood Zone 2/3	None		-		
160+940 – 161+025			Alluvium		Secondary A		
161+025 – 161+250			Alluvium (west), River Terrace Deposits 1 (east)		Secondary A		
161+250 – 161+530			River Terrace Deposits 1		Secondary A		
161+530 – 161+600			None		Secondary B		
161+600 – 161+970			River Terrace Deposits 2		Secondary A		
161+970 – 162+220			Alluvium		Secondary A		
162+220 – 162+415		Flood Zone 2/3	Head Deposits present on edge of UP line embankment between ch.162+285 – 163+310		Secondary B		
162+415 – 162+810		Flood Zone 2/3	Glaciofluvial Deposits		Secondary A		
162+810 – 164+685	Motorway crossing		None		-		
164+685 – 165+075			Head Deposits		Secondary B		

Chainage	Existing Land Uses	Hydrological Features	Geology		Hydrogeology (within 250m)		Sensitive Site Designations
			Superficial Deposits	Bedrock Geology	Superficial Aquifer	Bedrock Aquifer	
165+075 – 165+530	Agricultural fields	-	Glaciofluvial Deposits		Secondary A		
165+530 – 165+560		-	None		-		
165+560 – 165+590		-	None		-		None
165+590 – 165+630		-	None		-		
165+630 – 165+658		-	Head Deposits		Secondary B		
North Chord:							
000+000 – 000+160	Agricultural fields	-	Glaciolacustrine Deposits (Glaciofluvial Deposits present on UP line between ch.0+000 – 0+020)	Mercia Mudstone Group	Unproductive Strata	Secondary B Aquifer	None
000+160 – 000+310	Agricultural fields	Flood Zone 2/3	River Terrace Deposits 2		Secondary A		
000+310 – 000+930	Sewage Treatment Works		Alluvium		Secondary A		
000+930 – 001+210	Agricultural fields		River Terrace Deposits 1		Secondary A		
001+210 – 001+320		-	Glaciolacustrine Deposits (UP Line), River Terrace Deposits 1 (Down Line)		Unproductive Strata		
001+320 - 001+440		-	Glaciolacustrine Deposits		Unproductive Strata		
001+440 – 001+675	Motorway crossing	-	River Terrace Deposits 2 (DOWN Line), Glaciolacustrine Deposits (UP Line)		Secondary A		
001+675 – 001+790	Agricultural fields	-	Glaciolacustrine Deposits		Unproductive Strata		
001+790 – 004+120		-	Glaciolacustrine Deposits present on UP Line between ch.1+790 – 1+840		Unproductive Strata		

1.10 Historical Land Uses

A review of historical maps to provide an overview of the historical development of this section of the route has been undertaken in the Geotechnical Desk Study[i]. The historical maps consulted are presented in Appendix D of the desk study. This section provides a brief summary of the significant historical land uses.

The earliest available maps are dated 1889 to 1891. These maps indicate that most of the route is farmland and open fields.

The maps dated from 1900 to 1910 show little change in the overall landscape. There are several key features, including:

- Birmingham and Fazeley Canal (ch.167+700); and
- Birmingham and Derby Railway (ch.164+300).

Between 1920 and 1930 residential and industrial development of the surrounding areas has occurred with the towns of Water Orton and Coleshill expanding. Key features include:

- A number of clay / marl, sand and gravel pits between ch.160+000 and 165+000;
- A large gravel pit located north of Coleshill Pool at approximate ch.159+000;
- Coleshill Gas Works located to the north of Cole End at ch.164+000 to 164+300;
- Early development of Minworth Sewage Treatment Works, south of Cudworth at approximately ch.165+000;
- The Birmingham and Fazeley Canal passes through a tunnel north of Cudworth; and
- Hams Hall A power station and cooling towers (ch.164+900 to 165+100) although mapping is incomplete. Significant excavations and an unknown shaft are also present.

Mapping from 1930 to 1940 shows no significant changes. The Coleshill Gas Works is now disused.

1940 to 1960 mapping includes the construction of the following key features:

- Coleshill Sewage Treatment Works (ch.164+400 to 164+900).

Mapping from the 1960s shows industrial development largely associated with Hams Hall to the north and east of the proposed Sub-Lot 5 alignment, and the expansion of Minworth and Coleshill Sewage Treatment Works.

Significant development recorded on 1970s mapping includes the following:

- Construction of M6 motorway which the route crosses at ch.160+000; and
- Further expansion of Coleshill Sewage Treatment Works.

1980 to 1990 mapping indicates the following:

- Significant residential development of Chelmsley Wood. Industrial land use to the south including depots and warehouses; and
- Construction of the M42 and a large motorway interchange at ch.160+500.

1990 to present day mapping indicates that there are no significant changes in land use.

For full details of the historical land uses and the historical maps, see the Geotechnical Desk Study for Delta Junction.

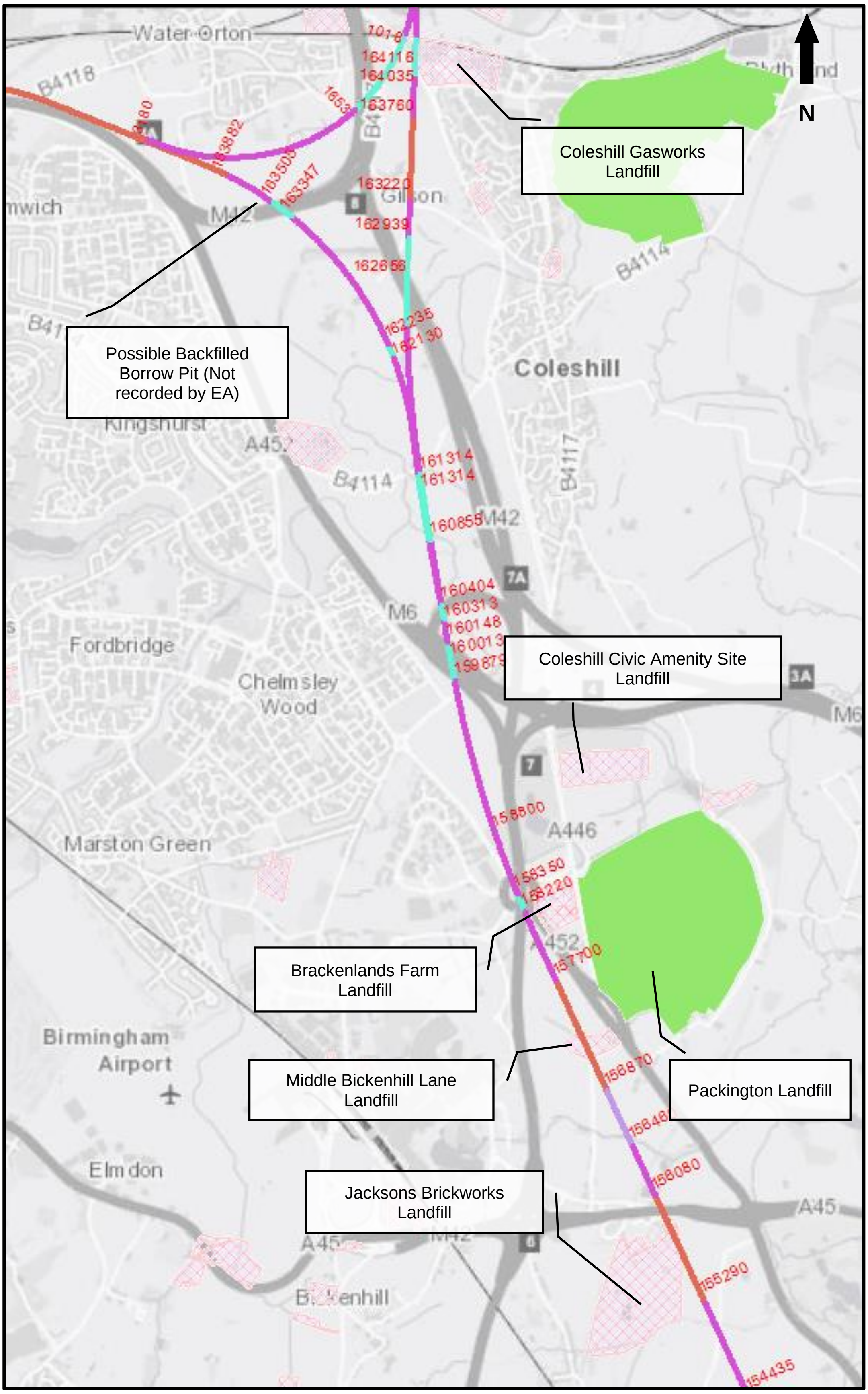
1.11 Landfills

Several landfills were identified in the Environmental Statement (2013) Technical Appendices[v] and the Environment Agency (EA) WMS layers for Historic and Authorised Landfills which may have an impact on the scheme.

Additional reference has been made to the Remediation Strategy Report for the BIS Triangle[vi] (written by Laing O'Rourke and Murphy, working on behalf of HS2).

A summary of the landfills and their uses is presented below and illustrated in Figure 3.

Figure 3: Environment Agency Recorded Landfills, Sub-Lots 5 and 6



Source: EA WMS Layers

1.11.1 Jacksons Brickworks Landfill (Historical)

Jacksons Brickwork landfill accepted inert, industrial, commercial, household, and special waste from the 1990s. Prior to this time, several clay pits were recorded on historical plans which appear to have been infilled. There is no information on landfill containment systems at the site. The site is now occupied by a Solihull Metropolitan Borough Council civic amenity site permitted to undertake waste transfer operations. In the site Environmental Permit Operational Working Plan, a "*pre-operational inert landfill site*" is described which appears to relate to brickwork pits that are currently being excavated according to aerial photography rather than historic landfilling.

There is no evidence of landfill containment systems or monitoring controls.

Diddington Cutting is to pass through the north-west portion of the former landfill area. New road works are also proposed in this area to the south of the A45 to allow access from the waste transfer site to continue.

1.11.2 Packington Operational Landfill

Packington Landfill is operated by Suez Recycling and Recovery UK (formerly known as SITA UK Limited) under an Environmental Permit. The landfill accepts domestic waste, contaminated material, and low-grade radioactive waste. The Environmental Statement[v] reports that the landfill is fully lined with gas and leachate collection systems (HS2, 2013).

The only works proposed in the landfill area relate to the modification of underground and overground electricity cables at ch.157+200.

1.11.3 Brackenlands Farm Landfill (Historical)

The EA reports that the site was created as a shallow 2m to 6m sand and gravel borrow pit during the construction of the M42. The landfill accepted inert and liquid / sludge waste including wastewater, sewage sludge and chemical waste mixed with municipal solid waste between 1975 and 1977.

The western and northern margins of the landfill mark the boundary between the LoD and LLAU except for a portion of the LoD which is within the south-western corner of the landfill.

Information provided in the Environmental Statement clarifies that "*approximately 70,000m^3 of sewage sludge was deposited on part of the site*"[vii] originating from Saltley Sewage Works. Contamination testing on sludge showed elevated levels of heavy metals. Due to concerns about contamination exposure 0.3m of "*soil*" was placed over the sludge on-site[viii]. The area of infilling is indicated on Figure 4 below:

Figure 4: Hatched Area Showing "*Approximate area of sewage sludge infill*" at Brackenlands Farm Landfill

Source: Register of land which is being / has been put to a contaminative use. Solihull Metropolitan Borough Council draft entry October 1991.

No information exists on pollution containment systems for the site.

1.11.4 Coleshill Civic Amenity Site Landfill (Historical)*:*

The site was a former sand quarry which accepted inert, industrial, commercial, and household waste between 1964 and 1980.

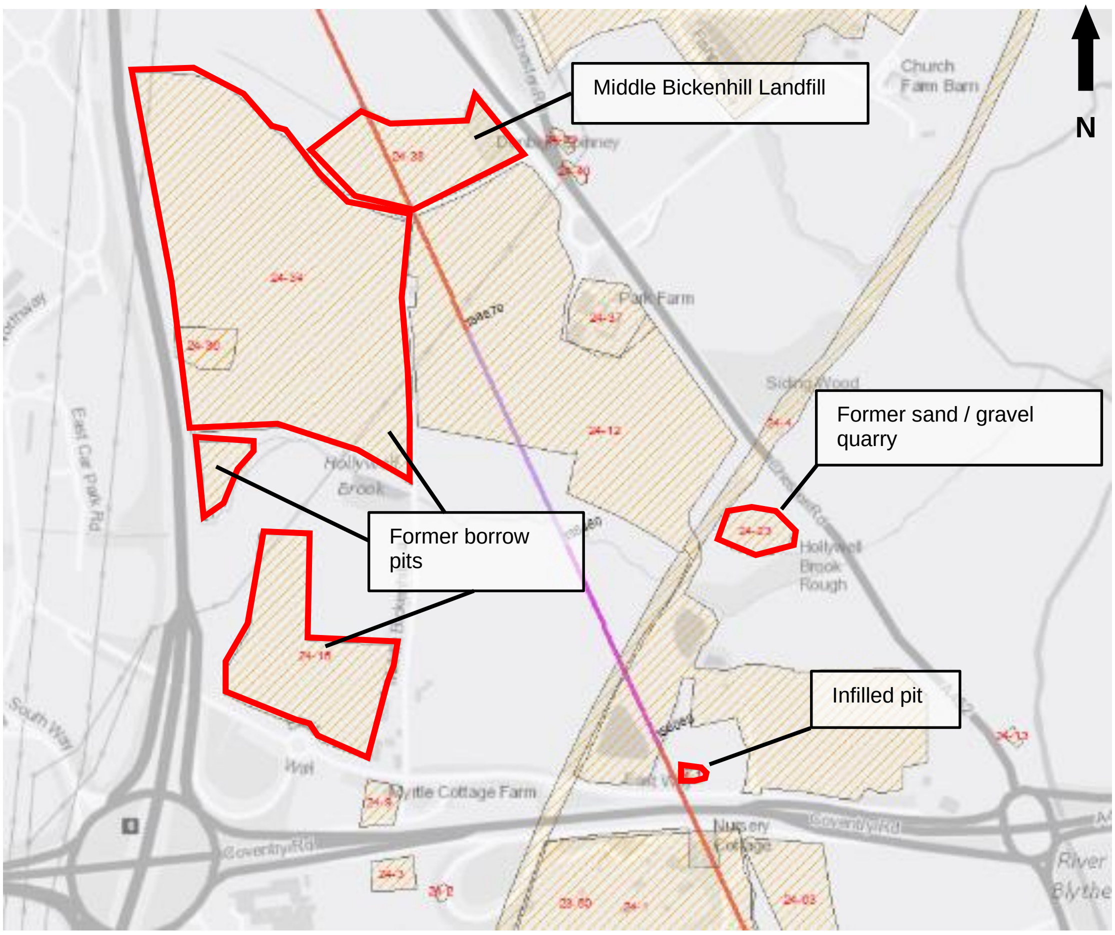
The EA has no knowledge of any environmental monitoring or controls at the site.

1.11.5 Landfilling in the BIS Triangle

The BIS Triangle has been subject to a range of historic landfilling activities in former quarries. Three main landfilling areas have been identified below and are illustrated in Figure 5:

- Land Quality (LQ) site 24-38: Middle Bickenhill Landfill;
- LQ site 24-23: infilled sand and gravel quarry; and
- LQ sites 23-34 and 24-16: backfilled borrow pits.

Figure 5: Landfills in BIS Triangle



1.11.5.1 Middle Bickenhill Landfill (LQ site 24-38):

The Environment Statement recorded that the landfill accepted inert, industrial, commercial, household and special waste between 1962 and 1985. The landfill was licensed in 1978 for disposal of "*virgin sub-soil, inert hardcore and inert builders' rubble*". The license required that the site was covered with a 300mm layer of topsoil "*immediately prior to the cessation of tipping*".

The Preliminary Risk Assessment (PRA) (HS2, 2016)[ix] recorded placement of material in 1970 and 1971 with landfill thicknesses estimated to be up to 6m in 1973. A single trial-pit recorded in the PRA showed Made Ground to a depth of at least 4.1m bgl exhibiting "*elevated copper*", and sulphurous odours, but no gas monitoring was undertaken. The EA Landfill datasheet records that the site had a history of fly tipping of both domestic and industrial waste including putrescible wastes. The license holder went into receivership in 1982 and the license became void. The EA are not aware of any reclamation works which preceded the development of current motorcycle park on the site. They do however report on a perimeter survey in 1988 which "*failed to detect significant concentrations of landfill gas*". The EA are not aware of any ongoing gas monitoring or control measures at the site.

A site visit by Balfour Beatty Vinci (BBV) conducted on 4th July 2018 reported the following:

"*The Made Ground beneath the motorcycle track area is typical of landfill waste of c1980's age and contains domestic refuse such as plastic packaging and small animal bones as well as larger material that appears likely to be commercial waste and includes substantial fragments of material identified as cement bound asbestos based on visual appearance. Some of the material appears likely to be of notably poor chemical quality based on visual and olfactory observations. There is also substantial growth of Japanese knotweed in the area.*

According to Reg, the motorcycle track tenant, the track has been present since the mid 1990's and races are still run at weekends. The dirt track is reprofiled after each race-day using one of the tenants' two tracked vehicles. The effect of the reprofiling appears to be that fragments of Japanese knotweed and cement bound asbestos have been spread all over the motorcycle track area, with the result that both are ubiquitous on that part of the site. There is a small stream to the north of the motorcycle track area".

The remediation strategy for the BIS Triangle[vi] reported that the landfill is at a higher elevation relative to the surrounding ground. GI undertaken within the landfill boundary recorded the thickness of landfill material between 1m and 5.5m. Fill materials were generally described as sandy clay or sand and gravel with anthropogenic inclusions including plastic, wood, glass, fabric, brick, concrete, clinker, ash, rubber, asphalt and tile fragments. Also noted were the potential of asbestos containing material (ACM) within several exploratory locations. Japanese knotweed was recorded to be present across the landfill.

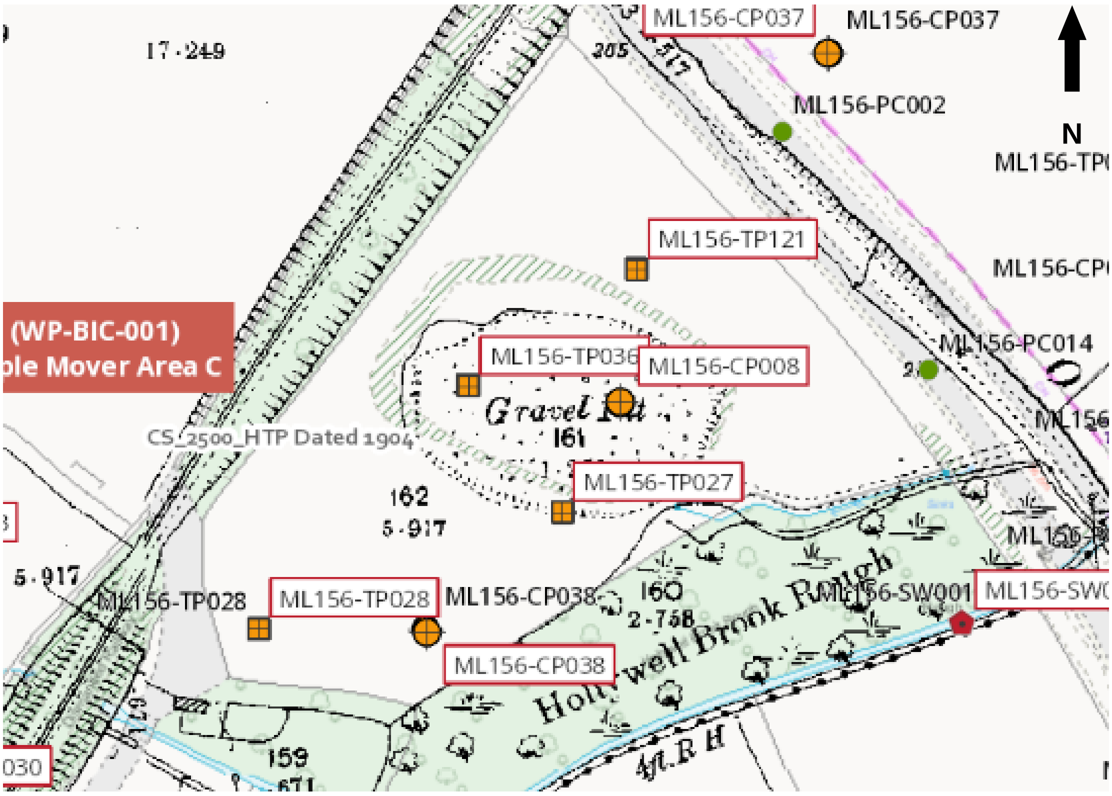
Groundwater strikes were recorded in seven of the 24 exploratory holes which encountered Made Ground, located near the base of the landfill in granular soils (potentially in continuity with groundwater) or at shallower depths recorded as "*seepages*".

1.11.5.2 Infilled Sand and Gravel Quarry (LQ site 24-23)

This site is currently agricultural land. GI data records landfill material of up to 4.4m depth in ML156-CP008 and ML156-TP036. The fill material is described as SAND or GRAVEL, and waste components include tyres, glass, metal, ash, brick, concrete, wood, and fabrics. A newspaper dated 1960 was encountered in ML156-TP036. Organic and hydrocarbon odours were recorded in the waste material. Historic investigation in the PRA[ix] recorded "*Black waste fill*". The landfill appears to be constructed directly over glaciofluvial deposits comprising slightly sandy gravelly CLAY over sandy clayey GRAVEL. The extent of landfilling recorded in the GI appears to be consistent with the historically mapped extent of the former gravel pit (Figure 6).

The remediation strategy for the BIS Triangle[vi] reported the GI identified the fill to include domestic and construction type waste, including abundant ash. Fill material thickness ranged between 4m and 7.6m and was recorded to comprise sandy gravel with clay inclusions and anthropogenic material, including brick, rubber, ash, clinker, ceramics, glass, metal, plastic and paper.

Figure 6: 1904 Historical Mapping Showing the Extent of Former Sand and Gravel Quarry



Source: HS2 gViewer

1.11.5.3 Backfilled Borrow Pits (LQ site 24-16 and 24-34)

The borrow pits are understood to have been quarried to obtain material for the construction of the M42.

GI was mainly focused on the northern borrow pit area to the west of the Middle Bickenhill Landfill. This showed Made Ground proven up to a depth of 5.7m bgl, with greatest thicknesses in the northern part of this area. Thicknesses in the southern half of the northern borrow pit were typically nil to 1.7m. The composition of the fill material varies between clay, sand and gravel. Anthropogenic inclusions included occasional timber, wire and plastic, brick, asphalt, tile and ash. The overall Made Ground composition appears to be consistent with earthworks waste rather than domestic of industrial landfill.

The remediation strategy for the BIS Triangle[vi] reported the Made Ground within the borrow pits typically comprises relatively inert material, with localised areas of construction type material present. Fill material thicknesses ranged between 0.25m and 5.7m, and comprised sandy gravelly clay and sand, with anthropogenic inclusions of wood, brick, plastic, clinker, textile, metal, rubber, wire, macadam and concrete.

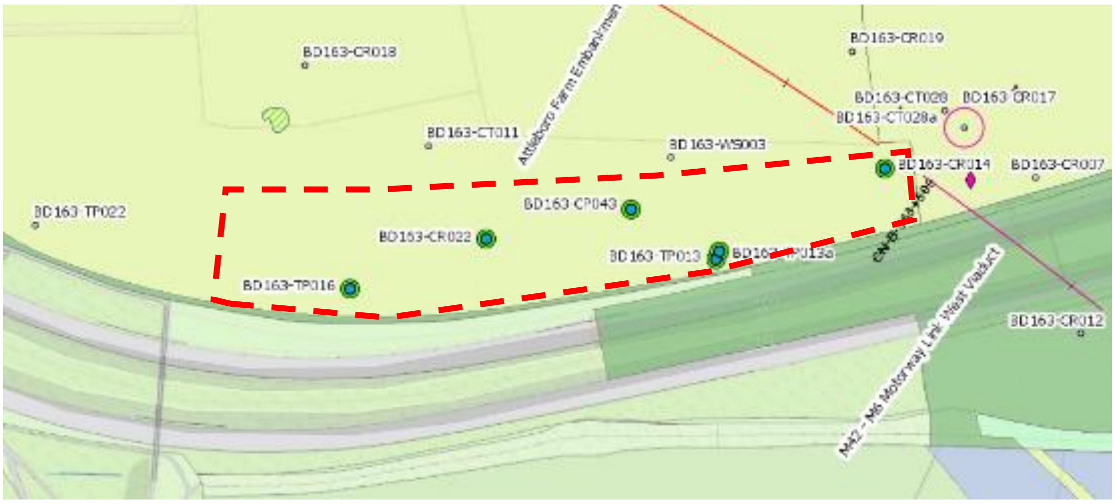
1.11.5.4 Infilled Pit (LQ site 24-11)

Little is known about this feature which was first recorded as a pit / pond in mapping from 1888, although the PRA[ix] does suggest that the pit was excavated in the Mercia Mudstone Group. Recent site walkover surveys conducted by the Enabling Works Contractor (EWC) have shown that this pit was not filled, is still in existence and is occupied by a pond.

1.11.6 Possible Backfilled Borrow Pit (BS ch.163+450 to 163+500)

Evidence of a deep area of Made Ground was encountered in the position of the M42-M6 Motorway Link West Viaduct. The feature is not recorded on any historical plans or by the Environment Agency. The GI data shows a linear area of Made Ground some 350m on the east-west axis and 60m on the north-south axis, with the area indicated below:

Figure 7: Red Hatch: Indicative area of deep made ground, ch.163+450 to 163+500

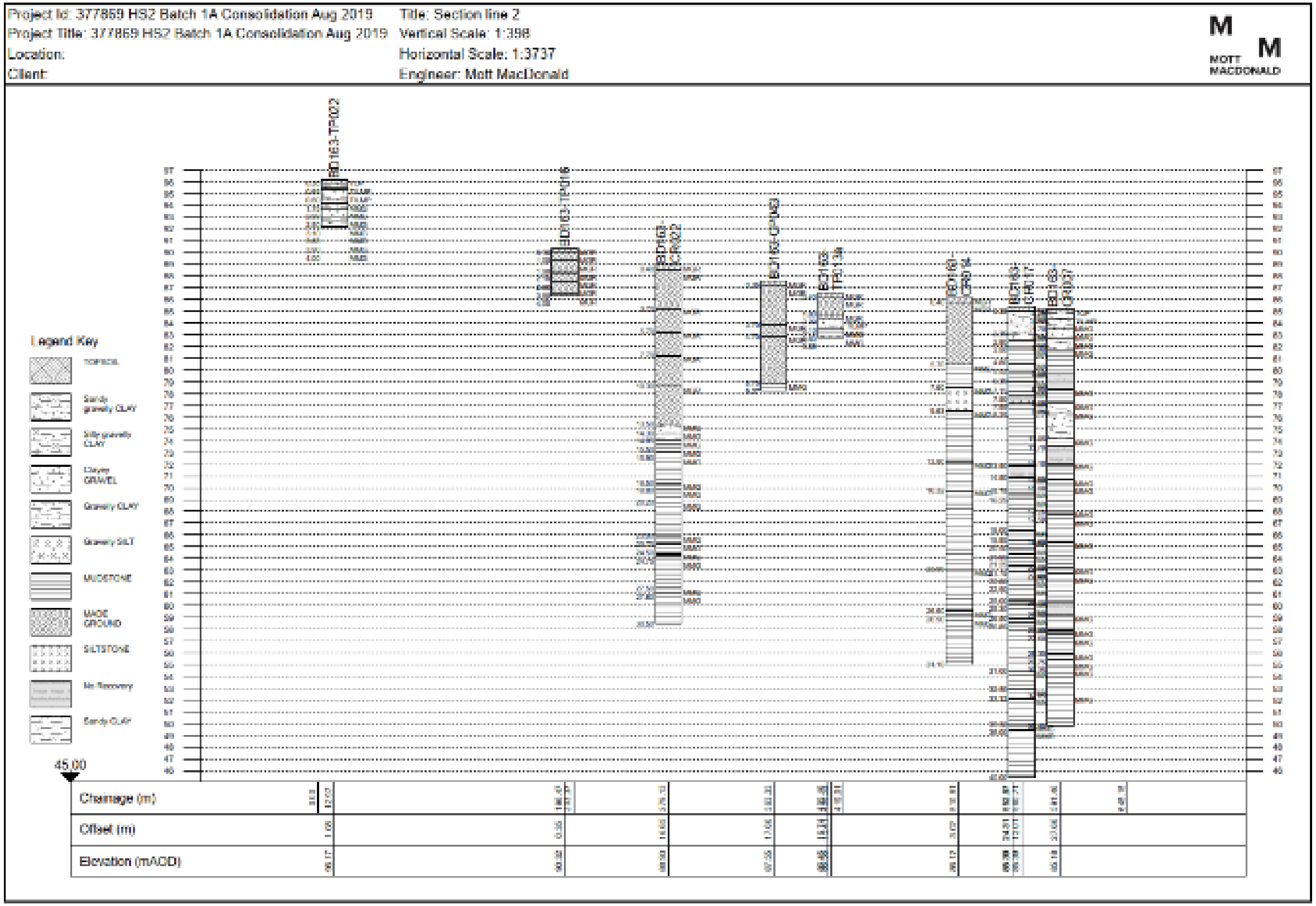


The location and geometry of the area of Made Ground is consistent with a postulated borrow pit constructed for the motorway.

A cross section through the borrow pit long axis is shown below:

Figure 8: Long Section through postulated borrow pit

Figure 9: Long section through postulated borrow pit



The data indicates that that Made Ground extends to a depth of about 5.7m bgl at the location of the viaduct, deepening to the west to a maximum recorded depth of 13.5m bgl. The majority of the Made Ground is composed of reworked natural material including sandstone, slate, siltstone, mudstone within a sandy CLAY matrix. Secondary or "*rare*" components include construction and demolition wastes described as: brick, coal, tarmac, ceramic, ash, and wood. There is no visual or olfactory evidence of contamination, and laboratory data suggests evidence of low-moderate TPH and low PAH concentrations in the Made Ground.

The postulated borrow pits are located over glacial till or weathered Mercia Mudstone composed of slightly sandy slightly gravelly CLAY or unweathered mudstone.

1.11.7 Planning Proposals for Mineral Extraction within the BIS Triangle

Parts of the BIS Triangle is understood to have been subject to approved planning applications for mineral extraction. The following planning applications have been identified:

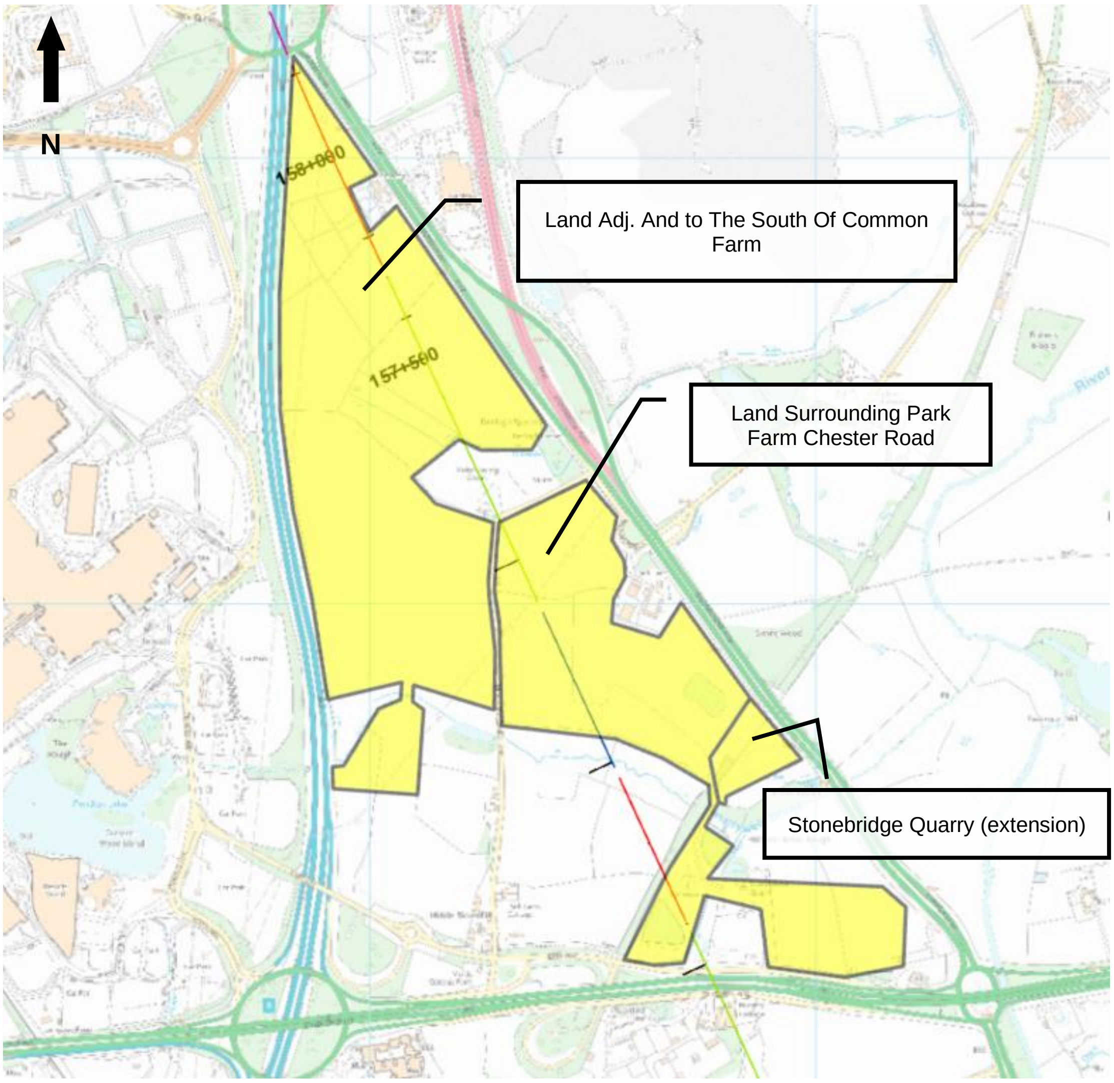
Table 4: Identified Planning Applications within the BIS Triangle

Application Number	Application Name	Development Proposals
PL/2011/01951/FULM	Land Surrounding Park Farm Chester Road Middle Bickenhill, Solihull	Planning application to allow the extraction and processing of sand and gravel including the construction of a new site access road, landscaping and screening bunds, sand screening plant, minerals washing plant, silt settlement lagoons, quarry offices, sand bagging shed and other associated infrastructure
PL/2015/50745/MAJFOT	Stonebridge Quarry	Extension to Phase 1 mineral extraction area at Stonebridge Quarry, with landscaping and restoration
PL/2015/52804/MWMAJ	Land Adj. And to The South of Common Farm	Planning application to allow the extraction and processing of sand and gravel, including the construction of a new site access road, landscaping and screening bunds, mineral washing plant and other associated infrastructure with restoration using imported inert fill materials

All planning applications contain provisions to accommodate HS2 requirements.

The approximate locations of these planning applications are marked in yellow on the plan below:

Figure 10: Planning Application Areas (Yellow)



Laing Murphy (2018)[x] reported that only Park Farm Quarry is currently operational. Planning application PL/2015/50745/MAJFOT was for the extension of this quarrying to the south over the former infilled sand and gravel quarry (LQ site 24-23). This extension does not appear to have occurred.

1.12 Geochemistry

The British Geological Survey (BGS) have defined Normal Background Concentrations[xi] (NBCs) for arsenic, cadmium, benzo(a)pyrene, mercury, copper, nickel and lead for English soils. The NBCs represent the "*upper limit of 'normal' levels of contaminants in soil as described by the Environmental Protection Act 1990 Part IIA*". The upper limit is defined statistically as the upper 95% confidence limit of the 95th percentile concentration based on analysis of national soil contamination datasets. NBCs are defined for a set of "*domains*" representing NBCs in areas of natural enrichment, and anthropogenic enrichment, as appropriate. Based on the BGS distribution maps, the NBCs that can be applied to the study area are presented in Table 5.

Table 5: BGS Normal Background Concentrations

Contaminant	Domain	NBC (mg/kg)	Sub-Lot
Arsenic	Principal	32	5 and 6
Benzo[a]pyrene	Urban	3.6	6
	Principal	0.5	5
Cadmium	Urban	2.1	6
	Principal	1.0	5
Copper	Urban	190	6
	Principal	62	5
Lead	Urban	820	6
	Principal	180	5
Mercury	Urban	1.9	6
	Principal	0.5	5
Nickel	Principal	42	5 and 6

Principal domains are areas outside of regions where the contaminant concentration can be readily attributed to underlying geology, urban development, or "*non-ferrous metalliferous mineralisation".*

Urban domains are areas where the urban development is an important contributing factor to the contaminant concentration.

1.13 Hydrogeology

For a comprehensive review of the hydrogeological setting along the route, please see Table 3.

The EA aquifer classification framework of Secondary A aquifers are permeable layers capable of supporting water supplies at local rather than strategic scale and in some cases forming an important source of base flow to rivers. Geological units along the route which are Secondary A aquifers include Alluvium, Glaciofluvial Deposits, and River Terrace Deposits.

Secondary B Aquifers are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. Geological units along the route which are Secondary B aquifers are superficial Head deposits, and bedrock Mercia Mudstone Group.

The route does not fall within, or within 500m of, any groundwater source protection zones.

1.14 Hydrology

The Proposed Scheme crosses several watercourses, including main rivers such as the River Cole, and several minor watercourses and land drains. The scheme crosses the following main watercourses:

- River Cole;
- River Tame; and
- Birmingham and Fazeley Canal.

In-addition, there are several water bodies within 250m of the route:

- Coleshill and Bannerly Pools Site of Special Scientific Interest (SSSI); and
- Pools associated with Pool Wood.

EA flood mapping indicates that sections of the route fall within flood risk zones 2 and 3. These are defined as:

- Flood Zone 3 defines the extent of a flood from rivers with a 1% (1 in 100) chance or greater of happening in any given year; and
- Flood Zone 2 defines the extent of a flood from rivers with a 0.1% (1 in 1000) chance or greater of happening in any given year and contains areas that have bene recorded as flooding in the past.

The locations of the watercourses and flood zones are presented in Table 3.

1.15 Radon

The UK radon interactive map viewer indicates that the route of Sub-Lots 5 and 6 are within the lowest band of radon potential, which is a zone where less than 1% of homes are above the action Level (200Bq/m^3).

1.16 Designated Areas

At approximate ch.159+000 is Coleshill & Bannerly Pools, which is designated as a site of special scientific interest (SSSI). The site comprises two pools and an area of bog between them which forms the only valley mire system in Warwickshire.

The entirety of the Proposed Scheme is within a surface water Nitrate Vulnerable Zone (NVZ).

1.17 Environmental Permits for Waste and Large Installations

A review of environmental permits which may be affected by the scheme has been undertaken. A summary of sites operating under environmental permits, and the interface status of the permits derived by HS2 (Table 6) is presented in Table 7.

Table 6: Environmental Permit Interface Status Descriptors (HS2, 2017)[xii]

Interface Status	Description
Red	CT05 boundary intersects permitted site boundary – requirement for full or partial surrender of permit anticipated
Amber	CT05 boundary in close proximity to permitted site boundary but does not intersect -no requirement for permit surrender anticipated
Green	No anticipated impact on permitted site

Table 7: Summary of Identified Environmental Permits

Name	Approximate Chainage	Distance from Line (m)	Facility Type	Interface Status
Arden Brickworks	155+600	540	Deposit of waste to land.	Green
Bickenhill Household Waste Recycling Centre	155+900	270	Waste transfer.	Red
Packington Landfill	157+780	376	Landfill	Amber
STW Coleshill Water Reclamation Works	164+350	10	Sludge treatment	Red
Coleshill Street Sweeping Plan	164+390	110	Waste transfer.	Red

The permit boundaries for Bickenhill Household Waste Recycling Centre, STW Coleshill Water Reclamation Works, and Coleshill Street Sweeping Plan are intersected by the proposed works.

1.17.1 Packington Landfill

Packington Landfill is located within a utility construction zone around existing overhead electricity cables. This zone encroaches on the environmental permit area shown in green on the plan below.

Figure 11: Utility Construction Zone through Packington Landfill

The northern part of the utility construction zone includes an "*asbestos tipping area*"[xiii]. Where underground works are proposed, the impact of these works on existing landfill containment facilities, operational and monitoring plans needs to be carefully considered.

To the south-east of the Packington landfill permit area, utility modification works, potentially including underground utilities are proposed through a former pond recorded with 1.7m of fill with a reported strong hydrocarbon odour (ML157-TP001). There do not appear to be any permitting obligations for this area.

1.17.2 STW Coleshill Water Reclamation Works

At Coleshill Water Reclamation Works Watton House Embankment, Water Orton No.2 Viaduct and the River Tame West Viaduct cross the area subject to an historical waste management license for sludge deposition, as illustrated by the below plan:

Figure 12: Extent of Waste License SL162 at Coleshill Sewage Treatment Works

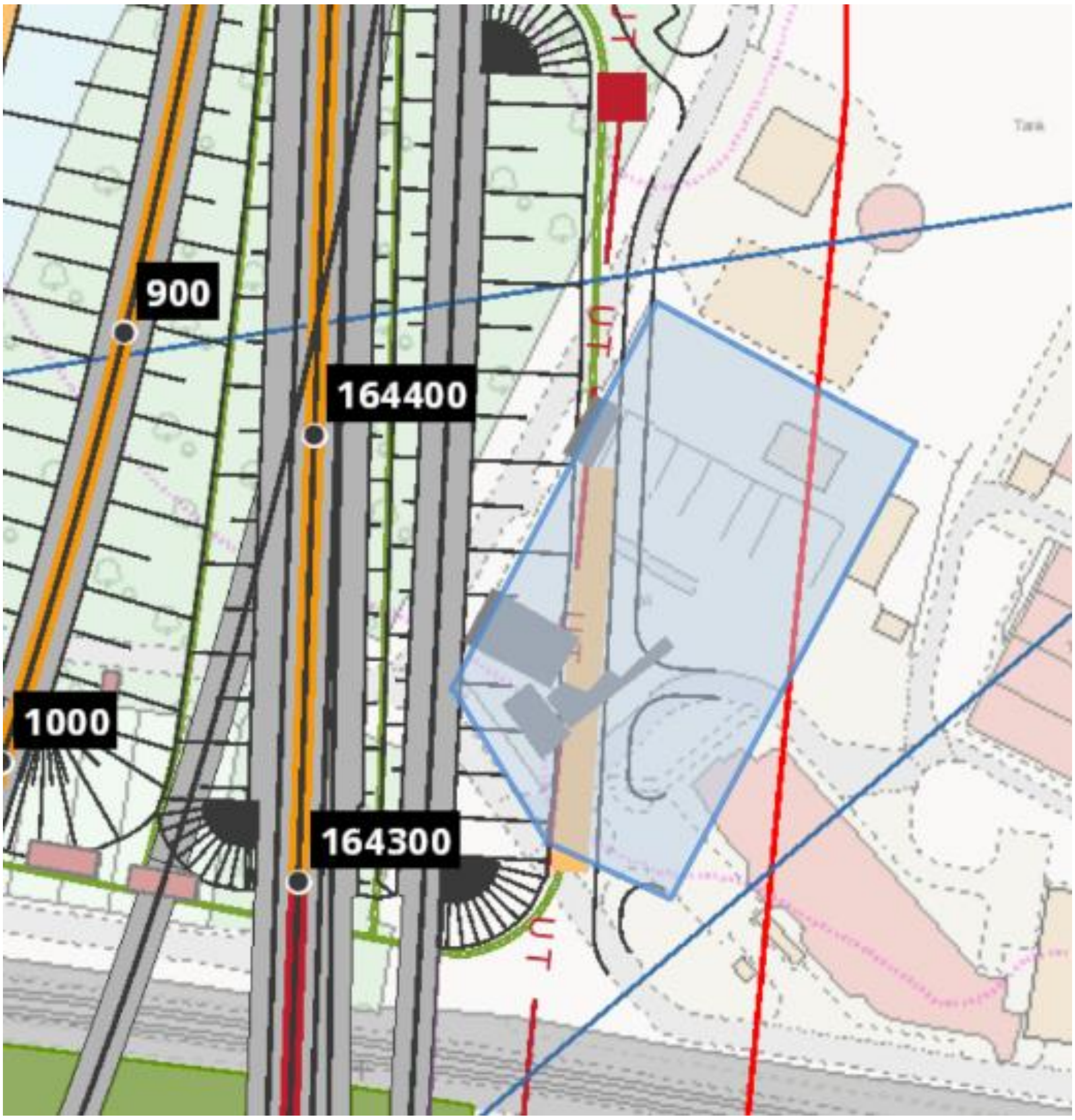
Exploratory hole logs for the sludge area do not record any containment systems, and the former "*sludge beds*" comprise gravel and clay layers overlying river terrace gravels.

The works in this area will maintain access to the sewage treatment works but may require alterations to permit boundaries to allow for HS2 land acquisition.

1.17.3 Coleshill Street Sweeping Plan

The Coleshill Street Sweeping Plan permit relates to a grit separation plant within the Coleshill Sewage Treatment Works. Permitted activities are for the recycling / reclamation or organic and inorganic substances, and the storage of waste pending treatment. The permit area is indicated in blue in Figure 13.

Figure 13: Coleshill Sewage Treatment Works Grit Separation Plan: Environmental Permit Area (blue polygon)



The permit appears to include point source drainage water monitoring requirements prior to discharge at the head of the works. The permit does not refer to any groundwater monitoring obligations.

1.17.4 Bickenhill Household Waste Recycling Centre

Bickenhill Household Waste Recycling Centre is used for the "*segregation and storage of household waste prior to onward shipping to specified licensed sites*"[xiv]. The working plan details the following "*site engineering*" elements for pollution prevention and control:

- Reinforced concrete hardstanding with regular inspection and repair;
- Drainage of surface water to interceptor;
- Interceptor maintenance and "weekly checking by site as required". Monthly interceptor cleaning; and
- Foul drainage to a cesspit maintained annually by Sandwell Metropolitan Borough Council.

There does not appear to be any groundwater or ground gas monitoring at the site.

Access to the Bickenhill Household Waste Recycling Centre will be maintained by the permanent works, although the area is to be occupied by a temporary works compound which is likely to result in disruption in the short to medium term.

Recommendations

The acquisition of sites with active Environmental Permits will require that permits are varied and partially surrendered within the works footprint to ensure that HS2 do not acquire liabilities under the permits. Other works not requiring acquisition (including utility diversions) may also impact on permits. Partial or full surrender of the permits will require the permit holder to return the land to a "*satisfactory state*" (a term defined in the permit). While responsibility for surrender rests with the permit holder, surrender requirements can be lengthy and complex. The precise requirements for permit surrender will depend upon the works proposed – not only the HS2 acquisition areas, but also the anticipated remediation and earthworks necessary to address geotechnical and remediation requirements. Of greatest concern for the Sub-Lots 5 and 6 work packages are the utility diversion works over Packington landfill, and the viaduct construction over the Coleshill Sewage Treatment Works which need to be carefully coordinated to ensure that they do not impact on any existing waste containment systems.

It is recommended that the details of the scheme are passed on to the permit holders in order to allow permit surrender plans to be formulated within construction timescales.

1.18 Potentially contaminated sites identified in the Environmental Statement

A list of all sites identified in the Environmental Statement as potentially posing a contaminative risk to the Proposed Scheme is provided in Table 8. Sites have been classified based on the following:

- **Group A Sites**: Fall fully / partially within the land required to construct the Proposed Scheme, potentially affected by soil / groundwater contamination and ground gas.
- **Group B Sites**: Fall fully / partially within the land required to construct the Proposed Scheme, potentially affected by soil / groundwater contamination only.
- **Group C Sites**: Fall outside of the land required to construct the Proposed Scheme, potentially affected by soil / groundwater contamination and ground gas.
- **Group D Sites**: Fall outside of the land required to construct the Proposed Scheme, potentially affected by soil / groundwater contamination only.

Each site's potential for contamination has also been classified based on the following:

- **Class 1**: Low risk of potential contamination, or less hazardous chemicals in use.
- **Class 2**: Medium risk of potential contamination, more hazardous chemicals in possible use.
- **Class 3**: High risk of potential contamination, hazardous chemicals likely to be present.

All chainages are approximate unless specified otherwise.

The Environmental Statement did not classify all the potentially contaminated sites as Groups, and none of the sites as Classes. The sites have been assessed as part of this study and have been assigned a Class and Group based on the descriptions above.

Table 8: Areas Potentially Posing a Contaminative Risk to the Proposed Scheme

Chainage Start	Chainage End	Site ID	Site Title	Land Use Classification	GI Undertaken	No. Exploratory Positions
Group A Sites						
155+200	155+900	24-1	Jacksons Brickworks Landfill (historical)	2 – historical land use	Yes	21
156+000	156+000	24-11	Infilled pit	2 – historical land use	No	N/A
156+000	156+000	24-2	Infilled pond	2 – historical land use	No	N/A
156+200	156+600	24-16	Backfilled borrow pit	2 / 3 – historical land use	No	N/A
156+400	156+500	24-23	Infilled sand and gravel quarry	2 / 3 – historical land use	Yes	3
156+600	157+400	24-34	Backfilled borrow pit	2 / 3 – historical land use	Yes	26
157+000	158+200	24-41	Packington operational landfill	2 – current land use	No	N/A
157+050	157+300	24-38	Middle Bickenhill Landfill	2 / 3 – historical land use	Yes	Unknown*
157+000	157+100	24-40	Infilled pit	2 / 3 – historical land use	Yes	1
157+100	157+100	24-39	Infilled pit	2 / 3 – historical land use	No	N/A
158+000	158+300	24-44	Brackenlands Farm Landfill (historical)	2 – historical land use	Yes	5
158+900	159+200	24-54	Coleshill Civic Amenity Site landfill (historical)	2 – historical land use	No	N/A
161+220	161+260	19-20	Timber yard, formerly a saw mill	1 – historical & current land use	Yes	1
162+580	162+660	19-07	Former sewage works	2 – historical land use	No	N/A
164+080	164+850	19-17	Coleshill Gas Works historical landfill	2 – historical land use	Yes	9
164+300	164+600	19-25	Coleshill Sewage Treatment works	2 – current land use	Yes	6
Group B Sites						
155+850	157+070	24-12	Park Farm Quarry (now named Stonebridge Quarry)	1 – current land use	Yes	36
155+900	155+900	24-13	Former Smithy	1 – historical land use	Yes	1
156+100	157+500	24-32	Rugby to Birmingham Rail Line and Birmingham International Station	1 – current land use	No	N/A
156+100	156+200	24-9	Myrtle Cottage Farm and garage services	1 – current land use	No	N/A
156+200	156+200	24-4	Dismantled Hampton-in-Arden to Shustoke line	1 – historical land use	No	N/A
156+800	156+900	24-37	Park Farm	1 – current land use	No	N/A
156+900	157+000	24-36	Warren Farm with tank	1 – current land use	Yes	1
157+800	158+100	24-43	Melbick Nursery	1 – current land use	No	N/A
158+400	159+200	24-46	Birmingham Business Park	1 – current land use	No	N/A
159+800	160+000	24-58	Highways Agency Depot (operational)	1 – current land use	No	N/A
164+260	164+280	19-24	Birmingham to Nuneaton Line	1 – historical land use	No	N/A
164+300	164+300	19-56	Infilled pond	2 – historical land use	No	N/A
164+400	164+550	19-16	Infilled pond	1 – historical land use	No	N/A
162+600 (BS)	162+700 (BS)	19-38	Former tank	1 – historical land use	No	N/A
162+700 (BS)	162+700 (BS)	19-35	Electricity substation	1 – current land use	No	N/A
001+000 (NC)	001+100 (NC)	19-24	Birmingham to Nuneaton Line	1 – current land use	No	N/A
001+000 (NC)	001+100 (NC)	19-49	Former works including coal and cement block factories now Jack O'Watton Business park	1 – historical land use	No	N/A

001+200 (NC)	001+200 (NC)	19-46	Infilled pond	2 – historical land use	No	N/A
002+000 (NC)	002+000 (NC)	19-45	Infilled pond	1 – historical land use	No	N/A
002+400 (NC)	002+400 (NC)	19-43	Infilled pond	1 – historical land use	No	N/A
002+720 (NC)	002+720 (NC)	19-40	Infilled pond	2 – historical land use	Yes	1
Group C Sites**						
156+500	156+700	24-5	Windbridge Nurseries Landfill	2 / 3 – historical land use	No	N/A
159+400	159+500	24-56	Infilled gravel pit	2 – historical land use	No	N/A
161+300	161+600	19-05	Woodlands Cemetery historical landfill	1 – historical land use	No	N/A
163+100	163+300	19-10	Grimstock Hill historical landfill	2 – historical land use	No	N/A
163+400	163+500	19-12	Former garage	1 – historical land use	No	N/A
163+400	163+500	19-13	Trajan Hill historical landfill	2 – historical land use	No	N/A
162+250 (BS)	162+550 (BS)	19-27	Former Coleshill Hall Hospital with former tank	1 – historical land use	No	N/A
Group D Sites**						
163+000	163+000	19-08	Infilled pond	1 – historical land use	No	N/A
163+400	163+400	19-15	Infilled pond	1 – historical land use	No	N/A

*GI Undertaken as part of the production of BIS Triangle remediation strategy report. The number of exploratory positions was not reported.

A summary showing the indicative proportion of the Sub-Lot 5 & 6 route occupied by contaminative sites is presented in Table 9 (Mainline including BIS Triangle) and Table 10 (North Chord); no potentially contaminative sites are present on the route along the Birmingham Spur. The proportion of each land use class has been approximated by dividing the overall scheme chainage length by the sum of the chainages for each LQ site that underlie the route.

The total length of the mainline in Sub-Lot 5 & 6 (including BIS Triangle) is 10.1km, between ch.154+435 and 164+540. The length of North Chord is approximately 2.4km between ch.000+750 NC and 3+215 NC.

Table 9: Proportion of the Mainline (including BIS Triangle) occupied by contaminative sites

Land Class	Length of route occupied	Percentage of route occupied
2 and 2 / 3	800m	7.9%
1	700m	6.9%

Table 10: Proportion of North Chord occupied by contaminative sites

Land Class	Length of route occupied	Percentage of route occupied
2	100m	4.2%

Notes: Group C and D sites are outside of the LoD and LLAU.

2 PRELIMINARY RISK ASSESSMENT

2.1 Summary of Previous Reports

A geotechnical desk study has been undertaken which covers the majority of the two Sub-Lots:

- HS2 (May 2016) Delta Junction Geotechnical Desk Study (Volume 1 and Volume 2). Report number C223-CSI-GT-REP-030-000003, revision P06[i].

The desk study states that "*specific work on contaminated land issues has been carried out under a separate professional services agreement, Lot 3, which covers the provision of Environmental Services to HS2*" and as such the desk study does not contain a detailed assessment of contaminated land. A summary of potentially contaminated sites identified in the Environmental Statement (ES) is presented in Section 1.18 of this report. Additional desk study data is available in the PRA[ix] for the BIS triangle.

Preliminary contamination risk assessments were undertaken in the Environmental Statement for HS2 Phase 1. These assessments considered the following scenarios:

- Baseline Risk with mitigation;
- Risks with Construction Phase Mitigation (assuming compliance with the Construction Code of Practice);
- Risks with Permanent Works Mitigation (assuming remediation); and
- Construction and Post Construction Effects Significance.

The ES establishes the post-construction effects significance which should not be exceeded subject to exceptions in the EMRs. None of these risk or impact significance assessments clarify the post development risks without mitigation in the form of remediation. As a consequence, the qualitative risk assessment summary for non-controlled waters presented in Section 5 has reviewed the risks for each postulated contaminant linkage adopting the Probability x Consequence Risk classification system described in Appendix A1 of Arup / URS (undated)[xv] reproduced in Appendix F. The qualitative risk assessment summary for controlled waters presented in Section 5 has reviewed the risks for each postulated contaminant linkage adopting the Probability x Consequence risk classification described in HS2's Technical Note – Groundwater Protection[xvi].

2.2 Preliminary Conceptual Model

Table 11 below summarises the preliminary conceptual model for the Proposed Scheme based on the previous review of geo-environmental conditions. The model details the type of risk assessment undertaken for each potential contaminant linkage, which has been used to create updated conceptual models presented in Section 5.

Table 11: Preliminary Conceptual Model

Source	Pathway	Receptor	Method of Assessment
On-site: **S1a**: Contaminated Soils – On-Site Group A & B Sites **Off-site:** **S1b:** Contaminated Soils – Off-Site Group C & D Sites **S3:** Contaminated Groundwater – Off-Site	**P1:** Direct contact, ingestion, inhalation of dust / vapour with / from contaminated soils **P2:** Inhalation of vapour with / from contaminated waters **P3:** Direct contact, ingestion from contaminated waters	**R1:** On-site users – commercial / public open space **R2:** Off-site users – residential **R3:** Off-site users – commercial / public open space **R4:** Construction Personnel **R5:** Maintenance Personnel	**S1a & S1b - P1 - R1, R2, R3** GQRA (where data allows) **S1a & S1b - P2 - R1, R2, R3** GQRA using Society of Brownfield Risk Assessment GACgwvap **S1a & S1b - P3 - R1, R2, R3** Preliminary Qualitative Risk Assessment **S1a & S1b - P1-3 - R4, R5** Preliminary Qualitative Risk Assessment
	P4: Exposure to explosive gases **P6:** Direct Contact	**R6:** Property Receptors – buildings, foundations and services (on and off-site)	**S1a & S1b - P4 - R6** GQRA (where data allows) - assessment of gases >LEL **S1a & S3 - P5, P6 - R6** GQRA (where data allows) – concrete aggressivity assessment and qualitative assessment of risks to potable services.
S2a: Ground Gases – On-Site Group A Sites **S2b:** Ground Gases – Off-Site Group C sites	**P5a:** Vertical and lateral migration via naturally created pathways **P5b:** Vertical and lateral migration via man-made pathways **P7:** Inhalation of Ground Gases	**R1:** On-site users – commercial **R2:** Off-site users – residential **R3:** Off-site users – commercial / public open space **R4:** Construction Personnel **R5:** Maintenance Personnel	**S2a & S2b - P7 - R1, R3** GQRA (where data allows) using CIRIA C665 **S2a & S2b - P7 - R4, R5** GQRA (where data allows) using CIRIA C665
S1a: Contaminated Soils – On-Site Group A & B Sites **S1b:** Contaminated Soils – Off-Site Group C & D Sites **S3a:** Contaminated Groundwater – Group A & B Sites **S3b:** Contaminated Groundwater – Off-Site Group C & D Sites	**P5a:** Vertical and lateral migration via naturally created pathways **P5b:** Vertical and lateral migration via man-made pathways **P8:** Groundwater Migration	**R7:** Controlled waters – Groundwater (Alluvium Secondary A aquifer, Glaciofluvial Deposits Secondary A aquifer, River Terrace Deposits Secondary A aquifer, Head deposits Secondary B aquifer Mercia Mudstone Group Secondary B aquifer) Surface Waters (River Cole, River Tame, Coleshill Pool, Pools associated with Pool Wood) **R8:** Controlled waters – Off-site: Groundwater (Alluvium Secondary A aquifer, Glaciofluvial Deposits Secondary A aquifer, River Terrace Deposits Secondary A aquifer, Head deposits Secondary B aquifer, Mercia Mudstone Group Secondary B aquifer) **R9:** Coleshill and Bannerly Pools SSSI	**S1a, S1b, S3a & S3b - P5a, P5b, P8 - R7 & R8 (& R9)** GQRA (where data allows) based on screening against UK Drinking Water Standards and Environmental Quality Standards. For organics in soils a qualitative risk assessment only is undertaken.
	P9: Direct run-off from site	**R8:** Controlled waters – Off-site: Groundwater (Alluvium Secondary A aquifer, Glaciofluvial Deposits Secondary A aquifer, River Terrace Deposits Secondary A aquifer, Head deposits Secondary B aquifer, Mercia Mudstone Group Secondary B aquifer)	**S3a & S3b - P9 - R8** Preliminary Qualitative Risk Assessment

2.3 Additional Risks to Groundwater

In-addition to contaminated soils and groundwater as potential sources of groundwater contamination, there are several other potential sources of contamination to groundwater, as detailed in the Technical Standard for Groundwater Protection (HS2-HS2-EV-STD-000-000010). Sources related to both permanent and temporary works are considered. These additional sources cannot be assessed by GQRA and therefore are not carried through to the risk assessment section but are presented in Appendix B, along with recommended mitigation measures.

3 GROUND INVESTIGATION STRATEGY AND FIELDWORK

3.1 Scope of Work / Investigation Strategy

A total of 11 GIs have been undertaken within the Proposed Scheme or within 250m of the start and end chainages of the Proposed Scheme. The data available as of the 7th August 2019 and used in the report are summarised in Table 12.

Table 12: Summary of Ground Investigations Used in this Study and Received up to 7th August 2019

Ground Investigation Work Package						Section of route covered		GI Contractor
Name	ID	Data Format	File / Report Ref	Revision Status	HS2 Assurance Code	Sub-Lot	Chainage	
BIS & People Mover Area A	WP-BIA-001	AGS	BIA_Final Factual Report Data_P01.ags	COMPLETE P01	Code 1	5	158+115 to 158+185	Ian Farmer Associates
		PDF	1G001-IFR-GT-REP-000-000003[xvii]	Final P01	Code 1			
BIS & People Mover Area B	1G002-BIB	AGS	1G002-IFR-GT-AGS-000-000023.zip	COMPLETE P01	Code 1	5	156+000 to 157+500	Ian Farmer Associates
		PDF	1G002-IFR-GT-REP-000-000004[xviii]	Final P01	Code 1			
BIS & People Mover Area C	E5601-15	AGS	1G003-ESG-GT-REP-000-000005 [0.2].zip	COMPLETE P02	Code 1	5	155+900 to 158+000	Environmental Scientifics Group
		PDF	1G003-ESG-GT-REP-000-000005[xix]	Final P02	Code 1			
BIS & People Mover Area D	WP-BID-001	AGS	1G004-IFR-GT-AGS-000-000020 [0.2] (1).zip	COMPLETE P02	Code 1	5	157+700 to 158+115	Ian Farmer Associates
		PDF	1G004-IFR-GT-REP-000-000004[xx]	Final P03	Code 1			
Delta Junction Area A	WP-DJA-001	AGS	1G026-RPS-GT-AGS-000-000025 [0.2].zip	Final MIP P04	Code 1	5	158+185 to 159+870	RPS
		PDF	1G026-RPS-GT-REP-000-000009[xxi]	Final P02	Code 1			
BBV – Area B*	-	AGS	1MC08-BBV-GT-REG-N001-100078	-	-	5 / 6	0+000(NC) to 4+940(NC)	Soil Engineering Geoservices Limited
BBV – Area C*	-	AGS	1MC08-BBV-GT-REG-N001-100078	-	-	5 / 6	ch.154+435(ML) to ch.163+760 (ML) 160+425(BS) to 164+505(BS)	Soil Engineering Geoservices Limited
Delta Junction Area Z	WP-DJZ-001	AGS	1G027-ESG-GT-AGS-000-000078.zip	Final MIP P03	Code 1	5	159+870 to 162+460	Environmental Scientifics Group
							163+860 to 165+030	
		PDF	1G027-ESG-GT-REP-000-000002[xxii]	Final P02	Code 1	6	160+425(BS) to 164+505(BS)	
							0+300(NC) to 4+940(NC)	
North Package A Washwood (Phase A Addendum)	BAX.HS06	AGS	1G105-BAM-GT-AGS-000-000081 [0.2]	Final MIP P02	Code 1	5	156+300 to 157+850	BAM Ritchies
		PDF	1G105-BAM-GT-REP-000-000014[xxiii]	Final P01	Code 1			
North Package B Interim No2 Phase B	WP-NPB-001	AGS	1G105-BAM-GT-AGS-000-000085 [0.2]	Final MIP P02	Code 1	5	162+460 to 163+860	Soil Engineering Geoservices Limited
		PDF	1G106-SEN-GT-REP-000-000007[xxiv]	Final P02	Code 1			
Ufton to BIS Area X	WP-UBX-001	AGS	1G062-SEN-GT-AGS-000-000032 (1).zip	Final MIP P01	Code 3	5	154+435 to 155+890	Soil Engineering Geoservices Limited
		PDF	1G062-SEN-GT-REP-000-000009[xxv]	Final P03	Code 3			
		PDF	1G062-SEN-GT-RES-000-001339	P02	Code 3			

*GI at BBV Area B and Area C are ongoing.

Unless stated, the length of the Proposed Scheme subject to generic screening assessment and fieldwork review includes ch.154+435 to ch.164+540, ch.000+750 NC to ch.003+215 NC, and ch160+425 BS to ch.164+505 BS including a 250m buffer at either end of these chainage limits, to pick up any off-site sources that are in the close vicinity of the Scheme. The aims of each of the GIs are summarised below;

The aim of the Soil Engineering GI for the Ufton to BIS Area X and North Package B was to "*provide both geotechnical and geo-environmental information to enable the safe and cost effective design and construction of the proposed main works"*.

The aim of the Ian Farmer Associates GI for the BIS and People Mover Areas A, C, and D was to "*provide both factual geotechnical and geo-environmental information to enable safe and cost effective design and construction of the proposed main works"*.

The aim of the RPS GI for the Delta Junction Area A was to "*provide both factual geotechnical and geo-environmental information to enable safe and cost effective design and construction of the proposed Phase One (London-Birmingham) high speed rail scheme in work package Delta Junction, Area A*".

The aim of the Environmental Scientifics Group GI for the Delta Junction Area Z and BIS People Mover Area C was to "*obtain geotechnical and geo-environmental information"* for the *"(Delta Junction Area Z) of the proposed high speed railway line*", and the "*Birmingham Interchange Station including building accommodation, platforms, and associated infrastructure*".

The DJV ground investigation was designed to address gaps in the HS2 ground investigation and to allow completion of Contamination Generic Quantitative Risk Assessments. At the time of writing this ground investigation is ongoing.

3.2 Methodology (including Sampling Strategy)

The scope of the GIs undertaken is summarised in Table 13.

Table 13: Ground Investigation Fieldworks Summary in SL5 / 6 based on AGS Data

Investigation technique	No.	Maximum depth (m bgl)	Comments on contamination investigation aspects
Inspection Pits only	4	1.2	Geo-environmental soil samples were collected from each borehole and trial pit and selected samples were analysed for the contaminants of concern (COC), as detailed in Section 0.
Trial Pits	148	4.5	
Cable Percussive Boreholes	104	25.3	
Cable Percussive Boreholes with Rotary Follow-on	195	45.5	
Dynamic (Windowless) Sample Boreholes (including with rotary follow-on)	126	30.5	
Rotary Coring or Open-Hole Drilling	17	40.7	
Installation of Monitoring Standpipes	234	-	Response zones are summarised in Appendix C

Source: GI Contractors AGS data (Table 76, Appendix C)

Notes: In addition to the above, three pavement / structural coring, 88 cone penetration testing, 26 dynamic probe sampling, 86 static cone penetrator, 22 surface water gauging / sampling, in-situ permeability testing and various geophysical methods were also undertaken.

Post fieldwork ground gas and groundwater monitoring was undertaken upon completion of the fieldworks.

3.3 Field Observations

3.3.1 Ground Conditions

A summary of the typical ground conditions encountered is reported in the Ground Investigation Report (GIR)[xxvi] for HS2 Sub-Lots 5, 6 and 7. The GIR was published in February 2018 and does not include information from GI obtained after that date. To provide an overview of the ground condition of Sub-Lots 5 and 6, the presented information from the GIR is shown in Table 14 below.

The ground model for ch.154+435 to 157+700 is not reported in the GIR, however, it has been summarised at a high-level based on field descriptions provided on exploratory hole logs received up to 05/08/2019.

Reference should be made to the GIR for further detailed information on the ground conditions and material properties.

Along the route the superficial deposits vary, and the summary below does not show the different superficial deposits in stratigraphical order.

Table 14: Ground Summary

Strata	Approximate Range of Depth to Base (m bgl)	Approximate Thickness (m)	Typical Description
Ch.154+435 to 156+000			
Topsoil	-	0.1 – 0.8	Brown clayey or sandy TOPSOIL with rootlets.
Made Ground	-	0.3 – 2.45	Variable composition of clay, sand and gravel. Anthropogenic inclusions include brick, ash, ballast, coal, concrete, glass, tarmacadam, metal, timber, possible ACM, slag, mortar and ceramic.
Alluvium	-	0.3 – 3.7	Either as a medium dense brown clayey gravelly or gravelly clayey fine to medium SAND. Or Firm brown gravelly sandy or sandy gravelly CLAY.
Glaciofluvial Deposits, Mid Pleistocene	-	0.3 -16.2	Reddish brown gravelly sandy or sandy gravelly CLAY. Or Brown gravelly clayey SAND. Or Reddish brown sandy clayey GRAVEL.
Till, Mid Pleistocene	-	0.3 – 6.7	Soft to stiff brown sandy gravelly CLAY. Or Reddish brown or brown gravelly clayey SAND.
Branscombe Mudstone Formation	-	>15	Very stiff reddish brown mottled greenish grey gravelly CLAY. Or Very weak or extremely weak reddish-brown MUDSTONE or greenish grey SILTSTONE.
Mercia Mudstone Group	-	>25	Grade 1 – Weak and very weak thinly to thickly laminated reddish-brown MUDSTONE or SILTSTONE. Grade 2 – Weak to extremely weak thinly laminated reddish-brown MUDSTONE or SILTSTONE. Grade 3 – Extremely weak to weak brown MUDSTONE or SILTSTONE, or, stiff and very stiff brown sandy gravelly CLAY. Grade 4a – Firm to stiff brown sandy gravelly CLAY. Grade 4b – firm to very stiff reddish-brown CLAY or sandy CLAY.
Ch.156+000 to 157+700			
Topsoil	-	0.1 – 0.7	Soft brown gravelly sandy CLAY wit rootlets Or Dark brown gravelly clayey SAND with rootlets
Made Ground	-	0.2 – 11.5	Variable composition of clay, sand and gravel. Can be topped with or contain layers of topsoil, asphalt, tarmacadam, block paving, and gravel. Anthropogenic inclusions include brick, clinker, ash, wood, asphalt, tile, wire, plaster, newspapers, concrete, glass, metal, tyres, tarmacadam, and plastic sheeting.
Alluvium	-	0.2 – 4.6	Soft to firm brown sandy gravelly or gravelly sandy CLAY.
Peat	-	0.4	Dark brown sandy gravelly pseudo-fibrous and amorphous PEAT. (Recorded in one hole within Alluvium).

Strata	Approximate Range of Depth to Base (m bgl)	Approximate Thickness (m)	Typical Description
Head	-	0.8	Soft to firm reddish brown gravelly sandy CLAY.
Till, Mid Pleistocene	-	0.8 – 1.1	Firm grey or brown sandy gravelly or gravelly sandy CLAY.
Glaciofluvial Deposits, Mid Pleistocene	-	0.2 – 11.7	Soft to firm reddish brown sandy gravelly CLAY Or Medium dense orangish brown silty and / or gravelly SAND.
Glaciofluvial Deposits, Devensian	-	0.3 – 11.3	Firm to stiff reddish brown sandy gravelly or gravelly sandy CLAY. Or Medium dense orangish brown gravelly silty or gravelly clayey SAND. Or Medium dense orangish brown sandy clayey GRAVEL.
Glaciofluvial Deposits, Sands and gravels	-	1.1	Stiff to very stiff reddish-brown gravelly CLAY.
"*Superficial Deposits Cohesive*"	-	0.5 – 0.7	Stiff brown sandy gravelly CLAY.
"*Superficial Deposits Granular*"	-	0.6	Reddish brown clayey sandy GRAVEL.
Mercia Mudstone Group	-	>30	Grade 1 – Very weak thinly to medium bedded reddish brown or grey MUDSTONE or SILTSTONE. Grade 2 – Extremely weak to very weak thinly laminated to thinly bedded reddish brown MUDSTONE or SILTSTONE. Grade 3 – Stiff to very stiff reddish brown sandy gravelly or gravelly CLAY. Grade 4a – Firm to very stiff reddish brown sandy gravelly CLAY. Grade 4b – Firm reddish brown sandy gravelly CLAY.
Branscombe mudstone Formation (Part of the Mercia Mudstone Group)	-	>15	Very stiff reddish-brown gravelly CLAY. Or Very weak to extremely weak reddish-brown MUDSTONE. Or Very weak greenish grey SILTSTONE.
Ch.157+700 to 159+000			
Glaciofluvial Deposits	Not Provided.	0.4 – 15	Mixed –cohesive and non-cohesive soils SAND and GRAVEL, loose to dense, reddish-brown (oxidised) sand is fine to medium grained, angular to subrounded of quartz; gravel is rounded quartz; some localized deposits of silt and clay.
Weathered Mercia Mudstone (MMG)	Not Provided.	0.8 – 3	Weak rock (mudstone)
Unweathered Mercia Mudstone (MMG)	Not Provided.	>20	Very weak to weak, laminated grey / red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Ch.159+000 to 159+450			
Glaciolacustrine Deposits	Not Provided.	0.6 – 12	Mixed –cohesive and non-cohesive soils Clayey SILT / silty CLAY of low to intermediate plasticity; with sand, gravel and peat. Soft to stiff.
Glaciofluvial Deposits	Not Provided.	1 – 15	Mixed –cohesive and non-cohesive soils SAND and GRAVEL, loose to dense, reddish-brown (oxidised), sand is fine to medium grained, angular to subrounded of quartz; gravel is rounded quartz; some localized deposits of silt and clay.
Weathered Mercia Mudstone (MMG)	Not Provided.	1 – 4	Weak rock (mudstone) Very weak to weak, laminated grey / red brown MUDSTONE.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>20	Weathering to: Silty CLAY, low to high plasticity, reddish-brown with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.

Strata	Approximate Range of Depth to Base (m bgl)	Approximate Thickness (m)	Typical Description
ch.159+450 to 160+050			
Glaciofluvial Deposits	Not Provided.	0.4 – 15	Mixed –cohesive and non-cohesive soils SAND and GRAVEL, loose to dense, reddish-brown (oxidised) sand is fine to medium grained, angular to subrounded of quartz; gravel is rounded quartz; some localized deposits of silt and clay.
Weathered Mercia Mudstone (MMG)	Not Provided.	0.8 – 3	Weak rock (mudstone) Very weak to weak, laminated grey / red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>20	
Ch.160+100 to 160+950			
Till	Not Provided.	0.6 – 14	Group of sediments laid down by the direct action of glacial ice. Variable lithology, usually sandy, silty clay (possibly chalky in southeast England) with pebbles, but can contain gravel-rich, or laminated sand layers; varied colour and consistency
Weathered Mercia Mudstone (MMG)	Not Provided.	0 – 5	Weak rock (mudstone) Very weak to weak, laminated grey / red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>30	
Ch.160+950 to 161+050			
Alluvium	Not Provided.	1 – 4	Mixed –cohesive and non-cohesive soils Sandy CLAY/ silty CLAY of low to intermediate plasticity, grey and reddish-brown; with impersistent lenses of sand, gravel and amorphous peat. Sand is fine grained. Soft to stiff.
Weathered Mercia Mudstone (MMG)	Not Provided.	0 – 4	Weak rock (mudstone) Very weak to weak, laminated grey / red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>20	
Ch.161+050 to 161+150			
River Terrace Deposits	Not Provided.	0.5 – 6	Non-cohesive soils Sandy GRAVEL, medium dense to dense orange, yellow and reddish-brown; with locally clayey deposits. Sand is fine to coarse grained of sub-angular to rounded quartzite and subordinate quartz clasts.
Weathered Mercia Mudstone (MMG)	Not Provided.	0 – 7	Weak rock (mudstone) Very weak to weak, laminated grey / red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown; with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>20	
Ch.161+150 to 161+250			
Alluvium	Not Provided.	1 – 4	Mixed –cohesive and non-cohesive soils Sandy CLAY/ silty CLAY of low to intermediate plasticity, grey and reddish-brown; with impersistent lenses of sand, gravel and amorphous peat. Sand is fine grained. Soft to stiff.
Weathered Mercia Mudstone (MMG)	Not Provided.	0 – 4	Weak rock (mudstone) Very weak to weak, laminated grey / red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>20	
Ch.161+250 to 162+150			
River Terrace Deposits	Not Provided.	0.5 – 6	Non-cohesive soils Sandy GRAVEL, medium dense to dense orange, yellow and reddish-brown; with locally clayey deposits. Sand is fine to coarse grained of sub-angular to rounded quartzite and subordinate quartz clasts.

Strata	Approximate Range of Depth to Base (m bgl)	Approximate Thickness (m)	Typical Description
Weathered Mercia Mudstone (MMG)	Not Provided.	0 – 7	Weak rock (mudstone) Very weak to weak, laminated grey / red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown; with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>20	
Ch.162+150 to 162+400			
Alluvium	Not Provided.	1 – 4	Mixed –cohesive and non-cohesive soils Sandy CLAY/ silty CLAY of low to intermediate plasticity, grey and reddish-brown; with impersistent lenses of sand, gravel and amorphous peat. Sand is fine grained. Soft to stiff.
Weathered Mercia Mudstone (MMG)	Not Provided.	0 – 4	Weak rock (mudstone) Very weak to weak, laminated grey / red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>20	
Ch.162+400 to 162+550			
Till	Not Provided.	0.6 – 14	Group of sediments laid down by the direct action of glacial ice. Variable lithology, usually sandy, silty clay (possibly chalky in southeast England) with pebbles, but can contain gravel-rich, or laminated sand layers; varied colour and consistency
Weathered Mercia Mudstone (MMG)	Not Provided.	0 – 5	Weak rock (mudstone) Very weak to weak, laminated grey / red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>30	
Ch.163+300 to 163+800			
Glaciolacustrine Deposits	Not Provided.	1 – 15	Mixed –cohesive and non-cohesive soils Clayey SILT/silty CLAY of low to intermediate plasticity with sand, gravel and peat. Soft to stiff.
Till	Not Provided.	2 – 16	Group of sediments laid down by the direct action of glacial ice. Variable lithology, usually sandy, silty clay (possibly chalky in southeast England) with pebbles, but can contain gravel-rich, or laminated sand layers; varied colour and consistency.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>15	Weak rock (mudstone) Very weak to weak, laminated grey / red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown; with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Ch.163+820 to 164+050			
Glaciofluvial Deposits	Not Provided.	1 – 6	Mixed –cohesive and non-cohesive soils SAND and GRAVEL, loose to dense, reddish-brown (oxidised); sand is fine to medium grained, angular to subrounded of quartz; gravel is rounded quartz; some localized deposits of silt and clay.
Till	Not Provided.	10 – 12	Group of sediments laid down by the direct action of glacial ice. Variable lithology, usually sandy, silty clay (possibly chalky in southeast England) with pebbles, but can contain gravel-rich, or laminated sand layers; varied colour and consistency.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>14	Weak rock (mudstone) Very weak to weak, laminated grey/red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown; with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Ch.164+050 to 164+350			
Till	Not Provided.	0.6 – 14	Group of sediments laid down by the direct action of glacial ice. Variable lithology, usually sandy, silty clay (possibly chalky in southeast England) with pebbles, but can contain gravel-rich, or laminated sand layers; varied colour and consistency

Strata	Approximate Range of Depth to Base (m bgl)	Approximate Thickness (m)	Typical Description
Weathered Mercia Mudstone (MMG)	Not Provided.	0 – 5	Weak rock (mudstone) Very weak to weak, laminated grey/red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>30	
Ch.164+300 to 165+050			
Alluvium	Not Provided.	0.2 – 5	Mixed –cohesive and non-cohesive soils Sandy CLAY/ silty CLAY of low to intermediate plasticity, grey and reddish-brown; with impersistent lenses of sand, gravel and amorphous peat. Sand is fine grained. Soft to stiff
River Terrace Deposits	Not Provided.	0.5 – 4	Non-cohesive soils Sandy GRAVEL, medium dense to dense orange, yellow and reddish-brown; with locally clayey deposits. Sand is fine to coarse grained of sub-angular to rounded quartzite and subordinate quartz clasts.
Weathered Mercia Mudstone (MMG)	Not Provided.	2 – 6	Weak rock (mudstone) Very weak to weak, laminated grey/red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown; with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>10	
Ch.161+925 (BS) to 162+050 (BS)			
River Terrace Deposits	Not Provided.	0.5 – 6	Non-cohesive soils Sandy GRAVEL, medium dense to dense orange, yellow and reddish-brown; with locally clayey deposits. Sand is fine to coarse grained of sub-angular to rounded quartzite and subordinate quartz clasts.
Weathered Mercia Mudstone (MMG)	Not Provided.	0 – 7	Weak rock (mudstone) Very weak to weak, laminated grey/red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown; with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>20	
Ch.162+300 (BS) to 162+700 (BS)			
Glaciofluvial Deposits	Not Provided.	1 – 6	Mixed –cohesive and non-cohesive soils SAND and GRAVEL, loose to dense, reddish-brown (oxidised); sand is fine to medium grained, angular to subrounded of quartz; gravel is rounded quartz; some localized deposits of silt and clay.
Till	Not Provided.	10 – 12	Group of sediments laid down by the direct action of glacial ice. Variable lithology, usually sandy, silty clay (possibly chalky in southeast England) with pebbles, but can contain gravel-rich, or laminated sand layers; varied colour and consistency.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>14	Weak rock (mudstone) Very weak to weak, laminated grey/red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown; with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Ch.162+050 (BS) to 162+120 (BS)			
Alluvium	Not Provided.	1 – 4	Mixed –cohesive and non-cohesive soils Sandy CLAY/ silty CLAY of low to intermediate plasticity, grey and reddish-brown; with impersistent lenses of sand, gravel and amorphous peat. Sand is fine grained. Soft to stiff.
Weathered Mercia Mudstone (MMG)	Not Provided.	0 – 4	Weak rock (mudstone) Very weak to weak, laminated grey/red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.
Unweathered Mercia Mudstone (MMG)	Not Provided.	>20	
Ch.162+120 (BS) to 162+300 (BS)			
Glaciofluvial Deposits	Not Provided.	0.4 – 15	Mixed –cohesive and non-cohesive soils SAND and GRAVEL, loose to dense, reddish-brown (oxidised) sand is fine to medium grained, angular to

Strata	Approximate Range of Depth to Base (m bgl)	Approximate Thickness (m)	Typical Description
			subrounded of quartz; gravel is rounded quartz; some localized deposits of silt and clay.
Weathered Mercia Mudstone (MMG)	Not Provided.	0.8 – 3	Weak rock (mudstone)
Unweathered Mercia Mudstone (MMG)	Not Provided.	>20	Very weak to weak, laminated grey/red brown MUDSTONE. Weathering to: Silty CLAY, low to high plasticity, reddish-brown with lithorelicts (mudstone, siltstone). Very soft to hard dependent on weathering grade.

3.3.1.1 Obstructions

Two exploratory hole locations were terminated due to encountering obstructions. These are ML156-CR028 and ML157-TP074. This is based on a review of the GI Contractor's factual reports (Table 12).

3.3.2 Groundwater Observations

Groundwater strikes were recorded in 224 exploratory holes. Groundwater strikes were recorded within Made Ground between 0.2m and 3m bgl. Within the superficial deposits, groundwater strikes ranged between:

- 0.6m and 3.5m bgl within Alluvium;
- 1.5m and 7.15m bgl within River Terrace Deposits;
- 1m and 12.6m bgl within Mid Pleistocene Till;
- 0.5m and 10.5m bgl within Mid Pleistocene Glaciofluvial Deposits;
- 0.3m and 23.97m bgl within Devensian Glaciofluvial Deposits; and
- 0.9m and 7.1m bgl within Glaciolacustrine Deposits.

Within the Mercia Mudstone Group bedrock groundwater strikes were recorded to range between 0.6m and 28m bgl.

Groundwater monitoring was undertaken intermittently between February 2016 and June 2019. Monitoring data indicates groundwater where recorded to range between:

- 103m and 57.8m AOD screened within Made Ground;
- 98.4m and 70.8m AOD screened within Alluvium;
- 81m and 70.6m AOD screened within River Terrace Deposits;
- 84m and 71m AOD screened with Mid Pleistocene Till;
- 101.6m and 78.6m AOD screened within Mid Pleistocene Glaciofluvial Deposits;
- 101.9m and 74.1m AOD screened within Devensian Glaciofluvial Deposits;
- 95.2m and 75m AOD screened within Glaciolacustrine Deposits; and
- 105.6m and 69.2m AOD screened within Mercia Mudstone Group.

3.3.3 Visual and Olfactory Evidence of Contamination

Visual and / or olfactory evidence of contamination was recorded in 29 exploratory holes. A summary of visual and olfactory evidence of contamination is provided in Table 15.

Table 15: Summary of Visual and / or Olfactory Evidence of Contamination

Hole ID	Depth range (m bgl)		Geological Formation	Description
	Top	Base		
BD161-TP028	1.2	1.4	River Terrace Deposits	Grey, very gravelly, slightly clayey, fine and medium SAND with slight organic odour (undefined) and plant remains. Gravel is subangular to rounded, medium and coarse of quartzite. (RIVER TERRACE DEPOSITS)
BD161-TP036	1	2	River Terrace Deposits	Black, slightly sandy, very clayey, subrounded and rounded, fine to coarse GRAVEL of quartzite with low cobble content. Sand is fine to coarse. Cobbles are rounded and subrounded of quartzite. Strong organic odour (undefined). (RIVER TERRACE DEPOSITS)
BD162-TP003	1.4	2.7	Alluvium	Firm and stiff, dark brown SILT with organic plant remains. Slight organic odour (undefined). (ALLUVIUM)
BD163-CP043	3.7	4.7	Made Ground	MADE GROUND: Stiff, dark brown, mottled brownish black, slightly sandy, slightly gravelly CLAY with strong odour (undefined). Sand is fine and medium. Gravel is angular to subrounded, fine to coarse of sandstone, siltstone, coal and tarmac.
BD163-CP043	4.7	8.7	Made Ground	MADE GROUND: Very soft to stiff, dark brown, slightly sandy, slightly gravelly CLAY with strong odour (undefined). Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of sandstone, siltstone, tarmac, concrete and plastic fragments (10x40mm) and rare wood pieces (10x30mm).
BD163-TP013a	1.8	2.3	Made Ground	MADE GROUND: Firm to very stiff, dark brown, mottled reddish brown, gravelly, organic CLAY with organic odour (undefined). Gravel is angular and subangular, medium and coarse of quartzite, siltstone and slate.
BD163-TP016	1.9	2.1	Made Ground	MADE GROUND: Soft to stiff, dark brown, slightly sandy, slightly gravelly CLAY with organic odour (undefined). Gravel is subrounded and rounded, medium and coarse of quartzite with rare coal fragments.
ML155-TP018	0.6	2.1	Made Ground	MADE GROUND: Black sandy angular to subrounded fine to coarse gravel sized fragments of tarmacadam, metal, glass, timber and possible asbestos containing materials with low cobble, boulder and large boulder content. Sand is fine to coarse. Cobble and boulder sized fragments are angular to subrounded of tarmac, brick and concrete. Large boulders are angular of metal (up to 1000mm x 700mm).
ML156-CP008	0.32	0.6	Made Ground	MADE GROUND: Dark brown slightly clayey gravelly fine and medium SAND with rare rootlets (up to 1mm diam) plant and wood fragments (up to 3mm diam) paper (up to 3mm) and faint organic odour. Gravel is angular to rounded fine to coarse quartzite clinker, sandstone and brick.
ML156-CR015	0	0.3	Topsoil	Dark brown slightly gravelly fine and medium SAND with occasional rootlets and strong organic odour. Gravel is subrounded and rounded fine and medium quartzite. (TOPSOIL).
ML156-CR015	0.3	2.9	Glaciofluvial Deposits	Medium dense reddish brown very gravelly clayey fine to coarse SAND with strong organic odour. Gravel is subrounded fine to coarse of quartzite and coal. (GLACIOFLUVIAL DEPOSITS)
ML156-CR036	0.85	2.7	Made Ground	MADE GROUND: Loose to medium dense, dark brown, gravelly, clayey, fine to medium sand, with frequent thin bands / pockets of soft, sandy gravelly clay. Gravel is angular to subangular, fine to coarse of brick. Organic odour
ML156-CR046	1.8	2.65	Alluvium	Firm, light greenish grey CLAY with a faint organic odour (Possible Alluvium)
ML156-CR046	2.65	3.2	Alluvium	Firm, intermediate plasticity, light greenish grey, sandy, slightly gravelly CLAY with occasional partings/cobble size pockets of clayey, fine to medium sand. Gravel is fine to medium, subrounded to rounded quartzite and rare mudstone. Very faint organic odour (Possible Alluvium)
ML156-CT028	0.5	0.8	Made Ground	MADE GROUND: Firm, dark grey, slightly sandy, silty clay and frequent rootlets and slight organic odour
ML156-CT029	0.9	1.3	Mercia Mudstone Group	Firm to stiff, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium, subrounded to angular quartzite and sandstone. Faint organic odour
ML156-CT031	1	1.2	Made Ground	MADE GROUND: Stiff to firm, dark grey, slightly sandy, slightly gravelly clay and frequent decayed rootlets and organic odours
ML156-TP036	1.3	4.2	Made Ground	MADE GROUND: Black, dark brown and grey slightly sandy slightly silty GRAVEL with high cobble content and glass bottles, tyres and metal, hydrocarbon odour noted. Sand includes ash. Gravel and cobbles are brick and clinker.
ML156-TP062	0.6	0.8	Glaciofluvial Deposits	Soft to firm, grey, sandy, slightly gravelly CLAY with faint organic odour. Gravel is fine to medium, subrounded to rounded quartzite (Glaciofluvial Deposits)
ML156-WS024	1.2	1.9	Alluvium	Very soft greenish grey mottled light brown slightly gravelly sandy CLAY with occasional roots. Gravel is rounded medium to coarse of quartzite, coal, siltstone, mudstone, and chert. Strong organic odour. (ALLUVIUM).

Hole ID	Depth range (m bgl)		Geological Formation	Description
	Top	Base		
ML156-WS040	0.2	0.4	Alluvium	Soft to firm dark brown sandy silty CLAY with abundant rootlets and organic material and strong organic odour. Sand is fine to coarse. (ALLUVIUM)
ML157-TP001	0.3	1.7	Made Ground	MADE GROUND: Dark brown to black gravelly clayey fine to coarse SAND. Gravel is rounded fine to coarse of siltstone and quartzite. Occasional decaying plant material and wood. Strong hydrocarbon odour. Rare pottery and metal fragments.
ML158-CP005	0.7	1.3	Made Ground	Made Ground: Soft dark grey and black sandy gravelly SILT. Sand is fine and medium. Gravel is angular to rounded fine to coarse of mixed lithologies including flint, brick and concrete with rare charcoal. Very slight hydrocarbon odour.
ML158-TP017	1	2.7	Made Ground	MADE GROUND: Firm, dark grey, sandy, gravelly clay. Gravel is fine to coarse, angular to subrounded brick, quartzite, tile and occasional ash. Hydrocarbon and organic odour to 1.30m
ML159-CR018	3.3	4	Made Ground	MADE GROUND: Dense, orangish brown, clayey, fine and medium SAND and angular to subrounded, fine to coarse GRAVEL of sandstone, quartzite and roadstone. Strong odour (undefined).
ML159-TP015	1.1	1.8	Glaciofluvial Deposits	Dark brown, mottled black, very gravelly, fine and medium SAND with low cobble content and decomposing organic odour (undefined). Gravel is subrounded and rounded, medium and coarse of quartzite. Cobbles are subrounded and rounded of quartzite. (GLACIOFLUVIAL DEPOSITS)
ML159-TP015	1.8	2.1	Glacial Till	Firm and stiff, friable, dark brown mottled black, slightly sandy, very gravelly CLAY with moderate organic odour (undefined). Gravel is subrounded and rounded, medium and coarse of quartzite. (GLACIAL TILL)
ML160-CP010	0.4	2.15	River Terrace Deposits	Medium dense, dark grey, clayey, fine to coarse SAND and angular to subrounded, fine to coarse GRAVEL of sandstone and quartzite. Strong biological odour (undefined). (Possible RIVER TERRACE DEPOSITS)
ML163-CR020	0.4	0.7	Made Ground	MADE GROUND: Grey, black and red, very sandy, angular and subangular, fine to coarse GRAVEL of brick, concrete and ceramic fragments, quartzite and sandstone with organic odour (undefined).
ML164-CP021	1.2	3.01	Made Ground	MADE GROUND: Brownish grey, sandy, silty, clayey, subangular to well rounded, fine to coarse GRAVEL of chert and quartzite. Sand is fine to coarse. With odour (undefined).
ML164-CR013	0.45	0.7	Made Ground	Dark brown, slightly sandy, slightly clayey with subrounded, fine to coarse gravel of quartzite. Hydrocarbon odour.
ML164-CR013	0.7	3	Made Ground	MADE GROUND: Brownish grey, very sandy, clayey, subangular and subrounded, fine to coarse GRAVEL of yellow and grey sandstone, concrete, brick fragments, clinker and subrounded quartzite with low cobble content and hydrocarbon odour. Sand is fine to coarse. Cobbles (<200mm) are subangular of sandstone, concrete and limestone.
ML164-CR046a	1	2.2	Made Ground	MADE GROUND: Soft and firm, reddish brown, slightly sandy, gravelly CLAY. Sand is fine to coarse. Gravel is angular to well rounded, fine to coarse of quartzite, chert, sandstone and brick fragments. Cementitious odour.
ML164-CR046a	2.2	2.7	Made Ground	MADE GROUND: Brown, sandy, clayey, angular to well rounded, fine to coarse GRAVEL of chert, quartzite and sandstone. Sand is fine to coarse. Cementitious odour.
ML164-TP011	1.2	1.7	Alluvium	Soft to very soft, slightly sandy, slightly gravelly CLAY with slight organic odour (undefined). Sand is fine to coarse. Gravel is subrounded, fine to coarse of quartzite. (ALLUVIUM)
ND001-CR005	0.2	0.9	Made Ground	Asbestos fragments.

3.4 Analytical and Testing Strategies

A programme of geo-environmental testing was specified by HS2 on soil and groundwater samples. Testing was carried out in accordance with the methods in the test reports. The geo-environmental test suites that were undertaken are presented in Table 16.

Table 16: Summary of Geo-environmental Testing Undertaken

Test Suite	Determinants	Number of samples tested
Soil testing		
Speciated volatile organic compounds (VOCs) & semi-volatile organic compounds (SVOCs)		33
Speciated polycyclic aromatic hydrocarbons (PAHs)		328
Unspeciated total petroleum hydrocarbons (TPH)		270
Speciated TPH		175
Arsenic, barium, beryllium, boron, cadmium, chromium (total & VI), copper, lead, nickel, mercury, vanadium, selenium, zinc		326
Asbestos (presence of)		169
Free Cyanide (unspeciated)		299 (165)
Organic matter		336
Speciated poly-chlorinated biphenyls (PCBs)		1
pH		328
Phenol Index		175
Total Sulphur		24
Sulphates (acid, water and undefined extracts on solid samples)		63
Moisture Content		195
Leachate testing		
Suite F	Metals by ICPMS: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc Metals by ICPOES: Barium, Beryllium, Boron, Chromium (hexavalent), Chromium (trivalent), Cyanide (total)	264
Ammoniacal Nitrogen		9
Cyanide		264
pH		264
Sulphate		2
Water		
Suite I	Arsenic, Boron, Cadmium, Chromium (total), Copper, Lead, Mercury, Nickel, Zinc, pH, Sulphate, TPH, speciated PAH, phenol, cyanide (total) inorganics, speciated TPH, speciated PAH	45
Suite I2	Dependent option: VOCs & SVOCs	44
Suite I3	Pesticides, herbicides and organophosphates	14
Benzene, toluene, ethylbenzene, xylene (BTEX)		45
Phenol		22
Methyl tert-butyl ether (MTBE)		12
Tert-Amyl methyl ether (TAME)		5
Barium		45
Beryllium		45
Calcium		42
Chloride		40
Conductivity		45
Cyanide		45
Hardness		37
Iron		37
Manganese		36
Nitrate		45
Nitrite		45
Nitrogen		14
Oxygen		17
Pentachlorophenol		14
Phosphate		30
Phosphorus		35
Potassium		42
Selenium		45
Sodium		42
Solids, Suspended		38

Test Suite	Determinants	Number of samples tested
Total Alkalinity as CaCO3		12
Total dissolved solids		45
Total hardness		5
Total Nitrogen		28
Total Organic Carbon		45
Total suspended solids		7
Trivalent Chromium		17
Vanadium		45

3.4.1 Deviating Samples

The analytical results from several samples were classified as deviating by the testing laboratory. This is based on available GI Contractors factual reports for the Proposed Scheme. A summary of deviating samples is presented in Table 17.

Table 17: Deviating Samples

Sample ID	Depth (m bgl)	Determinants
Soils		
ML155-CR001	0.05	Organics
ML155-CR001	1	Organics
ML155-CR005	0.0 to 0.1	Organics
ML156-CR025	0.05	pH and conductivity
ML156-CR025	0.3	pH and conductivity
ML157-CR027	0.2	pH and conductivity
ML156-CR035	0.3	pH and conductivity
ML156-CR023	0.1	pH and conductivity
ML156-CR020	0.2	BTEX, Naphthalene, PAH MS, pH + Conductivity and EPH/TPH
ML157-CR022	1	BTEX, Naphthalene, PAH MS, pH + Conductivity and EPH/TPH
ML156-CR014	0.5	pH, cyanides (free/total), phenol index, BTEX and ethyl benzene
ML156-CR014	12.2	pH, cyanides (free/total), phenol index, BTEX and ethyl benzene
ML156-WS025	0.3	pH, cyanides (free/total), phenol index, BTEX and ethyl benzene
ML157-WS036	0.7	pH, cyanides (free/total), phenol index, BTEX and ethyl benzene
ML156-CP008	0.35	Boron, PAH, pH, cyanide (free/total), phenol index, moisture, TPH, BTEX and ethyl benzene
ML156-CP008	2.35	Boron, PAH, pH, cyanide (free/total), phenol index, moisture, TPH, BTEX and ethyl benzene
ML156-TP027	1	Boron, PAH, pH, cyanide (free/total), phenol index, moisture, TPH, BTEX and ethyl benzene
ML156-TP036	2.5	Boron, PAH, pH, cyanide (free/total), phenol index, moisture, TPH, BTEX and ethyl benzene
ML156-TP036	4	Boron, PAH, pH, cyanide (free/total), phenol index, moisture, TPH, BTEX and ethyl benzene
BD163-TP013a	1.5	Gasoline range organics, BTEX and ethyl benzene
BD161-WS003	0.2	pH
BD161-WS003	1.1	pH
BD162-CR003	0.5	pH
BD161-TP002	0.15	Moisture
ML163-CP038	0.5	BTEX, MTBE, VOC and ethyl benzene
ML163-TP020	1	BTEX, MTBE, VOC and ethyl benzene
ML163-TP021	0.05	BTEX, MTBE, VOC and ethyl benzene
ML163-TP021	0.5	BTEX, MTBE, VOC and ethyl benzene
ML163-CP035	1	PAH and moisture
ML163-CR010	0.4	Moisture
ML163-CR010	2	PAH and moisture
ML163-CP023	0.05	Moisture
ML164-CP023	1.5	PAH and moisture
ND001-CR013	0.5	PAH and moisture

Sample ID	Depth (m bgl)	Determinants
ND001-CR013	2	PAH and moisture
ML161-CP032	0.9	Moisture
ML161-CP032	1.2	Moisture
ND001-CR041	0.2	Moisture
ML159-CR008a	1.2	BTEX and ethyl benzene
ML164-CR032	0.5	BTEX and ethyl benzene
ML164-CR032	1.2	BTEX and ethyl benzene
ND001-CP049	0.4	BTEX and ethyl benzene
ND001-CP049	0.6	BTEX and ethyl benzene
ML164-CP003	0.9	Metals, organic matter, gasoline range organics, PAH, pH, cyanides (free), phenol index, asbestos, moisture, TPH, BTEX, ethyl benzene and TOC
ML164-CP003	2	Metals, organic matter, PAH, pH, cyanides (free), phenol index, moisture, SVOC, VOC, TPH, BTEX, ethyl benzene and TOC
ML164-CP003	3.5	Metals, organic matter, PAH, pH, cyanides (free), phenol index, moisture, TPH, BTEX, ethyl benzene and TOC
ML164-CP004	3	Metals, organic matter, PAH, pH, cyanides (free), phenol index, SVOC, VOC, moisture, TPH, BTEX, ethyl benzene and TOC
ML164-CP004	4	Metals, organic matter, PAH, pH, cyanides (free), phenol index, moisture, TPH, BTEX, ethyl benzene and TOC
ML164-CP021	0.5	Metals, organic matter, PAH, pH, cyanides (free), phenol index, moisture, asbestos, TPH, BTEX, ethyl benzene and TOC
ML164-CR029	0.35	Metals, organic matter, PAH, pH, cyanides (free), phenol index, moisture, asbestos, TPH, BTEX, ethyl benzene and TOC
ML164-CR029	3.2	Metals, organic matter, gasoline range organics, PAH, pH, cyanides (free), phenol index, moisture, TPH, BTEX, ethyl benzene and TOC
ML164-CR029	4	Metals, organic matter, PAH, pH, cyanides (free), phenol index, moisture, TPH, BTEX, ethyl benzene and TOC
ML164-CP004	1	Anthrax
ML164-CP010	0.5	Boron, PAH, pH, cyanide (free), phenol index, moisture, TPH and BTEX
ML164-CR044	2	Boron, PAH, pH, cyanide (free), phenol index, moisture, TPH and BTEX
ML164-CP004	1	Gasoline range organics, pH, cyanide (free), phenol index, BTEX and ethyl benzene
Leachate		
ML157-CP024	1	Chromium III
ML157-TP001	1	Chromium III
ND002-CP019	1.5	Chromium III
BD163-CR014	0.5	Chromium III
BD163-CR014	2	Chromium III
BD163-CR014	4	Chromium III
ML162-CR004	0.6	Chromium III
BD162-CR020	0.5	Chromium III
BD162-CR020	1	Chromium III
ML159-CR018	1.6	Chromium III
ML159-CR018	3.6	Chromium III
BD163-CR006	0.8	Chromium III
ML161-CR009	0.2	Chromium III
ML161-CR009	0.5	Chromium III
ML161-CR021	0.5	Chromium III
ML163-CP035	1	Chromium III
ML163-CR010	0.4	Chromium III
ML163-CR010	2	Chromium III
ML164-CP023	0.05	Chromium III
ML164-CP023	1.5	Chromium III
ND001-CR013	0.5	Chromium III
ND001-CR013	2	Chromium III
ML164-CP003	0.9	Metals, cyanide (total) and pH
ML164-CP003	2	Metals, cyanide (total) and pH

Sample ID	Depth (m bgl)	Determinants
ML164-CP003	3.5	Metals, cyanide (total) and pH
ML164-CP004	3	Metals, cyanide (total) and pH
ML164-CP004	4	Metals, cyanide (total) and pH
ML164-CP021	0.5	Metals, cyanide (total) and pH
ML164-CR029	0.35	Metals, cyanide (total) and pH
ML164-CR029	3.2	Metals, cyanide (total) and pH
ML164-CR029	4	Metals, cyanide (total) and pH
ML164-CR046a	0.8	Metals, cyanide (total) and pH
ML164-CR046a	1.2	Metals, cyanide (total) and pH
ML164-CR046a	2.3	Metals, cyanide (total) and pH
ML164-CR009	0.05	Chromium III
ML164-CR009	0.4	Chromium III
ML164-CR009	1.5	Chromium III
ML164-CP004	1	Chromium III
ML164-CP036	1	Chromium III
ML164-CP036	3	Chromium III
ML164-CP036	5	Chromium III
ML164-TP011	0.7	Chromium III
ML164-TP011	2.5	Chromium III
ML164-CR044	2	Chromium III
ML164-CP010	0.5	Chromium III
Water		
ML156-SW007	N/A	Aliphatics/Aromatics, Alkalinity, BTEX/PRO, Conductivity, Conductivity (non-reportable), Chromium, Hexavalent, Dissolved Oxygen, Hardness, Anions, Kone, pH/Cond/TDS, Metals ICPMS, Metals ICPMS, Naphthalene, Ammoniacal Nitrogen as N, Nitrite as N, Nitrate as NO3, PAH MS, Phenols MS, Cyanide/Mono, pH, SVOC, Total Dissolved, TOC AN, EPH and Suspended solids
ML156-SW008	N/A	Aliphatics/Aromatics, Alkalinity, BTEX/PRO, Conductivity, Conductivity (non-reportable), Chromium, Hexavalent, Dissolved Oxygen, Hardness, Anions, Kone, pH/Cond/TDS, Metals ICPMS, Metals ICPMS, Naphthalene, Ammoniacal Nitrogen as N, Nitrite as N, Nitrate as NO3, PAH MS, Phenols MS, Cyanide/Mono, pH, SVOC, Total Dissolved, TOC AN, EPH and Suspended solids
ML156-SW009	N/A	Aliphatics/Aromatics, Alkalinity, BTEX/PRO, Conductivity, Conductivity (non-reportable), Chromium, Hexavalent, Dissolved Oxygen, Hardness, Anions, Kone, pH/Cond/TDS, Metals ICPMS, Metals ICPMS, Naphthalene, Ammoniacal Nitrogen as N, Nitrite as N, Nitrate as NO3, PAH MS, Phenols MS, Cyanide/Mono, pH, SVOC, Total Dissolved, TOC AN, EPH and Suspended solids
ML156-SW005	N/A	Dissolved oxygen, nitrite as N and nitrate as NO_3
ML156-SW006	N/A	Dissolved oxygen, nitrite as N and nitrate as NO_3
ML156-CP008	N/A	Chromium III, chloride, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate and suspended solids
ML156-CR012	N/A	Chromium III, chloride, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate and suspended solids
ML157-CP001	N/A	Chromium III, chloride, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate and suspended solids
ML157-CP010	N/A	Chromium III, chloride, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate and suspended solids
BD161-CR010	6.95	Chromium III, chlorides, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate, PAH, TPH and suspended solids
ML162-CR004a	26.29	Chromium III, chlorides, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate, TPH and suspended solids
ML164-CP036	8.2	Chromium III, chlorides, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate, PAH, TPH and suspended solids
ML164-CR009	22.7	Chromium III, chlorides, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate, PAH, TPH and suspended solids
ML164-CR029	24.32	Chromium III, chlorides, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate, TPH and suspended solids
ML164-CR046a	2.81	Chromium III, chlorides, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate, TPH and suspended solids

Sample ID	Depth (m bgl)	Determinants
ML161-CR021	28.74	Chromium III, hardness as $CaCO_3$, chlorides, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate, PAH, TPH and suspended solids
ND001-CP049	1.94	Chromium III, hardness as $CaCO_3$, chlorides, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate, PAH, cyanide (free/total), phenol index, TPH, suspended solids, acidity as $CaCO_3$ and pH
ND001-CR002	4.25	Chromium III, chlorides, ammoniacal nitrogen, nitrite, nitrate, chromium VI, phosphate and suspended solids
BD160-SW001	N/A	Chromium III
BD162-SW001	N/A	Chromium III
BD160-SW002	N/A	Chromium III
ML164-SW001	N/A	Chromium III
ML164-SW002	N/A	Chromium III
ND000-SW001	N/A	Chromium III

Source: GI Contractors factual reports

4 RESULTS AND GENERIC QUANTITATIVE RISK ASSESSMENT

4.1 Assessment of the results of the field investigation

The following sections comprise a GQRA and include summary tables showing exceedances of the adopted Generic Screening Criteria (GSC) for each potential contaminant linkage identified in Table 11.

All remediation items discussed in this section which aim to address unacceptable risks have been entered into the Geotechnical Risk Register (1MC08-MSD-GT-REG-N001-000001)[xxvii] and Project Risk Register (1MC08-BBV-PM-REG-N001-100011).

In-addition to the assessment undertaken for this report, relevant Land Quality Assessment (LQA) findings presented in the remediation strategy report[vi] for the BIS Triangle are summarised in Section 4.2.6 (non-asbestos soil contaminants), 4.4.1 (asbestos), 4.5.6 (ground gas), 4.9.5 (leachate) and 4.10.4 (groundwater).

4.1.1 Assessment Methodology

The risk assessment has been undertaken following the methodologies described in the following sections and in accordance with the framework set out in CLR11[iv].

The risk assessment is based on the geo-environmental test results presented in the GI Contractors' AGS data. The results of the risk assessment have been used to identify potential risks to sensitive receptors which may require remediation, investigation or further risk assessment.

Spreadsheets summarising all soil data used in the GQRA are included in Appendix D. The analytical testing suites are detailed in the GI Contractors' Factual Reports.

Where there is no contamination data or insufficient data to inform a GQRA, a preliminary risk assessment has been undertaken.

4.1.1.1 Assets with No Contamination Data

The following assets shown in Table 18 have no contamination data, and therefore have not been subject to quantitative risk assessment. Short assets such as individual overbridges, underbridges, and culverts have been omitted from the table.

Table 18: Assets with No Contamination Data

Asset	Start Chainage	Finish Chainage	LQ Site Within LoD / LLAU?
Mainline			
Highway – A45 / M42 Junction 6 Roundabout	156+050	156+050	No.
Building – Interchange Autotransformer Station (ATS)	157+750	157+750	No.
Highway – A452 Chester Road Roundabout Removal	157+800	157+800	No.
Highway – M6 Junction 4 Roundabout Widening	157+900	157+900	No.
Highway – A452 / B4438 Roundabout Works	158+150	158+150	No.
Viaduct – M42 Motorway Box Structure	158+220	158+350	No.
Embankment – Coleshill No. 1 Embankment	160+148	160+313	No.
Embankment – Coleshill No. 2 Embankment	160+404	160+855	No.
Highway – Manor Drive	162+120	162+120	No.

Asset	Start Chainage	Finish Chainage	LQ Site Within LoD / LLAU?
Viaduct – M42 Coleshill South Viaduct	162+348	162+436	No.
River Cole Diversion	162+390	162+390	No.
Highway – B4117 Gilson Road Realignment	162+930	162+930	No.
Building – Gilson Road ATS	163+170	163+170	No.
Viaduct – Water Orton No. 1 Viaduct	164+480	164+480	Yes 19-17 Coleshill Gas Works historical landfill 164+080 to 164+850
Birmingham Spur			
Viaduct – Coleshill East Viaduct	160+825 (BS)	161+371 (BS)	No.
Embankment – Coleshill No. 5 Embankment	161+301 (BS)	161+620 (BS)	No.
Cutting – Coleshill Manor Cutting	161+620 (BS)	161+901 (BS)	No.
Retaining Wall – Birmingham Spur Diveunder	161+901 (BS)	161+990 (BS)	No.
Embankment – Manor Drive Embankment	162+062 (BS)	162+190 (BS)	No.
Viaduct – River Cole East Viaduct	162+190 (BS)	162+325 (BS)	No.
Viaduct – M42 – M6 Motorway Link West Viaduct	163+347 (BS)	163+505 (BS)	No.
Viaduct – M42 – M6 Motorway Link East Viaduct	163+362 (BS)	163+520 (BS)	No.
Viaduct – Attleboro Flyover	164+140 (BS)	164+355 (BS)	No.

NC = North Chord BS = Birmingham Spur

4.2 Risks from Non-Asbestos Soil Contaminants to On-site Commercial and Public Open Space Receptors (SPR Linkage S1a – P1 – R1)

Risks to human health outside the BIS Triangle have been assessed using published GSC developed using the SP1010[xxviii] framework developed by Contaminated Land: Applications in Real Environments (CL:AIRE) on behalf of Department for Environment, Food and Rural Affairs (DEFRA), and the EA's Contaminated Land Exposure Assessment (CLEA)[xxix,xxx] framework.

The assessment of human health risks within the BIS Triangle has been undertaken within the Remediation Strategy Report[vi]. The findings of the Remediation Strategy Report are summarised in Section 4.2.6.

Under both frameworks, generic screening criteria have been developed for a range of generic land use categories. The Commercial and Public Open Space park (PoS(park)) end uses are considered to be protective of in-situ human receptors across the scheme area and for the great majority of areas outside of Sub-Lot 5 and 6 where material could be re-used. However, there are certain isolated areas of the wider HS2 Phase 1 scheme that are located close to residential properties including areas of proposed landscaping which may be within close walking distance of residential properties and accessible to the general public. In these areas soil data has been assessed assuming a public open space residential (PoS(resi)) land use.

Where available, the GSC are the Category 4 Screening Levels (C4SLs) published in the SP1010 policy companion document by DEFRA (2014). C4SLs are based on Low Level of Toxicological Concern *"which represents the estimated concentration of a contaminant [expressed as a daily intake] that poses a low risk to human health"*. This is regarded as far below an intake level that would represent a Significant Possibility of Significant Harm (SPOSH) to human health.

C4SLs have been published for a limited number of determinants. Where no C4SL exists, Suitable for Use Levels (S4ULs) published by Land Quality Management Ltd (LQM), have been used as GSCs. Both sets of generic screening criteria are based on Health Criteria Values (HCVs) representing a minimal / tolerable level of risk. This is regarded as far below an intake level that would represent a SPOSH to human health.

Organic GSCs have been developed by Mott MacDonald for the PoS(resi) land use using CLEA v1.071 adopting HCVs and adopting pathway and receptor parameters approved by DEFRA under the SP1010 framework.

Organic GSCs have been developed by Mott MacDonald for the PoS(park) and commercial land uses using CLEA v1.071 adopting low level of toxicological concern (LLTCs) (where available) or published HCVs and pathway and receptor parameters approved by DEFRA under the SP1010 framework.

All GSCs assume a Soil Organic Matter (SOM) content of 1% representing a typical lower bound for this parameter.

Chemical analysis has been undertaken on a total of 326 soil samples. The analytical results for the soil samples have been compared against the GSC for a commercial and PoS(park) end land use in the absence of published GSC for a railway end use. The following locations which have geo-environmental test data have also been compared against the PoS(resi) GSC due to their proximity to residential properties.

Coleshill No. 3 Embankment

- BD161-CR011
- BD161-TP002
- BD161-TP008
- BD161-WS003
- ML161-CR009
- ML161-CR021
- ML161-TP405

Coleshill West Viaduct

- ML161-WS002

Diddington Cutting

- ML155-CR001

Gilson Cutting

- ML163-CP401
- ML163-TP009

Gilson Embankment

- ML163-CR007
- ML163-CR401

Marsh Lane Embankment

- ND002-CP019
- ND002-CR013
- ND003-CR004

Water Orton No. 3 Viaduct

- ND001-CR031

Comparison of contaminant levels with the NBCs for English soils has also been undertaken for information although this has not informed the risk assessment. It is recommended that the applicability of NBCs for use in risk assessment is discussed and agreed with relevant Local Authorities in accordance with the Land Quality Technical Standard[xxxi].

Contaminant information taken from pavement cores has not been included within the assessment. This is due to material from pavement cores being a monolithic material, which is unlikely to result in significant human exposure pathways.

4.2.1 Results – Commercial

Several soil samples recorded concentrations of PAHs above the Commercial GSC. A summary of results is presented in Table 19.

Table 19: Summary of Commercial GSC Exceedances

Determinant	GSC (mg/kg)	No. Samples Analysed		Exceedances
		Total	No. Above GSC	
PAHs				
Benzo(a)anthracene	170	328	5	**BD161-TP002 at 0.15m bgl = 700mg/kg*** **ML164-CP036 at 1m bgl = 700mg/kg*** **ML164-CR009 at 1.5m bgl = 730mg/kg*** **ML164-CR046a at 0.8m bgl = 700mg/kg*** **ND000-CR020 at 1m bgl = 700mg/kg***
Benzo(a)pyrene	76	328	1	**ML164-CP003 at 0.9m bgl = 750mg/kg***
Benzo(b)fluoranthene	44	328	2	ML157-CR013 at 0.05m bgl = 57.9mg/kg **ML164-CR011 at 0.3m bgl = 700mg/kg***
Chrysene	350	328	3	**ML164-CP004 at 4m bgl = 670mg/kg*** **ML164-CR046a at 0.8m bgl = 700mg/kg*** **ND000-CR020 at 1m bgl = 720mg/kg***
Dibenz-a-h-anthracene	3.5	328	3	ML157-CR013 at 0.05m bgl = 7.69mg/kg ML158-CP005 at 0.5m bgl = 4.44mg/kg ML164-TP015 at 0.05m bgl = 4mg/kg
Indeno(1,2,3-cd)pyrene	500	328	2	**ML164-CP004 at 3m bgl = 750mg/kg*** **ML164-CR009 at 0.05m bgl = 730mg/kg***

*See Section 4.2.4 for discrepancy in exceedance concentrations.

4.2.2 Results – PoS(park)

Several soil samples recorded concentrations of PAHs above the PoS(park) GSC. A summary of results is presented in Table 20.

Table 20: Summary of PoS(park) GSC Exceedances

Determinant	GSC (mg/kg)	No. Samples Analysed		Exceedances
		Total	No. Above GSC	
PAHs				
Benzo(a)anthracene	49	328	6	**BD161-TP002 at 0.15m bgl = 700mg/kg*** ML157-CR013 at 0.05m bgl = 58.8mg/kg **ML164-CP036 at 1m bgl = 700mg/kg*** **ML164-CR009 at 1.5m bgl = 730mg/kg*** **ML164-CR046a at 0.8m bgl = 700mg/kg*** **ND000-CR020 at 1m bgl = 700mg/kg***
Benzo(a)pyrene	21	328	4	ML157-CR013 at 0.05m bgl = 50mg/kg ML158-CP005 at 0.5m bgl = 31.3mg/kg **ML164-CP003 at 0.9m bgl = 750mg/kg*** ML164-TP015 at 0.05m bgl = 31.2mg/kg
Benzo(b)fluoranthene	13	328	2	ML157-CR013 at 0.05m bgl = 57.9mg/kg ML158-CP005 at 0.5m bgl = 34.4mg/kg **ML164-CR011 at 0.3m bgl = 700mg/kg*** ML164-TP015 at 0.05m bgl = 37mg/kg

Determinant	GSC (mg/kg)	No. Samples Analysed		Exceedances
		Total	No. Above GSC	
Benzo(k)fluoranthene	370	328	1	**ND001-CR042 at 0.5m bgl = 750mg/kg***
Chrysene	93	328	3	**ML164-CP004 at 4m bgl = 670mg/kg*** **ML164-CR046a at 0.8m bgl = 700mg/kg*** **ND000-CR020 at 1m bgl = 720mg/kg***
Dibenz-a-h-anthracene	1.1	328	3	ML157-CR013 at 0.05m bgl = 7.69mg/kg ML158-CP005 at 0.5m bgl = 4.44mg/kg ML164-TP015 at 0.05m bgl = 4mg/kg
Indeno(1,2,3-cd)pyrene	150	328	2	**ML164-CP004 at 3m bgl = 750mg/kg*** **ML164-CR009 at 0.05m bgl = 730mg/kg***

*See section 4.2.4 for discrepancy in exceedance concentrations.

4.2.3 Results – PoS(resi)

Two soil samples recorded concentrations of barium and benzo(a)anthracene above the PoS(resi) GSC, presented in Table 21.

Table 21: Summary of PoS(resi) GSC Exceedances

Determinant	GSC (mg/kg)	No. Samples Analysed		Exceedances
		Total	No. Above GSC	
Metals				
Barium	**2680**	**326**	**1**	**BD161-CR011 at 0.7m bgl = 4150mg/kg**
PAHs				
Benzo(a)anthracene	29	328	1	**BD161-TP002 at 0.15m bgl = 700mg/kg***

*See section 4.2.4 for discrepancy in exceedance concentrations.

4.2.4 Exceedance Result Discrepancy

The exceedances which are in **bold** and followed by an asterisk in the above tables (Table 19, Table 20 and Table 21) represent results where there is a discrepancy between AGS data and results in the PDF factual reports. The AGS data shows PAH contamination levels precisely 1000x the concentration in the PDF factual reports.

This discrepancy applies to the exceedance concentrations reported above for locations BD161-TP002, ML163-CR020, ML164-CP003, ML164-CP004, ML164-CP036, ML164-CR009, ML164-CR011, ML164-CR046a, ND000-CR020, and ND001-CR042. The PAH concentrations ranging between 670mg/kg and 750mg/kg were from the AGS files for the GIs. Reported PDF values range between 0.67mg/kg and 0.75mg/kg, which no longer exceeds the selected screening thresholds.

Recommendation

It is recommended that the GI Contractor is contacted to correct discrepancies in the contamination data between AGS and PDF Factual Reports. Until such time as this error has been corrected, the exceedances for samples in which data varies between the two reporting formats has been disregarded for the purposes of this geo-environmental report based on unreliability.

4.2.5 Locations of Exceedances

The exceedance locations which appear to be based on reliable data for Commercial, PoS(park) and PoS(resi) are presented in Figure 14 and Figure 16.

Figure 14: ML158-CP005 soil exceedance location (Brackenlands Farm Landfill)

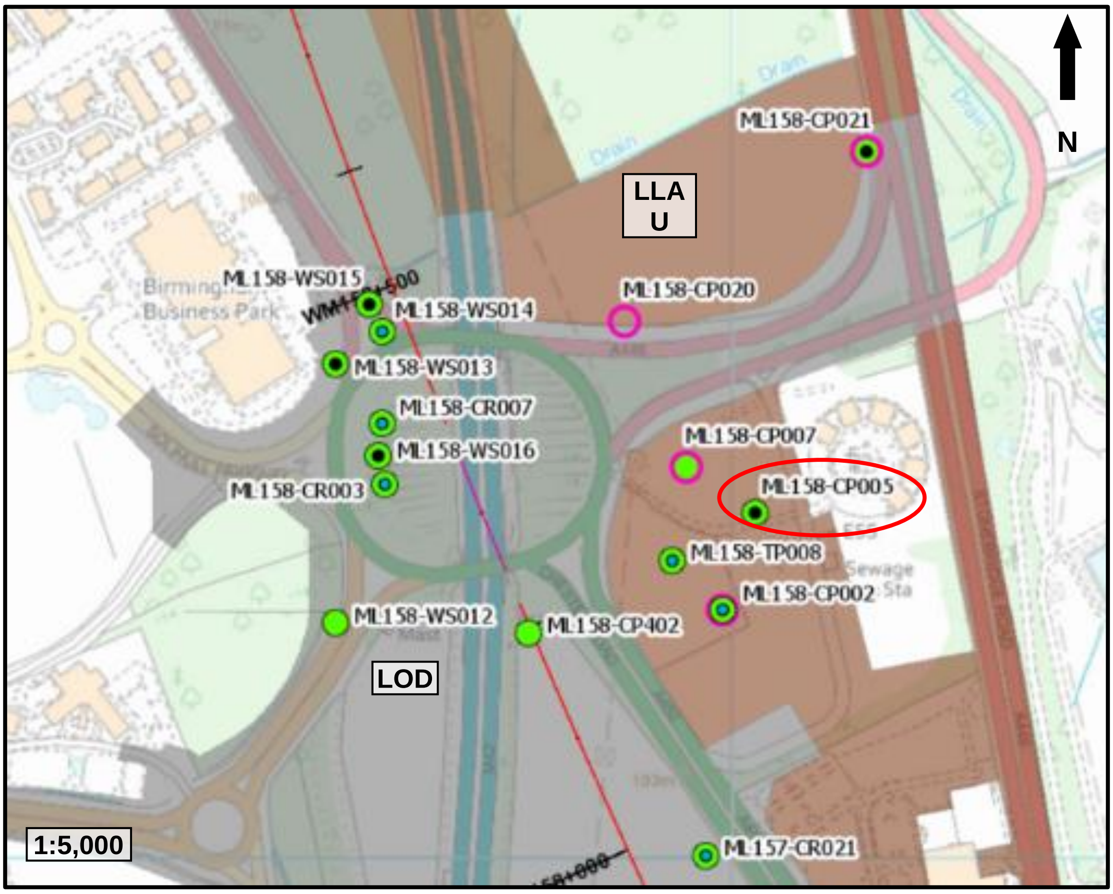


Figure 15: ML164-TP015 soil exceedance location (Chattle Hill Box Structure)

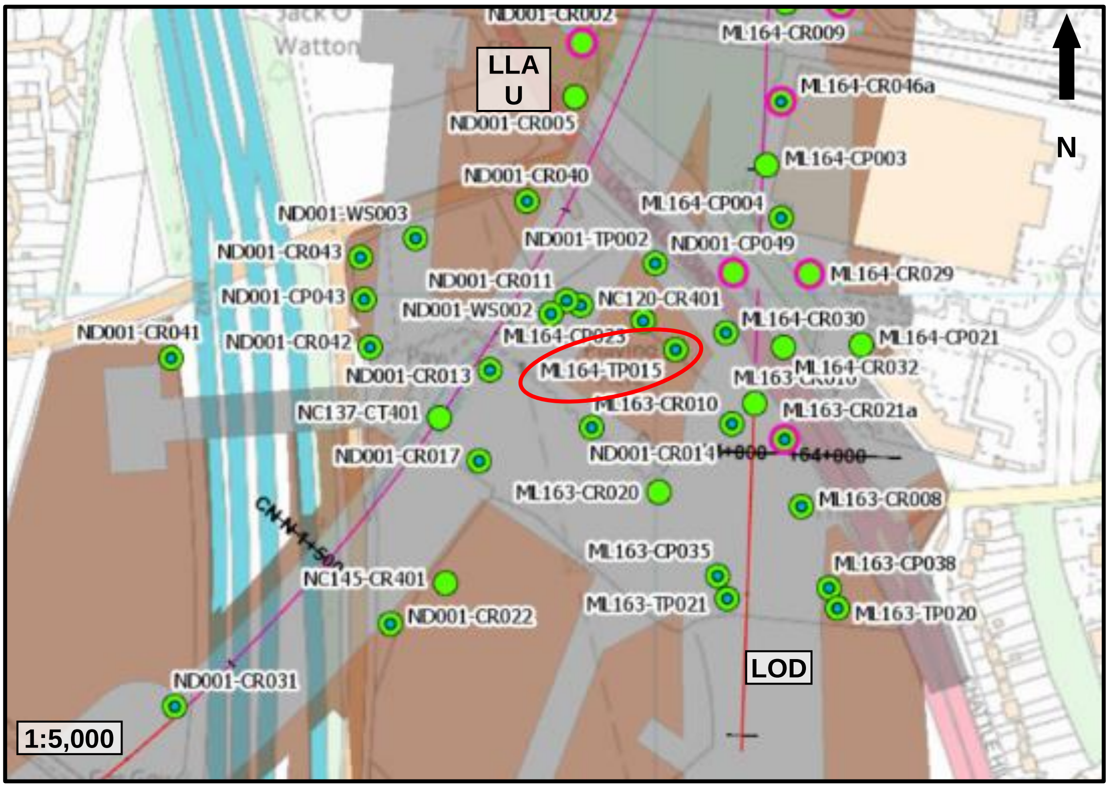
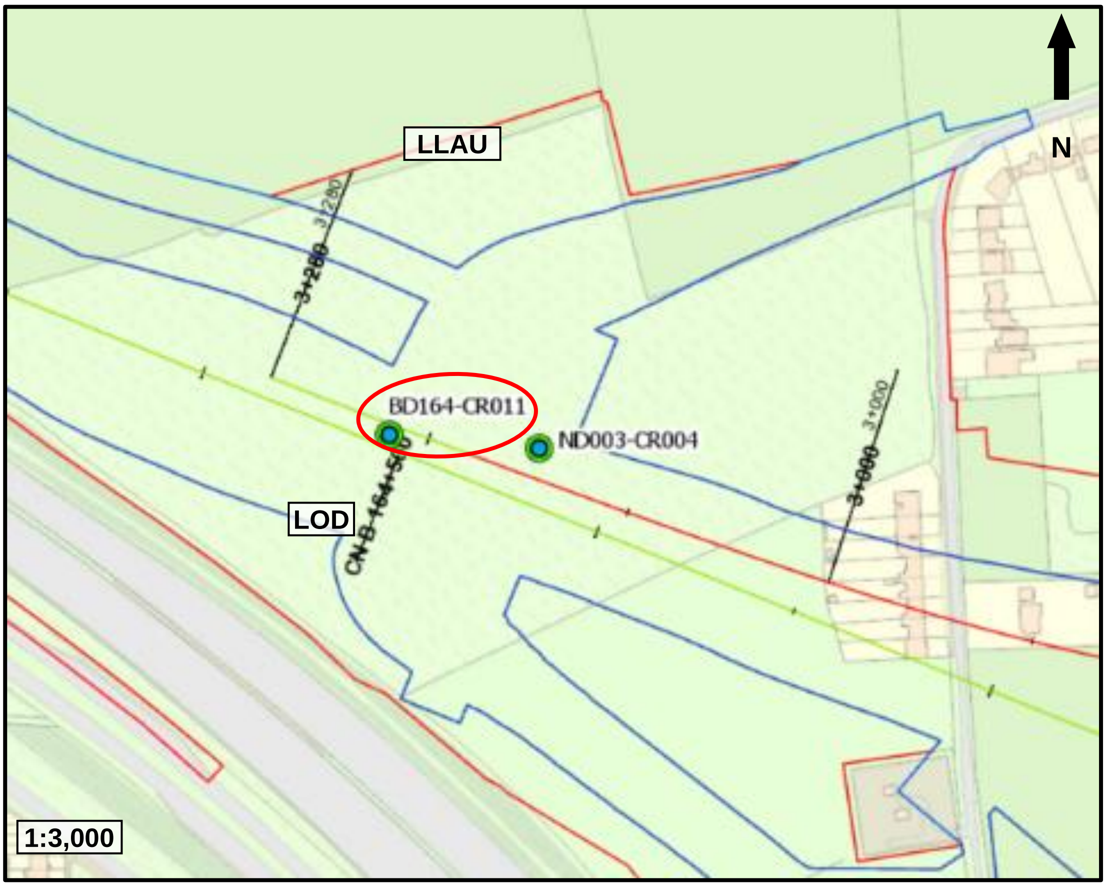


Figure 16: BD164-CR011 soil exceedance location (Water Orton Cutting)



4.2.5.1 Brackenlands Farm Historic Landfill (ch.158+000 to 158+300)

A shallow sample of fill material obtained at 0.5m bgl within ML158-CP005 recorded concentrations of benzo(a)pyrene, dibenz(ah)anthracene and benzo(b)fluoranthene in excess of threshold criteria. This exploratory hole is located within LQ site 24-44 historic Brackenlands Farm Landfill. ML158-CP002 also in the landfill exhibited a concentration of the WHO 12 PCBs of 0.106mg/kg within its fill material at 1.05m depth.

There are currently no proposed temporary or permanent works at Brackenlands Farm Historic Landfill. Responsibility for any remediation requirements will be under the EWC.

4.2.5.2 Chattle Hill Box Structure (ch.164+760 to 164+116)

A shallow sample of Made Ground obtained at 0.05m bgl within ML164-TP015 recorded concentrations of dibenz-a-h-anthracene, benzo(a)pyrene and benzo(b)fluoranthene in excess of threshold criteria. The exploratory hole is located within a grass playing field which is not within a designated LQ site, however is it located within 100m south-west of Coleshill Gas Works historical landfill (LQ site 19-17).

It is proposed to locate a balancing pond surrounded by landscaping in this area (part of the Chattle Hill Box Structure DES 164-L1). The hole is located over a proposed balancing pond which is likely to remove the source of contamination.

4.2.5.3 Area of PoS(resi) Exceedance

A sample of Made Ground from BD164-CR011 recorded an exceedance of barium against the threshold criteria. The exploratory hole is located within an agricultural field and not within a designated LQ site. It is within the alignment of Water Orton Cutting which will likely remove the source of the contaminant.

Disregarding results with a discrepancy between the AGS data and the PDF factual reports, there are no other exceedances of the PoS(resi) GSC.

4.2.6 BIS Triangle Remediation Strategy Report Non-Asbestos Soil Contaminants

The remediation strategy report[vi] for the BIS Triangle recorded contamination associated with areas of landfilling and Made Ground.

At the Middle Bickenhill Landfill (LQ site 24-38) the GI recorded concentrations of hydrocarbons, PAHs and metals in excess of the remediation strategy report's GAC for parks / open spaces. Additionally, Japanese knotweed is noted to be present across the landfill.

At the infilled sand and gravel quarry (LQ site 24-23) the GI noted locally elevated concentrations of hydrocarbons and lead in excess of the GAC for parks / open spaces.

At the backfilled borrow pits (LQ sites 23-34 and 24-16) one location reported concentrations of hydrocarbons in excess of the GAC, corresponding to the presence of demolition materials, including tarmac.

Remediation options from the remediation strategy report are summarised in Section 7.2.

4.2.7 Results – Normal Background Concentrations

For information only, the analytical results have also been compared against the NBCs for English soils, which are detailed in Section 1.12. Concentrations above the NBCs were recorded at various locations within the Proposed Scheme. A summary of recorded exceedances is presented in Table 22.

Table 22: Summary of NBC Exceedances

Contaminant	Normal Background Concentration (mg/kg)	No. Samples Analysed	
		Total	No. Above NBC
Arsenic	32	294	9
Benzo(a)pyrene	0.5	328	41
Cadmium	1.0	326	25
Copper	62	326	41
Lead	180	326	13
Mercury	0.5	326	18
Nickel	42.0	326	23

4.2.8 Total Petroleum Hydrocarbons

TPH testing was undertaken on 326 soil samples and TPH concentrations greater than 500mg/kg were recorded in 30 samples:

- ML156-CR025 at 0.05m bgl = 1,300mg/kg;
- ML156-CR027 at 0.2m bgl = 3,400mg/kg;
- ML156-CR035 at 0.3m bgl = 3,100mg/kg;
- ML157-CR013 at 0.05m bgl = 798mg/kg;
- ML157-CT018 at 0.1m bgl = 642mg/kg;
- ML157-CT027 at 0.05m bgl = 667.6mg/kg;
- ML157-CT039 at 0.2m bgl = 4,479.6mg/kg;
- ML158-CP002 at 1.05m bgl = 1,170mg/kg;
- ML158-CP002 at 3.05m bgl = 5,240mg/kg;
- ML158-CP005 at 0.5m bgl = 8,965mg/kg;

- ML158-CP005 at 1m bgl =1,740mg/kg;
- ML159-CP003 at 0.05m bgl = 5,697mg/kg;
- ML159-CP003 at 1.05m bgl = 1,397mg/kg;
- ML162-CR402 at 0.3m bgl = 1,000mg/kg;
- ML162-CR402 at 1m bgl = 780mg/kg;
- ML162-CR402 at 3m bgl =570mg/kg;
- ML163-CR020 at 0.5m bgl = 2,480mg/kg;
- ML164-CP003 at 2m bgl = 554mg/kg;
- ML164-CR013 at 1m bgl = 8,080mg/kg;
- ML164-CR029 at 0.35m bgl = 1,330mg/kg;
- ML164-CR029 at 3.2m bgl = 5,840mg/kg;
- ML164-CR032 at 0.5m bgl = 515mg/kg;
- ML164-TP015 at 0.05m bgl = 5,350mg/kg;
- ND001-CP049 at 0.4m bgl = 947mg/kg;
- ND001-CP049 at 0.6m bgl = 987mg/kg;
- ND001-CR014 at 1.1m bgl = 2,290mg/kg; and
- ND001-CR042 at 0.5m bgl = 1,130mg/kg.

The human health risk posed by the additive TPH concentrations in soil samples has been assessed in accordance with EA guidance on assessing risk to human health from petroleum hydrocarbons in soils[xxxii] by calculating an individual Hazard Quotient (HQ) for each Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) fraction (TPH band concentration divided by the GSC) and then summing the HQ to derive a Hazard Index (HI) (see below).

$$HQ_{TPH\ fraction} = \frac{TPH\ fraction\ concentration\ \left(\frac{mg}{kg}\right)}{GSC\ for\ TPH\ fraction\ \left(\frac{mg}{kg}\right)}$$

$$HI = \sum HQ_{TPH\ fractions}$$

Of the 30 samples with TPH concentrations greater than 500mg/kg, only 10 samples speciated the petroleum hydrocarbon concentrations based on the TPHCWG fractions. These 10 samples have had the HI calculated for commercial and PoS(park) end uses. Individual HIs are presented in Appendix D. The HI calculated for the 10 samples were all <1, therefore the cumulative risks from TPH within these samples are not considered to be significant.

4.2.9 Anthrax Testing

In addition to the contamination testing, four samples were selected for anthrax testing by Public Health England (PHE):

- ML164-CP004 at 1.00m;
- ML164-CP010 at 0.50m;
- ML164-CR044 at 2.00m; and
- NC120-CR401 at 1m.

The samples from ML164-CP004, ML164-CP010, and ML164-CR044 recorded the results by PHE as "*Bacillus anthracis not isolated*".

The result from NC120-CR401 has not been received. This shall be reviewed when it becomes available.

4.3 Risks from Non-Asbestos Soil Contaminants to Construction and Maintenance Personnel (SPR Linkage S1a & S1b – P1, P2, P3 – R4, R5)

The GSC used to assess the risk to human health are designed to assess the risk from long term exposure rather than the acute risks which would typically be faced by construction and maintenance personnel. Risks from acute exposure have therefore been assessed on a qualitative basis.

Construction personnel are likely to come into close contact with soils during earthworks operations. It is considered that construction and maintenance personnel will typically face higher risks in areas classified as Class 3 sites within the LoD and LLAU. Within Sub-Lots 5 and 6 there are seven LQ sites classed as Class 2 / 3 sites based on historical land use:

- LQ site 24-5: Windridge Nurseries Landfill (historical) at the National Exhibition Centre People Mover Stop;
- LQ site 24-16: Backfilled borrow pit between ch.156+200 and ch.156+600;
- LQ site 24-23: Infilled sand and gravel quarry between ch.156+400 and ch.156+500;
- LQ site 24-34: Backfilled borrow pit between ch.156+600 and ch.157+400;
- LQ site 24-38: Middle Bickenhill Landfill (historical) between ch.157+050 and ch.157+300;
- LQ site 24-39: Infilled pit between ch.157+100 and ch.157+100; and
- LQ site 24-40: Infilled pit between ch.157+100 and ch.157+100.

Recommendations

The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the Control of Substances Hazardous to Health (COSHH) Regulations 2017. Design solutions that minimise exposure to harmful contaminants in soil during construction should be used where reasonably practicable and in preference to the use of manual excavation with personal protective equipment (PPE).

4.4 Asbestos

The factual findings of the GI relating to asbestos have been reviewed and recorded. Asbestos screening was undertaken as part of the GIs and was carried out on 169 samples, with asbestos identified through quantification testing in nine of those samples.

A summary of sample locations is presented in Table 23.

Table 23: Asbestos testing

Hole ID	Depth (m bgl)	Asbestos Identification	Asbestos Quantification (Total %)
BD161-CR008	0.5	Chrysotile & crocidolite cement & chrysotile free fibres	0.034
BD163-CR022	7	Amosite free fibres	<0.001
ML156-TP036*	2.5	Amosite free fibres	0.02
ML156-CP008*	2.35	Amosite (free fibres)	-
ML156-CP008*	0.35	Chrysotile (free fibres)	-
ML157-CR027*	0.2	Small bundle of chrysotile	<0.001
ML158-TP008	1.05	Amosite and chrysotile ACM debris and loose fibres	0.0023
ML158-WS016	3	Chrysotile loose fibres in soil	0.0011

Hole ID	Depth (m bgl)	Asbestos Identification	Asbestos Quantification (Total %)
ML160-WS003	0.3	Chrysotile free fibres	0.002
ML163-CR021a	0.9	Chrysotile free fibres	0.003
ML164-CP003	0.9	Chrysotile	-
ND000-CR020	4	Amosite free fibres	0.001
ND001-CR005	-	Chrysotile	-

* In BIS Triangle and People Mover area

Recommendations

Please refer to Appendix H for asbestos risk assessment and recommendations.

4.4.1 BIS Triangle Remediation Strategy Report Asbestos Contaminants

The remediation strategy report[vi] for the BIS Triangle recorded the widespread presence of asbestos in fill materials (16 out of 50 samples analysed) in Middle Bickenhill Landfill (LQ site 24-38).

Localised presence of asbestos (two out of 18 samples analysed) was recorded in the infilled sand and gravel quarry (LQ site 24-23), and at the backfilled borrow pits (LQ site 23-34 and 24-16) (one out of 61 samples analysed).

The requirements for the management of asbestos provided in the remediation strategy report are summarised in Section 7.2.

4.5 Risks from Permanent Ground Gases to On-site and Off-site Receptors (SPR Linkages S2a & S2b – P7 – R1, R2, R3)

4.5.1 Results

Post fieldwork monitoring has been carried out over a range of atmospheric pressures (967mbar to 1,114mbar). A total of 109 installations were monitored, with 97 installations monitored on at least one occasion during low pressure (i.e. ≤1,000mbar). A summary of results is presented in Table 24 and post fieldwork monitoring results are presented in full in the GI Contractors' AGS data (see Table 12).

During post fieldwork gas monitoring the groundwater levels indicate 71 installations were flooded. The monitoring results from these boreholes may not be representative of the ground gas regime in the scheme area and the results are interpreted with caution.

4.5.2 Risk Assessment

To assess the risk from ground gas to building occupants, the monitoring results have been interpreted and assessed in-accordance with BS8485:2015+A1:2019[xxxiii]. A gas screening value (GSV) has been calculated for each borehole from the monitoring data using the maximum recorded gas concentration and flow. This is shown as:

$$GSV\left(\frac{l}{hr}\right) = Max\ borehole\ flow\ rate\left(\frac{l}{hr}\right) \times maximum\ concentration(\%)\ of\ CH_4\ and\ CO_2$$

The calculated GSV can then be assigned a Characteristic Situation (CS) which presents a hazard potential for the design of gas protective measures (if required) (by the comparison of calculated GSV with Table 2 of the BS8485:2015+A1:2019). CS range between CS1 (very low hazard potential) to CS6 (very high hazard potential). A summary table of calculated GSVs based on maximum gas concentrations and maximum flow rates for any round of monitoring for each standpipe is presented in Table 24.

Table 24: Maximum Gas Screening Value Summary

BH ID	GI Package	Response Zone (m bgl)	Flooded?	Flow	Methane	Methane LEL	Carbon Dioxide	GSV	CS	Asset
			Y/N	l/hr	%v/v	%	%v/v	l/hr		
BD161-CR008-1	DJZ	1 – 2.5	Y	7.2	0.1	0	6	0.432	CS2	Coleshill West Viaduct
BD161-CR008-2	DJZ	28.5 – 32.5	Y	1.2	0.6	13.2	0.1	0.0072	CS1	Coleshill West Viaduct
BD161-CR010-1	DJZ	3.5 – 7.5	Y	0	0	0	0.5	0	CS1	Coleshill No. 3 Embankment
BD163-CR017-1	DJZ	27.5 – 28.5	Y	7.8	0.1	0	0.5	0.039	CS1	M42 - M6 Motorway Link West Viaduct
BD164-CR003-1	DJZ	3.5 – 7.5	Y	13.1	0.1	0	0.2	0.0262	CS1	Water Orton Cutting
ML156-CP007-1	BIC	1 – 2	Y	0.1	0.2	0	3.3	0.0033	CS1	Bickenhill Embankment
ML156-CP008-1	BIC	1 – 4.3	N	0.1	6.1	58.2	16	0.016	CS2*	Bickenhill Embankment
ML156-CP009-1	BIC	1 – 3	Y	0.1	0.1	0	0.7	0.0007	CS1	Bickenhill Embankment
ML156-CP014-1	BIC	1 – 1.7	Y	7.6	0.2	0	5.7	0.4332	CS2	Birmingham Interchange Station
ML156-CP015-1	BIC	1 – 2.5	Y	0.1	0.2	0	0.1	0.0002	CS1	Birmingham Interchange Station
ML156-CP017-1	BIC	1 – 4	Y	3.4	0.2	0	0.4	0.0136	CS1	Birmingham Interchange Station
ML156-CP022-Pipe 1	BIB	1 – 4	N	3	0.1	-	5.3	0.159	CS2	Bickenhill Cutting
ML156-CP025-1	BIC	7 – 11	Y	0.1	0.3	0	0.9	0.0009	CS1	Bickenhill Cutting
ML156-CP027-Pipe 1	BIB	0.5 – 1.7	N	0.9	0	-	4.1	0.0369	CS1	Bickenhill Cutting
ML156-CP028-1	BIC	5 – 10	N	2.2	0.2	0	6.1	0.1342	CS2	Bickenhill Cutting
ML156-CP030-1	BIC	1 – 4	N	0.2	0.2	0	2	0.004	CS1	Bickenhill Embankment
ML156-CP038-1	BIC	1.75 – 6	N	0.1	0	0	0.3	0.0003	CS1	Bickenhill Embankment
ML156-CR004-1	BIC	9.5 – 15.5	Y	0.1	0.3	0	0.3	0.0003	CS1	Bickenhill Embankment
ML156-CR005-1	BIC	9.5 – 15.5	Y	0.1	0.2	0	0.4	0.0004	CS1	Bickenhill Embankment
ML156-CR008-1	BIC	15 – 20	Y	0	0	0	0	0	CS1	Birmingham Interchange Station
ML156-CR010-1	BIC	4.5 – 10.3	N	0.2	0.2	0	0.6	0.0012	CS1	Birmingham Interchange Station
ML156-CR012-1	BIC	19.5 – 25	Y	5.3	0.3	0	0.3	0.0159	CS1	Birmingham Interchange Station
ML156-CR014-1	BIC	19.5 – 25.5	Y	0.6	0.1	0	1.4	0.0084	CS1	Birmingham Interchange Station
ML156-CR015-1	BIC	11.5 – 20.5	Y	0.1	0.3	0	0.2	0.0003	CS1	Bickenhill Cutting
ML156-CR017-1	BIC	9.5 – 15.5	Y	0	0	0	1.7	0	CS1	Birmingham Interchange Station
ML156-CR018-1	BIC	1 – 3.5	Y	0.2	0	0	0.3	0.0006	CS1	Birmingham Interchange Station
ML156-CR019-1	BIC	10 – 15	Y	0.2	0.2	0	0.7	0.0014	CS1	Birmingham Interchange Station
ML156-CR020-Pipe 1	BIB	15.5 – 22.4	Y	3	0.1	-	1.7	0.051	CS1	Birmingham Interchange Station
ML156-CR022-Pipe 1	BIB	19.5 – 25.2	Y	0.1	0.1	-	1.1	0.0011	CS1	Birmingham Interchange Station
ML156-CR023-Pipe 1	BIB	14 – 25	Y	3.1	0.1	-	1.1	0.0341	CS1	Birmingham Interchange Station
ML156-CR024-Pipe 1	BIB	15.8 – 17.5	Y	0.1	0.1	-	0.3	0.0003	CS1	Birmingham Interchange Station
ML156-CR025-Pipe 1	BIA	3 – 7	N	2.7	32.2	-	35.1 (Steady)	0.9477	CS3	Birmingham Interchange Station

BH ID	GI Package	Response Zone (m bgl)	Flooded?	Flow	Methane	Methane LEL	Carbon Dioxide	GSV	CS	Asset
			Y/N	l/hr	%v/v	%	%v/v	l/hr		
							100 (Peak)	2.7	CS3	
ML156-CR030-1	BIC	14.5 – 20.5	Y	11.4	0.6	11.2	0.6	0.0684	CS1	Birmingham Interchange Station
ML156-CR035-Pipe 1	BIA	9 – 12	Y	3	0.1	-	2.4	0.072	CS2	Birmingham Interchange Station
ML156-CR037-Pipe 1	BIA	15 – 18	Y	0.9	0.2	-	2.3	0.0207	CS1	Birmingham Interchange Station
ML156-CR041-1	BIC	14.5 – 20.5	Y	27.6	0.4	0	0.9	0.2484	CS2	Birmingham Interchange Station
ML156-CR042-1	BIC	11.5 – 17.5	Y	0.1	0.1	0	0.3	0.0003	CS1	Bickenhill Embankment
ML156-CR044-1	BIC	14.5 – 20.5	Y	0	0	0	0	0	CS1	Birmingham Interchange Station
ML156-CR045-1	BIC	19.5 – 25.1	Y	4.6	0.4	0	0.1	0.0184	CS1	Birmingham Interchange Station
ML156-CR046-Pipe 1	BIA	3.2 – 5	Y	0.1	16.6	-	19.2	0.0192	CS2*	Birmingham Interchange Station
ML156-CR048-Pipe 1	BIA	8.5 – 11.5	Y	1.6	0.1	-	1.8	0.0288	CS1	Bickenhill Embankment
ML156-WS032-1	BIC	1 – 3	N	0.5	0.1	0	3.4	0.017	CS1	Birmingham Interchange Station
ML156-WS033-1	BIC	1 – 4	Y	0.2	0.2	0	0.5	0.001	CS1	Birmingham Interchange Station
ML156-WS040-1	BIC	1 – 2.8	Y	0.1	0.1	0	2	0.002	CS1	Birmingham Interchange Station
ML156-WS041-1	BIC	1 – 3	Y	4.2	0.2	0	0.6	0.0252	CS1	Birmingham Interchange Station
ML157-CP001-1	BIC	2 – 10	N	0.4	0.3	0	5.2	0.0208	CS2*	Bickenhill Cutting
ML157-CP008-Pipe 1	BIB	1.5 – 8	N	2.7	0	-	5	0.135	CS2	Bickenhill Cutting
ML157-CP010-1	BIC	1 – 6	Y	0.5	0.1	0	2.2	0.011	CS1	Bickenhill Cutting
ML157-CP014-1	BIC	1.5 – 7.5	Y	7	0.1	0	2.8	0.196	CS2	Bickenhill Cutting
ML157-CP018-Pipe 1	BID	1 – 3.5	N	0	0	-	0	0	CS1	Packington Embankment
ML157-CP022-Pipe 1	BID	0.5 – 5	N	0	0	-	0	0	CS1	Packington Embankment
ML157-CP024-1	BIC	2 – 10	N	0.7	0.3	0	2.4	0.0168	CS1	Bickenhill Cutting
ML157-CR003-1	BIC	14.5 – 20.5	Y	0.4	0.1	0	0.1	0.0004	CS1	Bickenhill Cutting
ML157-CR006-1	BIC	9.5 – 20.5	Y	9.6	0.1	0	2.6	0.2496	CS2	Bickenhill Cutting
ML157-CR009-Pipe 1	BIA	24 – 29.8	Y	0.6	0.1	-	0.9	0.0054	CS1	Bickenhill Cutting
ML157-CR012-1	NPA A	10.5 – 16.5	Y	2.9	0.1	2	0.9	0.0261	CS1	Bickenhill Cutting
ML157-CR012-2	NPA A	1.5 – 5.5	N	0.3	0.1	2	4.8	0.0144	CS1	Bickenhill Cutting
ML157-CR014-1	NPA A	14.5 – 18.5	Y	14.7	0.1	2	1	0.147	CS2	Bickenhill Cutting
ML157-CR014-2	NPA A	3.5 – 9.5	N	2.6	0.1	2	2.4	0.0624	CS1	Bickenhill Cutting
ML157-CR015-1	NPA A	15.5 – 21	Y	0.2	0.1	2	2	0.004	CS1	Bickenhill Cutting
ML157-CR015-2	NPA A	4.5 – 10.5	N	0.2	0.1	2	2.2	0.0044	CS1	Bickenhill Cutting
ML157-CR023-Pipe 1	BID	12.5 – 17.5	Y	3	0	-	0.7	0.021	CS1	Packington Embankment
ML157-CR026-Pipe 1	BID	13.5 – 18.5	N	0	0	-	0	0	CS1	Packington Embankment
ML157-WS003-Pipe 1	BIB	1.5 – 3	N	0.2	0.1	-	3.3	0.0066	CS1	Bickenhill Cutting
ML157-WS006-Pipe 1	BIB	1.5 – 4	N	3.2	0	-	5.3	0.1696	CS2	Bickenhill Cutting

BH ID	GI Package	Response Zone (m bgl)	Flooded?	Flow	Methane	Methane LEL	Carbon Dioxide	GSV	CS	Asset
			Y/N	l/hr	%v/v	%	%v/v	l/hr		
ML157-WS035-1	BIC	1 – 5	N	0.8	0.2	0	2.6	0.0208	CS1	Bickenhill Cutting
ML157-WS067-1	BIC	1 – 5.45	N	0.1	0.2	0	1.8	0.0018	CS1	Bickenhill Cutting
ML157-WS069-Pipe 1	BID	1.5 – 2.5	Y	2.8	0	-	1.2	0.0336	CS1	Packington Embankment
ML158-CP002-1	DJA	1 – 3.5	N	21.2	4.2	6	19.4	4.1128	CS4	Packington Embankment
ML158-CP007-1	DJA	5 – 8	N	3.1	0.6	11	20.6	0.6386	CS2	M42 Motorway Box Structure
ML158-CP020-1	DJA	2 – 5	Y	0.5	0.2	4	2.1	0.0105	CS1	Pool Wood Embankment
ML158-CP021-1	DJA	2 – 5	N	0.6	0.3	5	4.3	0.0258	CS1	Pool Wood Embankment
ML158-WS008-Pipe 1	BID	1 – 4	N	3	0.1	-	4	0.12	CS2	Packington Embankment
ML158-WS010-Pipe 1	BID	1.2 – 5	N	0.4	0.1	-	5.4	0.0216	CS2*	Packington Embankment
ML158-WS011-Pipe 1	BID	1.5 – 3	Y	3	0.1	-	2.1	0.063	CS1	Packington Embankment
ML161-CR022-1	DJZ	0.75 – 3.5	Y	0.1	0.9	0.1	12	0.012	CS1	Coleshill No. 3 Embankment
ML162-CR004a-1	DJZ	26 – 27	Y	25.4	0.1	0	0.7	0.1778	CS2	M42 Coleshill Box Structure
ML162-CR024-01	NPB B	1.3 – 4	Y	0.4	2.1	0	4.1	0.0164	CS1	M42 Coleshill North Viaduct
ML162-CR024-1	NPB B	1.5 – 4	Y	0.4	6.1	122	4.4	0.0244	CS1	M42 Coleshill North Viaduct
ML162-CR025-01	NPB B	2 – 4	Y	0.5	0.1	2	1.1	0.0055	CS1	M42 Coleshill North Viaduct
ML162-CR025-1	NPB B	2 – 4	Y	0.5	0.5	14	3.3	0.0165	CS1	M42 Coleshill North Viaduct
ML163-CR010-1	DJZ	0.5 – 4.5	N	0.1	0	0	0.4	0.0004	CS1	Lichfield Road Embankment
ML163-CR010-2	DJZ	14.5 – 18.5	Y	0	0	0	0	0	CS1	Lichfield Road Embankment
ML163-CR014-01	NPB B	3.7 – 9	N	0.3	0.1	2	2.1	0.0063	CS1	Lichfield Road Embankment
ML163-CR014-1	NPB B	3.7 – 9	N	1.3	0.3	6	2.4	0.0312	CS1	Lichfield Road Embankment
ML163-CR015a-01	NPB B	14.5 – 18	Y	0	0.1	2	0.4	0	CS1	Lichfield Road Embankment
ML163-CR015a-02	NPB B	1.3 – 4.8	N	0	0.1	2	0.4	0	CS1	Lichfield Road Embankment
ML163-CR015a-1	NPB B	14.7 – 17.7	Y	0.3	0.2	4	0.4	0.0012	CS1	Lichfield Road Embankment
ML163-CR015a-2	NPB B	1.5 – 4.8	N	0.4	0.2	4	3.2	0.0128	CS1	Lichfield Road Embankment
ML163-CR021a-1	DJZ	1.5 – 4.5	Y	2	0.7	15.7	0.5	0.014	CS1	Lichfield Road Embankment
ML163-CR021a-2	DJZ	13.5 – 17.5	Y	9	0.01	0	1.3	0.117	CS2	Lichfield Road Embankment
ML164-CP004-1	DJZ	0.5 – 3.5	N	0.3	3.9	26.9	0.3	0.0117	CS1	Watton House West Viaduct
ML164-CP004-2	DJZ	11.5 – 13.4	Y	8	0.3	0.2	0.5	0.04	CS1	Watton House West Viaduct
ML164-CP010-1	DJZ	0.5 – 3	N	0.3	1.5	0	8.2	0.0246	CS2*	Watton House Embankment
ML164-CP036-1	DJZ	5.5 – 8.5	Y	1.4	3.6	72.9	1.5	0.0504	CS1	Watton House Embankment
ML164-CR009-1	DJZ	6.5 – 10.5	Y	15	0.1	0	2.5	0.375	CS2	Watton House West Viaduct
ML164-CR009-2	DJZ	24.5 – 25.5	Y	0.4	0.01	0	0.2	0.0008	CS1	Watton House West Viaduct
ML164-CR029-1	DJZ	1 – 3	N	0.4	0.1	0	0	0.0004	CS1	Chattle Hill Box Structure
ML164-CR029-2	DJZ	24.5 – 25.5	Y	0.1	0	0	0.2	0.0002	CS1	Chattle Hill Box Structure

BH ID	GI Package	Response Zone (m bgl)	Flooded?	Flow	Methane	Methane LEL	Carbon Dioxide	GSV	CS	Asset
			Y/N	l/hr	%v/v	%	%v/v	l/hr		
ML164-CR046a-1	DJZ	1 – 3.5	Y	5.2	7.3	81.9	10.6	0.5512	CS2	Watton House West Viaduct
ML164-CR046a-2	DJZ	19.5 – 20.5	Y	0.2	0	0	0.1	0.0002	CS1	Watton House West Viaduct
ND001-CP043-1	DJZ	1 – 5	N	0	0	0	0.3	0	CS1	Water Orton No. 3 Viaduct
ND001-CP049-1	DJZ	0.5 – 2.5	Y	0.9	0.1	0	3.2	0.0288	CS1	Chattle Hill Box Structure
ND001-CP049-2	DJZ	11.5 – 14.7	Y	1.2	0	0	1	0.012	CS1	Chattle Hill Box Structure
ND001-CR002-1	DJZ	1.5 – 5.5	N	0.2	0.1	0	12	0.024	CS2*	Water Orton No. 3 Viaduct
ND001-CR002-2	DJZ	24.5 – 25.5	Y	0.4	0	0	0.1	0.0004	CS1	Water Orton No. 3 Viaduct
ND001-CR017-1	DJZ	2.5 – 6.5	N	0	0.1	0	3.9	0	CS1	Water Orton No. 3 Viaduct
ND002-CR002-1	DJZ	2.5 – 4.5	Y	0	0	0	0	0	CS1	Marsh Lane Embankment
ND002-WS001-1	DJZ	0.5 – 3.45	Y	0	0.2	2.8	0	0	CS1	Marsh Lane Embankment

Notes:

*Increased to CS2 due to concentration of methane ≥1% and / or carbon dioxide ≥5%.

Grey cells indicate response zone was flooded. Where the average clear air space above standing water in standpipe response zones is <1m, boreholes are recorded as flooded.

Red cells indicate concentration of methane ≥1% and / or carbon dioxide ≥5%.

Ground gas monitoring has indicated that 25 installations are assessed to be CS2 or greater. Twenty-three installations have been assessed to be CS2, one installation assessed to be CS3 (moderate) and one installation assessed to be CS4 (moderate to high). Six of the installations assessed to be CS2 were due to concentrations of methane and / or carbon dioxide being greater than the typical concentrations for CS1 (<1% and <5%, respectively).

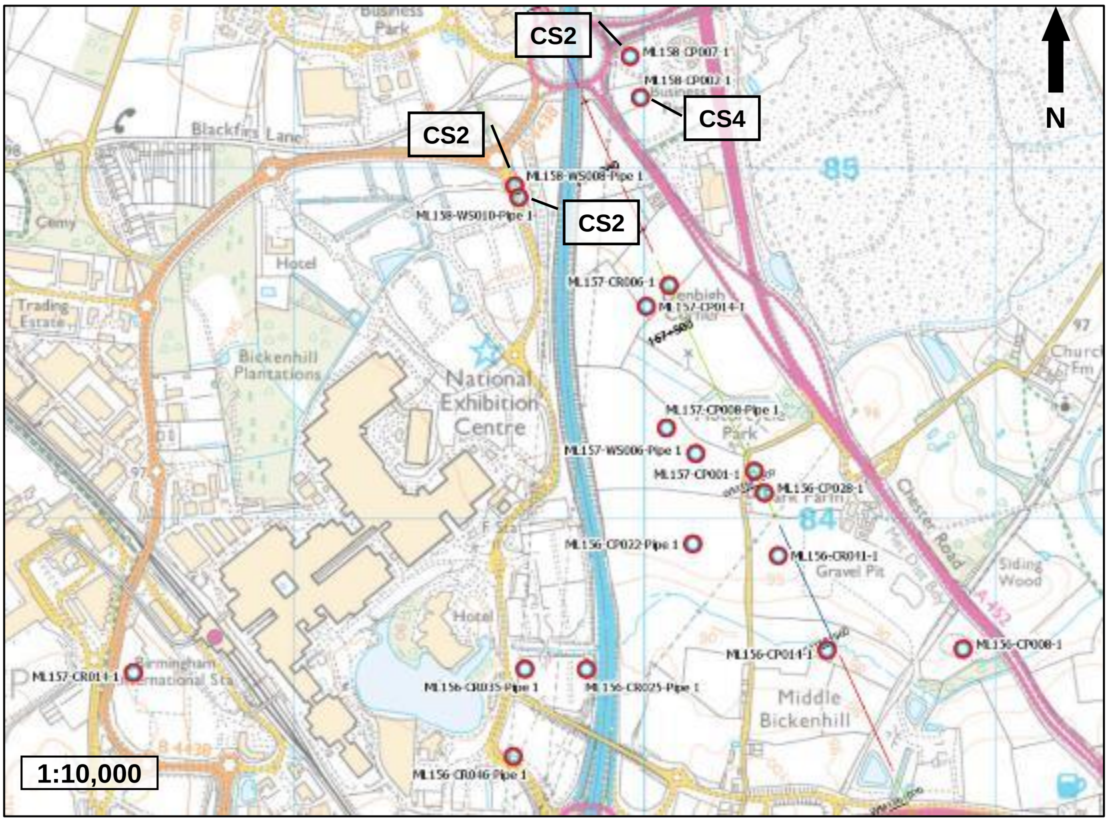
Note that 10 of the 25 installations are within the BIS Triangle. These have not been assessed any further. The BIS Triangle remediation strategy report has considered a much greater number of installations within the triangle. A summary of the remediation strategy report's findings is presented in Section 4.5.6.

Assets with installations assessed to be CS2 or greater include Coleshill West Viaduct, Bickenhill Embankment, Birmingham Interchange Station, Bickenhill Cutting, Packington Embankment, M42 Motorway Box Structure, M42 Coleshill Box Structure, Lichfield Road Embankment, Watton House Embankment, Watton House West Viaduct and Water Orton No. 3 Viaduct.

4.5.3 Characteristic Gas Situation Value Discussion – Around the BIS Triangle

Figure 17 below shows characteristic gas situations CS2 or greater for flooded and unflooded installations around the BIS Triangle. There are four installations around the northern part of the BIS triangle and near to MWCC assets assessed to be CS2 or greater. Gas monitoring data for the People Mover area to the west of the BIS triangle has not been assessed.

Figure 17: BIS Triangle Locations with CS-2 or Greater



4.5.3.1 LQ Site 24-44 Brackenlands Farm Landfill

ML158-CP002-1 and ML158-CP007-1 are within LQ site 24-44 (Brackenlands Farm Landfill) and were initially assessed on a worst-case basis to be CS4 and CS2 respectively due to elevated concentrations of carbon dioxide (up to 20.6%) and methane (up to 4.2%), and flow rate (up to 6.5l/hr). ML158-CP002 screened the fill material (up to 3.6m of landfill material) which recorded the presence of wood and "*black very organic*" soil, which was predominantly a sandy clay. ML158-CP007 screened the

Glaciofluvial Deposits which was predominantly encountered as a gravelly clay overlying gravel. The landfill is known to have accepted sewage sludges historically.

Neither of the installations are flooded and have had 12 to 13 rounds of monitoring, with one round during low pressure each. In ML158-CP002-1 six rounds detected elevated concentrations of carbon dioxide and / or methane. However, the GSVs calculated for these six rounds along with five other rounds are assessed to be CS1. During the third and last round of monitoring, elevated flow rate (21.2l/hr and 8l/hr, respectively) along with detected methane concentrations (0.8% and 0.9%, respectively) resulted in GSVs assessed to be CS2. Given the data the initial CS4 assigned to this installation is conservative, and it is considered reasonable to lower it to CS2, which better reflects the data. GSVs calculated for individual monitoring rounds recorded a maximum CS of 2 for both holes.

There are currently no proposed temporary or permanent MWCC works at Brackenlands Farm Landfill and it assumed that responsibility for further investigation and mitigation of ground gas risks from the landfill will be responsibility of the Enabling Works Contractor.

4.5.3.2 ML158-WS008 and ML158-WS010

To the north-west of the BIS triangle are installations ML158-WS008-Pipe 1 and ML158-WS010-Pipe 1 (both unflooded) which are initially assessed to be CS2 based on maximum gas flow rate x maximum gas concentration. For 12 individual monitoring rounds the CS has been calculated as 1 for ML158-WS008-Pipe1 and remains at CS2 for ML158-WS010-Pipe 1. These installations screened the Glaciofluvial Deposits predominantly recorded as a sand, with the bottom of ML158-WS010-Pipe 1 response zone set within the Mercia Mudstone Group.

This area will be covered with a balancing pond which may alter gas migration pathways.

Recommendation

It is recommended that the area around the proposed balancing pond is subject to construction phase gas monitoring to ensure that any adverse risk on the ground gas regime are detected and managed in the construction.

4.5.3.3 Overview

Upon review of data of individual monitoring rounds for installations which are assessed to be CS2 or greater, several CS have been subsequently lowered based on the data from completed the completed monitoring programme. These are summarised in Table 25.

Table 25: Revised CS for Installations within BIS Triangle

Installation	CS based on max flow rate x max gas concentration	Highest CS calculated for individual monitoring rounds	Risk
ML158-CP002-1	CS4	CS2	Low-Moderate
ML158-CP007-1	CS2	CS2	
ML158-WS008-Pipe 1	CS2	CS1	Very Low
ML158-WS010-Pipe 1	CS2	CS2	Low

4.5.4 Characteristic Gas Situation Value Discussion – outside of the BIS Triangle

Figure 18 and Figure 19 below shows characteristic gas situations CS2 or greater for flooded and unflooded installations beyond the BIS triangle. There are seven installations assessed to be CS2 (no installations assessed to be greater than CS2), four of which are located within and one adjacent to identified LQ Sites.

Figure 18 Locations around Coleshill Gas Works Historical Landfill with CS-2

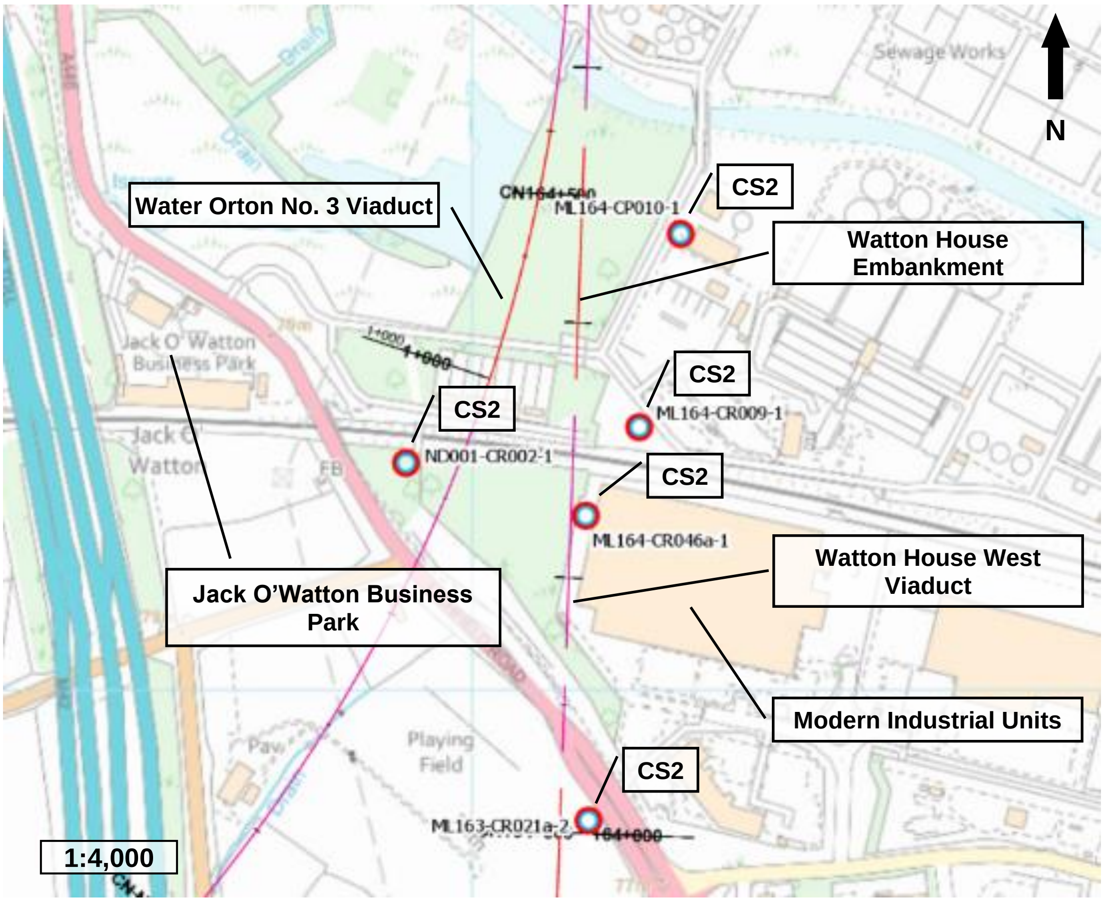
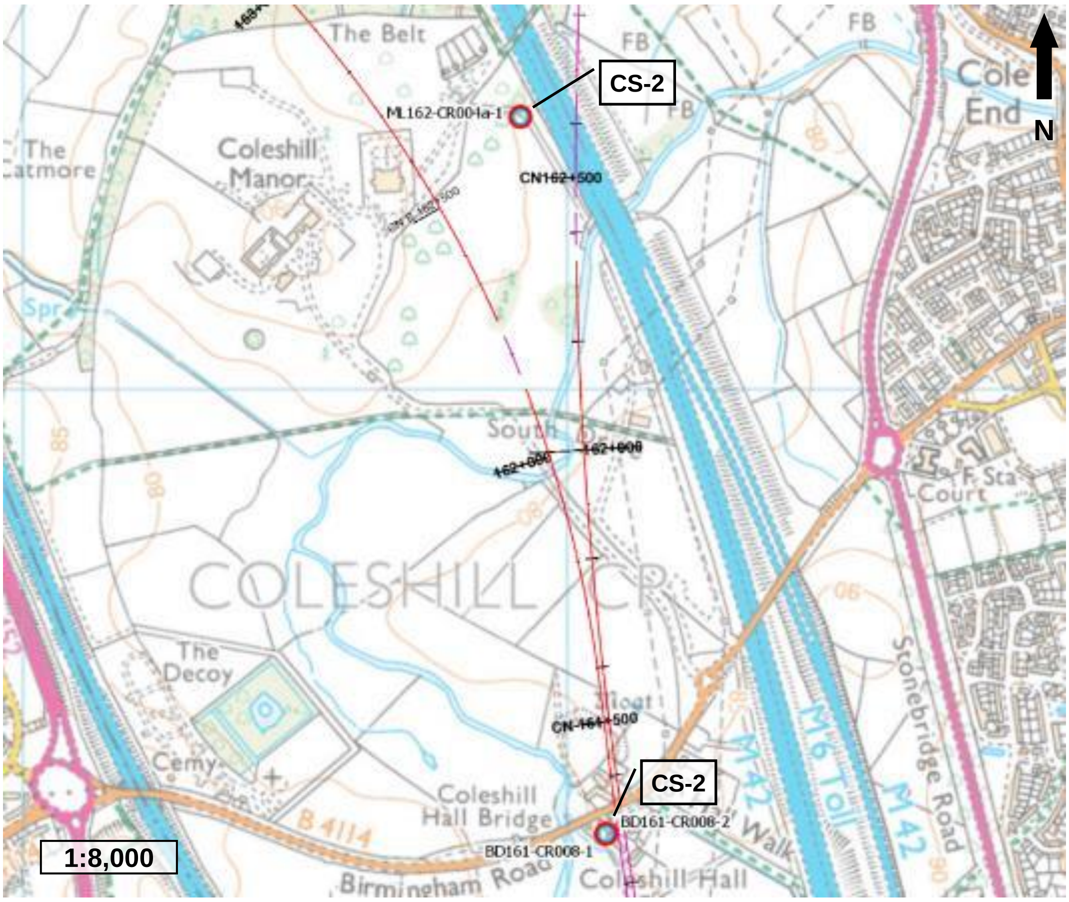


Figure 19 Locations in the Southern Part of Delta Junction with CS-2



4.5.4.1 Within LQ Sites

LQ Site 19-20 Former Timber Yard

BD161-CR008-1 (flooded) is within LQ site 19-20 (Former Timber Yard) and was screened in the Made Ground. The GSVs based on maximum gas levels x maximum flow rates are consistent with GSVs calculated for individual monitoring rounds. Given it is flooded and recorded elevated gas concentrations, an equivalent characteristic situation of CS2 is considered appropriate.

The proposed works in the area is the Coleshill West Viaduct which is unlikely to significantly alter contamination pathways. Coleshill No. 3 Embankment is located to the east of this location, but installation ML161-CR022-1 within the embankment footprint does not indicate significant ground gas levels in this area.

LQ Site 19-17 Coleshill Gas Works Historical Landfill

Installation ML164-CR046a-1 (flooded) is located within LQ site 19-17 (Coleshill Gas Works Historical Landfill), with ND001-CR002-1 (unflooded) located adjacent to the LQ site. At least 10 rounds of monitoring have been undertaken with at least two rounds during low pressure.

These installations are assessed to be CS2 due to elevated concentrations of methane (up to 7.3%), concentrations of carbon dioxide (up to 12%) and / or flow rate (up to 5.2l/hr). ML164-CR046a-1 screened the Made Ground and Glacial Till, with a cementitious odour noted in the Made Ground. ND001-CR002-1 adjacent to the LQ site screened the River Terrace Deposits and the Glaciolacustrine Deposits.

These installations are in the vicinity of the proposed Watton House West Viaduct and Water Orton Viaducts which will be located over the former Coleshill Gasworks Landfill. The gasworks landfill is adjacent and perhaps underlies industrial units which have been constructed to the east of Watton House West Viaduct between 2001 and 2003. To the west of the landfill the nearest building receptors that will be retained under the scheme are within the Jack O'Watton Business Park. These receptors are illustrated in Figure 18.

The proposed viaduct construction is considered unlikely to alter the existing gas regime on the site. However, the precise ground gassing regime requires further investigation in order to determine risks from on-site landfill gas sources to the surrounding industrial units. The geo-environmental report currently assumes that the footprint of gassing ground extends under the industrial units to the east and these have adequate gas protection measures, and further assumes that ground gasses do not extend to the Jack O'Watton Business Park. Further investigation is proposed to determine the extent of the landfill to the west of the alignment and the requirement for any remediation measures to address migration of ground gases around the landfill.

Recommendation

Further monitoring is proposed to gain further clarity on gas risks in and around the former landfill. Further gas monitoring will also be required during construction to ensure that the viaduct does not result in a significant deterioration in ground levels in the surrounding area.

LQ Site 19-25 Coleshill Sewage Treatment Works

Installations ML164-CP010-1 (unflooded) and ML164-CR009-1 (flooded) are located within LQ site 19-25 (Coleshill Sewage Treatment Works) and are assessed to be CS2. ML164-CP010-1 largely screened in the Made Ground with the base of the response zone within Alluvium, and ML164-CR009-1 is screened in the Mercia Mudstone Group. Borehole log descriptions did not indicate a potential source of ground gas.

The proposed Watton House Embankment is near to the west of the installation which may potentially divert ground gas migration to nearby receptors. As with the installations within LQ Site 19-17, the precise ground gassing regime requires further investigation in order to determine risks from on-site landfill gas sources to the surrounding industrial units. It is currently assumed that the existing sewage treatment works is not a sensitive receptor to ground gas, and the industrial units to the south have adequate gas protection measures. Further investigation is proposed to determine the extent of the landfill to the west of the alignment and the requirement for any remediation measures to address migration of ground gases around the landfill.

Recommendation

Further monitoring is proposed to gain further clarity on gas risks in and around the former landfill. Further gas monitoring will also be required during construction to ensure that the embankment does not result in a significant deterioration in ground levels in the surrounding area.

4.5.4.2 Not Within LQ Sites

ML162-CR004a

ML162-CR004a (flooded) is located between the proposed M42 Coleshill Box Structure and Green Lane Embankment. It has been assessed to be CS2 due to carbon dioxide concentration (up to 0.7%) and elevated flow rate (up to 25.4l/hr). It is screened in the Mercia Mudstone Group.

The proposed works at this location being woodland and grassland habitat creation. This is unlikely to affect the existing ground gas regime.

ML163-CR021a-2

ML163-CR021a-2 (flooded) is in a field off the A446 and is approximately 50m away from LQ Site 19-17 (Coleshill Gas Works Historical Landfill). It is screened in the Mercia Mudstone Group and is assessed to be CS2 due to carbon dioxide concentrations (up to 1.3%) and elevated flow rate (up to 9l/hr).

The proposed Chattle Hill Box Structure is considered unlikely to alter the ground gas regime in this area in the long term.

Recommendation

Further monitoring from shallow standpipes is proposed in this area to gain further clarity on ground gas risks. Further gas monitoring will also be required during construction to ensure that the structure does not result in a significant deterioration in ground levels in the surrounding area.

4.5.5 Risks to Off-site Receptors

Risks from installations assigned CS1 are regarded as presenting a very low risk to nearby receptors, although several of these are flooded which may result in an underestimation of gas risks in these areas.

In-relation to installations assessed to be CS2 ground gases may present a low risk to the nearby receptors, the industrial estate east of Watton House West Viaduct and Jack O'Watton Business Park to the west of Water Orton No. 3 Viaduct. Further investigation is proposed to determine the extent of the Coleshill Gas Works historical landfill (LQ site 19-17) to the west of the alignment and the requirement for any remediation measures to address migration of ground gases around the landfill.

Assuming the industrial units which are constructed on the Coleshill Gas Works Historical Landfill has adequate gas protection measures and ground gas migration does not extend to Jack O'Watton Business Park, the risk to these receptors is Low.

4.5.6 BIS Triangle Remediation Strategy Report Ground Gases

Six rounds of ground gas monitoring were undertaken for the BIS Triangle remediation strategy report[vi] between July and November 2018. It reported the following:

4.5.6.1 Middle Bickenhill Landfill (LQ Site 24-38)

"*Elevated ground gases were recorded in the fill materials, with a peak carbon dioxide concentration of 26% v/v and methane of 56% v/v. Depleted oxygen was also recorded (down to 0.1% v/v).*

Maximum peak flow rates of 12.7 l/hr and 10.2 l/hr were recorded from the same location from the fill material at ML157-CP306; however, steady flow rates from this location were much lower at between 0.0 and 0.1l/hr. Steady-state flow rates recorded from all wells installed into the fill material ranged from 0 to 2.1 l/hr."

The MWCC works involve the construction of Bickenhill Cutting through Middle Bickenhill Landfill. BBV have assumed that landfill material will be removed in its entirety beneath the base of the cutting and cutting batters. Sections of landfill will therefore be retained beneath access roads which are proposed outside of the cutting. The area of full depth landfill removal is illustrated below:

Figure 20: Middle Bickenhill Landfill: Area of full depth landfill removal

Key:

Green Hatch: Middle Bickenhill Landfill

Responsibility for design and construction:

Transparent Red: Main Works Civil Contract

Transparent Green: Enabling Works Contract EWC

Transparent Blue: Station Design Services Contract

4.5.6.2 Infilled Sand and Gravel Quarry (LQ Site 24-23)

"*Elevated carbon dioxide (up to 32% v/v) and slightly elevated methane (up to 3.5% v/v) were recorded from the Made Ground and glaciofluvial deposits within the footprint of the infilled quarry. Only low flow rates were recorded (up to 1.2 l/hr)*"

It should be noted that the MWCC works associated with a nearby attenuation pond and access track will not extend over the infilled sand and gravel quarry.

4.5.6.3 Backfilled Borrow Pit (LQ Site 24-34 and 24-16)

"*Ground gases were typically recorded at low concentrations across the borrow pits. However, localised elevated carbon dioxide (>5%) was consistently recorded at three locations in three separate areas of the borrow pits (including ML156-CP304, ML156-CP306 and ML157-CP302) and methane > 1% was* *consistently recorded at one location (max. 29% v/v at ML156-CP304). The highest concentrations recorded were at ML156-CP304 which correlates with observations of a 'sewerage' odour in the Made Ground at this location. Low or no flow rates were typically recorded from monitoring wells*".

4.5.6.4 Station Buildings

"*Nine wells (installed within the superficial deposits and Mercia Mudstone) were positioned in the vicinity of the proposed Interchange Station in the central southern part of the site where no Made Ground has been recorded as being present. The wells were monitored on six occasions (including ML156-CR041, CR045, CR012, CR030, CR018, CR019, WS032, WS040 and CP017). The concentrations recorded were all below 1% methane and 5% carbon dioxide. Based on these results and also the flow rates obtained, this part of the site would be consistent with Characteristic Situation 1 where no specific gas protection measures are required*".

4.5.6.5 People Mover Depot

"*The location of the People Mover Depot is not finalised; however, plans recently provided by SDSC (including 1SN03-ARP-HW-DGA-NS07-150102 provided in Appendix B) indicate that this depot may be located at the south-western site boundary to the south of Hollywell Brook. There is limited GI data (ML156-CR023 only) from within the footprint of the proposed depot location and no previous ground gas data. The ground conditions from ML156-CR023 did not record Made Ground as being present. The southern borrow pit is located close to the east of the depot location and ground gas results collected from this southern borrow pit have not recorded significantly elevated ground gases*".

4.5.6.6 Multi-Storey Car Parks

"*In the event that the design of the car park layout is altered, including incorporation of multi-storey car parks or basement car parking, then risk assessment and characterisation of ground gases to these structures will be required in order to establish the ground gas regime and requirements for gas protection measures*".

4.5.6.7 General requirements of the BIS Triangle remediation strategy in relation to ground gases

Where portions of the Middle Bickenhill Landfill and the Former Sand and Gravel Pit are to be retained under the MWCC assets, the remediation strategy obliges the construction of passive gas venting systems to allow gas to escape the atmosphere following construction of low permeability layers necessary to reduce leachate production. Such measures are required unless detailed ground gas risk assessment reveals that this is not necessary.

If the works involve the significant reuse of landfill materials across the scheme, further gas monitoring is likely to be required, post earthworks, to determine the requirements for the provision of further ground gas protection for buildings, and to minimise risks to off-site receptors.

4.5.7 Environmental Assessment Limits

Carbon monoxide and hydrogen sulphide concentrations have been compared against the long-term and short-term Environmental Assessment Limits (EAL), which are presented in Table 26.

Table 26: Environmental Assessment Limits

Ground Gas	EAL	
	Short-term Exposure Limit	Long-term Exposure Limit
Carbon Monoxide	10ppm	0.35ppm
Hydrogen Sulphide	0.15ppm	0.14ppm

Source: CIRIA C665[xxxiv]

Several installations recorded carbon monoxide and / or hydrogen sulphide exceeding one or both EALs for the respective gases.

Six installations recorded carbon monoxide concentrations which exceed the short-term and long-term exposure limits, these are ML156-CR018-1, ML157-CP014-1, ML157-CR009-Pipe 1, ML157-CR014-2, ML163-CR014-01, ND001-CR002-1 and ND001-CR017-1. The first two installations are recorded as flooded, with the latter unflooded. Most of these installations recorded concentrations up to 22.6ppm, except for ND001-CR002-1 (unflooded) which recorded a concentration of 359ppm. Forty-eight other installations recorded carbon monoxide concentrations which exceed the long-term exposure limit, with recorded concentrations up to 7ppm. Fourteen of the 48 installations are unflooded.

Twelve installations recorded hydrogen sulphide concentrations which exceed the short-term and long-term exposure limits, these are ML156-CP014-1, ML157-CR012-1, ML157-CR012-2, ML157-CR014-1, ML157-CR014-2, ML157-CR015-1, ML157-CR015-2, ML157-CR023-Pipe 1, ML157-WS069-Pipe 1, ML158-WS010-Pipe 1, ML163-CR021a-2 and ML164-CR046a-1. Hydrogen sulphide was recorded up to 3ppm in these installations. Four installations are unflooded, these are ML157-CR012-2, ML157-CR014-2, ML157-CR015-2 and ML158-WS010-Pipe 1.

4.5.8 Radon

The UK radon interactive map viewer indicates that the route of Sub-Lots 5 and 6 is within the lowest band of radon potential, which is a zone where less than 1% of homes are above the action level (200Bq/m^3).

Radon is not considered to require radon protection measures for the scheme within Sub-Lots 5 & 6.

4.5.9 New Building Structures and Assessed CS

A table which summarises the new buildings and their assessed CS are presented in Table 27. General ground gas protection measures are discussed after the table. Recommendations made should not be used for final design but used as a reference of understanding the current reported ground gas regime.

Table 27: New Buildings and their Assessed Gas CS

Structure	Chainage	Closest Borehole (Approx. Distance)	Characteristic Situation
Birmingham Interchange Station	156+450 156+900	-	To be assessed by the station design services contractor following completion of earthworks
Interchange ATS	157+750	-	To be assessed by the station design services contractor following completion of earthworks
Coleshill Manor Cutting Pumping Station	ML 161+900	-	CS-2
Gilson Road ATS	ML 163+130	ML162-CR025 (230m South)	CS-1
Water Orton Cutting/Marsh Lane Embankment Pumping Station	BS 164+330	BD164-CR003 (230m South-east)	CS-1

The Gilson Road ATS may have buildings and are assumed to be smaller Type C buildings with single occupancy and central building management control over maintenance. Based on gas data from the closest installation to the ATS, no gas protection measures are required.

There is no nearby gas monitoring data for the Coleshill Manor Cutting Pumping Station. There are no landfills recorded in the vicinity of this site, and no made ground recorded in the area. The only potential source of carbon dioxide and methane is considered to be thin river terrace deposits (0.3m thick) which may contain gas trapped in pockets and which does not appear to be affected by changes in groundwater levels. CS-2 is assumed for the pumping station based on CL:AIRE (2012).

Coleshill No.3 Embankment Pumping Station is assumed to be a Type C building, which can have small to large room sizes. Minimum gas protection scores for this building and an example of gas protection measures, as stated in BS8485, is summarised in Table 28.

Table 28: CS-2 Gas Protection measures

Structure	Building Type	Gas Protection Score required	Gas Protection Measures (Score)
Coleshill Manor Cutting Pumping Station	C	2.5	Cast in-situ monolithic reinforced ground bearing raft or reinforced cast in-situ suspended floor slab with minimal penetration. Reinforced to control cracking (1.5). AND Good performance passive sub floor dispersal layer (1.5).

An alternative to foundation protection is the provision of passive vents for the pumping station building using slats for instance.

The data indicates that no gas protection is required for Water Orton Cutting/Marsh Lane Embankment Pumping Station. However, this will be confirmed through further gas monitoring from more nearby standpipes.

For ground gas mitigation measures for buildings within the BIS Triangle, please refer to the BIS Triangle remediation strategy report[vi]. Remediation options from the remediation strategy report are summarised in Section 7.2.

4.6 Risks from Ground Gases to Construction and Maintenance Workers (SPR Linkages S2a & S2b – P7 – R4, R5)

The gas monitoring results from all monitoring standpipes have been compared against the occupational health exposure limits (OELs) published by the HSE[xxxv]. A summary of the OELs is presented in Table 29.

Table 29: Occupational Health Exposure Limits for Ground Gases

Ground Gas	Units	Occupational Exposure Limits		Maximum Recorded Concentration
		Short-term	Long-term	
Methane	%	N/A[1]	N/A[2]	32.2
Carbon dioxide	%	1.5	0.5	100[3]
Carbon monoxide	ppm	200	30	359
Hydrogen sulphide	ppm	10	5	3

Notes: [1] At concentrations >33% asphyxiation can occur due to displacement of oxygen.

[2] At concentrations >30% asphyxiation can occur due to displacement of oxygen.

[3] Peak reading of 100%v/v from ML156-CR025. Steady-state reading recorded 35.1%v/v.

Carbon dioxide concentrations were recorded above the short-term OEL in 51 installations and above the long-term OEL in 71 installations. ML156-CR025-Pipe 1 encountered the maximum peak value of 100% in Mercia Mudstone. The maximum steady-state reading was 35.1%.

Of the 51 locations where recorded carbon dioxide concentrations were above the short-term OEL, eight of the locations recorded concentrations above 10%. These are:

- ML156-CP008-1 which screened Made Ground and recorded 16% concentration. It is located within LQ site 24-23 (infilled sand and gravel quarry);
- ML156-CR025-Pipe 1 and ML156-CR046-Pipe 1 both screened the Mercia Mudstone Group and recorded 35.1% and 19.2% concentrations, respectively. These are located within car parks of the NEC;
- ML158-CP002-1 and ML158-CP007-1 are both located within LQ site 24-44 (Brackenlands Farm Landfill) and recorded 19.4% and 20.6% concentrations, respectively. The former screened the Made Ground and the latter screened the Glaciofluvial Deposits;

- ML161-CR022-1 which screened the River Terrace Deposits recorded 12% concentration. It is located north-east of LQ site 19-20 (Former Timber Yard);
- ML164-CR046a-1 screened the Made Ground and recorded 10.6% concentration. It is located within LQ site 19-25 (Coleshill Gas Works Landfill); and
- ND001-CR002-1 which screened the River Terrace Deposits recorded 12% concentration. It is located adjacent to LQ site 19-25.

The carbon monoxide concentration of 359ppm at ND001-CR002-1 exceeded the short-term and long-term OEL. As mentioned above, this location screened the River Terrace Deposits and is adjacent to LQ site 19-25 (Coleshill Gas Works Landfill). Although no other locations recorded concentrations above the long-term (thereby short-term) OEL, elevated concentrations were recorded at:

- ML156-CR018-1 which screened the Alluvium and recorded 22.6ppm concentration. It is located within an agricultural field in the BIS Triangle;
- ML157-CP014-1 which screened the Glaciofluvial Deposits and recorded 22.6ppm concentration. It is located within an agricultural field in the BIS Triangle;
- ML157-CR014-2 which screened the Mercia Mudstone Group and recorded 14ppm concentration. It is within a car park associated with Birmingham International Station;
- ML163-CR014-01 which screened the Glaciolacustrine Deposits and recorded 16ppm concentration. It is located within an agricultural field; and
- ND001-CR017-1 which screened the River Terrace Deposits and recorded 17ppm concentration. It is located within sport pitches adjacent to Lichfield Road.

One location, ML156-CR025-Pipe 1 recorded methane concentration of 32.2%. This is greater than the 30% long-term threshold where asphyxiation can occur due to displacement of oxygen. As mentioned previously, this location screened the Mercia Mudstone Group and is located within a car park of the NEC. No other locations recorded concentrations above the long-term (thereby short-term) asphyxiation threshold.

Recommendations

The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.

4.7 Risks from Flammable / Explosive Ground Gases to Property (SPR Linkages S1a – P4 – R6)

Methane and carbon monoxide are explosive in air between 5% – 15% and 12.5% – 74.2% respectively[xxxiii]. All recorded concentrations of carbon monoxide were well below the lower explosive limit (LEL). Concentrations of methane were recorded to be above the LEL at installations:

- ML156-CP008-1: Maximum concentration: 6.1%: This installation monitored Made Ground and is located within the LQ site 24-23 Infilled Sand and Gravel Quarry;
- ML156-CR025-Pipe 1: Maximum concentration: 32.2%: This installation monitored the Alluvium and the Mercia Mudstone Group. The standpipe is not located in a LQ site;
- ML156-CR046-Pipe 1: Maximum concentration: 16.6%: This installation monitored the Alluvium and the Mercia Mudstone Group. The standpipe is not located in a LQ site;

- ML162-CR024-1: Maximum concentration: 6.1%: This installation monitored the Alluvium and River Terrace Deposits. This installation is not located in a LQ site; and
- ML164-CR046a-1: Maximum concentration: 7.3%: This installation monitored Made Ground and Glacial Till, located within LQ site 19-17 Coleshill Gas Works historical landfill.

A hazard exists when a flammable ground gas accumulates in a confined space at concentrations above the LEL. Concentrations above the upper explosive limit (UEL) can still be hazardous as dilution with air can easily reduce the concentration to within the explosive range.

Recommendations

No HS2 enclosed buildings are proposed directly over these methane hotspots and it is unlikely that flammable / explosive ground gases at these installations will pose a risk to property.

4.8 Risks from Volatile Contaminants within Groundwater to On-Site and Off-site Receptors (SPR Linkages S3a & S3b – P2 – R1, R2, R3)

Risks from volatile contaminants in groundwater to on-site commercial, public open spaces and off-site commercial and residential receptors have been assessed using the GAC_{gwvap} values developed by the Society of Brownfield Risk Assessment (SoBRA). These thresholds represent the *"theoretical concentration in groundwater / perched water beneath a property that is modelled as resulting in an estimated daily exposure to the critical receptor that is equal to the Health Criteria Value".* The GAC_{gwvap} assume the following:

- The assumption that the impacted groundwater / perched water is directly beneath the building, when in fact it may be laterally offset from the receptor;
- The assumption that there is an infinite source term, when in fact the source may be finite;
- The assumption that there is no biodegradation between the source term and the receptor;
- The assumption that the groundwater source is at a depth of 0.65mbgl;
- The use of Sand soil type [as defined in SR3 (Environment Agency, 2009[xxxvi])] for both the saturated and unsaturated zone; and
- The omission of a capillary fringe between the saturated and unsaturated zones.

Table 30 presents concentrations of VOCs that exceed their GAC_{gwvap}.

Table 30: Volatile contaminants within groundwater

Hole ID	Depth (m bgl)	Determinant	Recorded value (µg/l)	Exceeds
ML164-CR009	22.7	Vinyl Chloride	3	Residential (0.62µg/l)
ML164-CR029	24.32	Vinyl Chloride	3	Residential (0.62µg/l)
ML164-CR046a	2.81	Vinyl Chloride	8	Residential (0.62µg/l)
		Trichloroethene	7	Residential (5.7µg/l)
		Naphthalene	804	Residential (220µg/l)

Exceedances were reported for three contaminants against the GAC_{gwvap} for residential receptors. ML164-CR009 is located at ch.164+320, ML164-CR029 at ch.164+130, and ML164-CR046a at ch.164+250, with the closest assets being the Watton House East and West Viaduct, Watton House Embankment, and Chattle Hill Box Structure. All holes are located within and in the close vicinity of the former Coleshill gasworks landfill (ES LQ 19-17), a sewage works (ES LQ 19-36) and a railway (ES LQ 19-24). The area is in an area of modern industrial units and there will not be residential receptors in the vicinity, therefore it is considered unlikely to pose a significant risk to receptors.

4.9 Risks from Soils to Controlled Water Receptors (SPR Linkages S1a – P5a. P5b – R7, R8) and Coleshill and Bannerly Pools SSSI (R9)

4.9.1 Hydrogeological setting

Groundwater monitoring within Sub-Lot 5 and Sub-Lot 6 has been undertaken intermittently between February 2016 and June 2019 from 236 monitoring installations. Of these monitoring points, eight were screened in the Made Ground, three in Alluvium, six in Till, ten in the River Terrace Deposits, one in Glaciolacustrine deposits, 32 in the Glaciofluvial deposits, and 118 in the Mercia Mudstone Group. The remaining 57 points were screened across various combinations of the geological strata above.

Groundwater levels over the entirety of the data set range from 0.03m – 18.67m bgl or 46.87m – 102.71m AOD.

Using this data, a general flow regime was generated using GIS interpolation. In summary, a groundwater divide with a high of 102.7m AOD is encountered at ch.158+200. Flow to the south reaches a low of 80.5m AOD at ch.156+500 at Hollywell Brook, before rising again to 98.4m AOD at ch.155+700 and then falling to 81.4m AOD at ch.154+500, this low is associated with the River Blythe with groundwater presumably flowing towards it.

Flow north of the flow divide reaches a low of 74.1m AOD at ch.162+350 associated with the River Cole. Groundwater rises slightly to the west reaching 85.6m AOD at BD ch.164+500. Between ch.162+500 and 163+800 a single borehole reported a high of 86.6m AOD. Between ch.163+800 and 164+400 groundwater levels decrease from 75.8m AOD to 70.9m AOD to the River Tame. Monitoring points north of the River Tame report an increase in groundwater to a high of 77.8m AOD at ch.165+500.

It must be noted that because of the linear nature of the GI a north-west bias is created when analysing flow directions, it is assumed that north of the flow divide groundwater flows north-east towards the confluence of the River Cole and River Blythe. South of the flow divide it is assumed that water flows to the south east towards the River Blythe.

It is assumed where present that there is continuity between groundwater in the Made Ground, Alluvium, Glaciofluvial deposits and Mercia Mudstone Group. There will be a limited unsaturated zone in the vicinity of the surface water features. It must be noted that there are lower and higher permeability horizons through the Mercia Mudstone resulting in variable permeability through the Group and potentially perched water horizons.

4.9.2 Data Acquired and Methodology

Soil leachate samples were acquired from the following geological formations:

- Topsoil (15);
- Made Ground (165);
- Alluvium (9);
- River Terrace Deposits (24);
- Mid Pleistocene Glaciofluvial Deposits (4);
- Devensian Glaciofluvial Deposits (22);
- Glaciofluvial Sand and Gravel (1);
- Glaciolacustrine Deposits (5);
- Head (3);
- Mid Pleistocene Till (9);

- "*Superficial Deposits – Cohesive*" (4); and
- Mercia Mudstone Group (9).

Leachate samples which only tested for sulphate (in units of g/l) were not included in this assessment.

The leachate samples were tested for metals and other inorganic contaminants. No organic determinants were tested for in the soil leachate samples. Risks from inorganic contaminants leached from soils to controlled water receptors (groundwater and surface water) are discussed herein, and risks from organic contaminants leached from soils to controlled water receptors are discussed in Section 4.9.4.

Risks from contaminants leached from soils to controlled water receptors (groundwater and surface water) have been assessed following the procedures set out in current authoritative guidance, notably CLR11, CIRIA C552, and the EA's approach to groundwater protection (2018)[xxxvii] and Remedial Targets Methodology. For the potentially active contaminant linkages, defined in the screening stage of this report, a GQRA has been undertaken based on the soil leachate data provided by the laboratory analysis from the GIs. In-addition, a semi-quantitative assessment of potential risks from organic soil contaminants to controlled waters has been undertaken.

Risks from soils (S1a) to on-site controlled water receptors (R7, R8) comprise contaminants, whose concentrations exceed the relevant generic assessment criteria, dissolved in water which has been leached from contaminated soils. Laboratory soil leachate data has been compared with Drinking Water Standards (DWS) to protect groundwater (Principal and Secondary aquifers) and Environmental Quality Standards (EQS) for freshwater, to protect surface waters. This risk assessment does not model biodegradation, dispersion and attenuation between the source and groundwater, and between the source and down-gradient receptors. These processes are considered qualitatively in the interpretation but will require DQRA in certain instances in order to clarify risks for the purposes of remedial design.

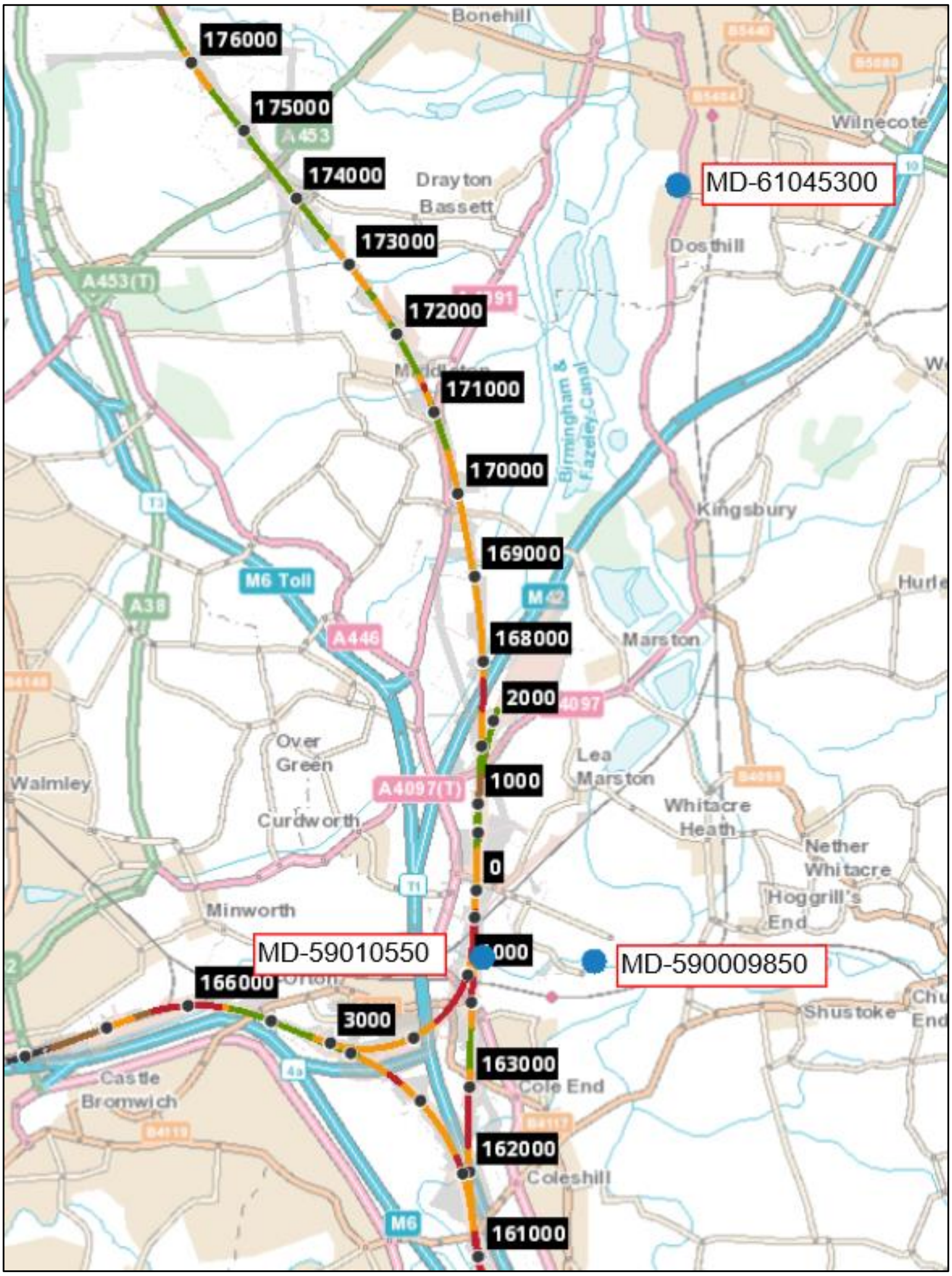
The rivers and lakes metal bioavailability tool (M-BAT)[xxxviii] has been used for determining site specific $EQS_{bioavailable}$ for copper, zinc, manganese, lead and nickel. This uses pH, calcium, and dissolved organic carbon (DOC) concentrations at a downstream surface water monitoring point to determine site specific $EQS_{bioavailable.}$ Data was accessed from the Environment Agency's water quality data archive[xxxix], specifically points MD-590009850, MD-59010550 and MD-61045300 (see Figure 21). Calcium concentrations from these monitoring points have been used to calculate a water hardness, which has been used to define EQS values for cadmium. The following equation has been used to calculate water hardness:

$$Water\ hardness\ \left(\frac{mg}{l}Ca\ CO_3\right) = Ca\ concentration\ \left(\frac{mg}{l}\right) \times 2.5$$

The updated $EQS_{bioavailable}$ values and cadmium EQS are:

- Copper: 0.03mg/l;
- Zinc: 0.03mg/l;
- Manganese: 0.41mg/l;
- Nickel: 0.02mg/l;
- Lead: 0.008575mg/l; and
- Cadmium: 0.00015mg/l.

Figure 21: Surface Water Monitoring Points Used in M-BAT Tool



4.9.3 Sub-Lots 5 & 6 Leachate Exceedances

The following exceedances were identified along the route (shown in Table 31) These are shown graphically in Figure 22 to Figure 25. The full contamination soil leachate data in provided in Appendix D.

Leachate samples were tested on a 2:1 liquid:solid ratio. The following boreholes (ML155-CR403, ML155-CR404, ML156-CR401, ML157-CR021, ML162-CR402, ML162-CR403, ML162-CR404, ML164-CR404, NC120-CR401) were tested on a 10:1 liquid:solid ratio. These leachate results may provide an underestimation of the concentration of the determinant. Exceedances of water quality standards for the 10:1 leachate tests are shown below, and are discussed with regards to the asset in Section 4.10.6. These 10:1 leachate samples were also tested for organic determinants. Concentration values from organic determinants have not been considered in the asset concentration discussion, but any organic exceedances against the relevant water quality standards are shown below for fullness of reporting. Risks from organic soil determinants to controlled waters are discussed in Section 4.9.4.

Table 31: Soil Leachate Exceedances of the DWS and EQS (BIS Triangle Assets Excluded)

Asset	Borehole	Depth (m bgl)	Stratum	Determinant	UK DWS	EQS	Units	Result
Diddington Cutting	ML155-TP025	-	Topsoil	Copper	2	0.03	mg/l	0.035
		0.3	Mid Pleistocene Till	Chromium	0.05	0.005	mg/l	0.006
				Copper	2	0.03	mg/l	0.033
				Mercury	0.001	0.00007	mg/l	0.00009
	ML155-WS044	-	Topsoil	Mercury	0.001	0.00007	mg/l	0.00008
Packington Embankment	ML158-CP002	1.05	Made Ground	Arsenic	0.01	0.05	mg/l	0.0155
				Cadmium	0.005	0.00015	mg/l	0.00117
				Copper	2	0.03	mg/l	0.0352
				Nickel	0.02	0.02	mg/l	0.103
				Zinc	5	0.03	mg/l	0.233
		3.05	Made Ground	Arsenic	0.01	0.05	mg/l	0.0661
				Cadmium	0.005	0.00015	mg/l	0.000811
				Chromium	0.05	0.005	mg/l	0.00739
				Copper	2	0.03	mg/l	0.112
				Nickel	0.02	0.02	mg/l	0.121
				Zinc	5	0.03	mg/l	0.242
		3.65	Devensian Glaciofluvial Deposits	Arsenic	0.01	0.05	mg/l	0.0174
				Cadmium	0.005	0.00015	mg/l	0.0003
				Copper	2	0.03	mg/l	0.038
				Nickel	0.02	0.02	mg/l	0.0372
				Zinc	5	0.03	mg/l	0.0391
	ML158-CP005	1	Made Ground	Arsenic	0.01	0.05	mg/l	0.0151
				Cadmium	0.005	0.00015	mg/l	0.000196
				Copper	2	0.03	mg/l	0.0315
				Nickel	0.02	0.02	mg/l	0.0235
M42 Motorway Box Structure	ML158-CP007	3.05	Made Ground	Arsenic	0.01	0.05	mg/l	0.0179
				Cyanide (total)	0.05	0.001	mg/l	0.051
Pool Wood Embankment	ML158-WS016	3	Made Ground	Arsenic	0.01	0.05	mg/l	0.0264
				Boron	1	2	mg/l	2.92
				Cadmium	0.005	0.00015	mg/l	0.000218
				Vanadium	-	0.02	mg/l	0.0849
	ML159-CP003	0.05	Made Ground	Copper	2	0.03	mg/l	0.032
				Chromium - Hexavalent	-	0.0034	mg/l	0.00482
		1.05	Made Ground	Cadmium	0.005	0.00015	mg/l	0.000161
				Nickel	0.02	0.02	mg/l	0.166
	ML159-CP018	-	Topsoil	Cadmium	0.005	0.00015	mg/l	0.000431
				Chromium	0.05	0.005	mg/l	0.0169
				Copper	2	0.03	mg/l	0.134
				Nickel	0.02	0.02	mg/l	0.02
M6 Motorway Box Structure	ML159-CR018	1.6	Made Ground	Chromium	0.05	0.005	mg/l	0.009
				Vanadium	-	0.02	mg/l	0.095
				Chromium - Hexavalent	-	0.0034	mg/l	0.004

Asset	Borehole	Depth (m bgl)	Stratum	Determinant	UK DWS	EQS	Units	Result
		3.6	Made Ground	Lead	0.01	0.008575	mg/l	0.012
				Zinc	5	0.03	mg/l	0.039
	ML159-TP015	0.15	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0013
				Copper	2	0.03	mg/l	0.044
				Lead	0.01	0.008575	mg/l	0.116
				Vanadium	-	0.02	mg/l	0.03
				Zinc	5	0.03	mg/l	0.283
		0.45	Devensian Glaciofluvial Deposits	Lead	0.01	0.008575	mg/l	0.012
				Zinc	5	0.03	mg/l	0.054
				Chromium - Hexavalent	-	0.0034	mg/l	0.053
	ML159-WS002	0.5	Made Ground	Zinc	5	0.03	mg/l	0.061
	ML159-WS002a	1.1	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0009
				Zinc	5	0.03	mg/l	0.056
M6 Motorway South Viaduct	ML159-CR008a	1.2	Made Ground	Zinc	5	0.03	mg/l	0.055
				Chromium - Hexavalent	-	0.0034	mg/l	0.004
	ML160-CP041	0.2	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0017
				Copper	2	0.03	mg/l	0.034
				Lead	0.01	0.008575	mg/l	0.035
				Zinc	5	0.03	mg/l	0.27
		0.6	Head	Cadmium	0.005	0.00015	mg/l	0.0007
				Copper	2	0.03	mg/l	0.035
				Lead	0.01	0.008575	mg/l	0.023
				Zinc	5	0.03	mg/l	0.13
				Chromium - Hexavalent	-	0.0034	mg/l	0.005
	ML160-CR030	1.5	Made Ground	Zinc	5	0.03	mg/l	0.038
	ML160-CR035	0.75	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2
				Lead	0.01	0.008575	mg/l	0.031
				Zinc	5	0.03	mg/l	0.107
				Chromium - Hexavalent	-	0.0034	mg/l	0.067
		1.1	Head	Cadmium	0.005	0.00015	mg/l	0.0006
				Chromium	0.05	0.005	mg/l	0.005
				Copper	2	0.03	mg/l	0.031
				Lead	0.01	0.008575	mg/l	0.04
				Mercury	0.001	0.00007	mg/l	0.0001
				Zinc	5	0.03	mg/l	0.175
				Chromium - Hexavalent	-	0.0034	mg/l	0.106
	ML160-WS003	1	Made Ground	Zinc	5	0.03	mg/l	0.035
Coleshill West Viaduct	BD161-CR008	0.5	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0003
				Zinc	5	0.03	mg/l	0.091
		2	Made Ground	Zinc	5	0.03	mg/l	0.039
	ML161-WS002	0.5	Made Ground	Copper	2	0.03	mg/l	0.035
				Zinc	5	0.03	mg/l	0.141
				Chromium - Hexavalent	-	0.0034	mg/l	0.004

Asset	Borehole	Depth (m bgl)	Stratum	Determinant	UK DWS	EQS	Units	Result
Coleshill No. 3 Embankment	BD161-CR010	0.5	Made Ground	Lead	0.01	0.008575	mg/l	0.009
				Zinc	5	0.03	mg/l	0.044
	BD161-TP002	0.15	Made Ground	Mercury	0.001	0.00007	mg/l	0.0001
				Vanadium	-	0.02	mg/l	0.09
				Zinc	5	0.03	mg/l	0.055
				Cyanide (total)	0.05	0.001	mg/l	0.02
	BD161-TP008	0.15	Made Ground	Lead	0.01	0.008575	mg/l	0.034
				Zinc	5	0.03	mg/l	0.182
				Chromium - Hexavalent	-	0.0034	mg/l	0.007
	BD161-TP035	0.1	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0008
				Copper	2	0.03	mg/l	0.039
				Lead	0.01	0.008575	mg/l	0.067
				Zinc	5	0.03	mg/l	0.176
				Cyanide (total)	0.05	0.001	mg/l	0.02
	BD161-WS003	0.2	Made Ground	Arsenic	0.01	0.05	mg/l	0.01
				Copper	2	0.03	mg/l	0.034
				Mercury	0.001	0.00007	mg/l	0.0001
				Vanadium	-	0.02	mg/l	0.022
				Zinc	5	0.03	mg/l	0.056
		1.1	Made Ground	Arsenic	0.01	0.05	mg/l	0.019
				Cadmium	0.005	0.00015	mg/l	0.0003
				Chromium	0.05	0.005	mg/l	0.006
				Copper	2	0.03	mg/l	0.087
				Lead	0.01	0.008575	mg/l	0.064
				Mercury	0.001	0.00007	mg/l	0.0014
				Vanadium	-	0.02	mg/l	0.044
				Zinc	5	0.03	mg/l	0.254
	BD162-TP003	0.65	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0003
				Lead	0.01	0.008575	mg/l	0.026
				Zinc	5	0.03	mg/l	0.091
	ML161-CP032	0.9	Made Ground	Zinc	5	0.03	mg/l	0.04
	ML161-CR009	0.2	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0004
				Copper	2	0.03	mg/l	0.032
				Zinc	5	0.03	mg/l	0.168
		0.5	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0003
				Zinc	5	0.03	mg/l	0.122
	ML161-CR021	0.5	Made Ground	Arsenic	0.01	0.05	mg/l	0.012
				Cadmium	0.005	0.00015	mg/l	0.2
				Lead	0.01	0.008575	mg/l	0.056
				Vanadium	-	0.02	mg/l	0.02
				Zinc	5	0.03	mg/l	0.105
M42 Coleshill Box Structure	ML162-CR004	0.6	Head	Zinc	5	0.03	mg/l	0.14
	ML162-CR402	3	Made Ground	Arsenic	0.01	0.05	mg/l	0.014

Asset	Borehole	Depth (m bgl)	Stratum	Determinant	UK DWS	EQS	Units	Result
	ML162-CR403	0.3	Mid Pleistocene Glaciofluvial Deposits	Ammoniacal Nitrogen as N	0.38	0.2	mg/l	2
		1	Mid Pleistocene Glaciofluvial Deposits	Ammoniacal Nitrogen as N	0.38	0.2	mg/l	2
M42 Coleshill North Viaduct	ML162-CR024	0.05	Topsoil	Cadmium	0.005	0.00015	mg/l	0.00017
				Zinc	5	0.03	mg/l	0.045
Lichfield Road Embankment	ML163-CP035	1	Alluvium	Lead	0.01	0.008575	mg/l	0.019
				Zinc	5	0.03	mg/l	0.102
	ML163-CP038	0.5	River Terrace Deposits 1	Zinc	5	0.03	mg/l	0.067
	ML163-CR008	0.05	Made Ground	Zinc	5	0.03	mg/l	0.072
		0.6	Made Ground	Zinc	5	0.03	mg/l	0.056
		1.2	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2
				Lead	0.01	0.008575	mg/l	0.025
				Zinc	5	0.03	mg/l	0.069
		1.5	River Terrace Deposits 1	Lead	0.01	0.008575	mg/l	0.015
				Zinc	5	0.03	mg/l	0.088
	ML163-CR010	0.4	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2
				Zinc	5	0.03	mg/l	0.061
		2	River Terrace Deposits 1	Zinc	5	0.03	mg/l	0.05
	ML163-CR016	0.5	Made Ground	Mercury	0.001	0.00007	mg/l	0.0003
				Zinc	5	0.03	mg/l	0.108
		1	River Terrace Deposits 1	Zinc	5	0.03	mg/l	0.128
	ML163-CR020	0.5	Made Ground	Chromium	0.05	0.005	mg/l	0.012
				Copper	2	0.03	mg/l	0.083
				Vanadium	-	0.02	mg/l	0.062
				Cyanide (total)	0.05	0.001	mg/l	0.07
		0.9	River Terrace Deposits 1	Arsenic	0.01	0.05	mg/l	0.024
				Chromium	0.05	0.005	mg/l	0.008
				Vanadium	-	0.02	mg/l	0.42
	ML163-CR021a	0.4	Made Ground	Arsenic	0.01	0.05	mg/l	0.01
				Lead	0.01	0.008575	mg/l	0.014
		0.9	Made Ground	Lead	0.01	0.008575	mg/l	0.01
				Mercury	0.001	0.00007	mg/l	0.0001
				Zinc	5	0.03	mg/l	0.095
		1.5	Alluvium	Zinc	5	0.03	mg/l	0.059
				Chromium - Hexavalent	-	0.0034	mg/l	0.009
	ML163-TP020	1	Glaciolacustrine Deposits	Cadmium	0.005	0.00015	mg/l	0.0004
				Chromium	0.05	0.005	mg/l	0.005
				Lead	0.01	0.008575	mg/l	0.053
				Zinc	5	0.03	mg/l	0.378
				Chromium - Hexavalent	-	0.0034	mg/l	0.143
	ML163-TP021	0.05	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0005
				Copper	2	0.03	mg/l	0.081
				Lead	0.01	0.008575	mg/l	0.095
				Mercury	0.001	0.00007	mg/l	0.0001

Asset	Borehole	Depth (m bgl)	Stratum	Determinant	UK DWS	EQS	Units	Result
				Zinc	5	0.03	mg/l	0.35
		0.5	River Terrace Deposits 1	Cadmium	0.005	0.00015	mg/l	0.0003
				Chromium	0.05	0.005	mg/l	0.005
				Lead	0.01	0.008575	mg/l	0.136
				Zinc	5	0.03	mg/l	0.234
Chattle Hill Box Structure	ML164-CP021	0.5	Made Ground	Arsenic	0.01	0.05	mg/l	0.027
				Chromium	0.05	0.005	mg/l	0.013
				Copper	2	0.03	mg/l	0.342
				Nickel	0.02	0.02	mg/l	0.037
				Vanadium	-	0.02	mg/l	0.088
		3	Made Ground	Zinc	5	0.03	mg/l	0.073
				Chromium - Hexavalent	-	0.0034	mg/l	0.004
	ML164-CP023	0.05	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0003
				Copper	2	0.03	mg/l	0.069
				Lead	0.01	0.008575	mg/l	0.056
				Mercury	0.001	0.00007	mg/l	0.0001
				Zinc	5	0.03	mg/l	0.228
		1.5	River Terrace Deposits 1	Zinc	5	0.03	mg/l	0.04
	ML164-CR029	0.35	Made Ground	Chromium	0.05	0.005	mg/l	0.04
				Copper	2	0.03	mg/l	0.067
				Vanadium	-	0.02	mg/l	0.024
				Chromium - Hexavalent	-	0.0034	mg/l	0.022
		4	Mid Pleistocene Till	Arsenic	0.01	0.05	mg/l	0.019
	ML164-CR030	0.9	River Terrace Deposits	Cadmium	0.005	0.00015	mg/l	0.2
				Lead	0.01	0.008575	mg/l	0.01
				Zinc	5	0.03	mg/l	0.063
				Chromium - Hexavalent	-	0.0034	mg/l	0.018
	ML164-CR032	0.5	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2
				Copper	2	0.03	mg/l	0.033
				Lead	0.01	0.008575	mg/l	0.017
				Zinc	5	0.03	mg/l	0.067
	ML164-TP015	0.05	Made Ground	Lead	0.01	0.008575	mg/l	0.012
				Zinc	5	0.03	mg/l	0.079
		0.35	River Terrace Deposits 1	Cadmium	0.005	0.00015	mg/l	0.2
				Copper	2	0.03	mg/l	0.034
				Lead	0.01	0.008575	mg/l	0.042
				Mercury	0.001	0.00007	mg/l	0.0001
				Zinc	5	0.03	mg/l	0.1
				Chromium - Hexavalent	-	0.0034	mg/l	0.006
		1.1	Glaciolacustrine Deposits	Cadmium	0.005	0.00015	mg/l	0.0003
				Copper	2	0.03	mg/l	0.034
				Lead	0.01	0.008575	mg/l	0.025
				Vanadium	-	0.02	mg/l	0.026

Asset	Borehole	Depth (m bgl)	Stratum	Determinant	UK DWS	EQS	Units	Result
				Zinc	5	0.03	mg/l	0.099
				Cyanide	0.05	0.001	mg/l	0.03
		1.7	Glaciolacustrine Deposits	Cadmium	0.005	0.00015	mg/l	0.2
				Lead	0.01	0.008575	mg/l	0.026
				Zinc	5	0.03	mg/l	0.118
	ND001-CP049	0.4	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2
				Copper	2	0.03	mg/l	0.085
				Zinc	5	0.03	mg/l	0.156
		0.6	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0007
				Copper	2	0.03	mg/l	0.065
				Lead	0.01	0.008575	mg/l	0.014
				Mercury	0.001	0.00007	mg/l	0.0001
				Vanadium	-	0.02	mg/l	0.029
				Zinc	5	0.03	mg/l	0.062
Watton House West Viaduct	ML164-CP003	0.9	Made Ground	Arsenic	0.01	0.05	mg/l	0.023
				Chromium	0.05	0.005	mg/l	0.008
				Vanadium	-	0.02	mg/l	0.187
				Chromium - Hexavalent	-	0.0034	mg/l	0.005
		2	Made Ground	Chromium	0.05	0.005	mg/l	0.006
				Copper	2	0.03	mg/l	0.041
				Vanadium	-	0.02	mg/l	0.225
		3.5	Mid Pleistocene Till	Arsenic	0.01	0.05	mg/l	0.01
	ML164-CP004	1	Made Ground	Arsenic	0.01	0.05	mg/l	0.012
				Chromium	0.05	0.005	mg/l	0.025
				Copper	2	0.03	mg/l	0.076
				Selenium	0.01	-	mg/l	0.01
				Vanadium	-	0.02	mg/l	0.307
				Chromium - Hexavalent	-	0.0034	mg/l	0.023
				Ammoniacal Nitrogen as N	0.38	0.2	mg/l	1.3
		3	Made Ground	Chromium	0.05	0.005	mg/l	0.012
				Copper	2	0.03	mg/l	0.075
				Vanadium	-	0.02	mg/l	0.291
		4	Made Ground	Vanadium	-	0.02	mg/l	0.212
	ML164-CR009	0.05	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0003
				Copper	2	0.03	mg/l	0.15
				Lead	0.01	0.008575	mg/l	0.015
				Mercury	0.001	0.00007	mg/l	0.1
				Zinc	5	0.03	mg/l	0.074
				Chromium - Hexavalent	-	0.0034	mg/l	0.004
		0.4	Made Ground	Zinc	5	0.03	mg/l	0.032
		1.5	Made Ground	Zinc	5	0.03	mg/l	0.033
	ML164-CR011	0.3	Made Ground	Zinc	5	0.03	mg/l	0.062
		0.75	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2

Asset	Borehole	Depth (m bgl)	Stratum	Determinant	UK DWS	EQS	Units	Result
				Copper	2	0.03	mg/l	0.032
				Lead	0.01	0.008575	mg/l	0.017
				Mercury	0.001	0.00007	mg/l	0.0002
				Zinc	5	0.03	mg/l	0.062
		1.1	River Terrace Deposits 1	Mercury	0.001	0.00007	mg/l	0.0001
				Chromium - Hexavalent	-	0.0034	mg/l	0.004
	ML164-CR046a	0.8	Made Ground	Chromium	0.05	0.005	mg/l	0.009
				Vanadium	-	0.02	mg/l	0.034
		1.2	Made Ground	Vanadium	-	0.02	mg/l	0.022
		2.3	Made Ground	Chromium	0.05	0.005	mg/l	0.007
				Lead	0.01	0.008575	mg/l	0.019
				Nickel	0.02	0.02	mg/l	0.038
				Zinc	5	0.03	mg/l	0.034
	ML164-TP011	0.7	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0003
		2.5	River Terrace Deposits 1	Cadmium	0.005	0.00015	mg/l	0.2
				Zinc	5	0.03	mg/l	0.04
Watton House Embankment	ML164-CR404	7.2	Made Ground	Benzo(a)pyrene	0.0001	0.00000017	mg/l	0.00003
	ML164-CP010	0.5	Made Ground	Mercury	0.001	0.00007	mg/l	0.0001
				Zinc	5	0.03	mg/l	0.041
		1	Made Ground	Cyanide	0.05	0.001	mg/l	0.03
	ML164-CP036	3	Made Ground	Zinc	5	0.03	mg/l	0.035
				Chromium - Hexavalent	-	0.0034	mg/l	0.005
		5	Alluvium	Zinc	5	0.03	mg/l	0.059
	ML164-CR013	0.2	Made Ground	Arsenic	0.01	0.05	mg/l	0.02
				Cadmium	0.005	0.00015	mg/l	0.2
				Chromium	0.05	0.005	mg/l	0.044
				Copper	2	0.03	mg/l	0.105
				Mercury	0.001	0.00007	mg/l	0.0001
				Selenium	0.01	-	mg/l	0.01
				Chromium - Hexavalent	-	0.0034	mg/l	0.04
				Cyanide	0.05	0.001	mg/l	0.35
		1	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2
				Zinc	5	0.03	mg/l	0.135
		4	Alluvium	Arsenic	0.01	0.05	mg/l	0.045
				Cadmium	0.005	0.00015	mg/l	0.0037
				Chromium	0.05	0.005	mg/l	0.014
				Copper	2	0.03	mg/l	0.219
				Lead	0.01	0.008575	mg/l	0.231
				Vanadium	-	0.02	mg/l	0.038
				Zinc	5	0.03	mg/l	0.721
	ML164-CR044	2	Made Ground	Arsenic	0.01	0.05	mg/l	0.027
				Chromium	0.05	0.005	mg/l	0.008
				Mercury	0.001	0.00007	mg/l	0.0003

Asset	Borehole	Depth (m bgl)	Stratum	Determinant	UK DWS	EQS	Units	Result
				Chromium - Hexavalent	-	0.0034	mg/l	0.005
				Cyanide (total)	0.05	0.001	mg/l	0.05
	ML164-CR045	0.8	Made Ground	Arsenic	0.01	0.05	mg/l	0.011
				Chromium	0.05	0.005	mg/l	0.007
				Zinc	5	0.03	mg/l	0.039
				Chromium - Hexavalent	-	0.0034	mg/l	0.006
		1.2	Made Ground	Arsenic	0.01	0.05	mg/l	0.01
				Vanadium	-	0.02	mg/l	0.038
		3	River Terrace Deposits 1	Lead	0.01	0.008575	mg/l	0.031
				Zinc	5	0.03	mg/l	0.098
Water Orton Viaducts	NC120-CR401	0.3	River Terrace Deposits 2	Ammoniacal Nitrogen as N	0.38	0.2	mg/l	3.1
		1	River Terrace Deposits 2	Ammoniacal Nitrogen as N	0.38	0.2	mg/l	2.7
	ND000-CR001	0.5	Made Ground	Zinc	5	0.03	mg/l	0.071
		2	Made Ground	Mercury	0.001	0.00007	mg/l	0.000073
				Zinc	5	0.03	mg/l	0.039
				Chromium - Hexavalent	-	0.0034	mg/l	0.005
	ND000-CR020	0.4	Made Ground	Copper	2	0.03	mg/l	0.03
				Mercury	0.001	0.00007	mg/l	0.0001
				Zinc	5	0.03	mg/l	0.051
		1	Made Ground	Arsenic	0.01	0.05	mg/l	0.035
				Copper	2	0.03	mg/l	0.3
				Mercury	0.001	0.00007	mg/l	0.0001
				Selenium	0.01	-	mg/l	0.01
				Vanadium	-	0.02	mg/l	0.025
		5	Made Ground	Zinc	5	0.03	mg/l	0.069
	ND000-TP035	0.4	Made Ground	Copper	2	0.03	mg/l	0.032
				Mercury	0.001	0.00007	mg/l	0.000078
				Zinc	5	0.03	mg/l	0.051
				Chromium - Hexavalent	-	0.0034	mg/l	0.005
				Cyanide (total)	0.05	0.001	mg/l	0.03
		0.8	River Terrace Deposits 1	Cadmium	0.005	0.00015	mg/l	0.0005
				Copper	2	0.03	mg/l	0.073
				Mercury	0.001	0.00007	mg/l	0.000091
				Zinc	5	0.03	mg/l	0.121
				Cyanide (total)	0.05	0.001	mg/l	0.02
	ND001-CP002	0.5	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2
				Copper	2	0.03	mg/l	0.036
				Lead	0.01	0.008575	mg/l	0.027
				Mercury	0.001	0.00007	mg/l	0.0003
				Zinc	5	0.03	mg/l	0.057
		1	Alluvium	Lead	0.01	0.008575	mg/l	0.009
				Vanadium	-	0.02	mg/l	0.028
				Zinc	5	0.03	mg/l	0.03

Asset	Borehole	Depth (m bgl)	Stratum	Determinant	UK DWS	EQS	Units	Result
	ND001-CP043	0.5	River Terrace Deposits 1	Chromium	0.05	0.005	mg/l	0.078
				Copper	2	0.03	mg/l	0.044
				Lead	0.01	0.008575	mg/l	0.265
				Chromium - Hexavalent	-	0.0034	mg/l	0.078
		2	River Terrace Deposits 1	Arsenic	0.01	0.05	mg/l	0.016
				Chromium	0.05	0.005	mg/l	0.018
				Vanadium	-	0.02	mg/l	0.04
				Chromium - Hexavalent	-	0.0034	mg/l	0.019
	ND001-CR001	0.5	Made Ground	Lead	0.01	0.008575	mg/l	0.013
				Mercury	0.001	0.00007	mg/l	0.00008
	ND001-CR002	0.5	Made Ground	Arsenic	0.01	0.05	mg/l	0.013
				Copper	2	0.03	mg/l	0.039
		1.5	River Terrace Deposits 1	Lead	0.01	0.008575	mg/l	0.056
				Zinc	5	0.03	mg/l	0.059
	ND001-CR011	0.05	Topsoil	Zinc	5	0.03	mg/l	0.129
		1.2	River Terrace Deposits 1	Lead	0.01	0.008575	mg/l	0.128
				Zinc	5	0.03	mg/l	0.047
	ND001-CR013	0.5	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0009
				Copper	2	0.03	mg/l	0.1
				Lead	0.01	0.008575	mg/l	0.069
				Zinc	5	0.03	mg/l	0.445
	ND001-CR014	0.05	Made Ground	Vanadium	-	0.02	mg/l	0.032
				Chromium - Hexavalent	-	0.0034	mg/l	0.004
		1.1	Made Ground	Zinc	5	0.03	mg/l	0.047
		1.7	River Terrace Deposits 1	Zinc	5	0.03	mg/l	0.031
	ND001-CR017	0.7	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2
				Copper	2	0.03	mg/l	0.03
				Lead	0.01	0.008575	mg/l	0.019
				Zinc	5	0.03	mg/l	0.121
		1.2	River Terrace Deposits 1	Cadmium	0.005	0.00015	mg/l	0.0003
				Copper	2	0.03	mg/l	0.037
				Lead	0.01	0.008575	mg/l	0.063
				Zinc	5	0.03	mg/l	0.199
				Chromium - Hexavalent	-	0.0034	mg/l	0.186
	ND001-CR022	0.1	Made Ground	Arsenic	0.01	0.05	mg/l	0.012
				Cadmium	0.005	0.00015	mg/l	0.0004
				Chromium	0.05	0.005	mg/l	0.006
				Copper	2	0.03	mg/l	0.11
				Lead	0.01	0.008575	mg/l	0.068
				Zinc	5	0.03	mg/l	0.146
	ND001-CR031	0.05	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0007
				Lead	0.01	0.008575	mg/l	0.013
				Zinc	5	0.03	mg/l	0.097

Asset	Borehole	Depth (m bgl)	Stratum	Determinant	UK DWS	EQS	Units	Result
	ND001-CR040	1.4	River Terrace Deposits 1	Zinc	5	0.03	mg/l	0.043
	ND001-CR041	0.2	Made Ground	Zinc	5	0.03	mg/l	0.051
	ND001-CR042	0.5	Made Ground	Chromium	0.05	0.005	mg/l	0.107
				Copper	2	0.03	mg/l	0.047
				Mercury	0.001	0.00007	mg/l	0.2
				Chromium - Hexavalent	-	0.0034	mg/l	0.106
	ND001-CR043	1	River Terrace Deposits 1	Arsenic	0.01	0.05	mg/l	0.011
				Chromium	0.05	0.005	mg/l	0.014
				Lead	0.01	0.008575	mg/l	0.029
				Vanadium	-	0.02	mg/l	0.046
				Chromium - Hexavalent	-	0.0034	mg/l	0.013
	ND001-TP002	0.05	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0007
				Copper	2	0.03	mg/l	0.101
				Lead	0.01	0.008575	mg/l	0.043
				Zinc	5	0.03	mg/l	0.377
		0.3	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2
				Lead	0.01	0.008575	mg/l	0.038
				Zinc	5	0.03	mg/l	0.104
				Chromium - Hexavalent	-	0.0034	mg/l	0.005
	ND001-WS002	0.1	Made Ground	Zinc	5	0.03	mg/l	0.073
	ND001-WS003	0.1	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0008
				Copper	2	0.03	mg/l	0.033
				Lead	0.01	0.008575	mg/l	0.013
				Zinc	5	0.03	mg/l	0.202
		1.1	River Terrace Deposits 1	Zinc	5	0.03	mg/l	0.067
Marsh Lane Embankment	ND002-CP019	1.5	Made Ground	Boron	1	2	mg/l	1.07
				Zinc	5	0.03	mg/l	0.101
	ND002-CR013	0.2	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2
				Copper	2	0.03	mg/l	0.042
				Lead	0.01	0.008575	mg/l	0.011
				Zinc	5	0.03	mg/l	0.129
	ND003-CR004	0.6	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0003
				Chromium	0.05	0.005	mg/l	0.01
				Copper	2	0.03	mg/l	0.034
				Lead	0.01	0.008575	mg/l	0.045
				Mercury	0.001	0.00007	mg/l	0.0002
				Vanadium	-	0.02	mg/l	0.03
				Zinc	5	0.03	mg/l	0.216
Green Lane Embankment	BD162-CP044	0.7	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2
				Copper	2	0.03	mg/l	0.057
				Lead	0.01	0.008575	mg/l	0.055
				Zinc	5	0.03	mg/l	0.392
	BD162-CR003	0.5	Mid Pleistocene Till	Lead	0.01	0.008575	mg/l	0.016

Asset	Borehole	Depth (m bgl)	Stratum	Determinant	UK DWS	EQS	Units	Result
				Zinc	5	0.03	mg/l	0.064
	BD162-CR020	0.5	Made Ground	Cadmium	0.005	0.00015	mg/l	0.2
				Chromium	0.05	0.005	mg/l	0.006
				Copper	2	0.03	mg/l	0.03
				Lead	0.01	0.008575	mg/l	0.053
				Zinc	5	0.03	mg/l	0.343
				Chromium - Hexavalent	-	0.0034	mg/l	0.007
		1	Mid Pleistocene Till	Cadmium	0.005	0.00015	mg/l	0.0004
				Zinc	5	0.03	mg/l	0.089
				Chromium - Hexavalent	-	0.0034	mg/l	0.005
	BD163-WS001	0.2	Made Ground	Zinc	5	0.03	mg/l	0.047
		0.5	Made Ground	Lead	0.01	0.008575	mg/l	0.011
				Zinc	5	0.03	mg/l	0.098
				Chromium - Hexavalent	-	0.0034	mg/l	0.012
Water Orton Cutting	BD164-CR011	0.7	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0009
				Lead	0.01	0.008575	mg/l	0.085
				Zinc	5	0.03	mg/l	0.15
Attleboro Farm Embankment	BD163-CP043	3	Made Ground	Zinc	5	0.03	mg/l	0.057
		5	Made Ground	Zinc	5	0.03	mg/l	0.031
	BD163-CR014	0.5	Made Ground	Lead	0.01	0.008575	mg/l	0.011
				Mercury	0.001	0.00007	mg/l	0.0001
				Zinc	5	0.03	mg/l	0.162
				Chromium - Hexavalent	-	0.0034	mg/l	0.008
		2	Made Ground	Zinc	5	0.03	mg/l	0.138
		4	Made Ground	Lead	0.01	0.008575	mg/l	0.092
				Zinc	5	0.03	mg/l	0.151
	BD163-CR022	7	Made Ground	Zinc	5	0.03	mg/l	0.08
				Cyanide (total)	0.05	0.001	mg/l	0.38
		9	Made Ground	Zinc	5	0.03	mg/l	0.081
		12.8	Made Ground	Zinc	5	0.03	mg/l	0.08
	BD163-TP013	0.8	Made Ground	Zinc	5	0.03	mg/l	0.051
	BD163-TP013a	1.5	Made Ground	Cadmium	0.005	0.00015	mg/l	0.0012
				Zinc	5	0.03	mg/l	0.068
	BD163-TP016	0.6	Made Ground	Zinc	5	0.03	mg/l	0.052
		2.3	Made Ground	Zinc	5	0.03	mg/l	0.064

Locations in grey cells had leachate samples tested on a 10:1 liquid:solid ratio.

Figure 22: Soil Leachate Exceedances against WQS (1 of 5)

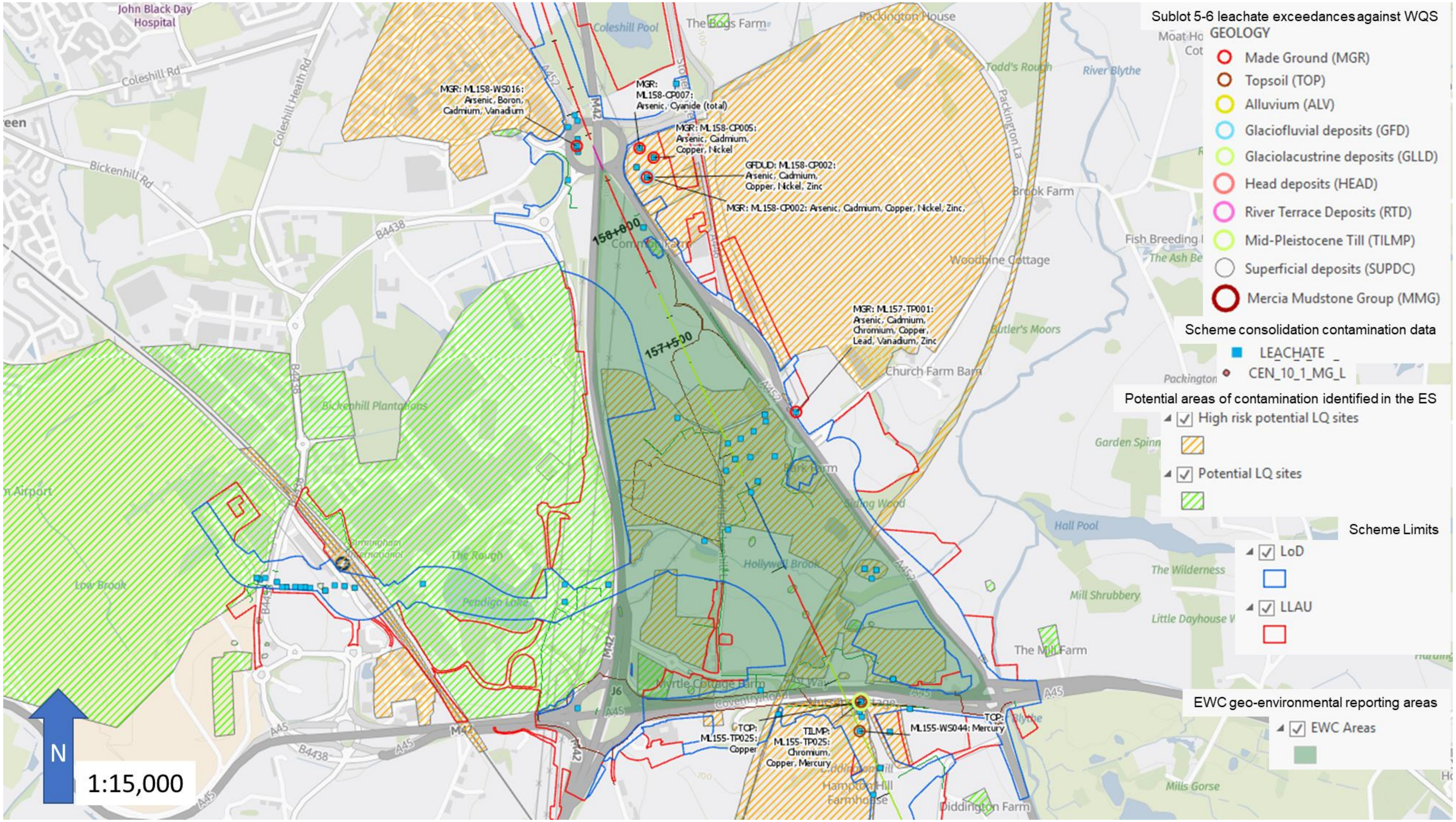


Figure 23: Soil Leachate Exceedances against WQS (2 of 5)

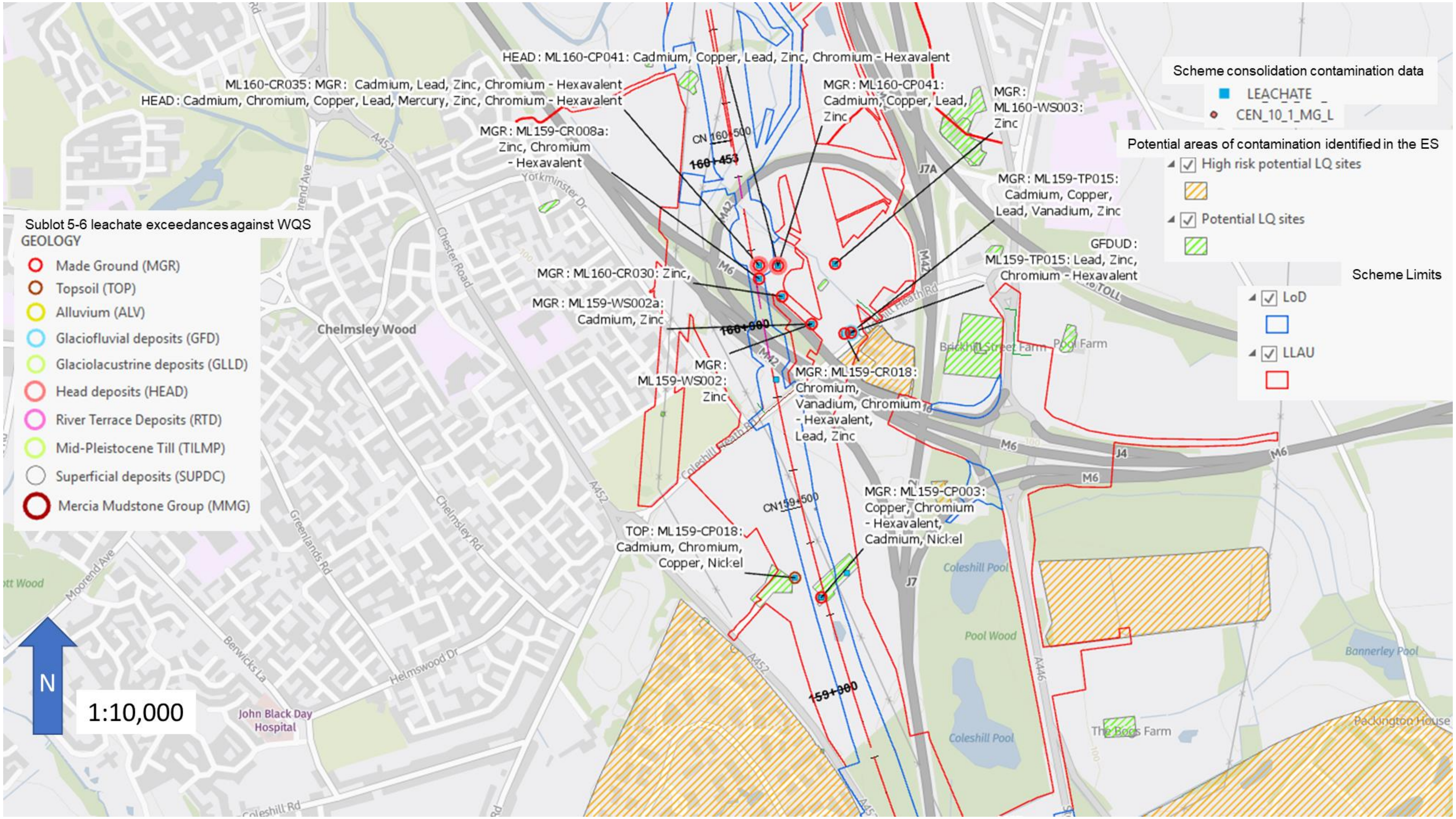


Figure 24: Soil Leachate Exceedances against WQS (3 of 5)

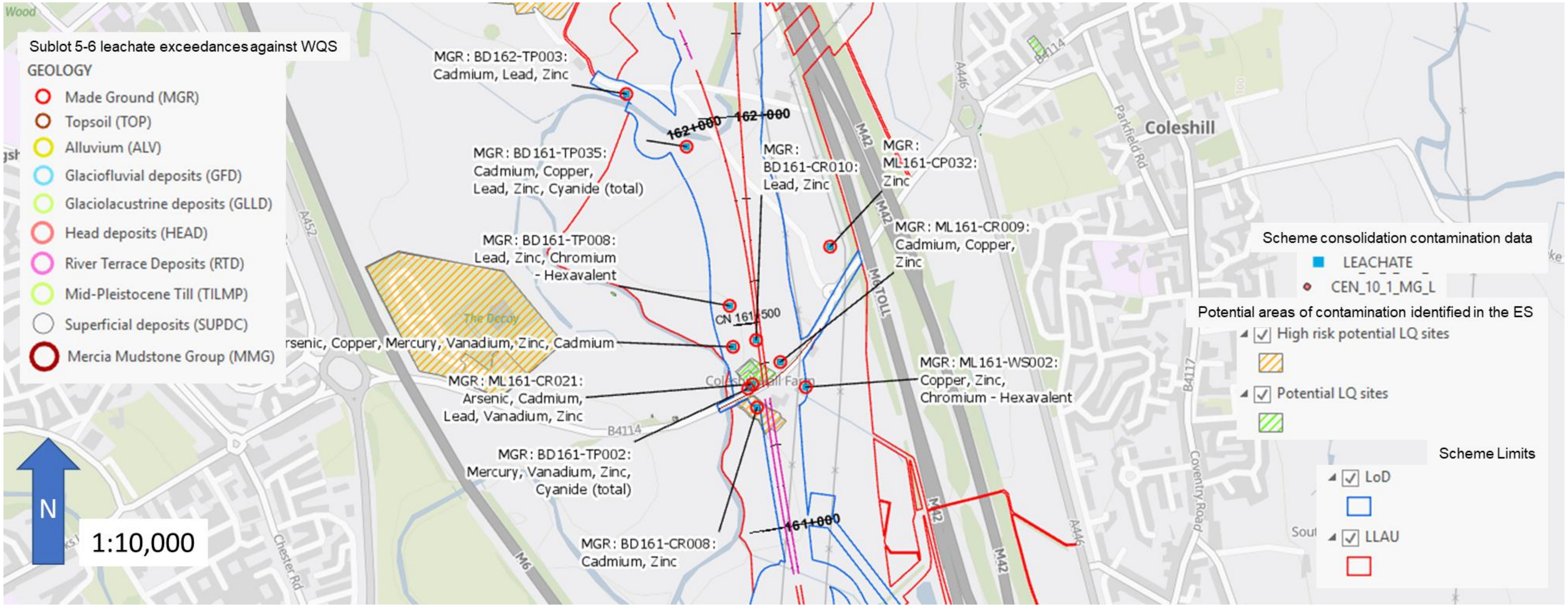


Figure 25: Soil Leachate Exceedances against WQS (4 of 5)

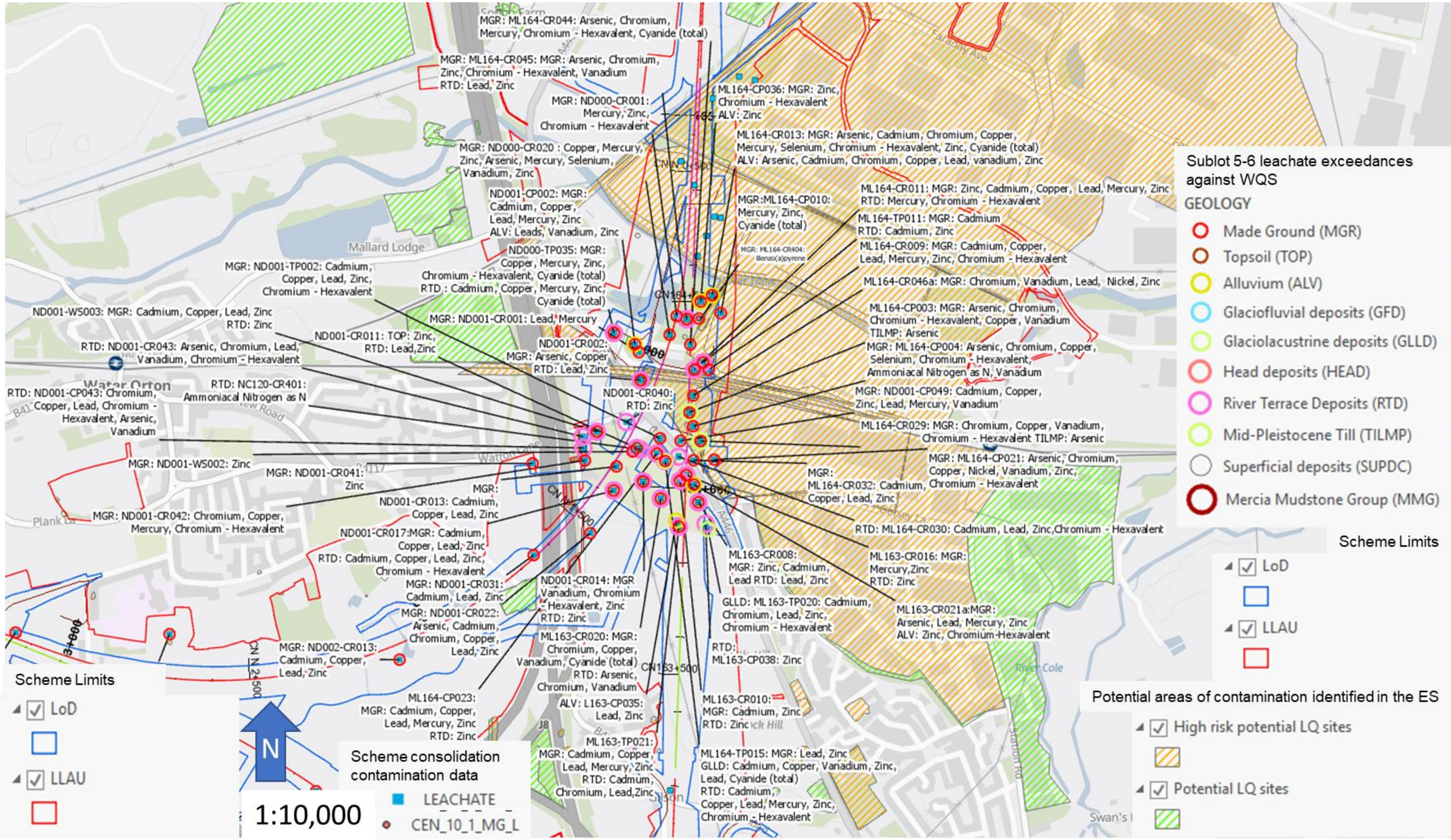
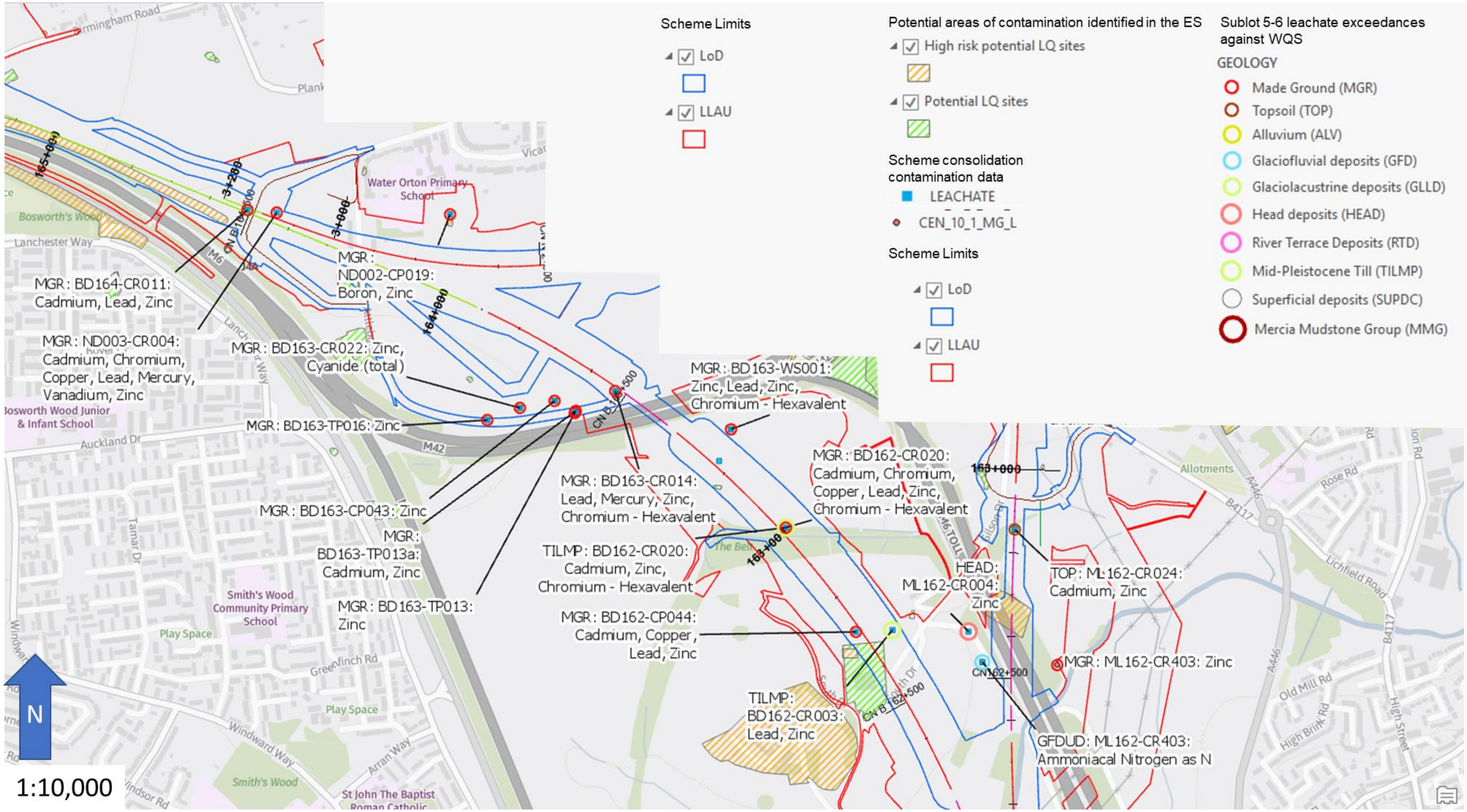


Figure 26: Soil Leachate Exceedances against WQS (5 of 5)



A discussion on the soil leachate data is presented in Section 4.10.6.

4.9.4 Risks from Organic Soil Contaminants to Controlled Waters

A high-level assessment of the organic contaminants recorded in the soil data (both TPH and PAH) has been undertaken to establish the risks from organic soils to controlled waters.

Semi-qualitative screening of the impacts to controlled waters from TPH soils data has been determined by using the following thresholds:

- Low – soil concentration <100 mg/kg
- Moderate – soil concentration 100 mg/kg to ≤1000 mg/kg
- High – soil concentration ≥1000 mg/kg

Semi-qualitative screening of the impacts to controlled waters from PAH in soils has been determined by using the following thresholds:

- Low – soil concentration <10 mg/kg
- Moderate – soil concentration 10 mg/kg to ≤100 mg/kg
- High – soil concentration ≥100 mg/kg

Risks from TPH and PAH soil concentrations are generally assessed to be low.

Table 32 and Table 33 summarises where moderate / high risk from TPH and PAH were found, respectively. These are shown graphically in Figure 27 to Figure 30.

Table 32: Moderate and High Organic TPH Concentrations (Semi-quantitative Risks to Controlled Waters) (Excludes BIS Triangle Assets)

Asset	Hole ID	Depth (m bgl)	Strata	Contaminant	Concentration (mg/kg)
Diddington Cutting	ML155-CR022	0.5	Made Ground	Aliphatics & Aromatics >C5-40	140
Packington Embankment	ML158-CP002	1.05	Made Ground	Aliphatics >C12-44	709
				Aliphatics >C16-21	126
				Aliphatics >C21-35	471
				Aromatics >C12-44	462
				Aromatics >C21-35	282
				EPH/TPH >C12-16	150
				EPH/TPH >C16-21	388
				EPH/TPH >C21-40	1580
				Aliphatics & Aromatics >C5-44	1170
		3.05	Made Ground	Aliphatics >C12-16	253
				Aliphatics >C12-44	3120
				Aliphatics >C16-21	529
				Aliphatics >C21-35	2010
				Aliphatics >C35-44	327
				Aromatics >C12-44	2110
				Aromatics >C16-21	346
				Aromatics >C21-35	1400
				Aromatics >C35-44	267
				EPH/TPH >C12-16	389
				EPH/TPH >C16-21	1070
				EPH/TPH >C21-40	4960
				Aliphatics & Aromatics >C5-44	5240
		3.65	Devensian Glaciofluvial Deposits	Aliphatics >C12-44	141
				Aromatics >C12-44	122
				EPH/TPH >C16-21	106
				EPH/TPH >C21-40	504
				Aliphatics & Aromatics >C5-44	268
	ML158-CP005	0.5	Made Ground	EPH/TPH >C12-16	125
				EPH/TPH >C16-21	1200
				EPH/TPH >C21-40	7640
		1	Made Ground	Aliphatics >C12-44	635
				Aliphatics >C21-35	350
				Aliphatics >C35-44	196
				Aromatics >C12-44	1100
				Aromatics >C21-35	606
				Aromatics >C35-44	397

Asset	Hole ID	Depth (m bgl)	Strata	Contaminant	Concentration (mg/kg)
				Aromatics >C40-44	172
				EPH/TPH >C16-21	226
				EPH/TPH >C21-40	1620
				Aliphatics & Aromatics >C5-44	1740
		1.3	Devensian Glaciofluvial Deposits	EPH/TPH >C21-40	158
	ML158-TP008	1.05	Made Ground	EPH/TPH >C21-40	127
		2.05	Made Ground	Aliphatics >C12-44	170
				Aliphatics >C21-35	108
				Aromatics >C12-44	272
				Aromatics >C21-35	150
				Aromatics >C35-44	114
				EPH/TPH >C21-40	793
				Aliphatics & Aromatics >C5-44	442
M42 Motorway Box Structure	ML158-CP007	1.05	Made Ground	EPH/TPH >C21-40	226
		3.05	Made Ground	EPH/TPH >C21-40	315
Pool Wood Embankment	ML158-CR007	5.05	Made Ground	EPH/TPH >C21-40	207
				Aliphatics & Aromatics >C5-44	130
	ML158-WS015	0.2	Made Ground	Aromatics >C12-44	103
				EPH/TPH >C21-40	213
				Aliphatics & Aromatics >C5-44	160
	ML158-WS016	3	Made Ground	EPH/TPH >C21-40	134
	ML159-CP003	0.05	Made Ground	EPH/TPH >C16-21	401
				EPH/TPH >C21-40	5270
		1.05	Made Ground	EPH/TPH >C16-21	143
				EPH/TPH >C21-40	1240
	ML159-CP018	0	Topsoil	EPH/TPH >C21-40	162
	ML159-CR003	0.05	Made Ground	EPH/TPH >C21-40	157
Coleshill West Viaduct	BD161-CR008	0.5	Made Ground	Aliphatics >C16-C35	178
				Aliphatics >C8-C44	231
				Aromatics >C21-35	175
				Aromatics >C8-C44	247
				EPH >C8-40	488
Coleshill No. 3 Embankment	BD161-TP002	0.15	Made Ground	EPH >C8-40	136
	BD161-TP035	0.1	Made Ground	EPH >C8-40	186
	BD161-TP002	0.2	Made Ground	EPH >C8-40	194
	ML161-CR009	0.5	Made Ground	EPH >C8-40	317
	ML161-CR021	0.5	Made Ground	EPH >C8-40	141
M42 Coleshill Box Structure	ML162-CR402	0.3	Made Ground	EPH >C10-35	790

Asset	Hole ID	Depth (m bgl)	Strata	Contaminant	Concentration (mg/kg)
				EPH/TPH >C35-40	230
				Aliphatics & Aromatics >C5-40	1000
		1	Made Ground	EPH >C10-35	560
				EPH/TPH >C35-40	220
				Aliphatics & Aromatics >C5-40	780
		3	Made Ground	EPH >C10-35	420
				EPH/TPH >C35-40	150
				Aliphatics & Aromatics >C5-40	570
Lichfield Road Embankment	ML163-CR020	0.5	Made Ground	Aliphatics >C16-C35	465
				Aliphatics >C35-44	277
				Aliphatics >C8-C44*	752
				Aromatics >C21-35	615
				Aromatics >C35-44	503
				Aromatics >C8-C44*	1180
				EPH >C8-40	2480
Chattle Hill Box Structure	ML164-CR029	0.35	Made Ground	EPH >C8-40	1330
		3.2	Made Ground	Aliphatics >C8-C44*	107.7
				Aromatics >C21-35	337
				Aromatics >C35-44	100.7
				Aromatics >C8-C44*	484
				EPH >C8-40	5840
	ML164-CR032	0.5	Made Ground	EPH >C8-40	515
	ML164-TP015	0.05	Made Ground	Aliphatics >C16-C35	263
				Aliphatics >C8-C44*	314
				Aromatics >C16-21	557
				Aromatics >C21-35	1920
				Aromatics >C35-44	209
				Aromatics >C8-C44*	2750
				EPH >C8-40	5350
		0.35	River Terrace Deposits 1	Aromatics >C21-35	149
				Aromatics >C8-C44*	204
	ND001-CP049	0.4	Made Ground	EPH >C8-40	947
		0.6	Made Ground	Aliphatics >C16-C35	127
				Aliphatics >C8-C44*	161
				Aromatics >C21-35	280
				Aromatics >C8-C44*	409
				EPH >C8-40	987
Watton House East and West Viaduct	ML164-CP003	0.9	Made Ground	Aliphatics >C16-C35	184

Asset	Hole ID	Depth (m bgl)	Strata	Contaminant	Concentration (mg/kg)
				Aliphatics >C8-C44*	197
				Aromatics >C8-C44*	114.2
				EPH >C8-40	377
		2	Made Ground	EPH >C8-40	554
	ML164-CP004	1	Made Ground	Aromatics >C8-C44*	136
				EPH >C8-40	183
		3	Made Ground	EPH >C8-40	243
		4	Made Ground	EPH >C8-40	132
	ML164-CR009	0.05	Made Ground	EPH >C8-40	229
		0.4	Made Ground	EPH >C8-40	146
		1.5	Made Ground	EPH >C8-40	437
	ML164-CR011	0.3	Made Ground	EPH >C8-40	153
	ML164-CR046a	0.8	Made Ground	EPH >C8-40	261
		2.3	Made Ground	EPH >C8-40	307
	ML164-TP011	0.7	Made Ground	EPH >C8-40	449
Watton House Embankment	ML164-CP036	1	Made Ground	EPH >C8-40	135
	ML164-CR013	0.2	Made Ground	EPH >C8-40	365
		1	Made Ground	EPH >C8-40	8080
		4	Alluvium	EPH >C8-40	112
	ML164-CR404	0.05	Made Ground	Aromatics >C21-35	150
				EPH >C10-35	160
				Aliphatics & Aromatics >C5-40	160
Water Orton Viaducts	ND000-CR001	2	Made Ground	EPH >C8-40	153
	ND000-CR020	0.4	Made Ground	EPH >C8-40	196
		1	Made Ground	EPH >C8-40	334
	ND001-CR002	0.5	Made Ground	EPH >C8-40	111
	ND001-CR013	0.5	Made Ground	EPH >C8-40	106
	ND001-CR014	1.1	Made Ground	EPH >C8-40	2290
	ND001-CR022	0.1	Made Ground	EPH >C8-40	114
	ND001-CR031	0.05	Made Ground	EPH >C8-40	118
	ND001-CR040	1.4	River Terrace Deposits 1	EPH >C8-40	132
	ND001-CR042	0.5	Made Ground	EPH >C8-40	1130
	ND001-WS003	0.1	Made Ground	EPH >C8-40	134
Green Lane Embankment	BD163-CR006	0.8	Made Ground	EPH >C8-40	165
Attleboro Farm Embankment	BD163-CR014	4	Made Ground	EPH >C8-40	272
	BD163-TP016	2.3	Made Ground	EPH >C8-40	107

Orange cells represent a moderate organic soil risk to controlled waters.

Red cells represent a high organic soil risk to controlled waters.

Table 33: Moderate and High Organic PAH Concentrations (Semi-quantitative Risks to Controlled Waters) (Excludes BIS Triangle Assets)

Asset	Hole ID	Depth (m bgl)	Strata	Contaminant	Concentration (mg/kg)
Packington Embankment	ML158-CP002	1.05	Made Ground	PAH, Total Detected USEPA 16	30.6
		3.05	Made Ground	PAH, Total Detected USEPA 16	73.4
		3.65	Devensian Glaciofluvial Deposits	PAH, Total Detected USEPA 16	11.4
	ML158-CP005	0.5	Made Ground	Anthracene	10.5
				Benzo (g,h,i) perylene	16.7
				Benzo(a)anthracene	25.2
				Benzo(a)pyrene	31.3
				Benzo(b)fluoranthene	34.4
				Benzo(k)fluoranthene	14.6
				Chrysene	22.8
				Fluoranthene	75.4
				Indeno(1,2,3-cd)pyrene	15.7
				PAH, Total Detected USEPA 16	365
				Phenanthrene	32.1
				Pyrene	69.5
		1	Made Ground	PAH, Total Detected USEPA 16	36.4
Pool Wood Embankment	ML159-CP003	0.05	Made Ground	PAH, Total Detected USEPA 16	11.5
Coleshill No. 3 Embankment	BD161-TP002	0.15	Made Ground	Benzo(a)anthracene	700*
	BD161-TP035	0.1	Made Ground	Fluoranthene	730*
				Pyrene	700*
Lichfield Road Embankment	ML163-CR020	0.5	Made Ground	Benzo (g,h,i) perylene	740*
				PAH, Total	18.94
Chattle Hill Box Structure	ML164-CR029	0.35	Made Ground	Fluoranthene	10.06
				PAH, Total	52.71
	ML164-TP015	0.05	Made Ground	Anthracene	13.4
				Benzo (g,h,i) perylene	16.5
				Benzo(a)anthracene	32.4
				Benzo(a)pyrene	31.2
				Benzo(b)fluoranthene	37
				Benzo(k)fluoranthene	14
				Chrysene	28.5
				Fluoranthene	66.7
				Indeno(1,2,3-cd)pyrene	23.5
				PAH, Total	376.92
				Phenanthrene	37.6

Asset	Hole ID	Depth (m bgl)	Strata	Contaminant	Concentration (mg/kg)
				Pyrene	61.1
	ND001-CP049	0.4	Made Ground	Phenanthrene	690*
		0.6	Made Ground	Acenaphthene	750*
				PAH, Total	54.88
Watton House East and West Viaduct	ML164-CP003	0.9	Made Ground	Benzo(a)pyrene	750*
		2	Made Ground	Benzo(a)anthracene	12
				Benzo(b)fluoranthene	11.5
				Chrysene	10.3
				Fluoranthene	20.2
				Phenanthrene	33
				Pyrene	17
	ML164-CP004	1	Made Ground	Benzo (g,h,i) perylene	720*
				PAH,Total	13.1
		3	Made Ground	Benzo (g,h,i) perylene	700*
				Indeno(1,2,3-cd)pyrene	750*
		4	Made Ground	Chrysene	670*
	ML164-CR009	0.05	Made Ground	Indeno(1,2,3-cd)pyrene	730*
		1.5	Made Ground	Benzo(a)anthracene	730*
	ML164-CR011	0.3	Made Ground	Benzo(b)fluoranthene	700*
				Fluoranthene	670*
	ML164-CR046a	0.8	Made Ground	Benzo(a)anthracene	700*
				Chrysene	700*
				Phenanthrene	700*
		1.2	Made Ground	Pyrene	690*
		2.3	Made Ground	Pyrene	670*
Watton House Embankment	ML164-CP036	1	Made Ground	Benzo(a)anthracene	700*
	ML164-CR404	0.05	Made Ground	PAH, Total	20
Water Orton Viaducts	ND000-CR020	1	Made Ground	Benzo(a)anthracene	700*
				Chrysene	720*
	ND001-CR042	0.5	Made Ground	Benzo (g,h,i) perylene	700*
				Benzo(k)fluoranthene	750*

Orange cells represent a moderate organic soil risk to controlled waters.

Red cells represent a high organic soil risk to controlled waters.

Grey cells represent contaminant results which are disregarded due to discrepancy between the AGS data and results in the PDF factual report, where the AGS PAH contamination data is 1000 times greater than the PDF data, as explained in Section 4.2.4.

Figure 27: Moderate and High TPH/PAH Soil Concentrations Along Sub-lots 5 and 6 (1 of 4)

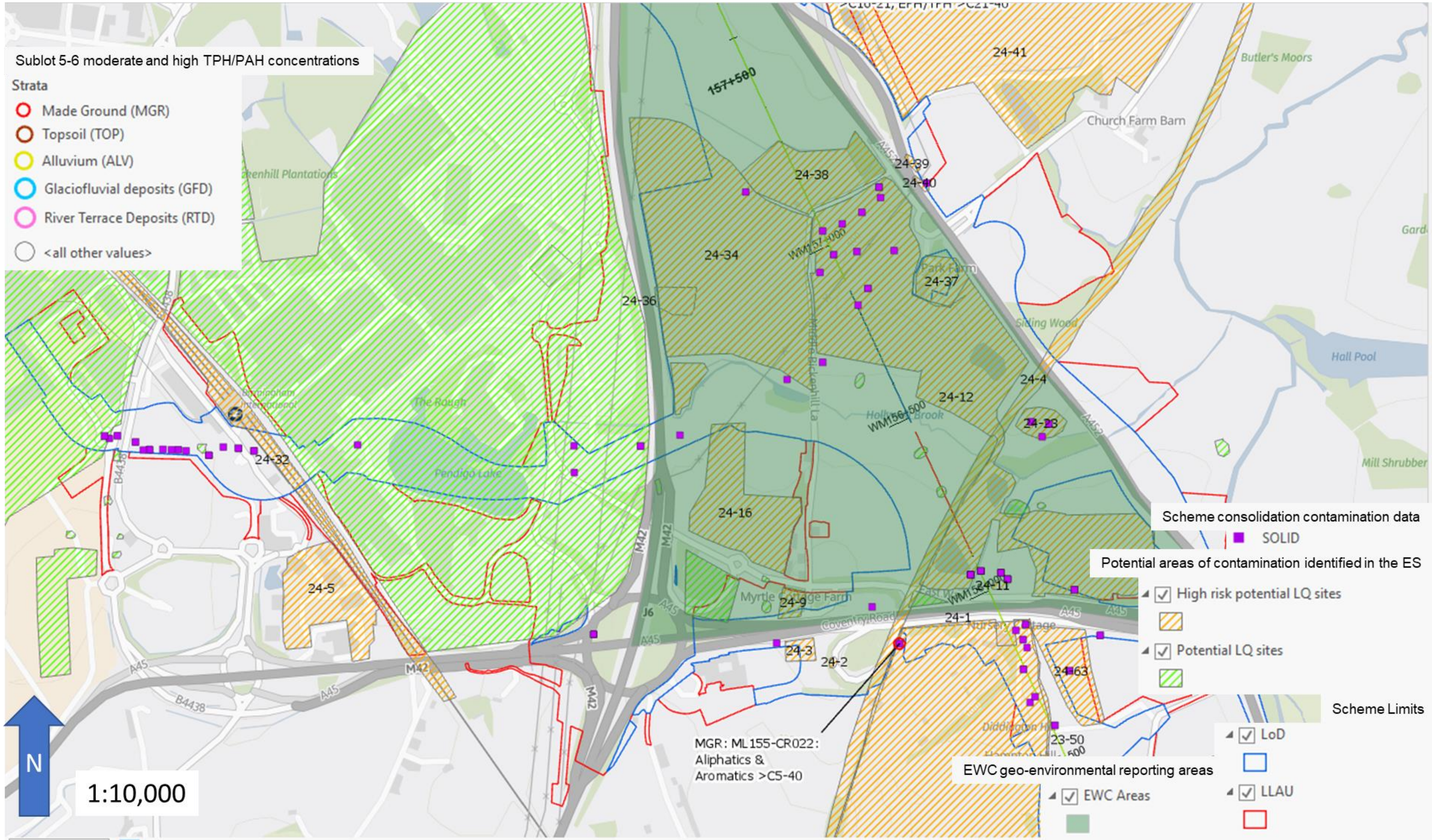


Figure 28: Moderate and High TPH/PAH Soil Concentrations Along Sub-lots 5 and 6 (2 of 4)

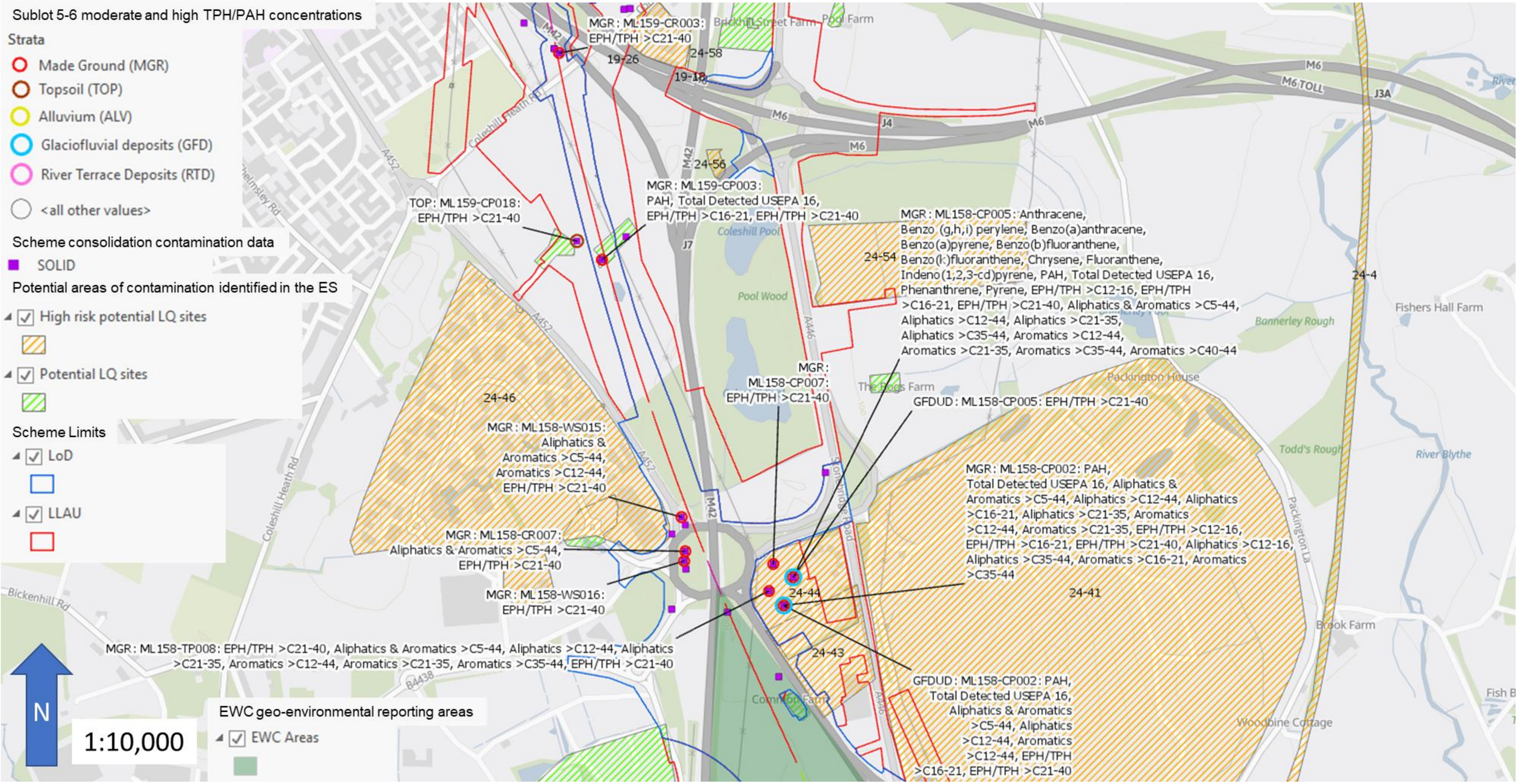


Figure 29: Moderate and High TPH/PAH Soil Concentrations Along Sub-lots 5 and 6 (3 of 4)

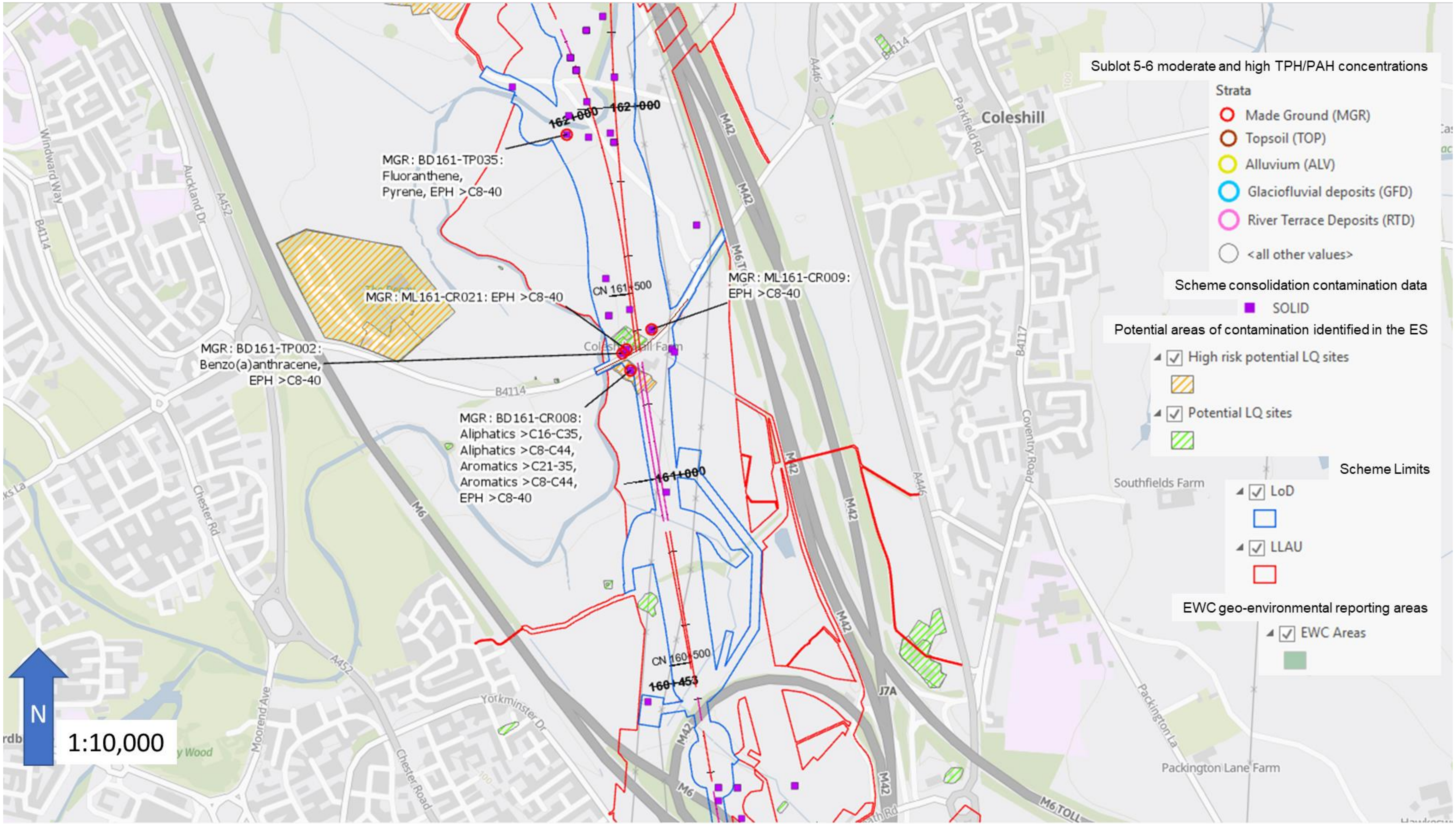
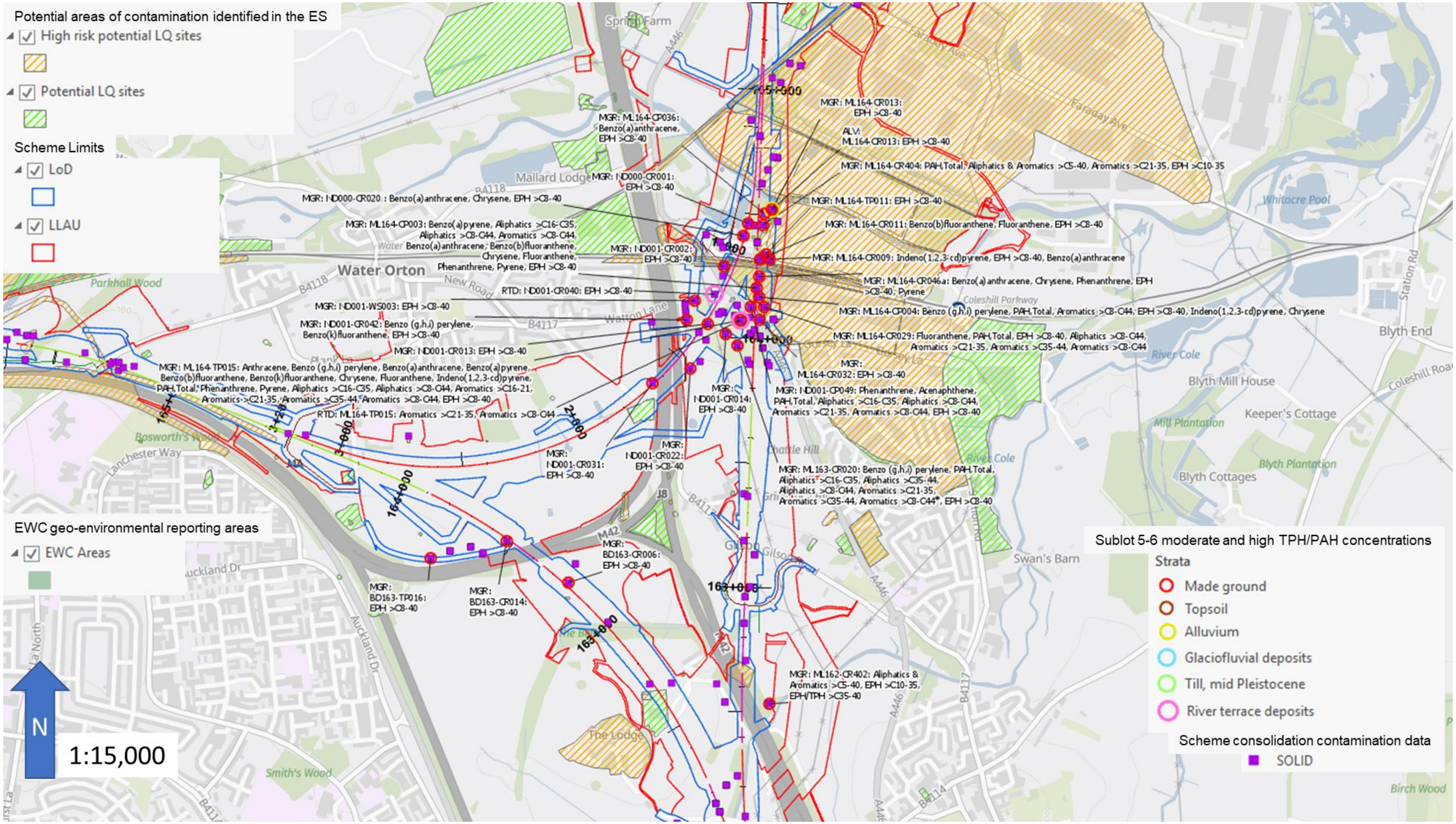


Figure 30: Moderate and High TPH/PAH Soil Concentrations Along Sub-lots 5 and 6 (4 of 4)



A discussion on the organic soil contamination is presented in Section 4.10.6.

4.9.5 BIS Triangle Remediation Strategy Report - Leachate

The BIS Triangle Remediation Strategy[vi] reported that contamination at the BIS Triangle is associated with the following three areas of landfilling and Made Ground:

- Middle Bickenhill Landfill which is intersected by Bickenhill Cutting between ch.157+080 and 157+250;
- An infilled sand and gravel quarry which is located some 270m east of the centreline of Bickenhill Embankment at approximate chainage 156+300, and which may be partially occupied by a proposed MWCC attenuation pond; and
- Backfilled borrow pits infilled following construction of the M42 and which are located partially over the alignment of Bickenhill Cutting between ch.156+900 and 157+250.

At Middle Bickenhill Landfill both inorganic and organic contaminants were recorded in shallow groundwater in excess of the Controlled Water GAC (including for total petroleum hydrocarbons (TPH), boron, hexavalent chromium, zinc, cyanide, ammoniacal nitrogen, PAHs and phenol) and a subsequent Detailed Quantitative Risk Assessment (DQRA) was undertaken to assess the risks from these contaminants to the Secondary A Aquifer to the eastern (down gradient) HS2 site boundary (LOD). Exceedance of the derived site-specific assessment criteria (SSAC) were recorded for inorganic and organic contaminants (including boron, zinc, hexavalent chromium, ammoniacal nitrogen and phenol).

At the infilled sand and gravel quarry a DQRA was carried out for elevated contaminants recorded in groundwater where a theoretical risk to Hollywell Brook (located 50m south) was identified in the GQRA (including boron, selenium, cyanide, and phenol). Exceedance of the SSAC included selenium and phenol.

In the backfilled borrow pits localised slight exceedances of the controlled water GAC for metals and hydrocarbons in groundwater and leachability tests were recorded

Remediation options from the remediation strategy report are summarised in Section 7.2.

4.10 Risks from existing Groundwater Pollution (SPR Linkages S3a & S3b – P5a, P5b, P8 – R7, R8) and Coleshill and Bannerly Pools SSSI (R9)

4.10.1 Hydrogeological Setting

The hydrogeological setting is as described in Section 4.9.1.

4.10.2 Data Acquired and Methodology

Risks from existing groundwater pollution have been assessed following the procedures set out in current authoritative guidance, notably CLR11: Model Procedures for the Management of Land Contamination, CIRIA C552, and the EA's approach to groundwater protection (2018) and Remedial Targets Methodology. For the potentially active contaminant linkages, defined in the screening stage of this report, a GQRA has been undertaken based on the groundwater monitoring data provided in the GI reports.

Risks from existing groundwater pollution to off-site controlled water receptors (R5) includes both groundwater and surface waters. For this assessment, groundwater pollution is defined as an exceedance of the generic assessment criteria by contaminant concentrations in groundwater samples. Laboratory groundwater data has been compared with DWS to protect groundwater (Principal and Secondary aquifers), and EQS for freshwater to protect surface waters.

The rivers and lakes M-BAT has been used for determining site specific $EQS_{bioavailable}$ for copper, zinc, manganese, and nickel. This uses pH, calcium, and DOC concentrations at a downstream surface water monitoring point. The M-BAT tool has also been used for determining site specific $EQS_{bioavailable}$ for lead, which uses DOC concentrations at a downstream surface water monitoring point. Data was accessed from the Environment Agency's water quality data archive, specifically points MD-590009850, MD-59010550 and MD-61045300. These are shown in Figure 21.

4.10.3 SL5/6 Groundwater Exceedances

Exceedances of the DWS and EQS identified along the route are shown in Table 34 and surface water exceedances shown in Table 35, which may be used as a baseline for environmental monitoring rather than for soil and groundwater contamination risk assessment. These are shown graphically in Figure 31 to Figure 34. Full contaminant groundwater data is shown in Appendix D.

Table 34: Groundwater Exceedances Identified (BIS Triangle Assets Excluded)

Asset	Hole ID	Water level (m bgl)	Response zone (m bgl)	Strata	Determinant	Units	UK DWS	EQS	Result
Diddington Cutting	ML155-CR003	2.41	3 – 6	Alluvium	Cadmium	mg/l	0.005	0.00015	0.0002
					Manganese	mg/l	0.05	0.41	0.31
					Fluoranthene	mg/l	-	0.0000063	0.00002
					Benzo(a)pyrene	mg/l	0.00001	0.00000017	0.00001
Packington Embankment	ML158-CP002	0.24	1 – 3.5	Made Ground	Cadmium	mg/l	0.005	0.00015	0.00025
					Chromium	mg/l	0.05	0.005	0.0057
					Copper	mg/l	2	0.03	0.0511
					Iron	mg/l	0.2	1	51.6
					Zinc	mg/l	5	0.03	0.0395
					Ammoniacal Nitrogen as N	mg/l	0.38	0.2	0.78
					Manganese	mg/l	0.05	0.41	1.59
					Aliphatics >C16-21	mg/l	0.01	-	0.11
					Simazine	mg/l	0.0001	0.001	0.000488
					Aromatics >C16-21	mg/l	0.01	-	0.088
					Aliphatics >C12-16	mg/l	0.01	-	0.014
					Aromatics >C21-35	mg/l	0.01	-	0.594
					Aliphatics >C21-35	mg/l	0.01	-	0.665
					EPH >C10-40	mg/l	0.01	-	1.72
					Isoproturon	mg/l	0.0001	0.0003	0.000511
M42 Motorway Box Structure	ML158-CP007	6.35	5 – 8	Glaciofluvial deposits	Cadmium	mg/l	0.005	0.00015	0.000402
					Iron	mg/l	0.2	1	239
					Zinc	mg/l	5	0.03	0.0467
					Calcium	mg/l	250	-	286
					Ammoniacal Nitrogen as N	mg/l	0.38	0.2	1.85
					Manganese	mg/l	0.05	0.41	29.8
					Aliphatics >C16-21	mg/l	0.01	-	0.023
					Simazine	mg/l	0.0001	0.001	0.000489
					Aromatics >C16-21	mg/l	0.01	-	0.036
					Aliphatics >C12-16	mg/l	0.01	-	0.062
					Aromatics >C21-35	mg/l	0.01	-	0.296
					Aliphatics >C21-35	mg/l	0.01	-	1.09
					EPH >C10-40	mg/l	0.01	-	2.08
					2,4-Dichlorophenoxy Acetic Acid (D)	mg/l	0.0001	0.0003	0.000168
					Isoproturon	mg/l	0.0001	0.0003	0.000506
Pool Wood Embankment	ML158-CP020	2.83	2 – 5	Glaciofluvial deposits	Chromium	mg/l	0.05	0.005	0.00562
					Iron	mg/l	0.2	1	301
					Lead	mg/l	0.01	0.008575	0.0136
					Zinc	mg/l	5	0.03	0.0591
					Manganese	mg/l	0.05	0.41	10.2
					Aliphatics >C16-21	mg/l	0.01	-	0.013
					Nitrate as N	mg/l	11	-	35.1
					Simazine	mg/l	0.0001	0.001	0.000483
					Aromatics >C16-21	mg/l	0.01	-	0.013
					Dieldrin	mg/l	0.00003	0.00001	0.000075
					Aliphatics >C12-16	mg/l	0.01	-	0.052
					Aromatics >C21-35	mg/l	0.01	-	0.141
					Aliphatics >C21-35	mg/l	0.01	-	0.605

Asset	Hole ID	Water level (m bgl)	Response zone (m bgl)	Strata	Determinant	Units	UK DWS	EQS	Result
					EPH >C10-40	mg/l	0.01	-	1.22
					Potassium	mg/l	12	-	13.4
					Isoproturon	mg/l	0.0001	0.0003	0.000502
	ML158-CP021	3.77	2 – 5	Glaciofluvial deposits	Arsenic	mg/l	0.01	0.05	0.0117
					Cadmium	mg/l	0.005	0.00015	0.00321
					Chromium	mg/l	0.05	0.005	0.0169
					Copper	mg/l	2	0.03	0.21
					Iron	mg/l	0.2	1	136
					Lead	mg/l	0.01	0.008575	0.113
					Nickel	mg/l	0.02	0.02	0.0811
					Zinc	mg/l	5	0.03	0.721
					Calcium	mg/l	250	-	880
					Magnesium	mg/l	50	-	112
					Ammoniacal Nitrogen as N	mg/l	0.38	0.2	0.674
					Manganese	mg/l	0.05	0.41	8.87
					Nitrate as N	mg/l	11	-	18
					Simazine	mg/l	0.0001	0.001	0.000479
					Aliphatics >C21-35	mg/l	0.01	-	0.019
					EPH >C10-40	mg/l	0.01	-	0.224
					2,4-Dichlorophenoxy Acetic Acid (D)	mg/l	0.0001	0.0003	0.000106
					Potassium	mg/l	12	-	31
					Isoproturon	mg/l	0.0001	0.0003	0.000501
	ML158-CR018	3.3	4 – 7	Glaciofluvial deposits	Cadmium	mg/l	0.005	0.00015	0.000196
					Iron	mg/l	0.2	1	8.29
					Zinc	mg/l	5	0.03	0.0839
					Manganese	mg/l	0.05	0.41	0.272
					Simazine	mg/l	0.0001	0.001	0.000482
					Aliphatics >C21-35	mg/l	0.01	-	0.028
					EPH >C10-40	mg/l	0.01	-	0.143
					Bis(2-ethylhexyl)phthalate	mg/l	-	0.0013	0.00575
					Isoproturon	mg/l	0.0001	0.0003	0.000501
	ML159-CR019	7.72	7 – 12	Glaciofluvial deposits	Cadmium	mg/l	0.005	0.00015	0.000533
					Chromium	mg/l	0.05	0.005	0.045
					Copper	mg/l	2	0.03	0.0708
					Iron	mg/l	0.2	1	178
					Lead	mg/l	0.01	0.008575	0.0618
					Nickel	mg/l	0.02	0.02	0.0466
					Vanadium	mg/l	-	0.02	0.0463
					Zinc	mg/l	5	0.03	0.118
					Manganese	mg/l	0.05	0.41	3.12
					Nitrate as N	mg/l	11	-	27.2
					Simazine	mg/l	0.0001	0.001	0.000476
					Aliphatics >C21-35	mg/l	0.01	-	0.137
					EPH >C10-40	mg/l	0.01	-	0.309
					Isoproturon	mg/l	0.0001	0.0003	0.000492
Coleshill West Viaduct	BD161-CR008	2	1.5 – 2	Made Ground	Aromatics >C21-35	mg/l	0.01	-	0.011
					EPH >C8-40	mg/l	0.01	-	0.06

Asset	Hole ID	Water level (m bgl)	Response zone (m bgl)	Strata	Determinant	Units	UK DWS	EQS	Result
		31.78	29 – 32	Mercia Mudstone Group	Aromatics >C21-35	mg/l	0.01	-	0.01
					EPH >C8-40	mg/l	0.01	-	0.07
Coleshill No. 3 Embankment	BD161-CR010	6.95	4 – 7	Mercia Mudstone Group	Iron	mg/l	0.2	1	55.2
					Vanadium	mg/l	-	0.02	0.02
					Magnesium	mg/l	50	-	66
					Manganese	mg/l	0.05	0.41	1.077
					Fluoranthene	mg/l	-	0.0000063	0.000016
					Aromatics >C21-35	mg/l	0.01	-	0.043
					EPH >C8-40	mg/l	0.01	-	0.04
					Benzo(a)pyrene	mg/l	0.00001	0.00000017	0.000017
	ML161-CR021	28.74	26 – 29	Mercia Mudstone Group	Calcium	mg/l	250	-	549
					Magnesium	mg/l	50	-	151
					Sulphate as SO4	mg/l	250	400	2170
					Naphthalene	mg/l	-	0.002	0.0096
					Aromatics >C10-12	mg/l	0.01	-	0.026
					EPH >C8-40	mg/l	0.01	-	0.04
					Sodium	mg/l	200	-	388
					Potassium	mg/l	12	-	26
M42 Coleshill Box Structure	ML162-CR004a	26.29	26 – 27	Mercia Mudstone Group	Iron	mg/l	0.2	1	11.2
					Magnesium	mg/l	50	-	58
					Manganese	mg/l	0.05	0.41	0.364
					Sulphate as SO4	mg/l	250	400	449
					Aromatics >C21-35	mg/l	0.01	-	0.015
					EPH >C8-40	mg/l	0.01	-	0.02
					Nitrite as N	mg/l	0.15	-	0.39
Lichfield Road Embankment	ML163-CR021a	3.87	2 – 4	River Terrace Deposits	Iron	mg/l	0.2	1	132
					Calcium	mg/l	250	-	441
					Magnesium	mg/l	50	-	85
					Manganese	mg/l	0.05	0.41	2.769
					Sulphate as SO4	mg/l	250	400	1720
					Aromatics >C21-35	mg/l	0.01	-	0.012
					EPH >C8-40	mg/l	0.01	-	0.03
					Sodium	mg/l	200	-	375
Chattle Hill Box Structure	ML164-CR029	24.32	24.5 – 25.5	Mercia Mudstone Group	Iron	mg/l	0.2	1	208
					Calcium	mg/l	250	-	510
					Ammoniacal Nitrogen as N	mg/l	0.38	0.2	0.5
					Manganese	mg/l	0.05	0.41	3.689
					Sulphate as SO4	mg/l	250	400	2850
					Chloroethene	mg/l	0.0005	-	0.003
					Aromatics >C21-35	mg/l	0.01	-	0.053
					EPH >C8-40	mg/l	0.01	-	0.07
					Sodium	mg/l	200	-	795
					Potassium	mg/l	12	-	37
	ND001-CP049	1.94	1 – 2	Made Ground / Mid-Pleistocene Till	Iron	mg/l	0.2	1	236
					Zinc	mg/l	5	0.03	0.036
					Magnesium	mg/l	50	-	86
					Manganese	mg/l	0.05	0.41	3.062
					Sulphate as SO4	mg/l	250	400	274

Asset	Hole ID	Water level (m bgl)	Response zone (m bgl)	Strata	Determinant	Units	UK DWS	EQS	Result
					Aromatics >C16-21	mg/l	0.01	-	0.018
					EPH >C8-40	mg/l	0.01	-	
					Sodium	mg/l	200	-	223
Watton House West Viaduct	ML164-CR009	22.7	24.5 – 25.5	Mercia Mudstone Group	Iron	mg/l	0.2	1	12
					Zinc	mg/l	5	0.03	5.484
					Calcium	mg/l	250	-	490
					Ammoniacal Nitrogen as N	mg/l	0.38	0.2	0.6
					Manganese	mg/l	0.05	0.41	0.526
					Sulphate as SO4	mg/l	250	400	2100
					Chloroethene	mg/l	0.0005	-	0.003
					Aromatics >C16-21	mg/l	0.01	-	0.015
					Fluoranthene	mg/l	-	0.0000063	0.000012
					Aromatics >C21-35	mg/l	0.01	-	0.156
					EPH >C8-40	mg/l	0.01	-	0.56
					Sodium	mg/l	200	-	444
					Potassium	mg/l	12	-	44
	ML164-CR046a	2.81	1.5 – 3.5	Made Ground/Mid-Pleistocene Till	Arsenic	mg/l	0.01	0.05	0.01
					Iron	mg/l	0.2	1	12.6
					Nickel	mg/l	0.02	0.02	0.045
					Vanadium	mg/l	-	0.02	0.082
					Ammoniacal Nitrogen as N	mg/l	0.38	0.2	3.4
					Manganese	mg/l	0.05	0.41	0.342
					Chloroethene	mg/l	0.0005	-	0.008
					Aromatics >C16-21	mg/l	0.01	-	0.123
					Aromatics >C12-16	mg/l	0.01	-	1.39
					Aromatics >C8-10	mg/l	0.01	-	0.066
					Anthracene	mg/l	-	0.0001	0.00174
					Benzene	mg/l	0.001	0.01	0.002
					Naphthalene	mg/l	-	0.002	0.804
					Aromatics >C10-12	mg/l	0.01	-	0.709
					EPH >C8-40	mg/l	0.01	-	3.78
					Fluoranthene	mg/l	-	0.0000063	0.00039
					Aromatics >C21-35	mg/l	0.01	-	0.052
					1,3,5 Trichlorobenzene	mg/l	-	0.0004	0.003
					Potassium	mg/l	12	-	51
Watton House Embankment	ML164-CP036	8.2	6 – 8	River Terrace Deposits/Mercia Mudstone Group	Iron	mg/l	0.2	1	40.3
					Zinc	mg/l	5	0.03	0.033
					Manganese	mg/l	0.05	0.41	2.857
					EPH >C8-40	mg/l	0.01	-	0.02
Water Orton No. 3 Viaduct	ND001-CR002	4.25	2 – 5	River Terrace Deposits	Iron	mg/l	0.2	1	233
					Calcium	mg/l	250	-	534
					Magnesium	mg/l	50	-	73
					Manganese	mg/l	0.05	0.41	4.93
					Sulphate as SO4	mg/l	250	400	1580
					Aromatics >C16-21	mg/l	0.01	-	0.022
					EPH >C8-40	mg/l	0.01	-	0.11
					Sodium	mg/l	200	-	307
					Potassium	mg/l	12	-	16

Asset	Hole ID	Water level (m bgl)	Response zone (m bgl)	Strata	Determinant	Units	UK DWS	EQS	Result
M42 - M6 Motorway Link West Viaduct	BD163-CR017	27.7	27.5 – 28.5	Mercia Mudstone Group	Arsenic	mg/l	0.01	0.05	0.07
					Iron	mg/l	0.2	1	7.57
					Magnesium	mg/l	50	-	73
					Ammoniacal Nitrogen as N	mg/l	0.38	0.2	10.7
					Manganese	mg/l	0.05	0.41	0.333
					Aliphatics >C10-12	mg/l	0.01	-	0.021
					Aromatics >C35-44	mg/l	0.01	-	0.016
					Aromatics >C16-21	mg/l	0.01	-	0.041
					Aliphatics >C12-16	mg/l	0.01	-	0.013
					Aromatics >C21-35	mg/l	0.01	-	0.245
					EPH >C8-40	mg/l	0.01	-	1.09
					Potassium	mg/l	12	-	14
Water Orton Cutting	BD164-CR003	4.24	4 – 7	Mercia Mudstone Group	Iron	mg/l	0.2	1	57.6
					Magnesium	mg/l	50	-	63
					Manganese	mg/l	0.05	0.41	0.926
					Nitrate as N	mg/l	11	-	22.9
					EPH >C8-40	mg/l	0.01	-	0.03
		7.75		Mercia Mudstone Group	Iron	mg/l	0.2	1	27
					Magnesium	mg/l	50	-	63
					Manganese	mg/l	0.05	0.41	0.412
					Nitrate as N	mg/l	11	-	19.2
					Aromatics >C21-35	mg/l	0.01	-	0.011
					EPH >C8-40	mg/l	0.01	-	0.06

Table 35: Surface Water Exceedances (BIS Triangle Assets Excluded)

Asset	Hole ID	Easting	Northing	Determinant	Units	UK DWS	EQS	Result
Diddington Lane Embankment	ML155-SW001	421208	282366	Cadmium	mg/l	0.005	0.00015	0.00041
				Chromium	mg/l	0.05	0.005	0.23
				Mercury	mg/l	0.001	0.00007	0.00008
				Fluoranthene	mg/l	-	0.0000063	0.00001
	ML155-SW002	421072	282385	Cadmium	mg/l	0.005	0.00015	0.00018
				Ammoniacal Nitrogen as N	mg/l	0.38	0.2	0.2
				Aliphatics >C16-21	mg/l	0.01	-	0.02
				Simazine	mg/l	0.0001	0.001	0.0002
				Aromatics >C12-16	mg/l	0.01	-	0.01
				Aliphatics >C12-16	mg/l	0.01	-	0.02
				Fluoranthene	mg/l	-	0.0000063	0.00005
				Benzo(a)pyrene	mg/l	0.00001	0.00000017	0.00003
				Aliphatics >C21-35	mg/l	0.01	-	0.02
Pool Wood Embankment	ML159-SW001	419533	286077	Iron	mg/l	0.2	1	0.925
				Ammoniacal Nitrogen as N	mg/l	0.38	0.2	0.562
				Simazine	mg/l	0.0001	0.001	0.00048
				Potassium	mg/l	12	-	23.4
				Isoproturon	mg/l	0.0001	0.0003	0.000515
Coleshill No. 1 Embankment	ML160-SW002	419390	287124	Iron	mg/l	0.2	1	20.2
				Manganese	mg/l	0.05	0.41	0.619
				EPH >C8-40	mg/l	0.01	-	0.14
				Fluoranthene	mg/l	-	0.0000063	0.000016
				Benzo(a)pyrene	mg/l	0.00001	0.00000017	0.000017
Coleshill West Viaduct	BD160-SW001	419000	287830	Iron	mg/l	0.2	1	0.58
				Manganese	mg/l	0.05	0.41	0.069
				Fluoranthene	mg/l	-	0.0000063	0.000011
				EPH >C8-40	mg/l	0.01	-	0.08
				Aromatics >C21-35	mg/l	0.01	-	0.011
Coleshill No. 3 Embankment	BD162-SW001	418821	288883	Iron	mg/l	0.2	1	0.64
				Manganese	mg/l	0.05	0.41	0.088
				EPH >C8-40	mg/l	0.01	-	0.06
M42 Coleshill Box Structure	ML162-SW001	419153	289383	Fluoranthene	mg/l	-	0.0000063	0.00002
				Benzo(a)pyrene	mg/l	0.00001	0.00000017	0.00001
				Aliphatics >C21-35	mg/l	0.01	-	0.02
M42 Coleshill North Viaduct	ML162-SW002	419039	289783	Ammoniacal Nitrogen as N	mg/l	0.38	0.2	0.45
				Aliphatics >C16-21	mg/l	0.01	-	0.02
				Anthracene	mg/l	-	0.0001	0.0001
				Fluoranthene	mg/l	-	0.0000063	0.0001
				Aliphatics >C21-35	mg/l	0.01	-	0.02

Figure 31: Groundwater and Surface Water Exceedances against WQS (1 of 4) – Excluding BIS Triangle

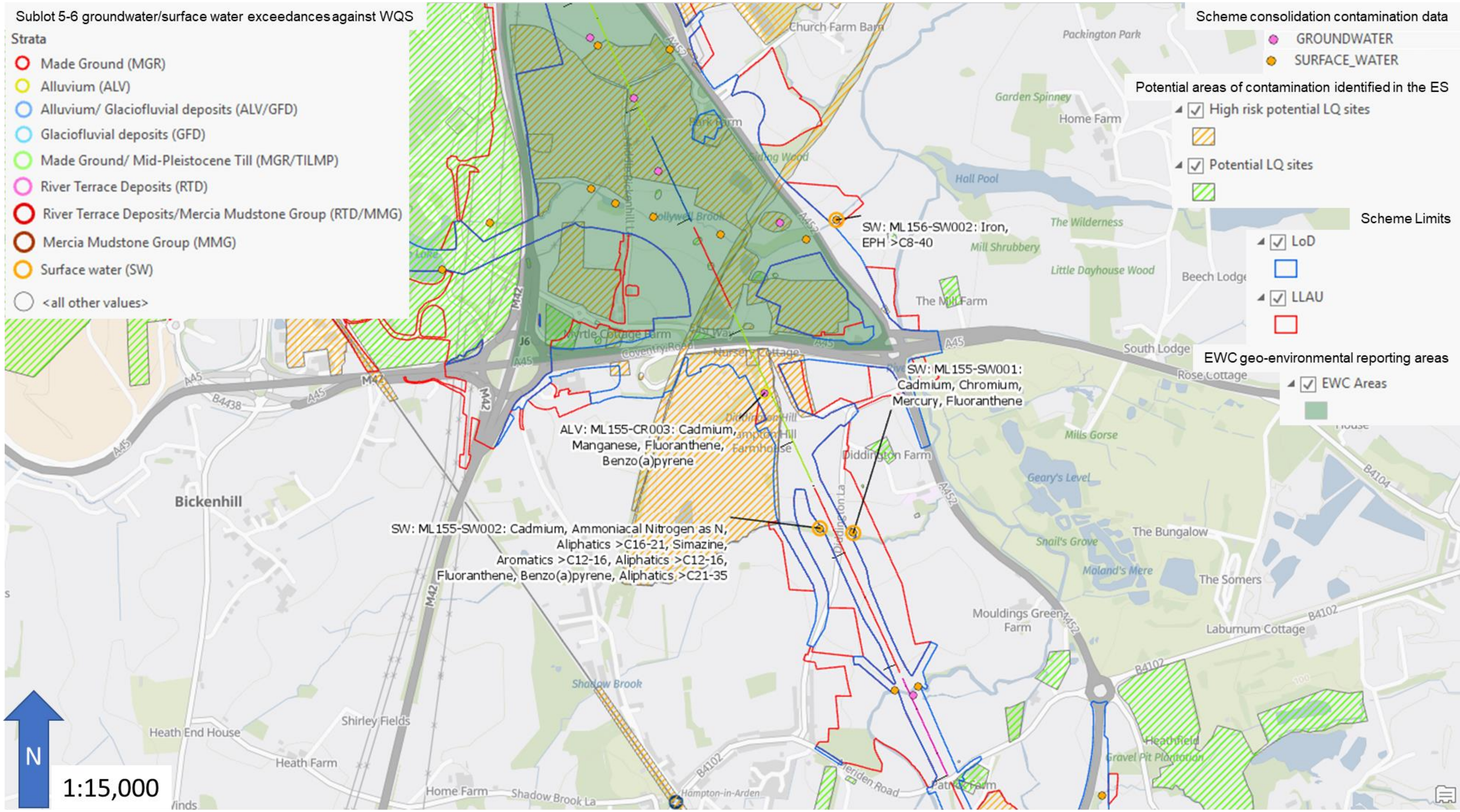


Figure 32: Groundwater and Surface Water Exceedances against WQS (2 of 4)

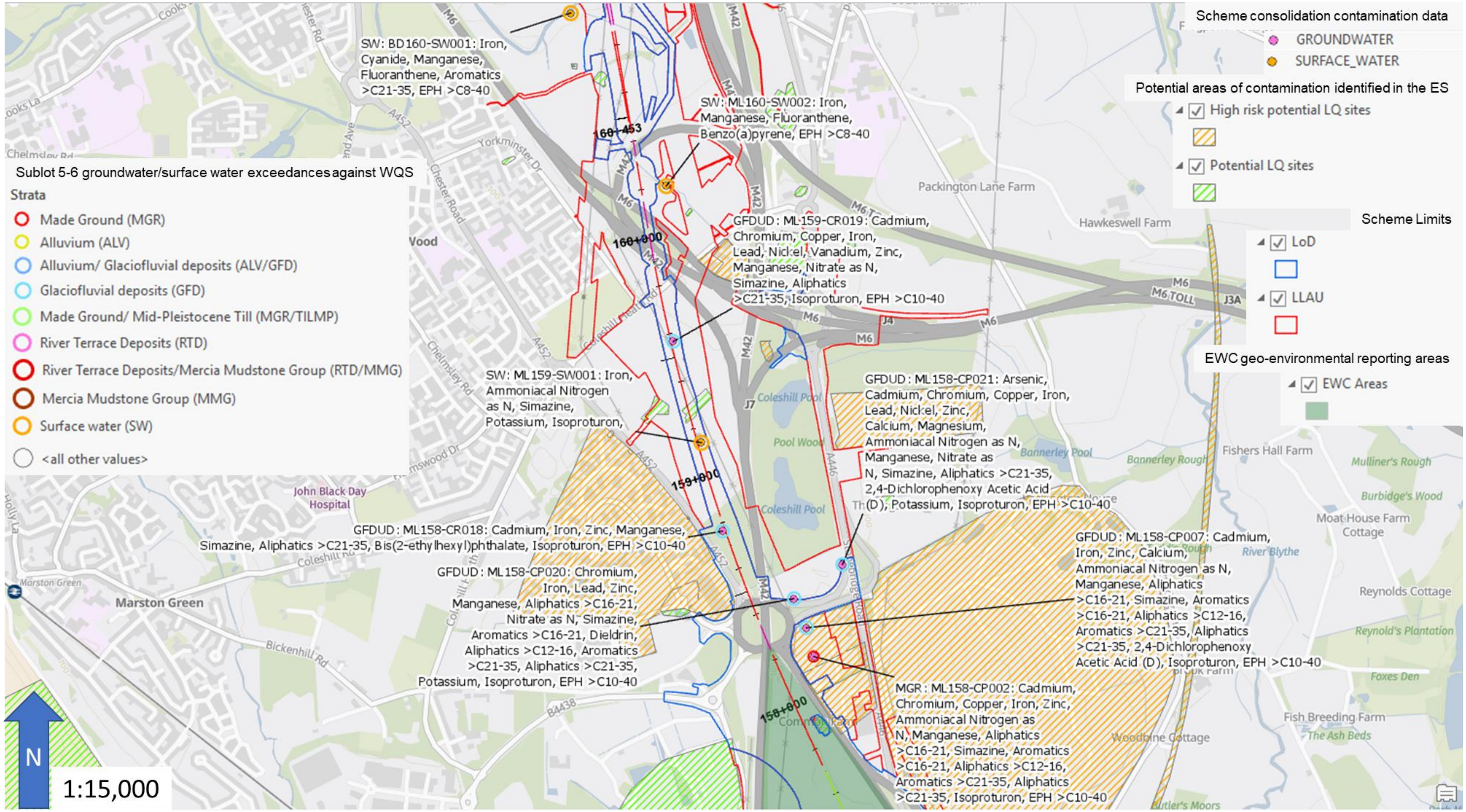


Figure 33: Groundwater and Surface Water Exceedances against WQS (3 of 4)

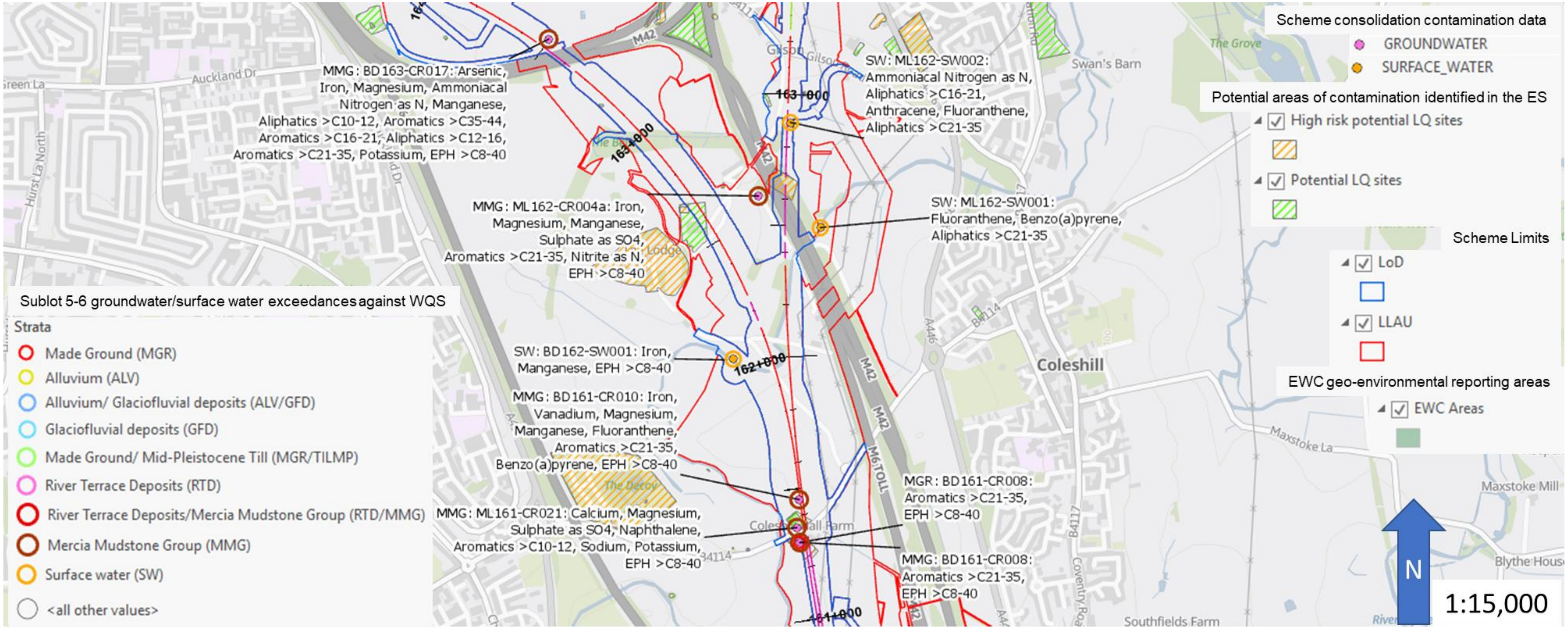
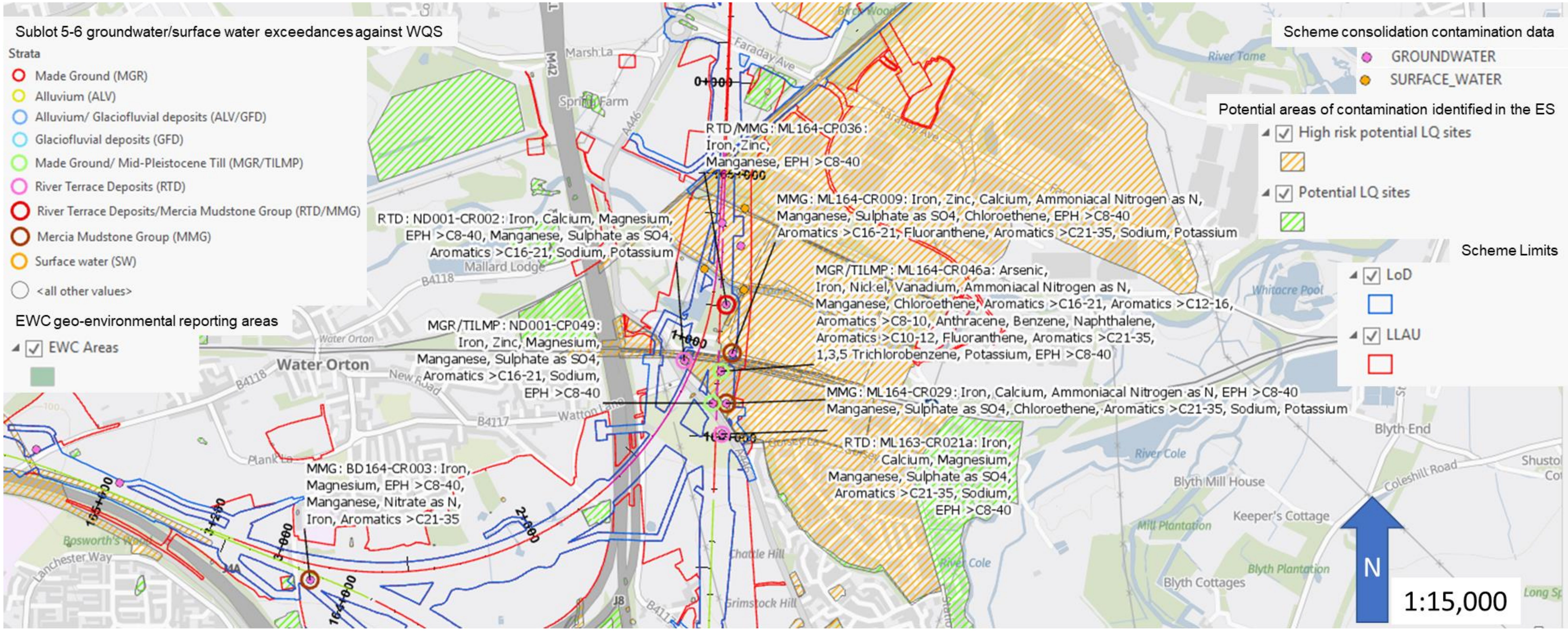


Figure 34: Groundwater and Surface Water Exceedances against WQS (4 of 4)



4.10.4 BIS Triangle Remediation Strategy Report Groundwater

The BIS Triangle remediation strategy report[vi] reported that contamination at the BIS Triangle is associated with areas of landfilling and Made Ground. At the Middle Bickenhill Landfill inorganic and organic contaminants (including TPH, boron, hexavalent chromium, zinc, cyanide, ammoniacal nitrogen, PAHs and phenol) in shallow groundwater were recorded in excess of the Controlled Water GAC. Subsequent DQRA reported boron, zinc, hexavalent, chromium, ammoniacal nitrogen and phenol in-excess of the Site-Specific Assessment Criteria (SSAC) protective of the Secondary A Aquifer in the eastern HS2 site boundary (LoD).

The infilled sand and gravel quarry reported boron, selenium, cyanide and phenol in excess of the GAC. With selenium and phenol in excess of the SSAC, in protection of Hollywell Brook (50m south of the pit).

At the backfilled borrow pits there were localised "*slight*" exceedances of the GAC for metals and hydrocarbons in groundwater.

Remediation options from the remediation strategy report are summarised in Section 7.2.

4.10.5 Statistical Review of Inorganic Leachates

A large number of exceedances of the EQS and DWS have been observed for inorganic leachate in agricultural areas across SL5/6. A preliminary statistical review of the leachate data has been performed with the objective of characterising the distribution of exceedances and contamination sources within areas of land that are in agricultural land outside of known land quality sites. This review will be further updated and refined following completion of ground investigation works.

4.10.5.1 Statistical Method

The statistical assessment is based on leachate data extracted across SL5-6 using a 2:1 Liquid:Solid Ratio. While groundwater data is likely to provide a more accurate impression of leachate impact on controlled waters, leachate data is far more plentiful, and therefore provides a more spatially representative dataset.

Point sources of contamination have been removed by eliminating from the dataset the following data:

- Samples acquired from non-agricultural ES LQ sites;
- Samples in vacant land located to the west of Coleshill Sewage Works;
- Samples within the sports fields south of the A446 which have been constructed from Made Ground;
- Samples within the former borrow pit located north of the M6-M42 Link Road; and
- Samples within areas of deep Made Ground at the M42 – M6 Junction which appear to have been associated with highway construction.

The remaining sample points relate to agricultural areas. No further attempts have been made to remove samples from the dataset. The assessment therefore includes samples that may have originated from areas of agricultural reprofiling and Made Ground deeper than the typical plough depth.

The following determinants have been subject to statistical analysis:

- Ammoniacal nitrogen;
- Arsenic;
- Boron;
- Cadmium;
- Chromium;
- Chromium III;

- Chromium VI;
- Copper;
- Lead;
- Mercury;
- Nickel;
- Vanadium; and
- Zinc.

The following statistics have been calculated:

- Arithmetic Mean;
- Geometric Mean; and
- Median.

Where the contamination levels are less than the detection limit, the result has been set to the detection limit.

4.10.5.2 Statistical Review

Statistical summaries are presented in the following table, Table 36.

Table 36: Summary of Statistical Review of Soil Leachate Results

	Units	Ammoniacal Nitrogen as N	Arsenic	Boron	Cadmium	Chromium	Chromium Hexavalent	Copper	Lead	Mercury	Nickel	Trivalent Chromium	Vanadium	Zinc
No.	-	3	52	52	52	52	51	52	52	34	52	48	52	52
Max	mg/l	2	0.019	0.34	0.0017	0.0169	0.106	0.134	0.116	0.0014	0.166	0.169	0.09	0.392
Min	mg/l	0.01	0.0002	0.02	0.00002	0.001	0.003	0.0009	0.0003	0.00001	0.000758	0.001	0.001	0.002
Mean	mg/l	1.33667	0.00283	0.10956	0.00025	0.00227	0.00772	0.02170	0.01787	0.00008	0.00715	0.00738	0.00804	0.08972
Mean	mg/l	2.00000	0.00200	0.08000	0.00010	0.00100	0.00300	0.01050	0.00400	0.00002	0.00200	0.00300	0.00251	0.05450
Geometric Mean	mg/l	0.341995189	0.0018	0.0869	0.000131	0.001626	0.003979284	0.0115	0.0043	2.7E-05	0.002819	0.003072616	0.003846	0.038
No. above EQS	-	2	0	0	22	5	10	15	21	5	1	12	5	33
% above EQS	%	66.67	0.00	0.00	42.31	9.62	19.61	28.85	40.38	14.71	1.92	25.00	9.62	63.46
No. above DWS	-	2	3	0	0	0	0	0	20	1	1	0	0	0
% above DWS	%	66.67	5.77	0.00	0.00	0.00	0.00	0.00	38.46	2.94	1.92	0.00	0.00	0.00
EQS	mg/l	0.2	0.05	2	0.00015	0.005	0.0034	0.03	0.0086	0.00007	0.02	0.0047	0.02	0.03
DWS	mg/l	0.38	0.01	1	0.005	0.05	-	2	0.01	0.001	0.02	-	-	5

Note: Red Cells >EQS

The maximum levels of all determinants except boron and arsenic exceed the EQS. Ammoniacal nitrogen, lead, mercury and nickel exceed the DWS, although the exceedances for lead and mercury are marginal.

The dataset for ammoniacal nitrogen consists of only 3 points. Since there is very little doubt that ammonium concentrations are likely to be strongly dictated by agricultural fertilizer applications and livestock activities, this contamination has not been subject to any further consideration and the risks from ammonium to controlled waters from agricultural activities are considered to be low.

The proportion of samples exceeding the EQS is ranked as follows:

- 1: Zinc: 64%;
- 2: Cadmium: 42%;
- 3: Lead: 40%;
- 4: Copper: 29%;
- 5: Chromium III: 25%;
- 6: Chromium VI: 20%;
- 7: Mercury: 15%;
- 8: Chromium: 10%;
- 8: Vanadium: 10%; and
- 9: Nickel: 2%.

Of the above, the arithmetic mean, geometric mean or the median exceeded the EQS for the following determinants:

- Cadmium;
- Chromium VI;
- Lead;
- Mercury;
- Chromium III; and
- Zinc.

Of the above the following determinants exhibited arithmetic mean, geometric mean or the median concentrations significantly above the EQS:

- Lead; and
- Zinc.

Of the above, only zinc exhibited median and geometric mean levels above the EQS.

4.10.5.3 Lead within Agricultural Land

Lead tends to be elevated near urban areas. Magrath and Loveland, 1992[xl] note that "*relatively high lead concentrations are …associated with densely populated industrial conurbations including Birmingham*". They go on to note that this "*'anthropogenic signature' …in urban areas is ubiquitous and is related to coal burning, old paint, piping solders, fuel lead and more general use of this this important metal*".

The lead frequency distribution appears to exhibit significant right skew (see Figure 35 and Figure 36) suggesting that the arithmetic mean may overestimate of the overall areal distribution of contamination.

Figure 35: Lead: Agricultural Land: Arithmetic Frequency Distribution

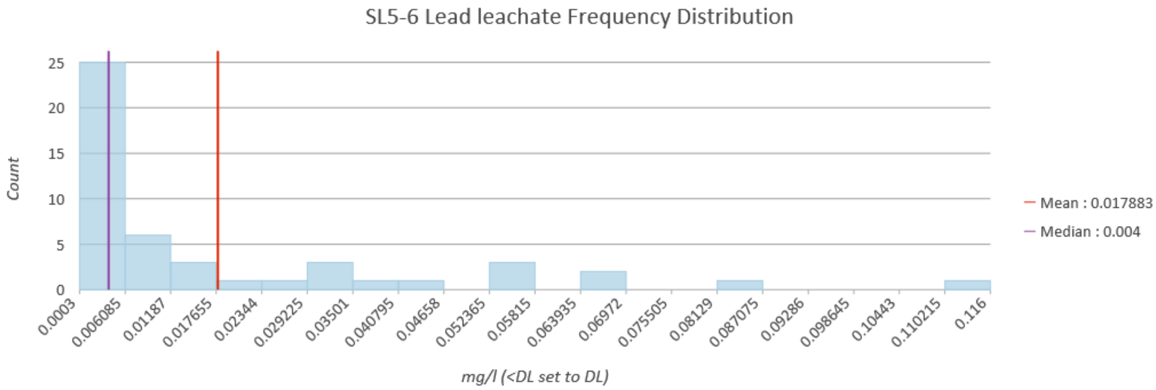
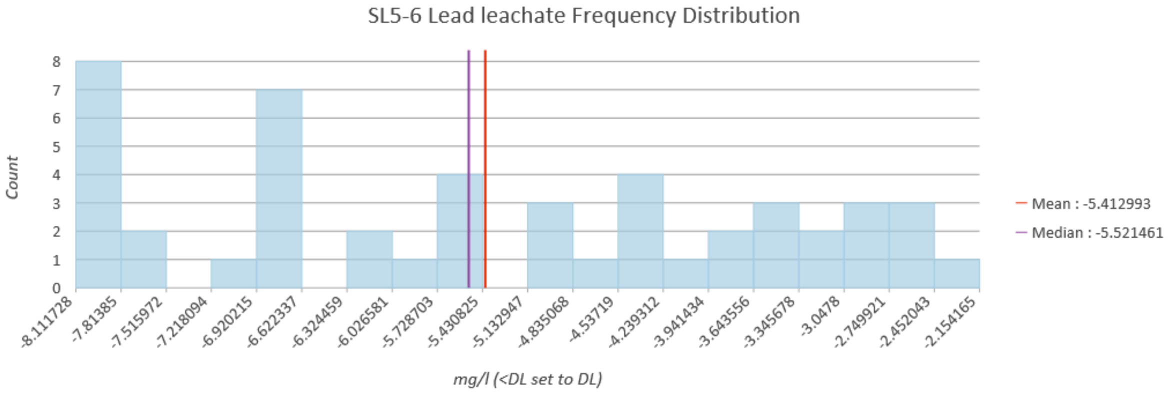


Figure 36: Lead: Agricultural Land: Logarithmic Frequency Distribution



The left peak is likely to be a result of the contamination levels approaching the detection limit, where analytical noise dominates the signal. When viewed spatially there do not appear to be clear correlations between the location of samples and sample concentration which suggests that the data comes from a single statistical population which is representative of agricultural areas of the study area.

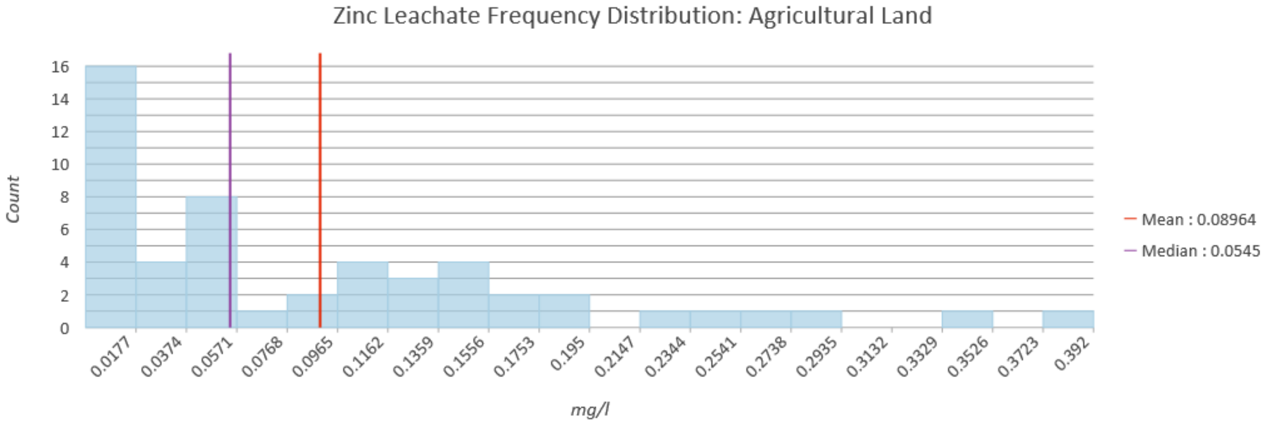
In view of the right skew to the data, the median and geometric mean are likely to provide a more representative indication of lead contamination levels across agricultural land. Both of these measures are significantly below the EQS, indicating that lead contamination across agricultural land within the SL5-6 study area presents Low risks to controlled waters. Lead risks are likely to be further limited by the low aqueous mobility of this substance.

4.10.5.4 Zinc within Agricultural Land

Rawlins et al. (2012)[xli] describe zinc as a “ubiquitous contaminant in urban soils” and is sourced from a range of industrial uses such as galvanising, alloys, pigments and batteries. Additional sources in agricultural settings are fertilizer and sewage sludge applications. The BGS Geochemical Atlas of topsoil concentrations based on a 5 x 5km grid survey shows an area of elevated zinc extending to the east over the study area.

Like lead, the frequency distribution for zinc also exhibits a right skew (see Figure 37).

Figure 37: Zinc: Agricultural Land: Arithmetic Frequency Distribution



There do not appear to be any obvious patterns in the spatial distribution of zinc across the study area. The figures below (Figure 38 and Figure 39) illustrate the distribution of leachate data and BGS topsoil data.

Figure 38: Zinc: Distribution of SL5/6 Leachate Data

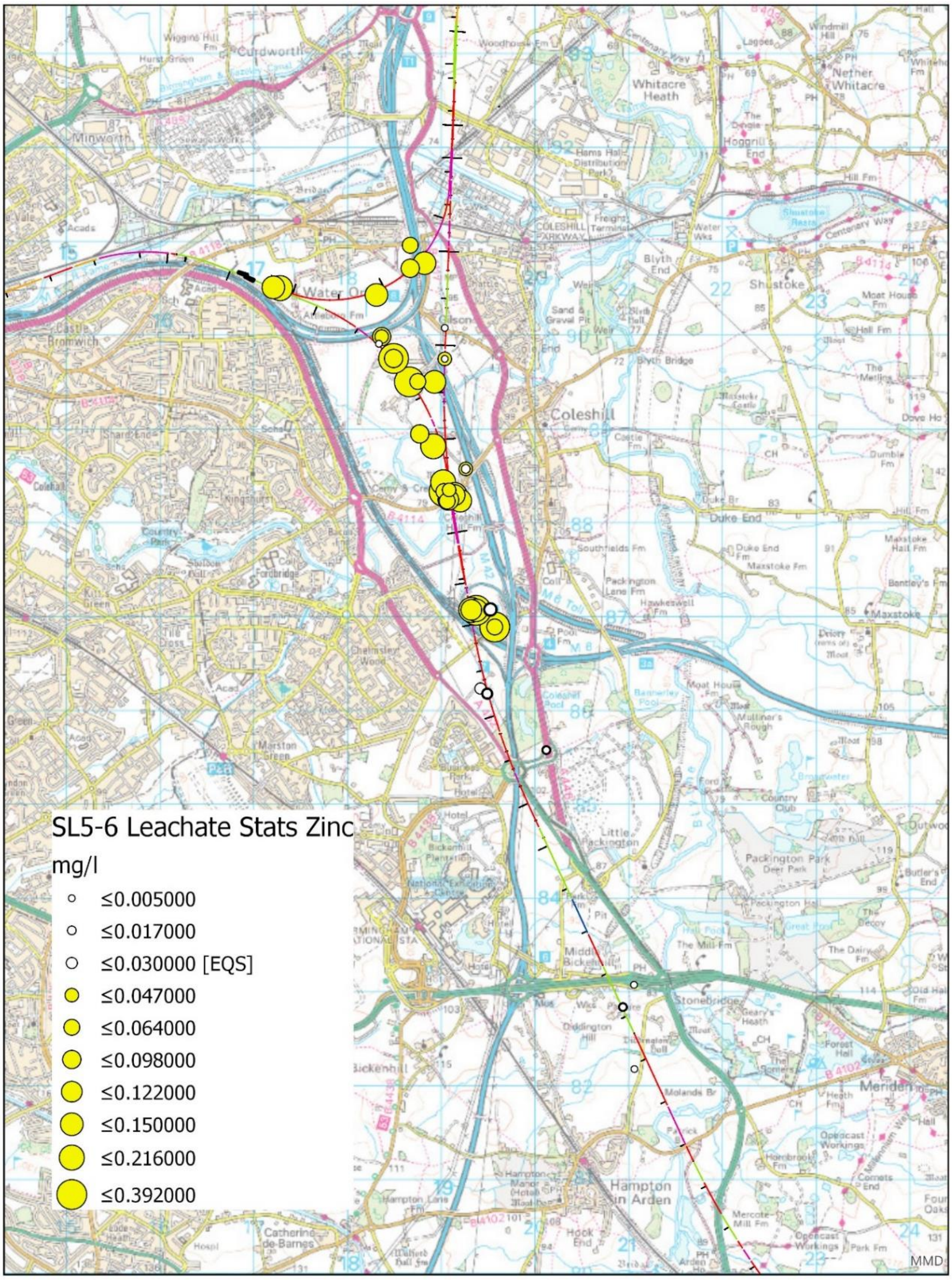
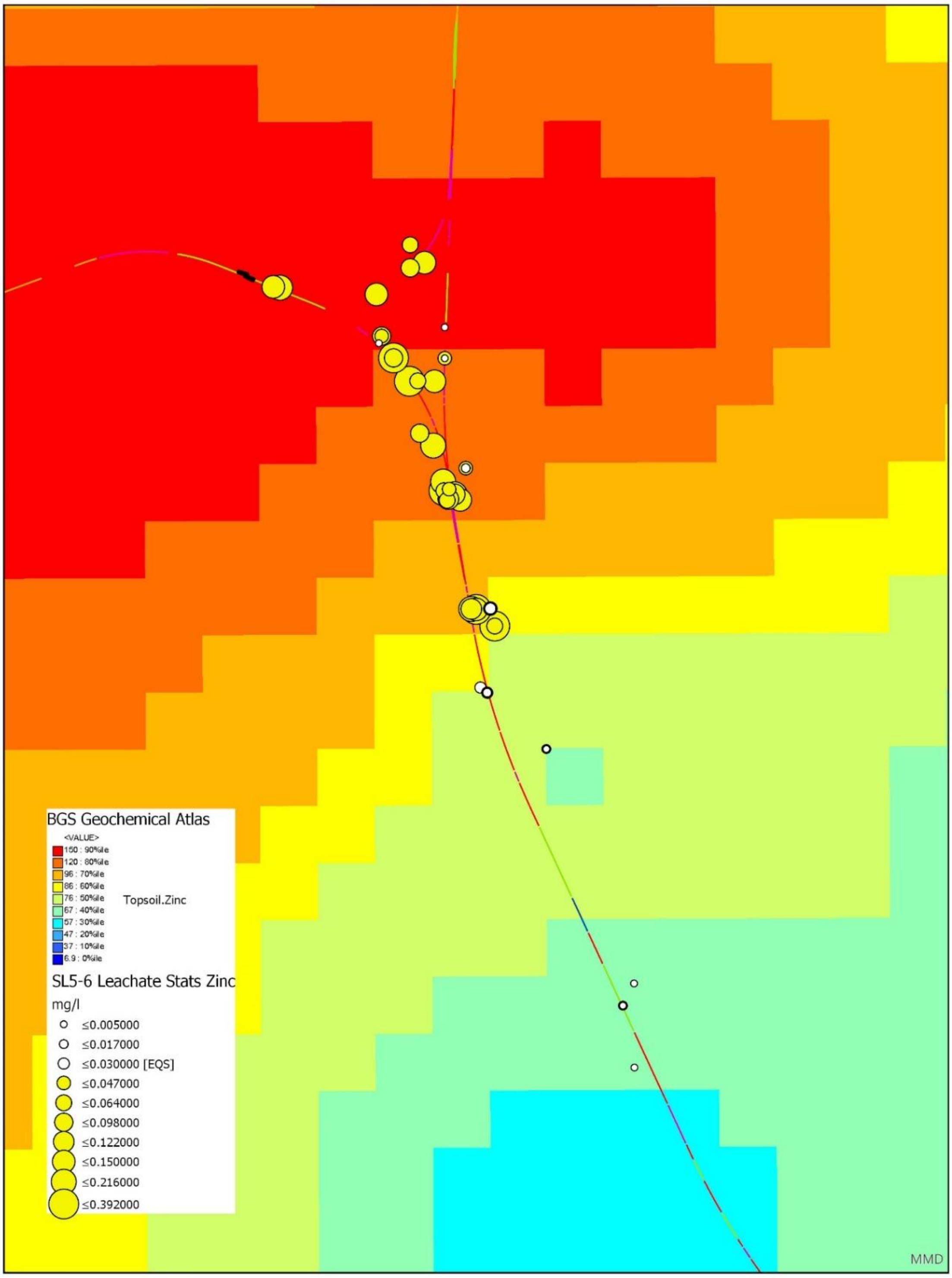


Figure 39: Zinc: BGS Topsoil Data



The median zinc leachate concentration is 0.054mg/l and the geometric mean is 0.038mg/l which exceed the EQS of 0.03mg/l. In the absence of shallow groundwater data, it is not possible to determine the impact of these leachates on groundwater quality, but linkages are plausible.

4.10.5.5 Statistics Conclusion and Recommendations

Given the extent of the contamination and its wide distribution across agricultural land it is likely to be highly challenging to remediate. Other particular sustainability constraints to remediation are:

- The sterilisation and loss of apparently useable and fertile topsoil through stabilisation or disposal;
- The high costs of remediation; and
- The distinct possibility that any remediation would not result in a net benefit in terms of controlled water quality, since the sources extend far beyond the development boundary.

Recommendations

Notwithstanding the elevated levels of zinc associated with dispersed agricultural sources in the area, remediation is not likely to be proposed. The only management action that is likely to viable will be controls on the movement of zinc contaminated material away from the Delta as part of the Material Management Plan.

Further groundwater monitoring is recommended in the SL5/6 area to assess zinc impacts on controlled waters, particularly focusing on areas of river diversions.

4.10.6 Summary of Contamination Data with Regards to Assets

The following sections describe controlled water risks for assets in which GI data has permitted quantitative risk assessment. Please refer to sections 4.9.5 and 4.10.4 for a summary of the BIS Triangle Remediation Strategy findings for Bickenhill Embankment, Bickenhill Cutting, and Packington Embankment.

4.10.6.1 Diddington Lane Embankment ch.154+435 – 155+290

This asset is not underlain by superficial deposits, except for Alluvium along the route of Shadow Brook. The bedrock geology is the Mercia Mudstone Group. Soil and soil leachate data is available from one location (ML154-TP023). This location is approximately 300m from the ES LQ site of (23-50) Jacksons Brickworks Landfill. For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (unnamed ponds, unnamed tributary and Shadow Brook) within 250m of the asset.

TPH and PAH were not detected in the soil sample. There are no exceedances of the screening criteria for the soil leachate analysis. Therefore, the risk from soil and soil leachate to controlled waters is assessed to be very low.

No groundwater samples are available for this asset.

The asset is located within the area of a small proposed diversion to Shadow Brook. No point contamination sources are in the vicinity of this diversion, although dispersed agricultural sources are likely to exist.

There is not considered to be any point sources of contamination for this asset although it should be noted that only one data point was available. Therefore, it is deemed that remediation is not likely to be required to address controlled water risks.

4.10.6.2 Diddington Cutting ch.155+290 – 156+080 (section outside of BIS Triangle)

This asset is underlain by Glaciofluvial Deposits between ch.155+300 – 155+750 overlying the Mercia Mudstone Group. The borehole logs also record Alluvium and Till. Soils, leachate and groundwater data is available from ch.155+500 – 155+900. The samples taken are associated with two ES LQ sites, 23-50 Jacksons Brickworks Landfill and 24-12 Park Farm Quarry Site. Although holes are recorded in the LQ site for the landfill only one, ML155-TP018 encountered localised deep made ground and the rest of the holes showed no indication of landfilling. For the WQS both DWS and EQS are applicable for this asset as there are surface water features (unnamed ponds, unnamed tributary and Shadow Brook) within 250m of the asset.

ML155-TP025 recorded exceedances of copper in the topsoil. In the Till, exceedances were recorded for chromium, copper and mercury. ML155-WS044 recorded an exceedance for mercury in the topsoil. ML156-TP006 reported minor exceedances of cadmium, lead and zinc in the topsoil.

One groundwater sample taken at 2.41m bgl from ML155-CR003 (located within LQ site 24-1) recorded minor exceedances of cadmium, manganese, benzo(a)pyrene and fluoranthene. No TPH was detected above the MDL in the sample. The log for this depth reported it as a zone of core loss so it is not possible to relate this sample to an aquifer. The leachate / soils could potentially be the source of some of the groundwater contamination, with cadmium being recorded in both.

As this asset is a proposed cutting, up to 8m thick in some places it is likely that the shallow impacted soils / Made Ground will be removed as part of the works. Therefore, risks from to controlled waters are likely to be Low, and remediation is not likely to be required to address in-situ contamination risks. If groundwater is to be drained from the cutting to surface water, this may need to be accompanied by an EA H1 Risk Assessment to support an Environmental Permit. Risks from groundwater to off-site controlled water are likely to be Low-Moderate.

Further GI is proposed to the west of the centreline in areas historically mapped to be landfilled. This data will provide further information on contamination risks in this area.

4.10.6.3 Packington Embankment ch.157+700 – 158+220

Packington Embankment is located within the BIS Triangle Remediation Strategy area of concern. Previous studies have identified the presence of significant contamination in the vicinity from Brackenlands Farm Landfill which is located on the north-east boundary of the triangle which appears to be impacting on groundwater around this source.

Soil sample results from ML158-CP002 and ML158-CP005 (both within Brackenlands Farm Landfill) recorded high concentrations of TPH in the Made Ground at 1.05m bgl (1170mg/kg) and 3.05m bgl (5,240mg/kg) and moderate concentrations in the Glaciofluvial Deposits at 3.65m bgl (268mg/kg). The TPH contamination was predominantly from heavy end fractions (>C16-44). All three samples also had moderate concentrations of PAHs.

ML158-CP002 recorded WQS exceedances in two samples from the Made Ground for arsenic, cadmium, copper, nickel and zinc. One sample in the Glaciofluvial Deposits recorded exceedances for arsenic, cadmium, copper, nickel and zinc. ML157-CR021 had leachate testing carried out at a 10:1 ratio, two samples recorded exceedances of the WQS for chromium (III) in the topsoil and Mercia Mudstone Group.

A groundwater sample taken at 0.24m bgl recorded exceedances of TPH aliphatics >C12-16, aliphatics >C16-21, aromatics >C16-21 and aromatics >C21-35. There was a notable exceedance of the DWS for EPH >C10-40 with 1.72mg/l. There are no PAH groundwater exceedances, with only naphthalene detected above the MDL. There were minor metals/ inorganics exceedances of ammoniacal nitrogen, cadmium, copper, manganese and zinc and a significant exceedance of iron. Based on the shallow depth of the groundwater sample it is considered likely that the Made Ground is the source of groundwater contamination and thus an active contaminant linkage is indicated. However, it is not clear from the current data whether this sample is indicative of the deeper groundwater or if it represents a perched waterbody or pocket of landfill leachate.

Based on the reviewed data, the risk from soil leachate to controlled waters is assessed to be low, and the risk from groundwater to controlled waters is assessed to be moderate / low.

Currently, there are no proposed temporary or permanent works at Brackenlands Farm Landfill. Any remediation requirements arising from future works will be the responsibility of the EWC and are not considered further in this report.

The BIS triangle Remediation Strategy[vi] does not regard the asset as falling within a "Remediation Area".

4.10.6.4 M42 Motorway Box Structure ch.158+220 – 158+350

This asset is underlain by Glaciofluvial Deposits in its entirety with the Mercia Mudstone Group beneath. It is located between LQ sites Brackenlands Farm landfill (24-44) to the east and Birmingham Business Park (24-46) to the west. The asset is located over the existing M42 motorway.

Soil and soil leachate data are available from ML158-CP005, ML158-CP007 and ML158-TP008, all located within ES LQ site Brackenlands Farm landfill (24-44) (not within the LOD).

A soil sample from ML158-CP007 (located in Brackenlands Farm landfill) recorded moderate concentrations of TPH at 1.05m and 3.05m bgl within Made Ground.

One contamination data point (ML158-CR003) was available within the LOD for this asset, although this is actually located within the proposed adjacent area of highway works.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (unnamed drain on the boundary of Coleshill Pool SSSI) within 250m of the asset.

For the on-site data point (ML158-CR003), soil leachate data from the Made Ground had no exceedances of the screening criteria.

A soil leachate exceedance for arsenic in Made Ground from ML158-CP007 was recorded at 3.05m bgl.

A groundwater sample taken at 6.35m bgl at ML158-CP007 in the glaciofluvial deposits recorded minor exceedances of ammoniacal nitrogen as N, nitrate as N, cadmium, zinc, aliphatics >C12-16, aliphatics >C16-21, aliphatics >C21-35, aromatics >C16-21 and aromatics >C21-35. Significant exceedances of iron, manganese and EPH >C10-40 were identified in the sample. It is possible that these exceedances could be a result of contamination from the Made Ground and some are indicators of landfill leachate contamination. Brackenlands Farm Landfill exhibits high levels of organic soil and moderate levels of inorganic leachate contamination. An apparent plume of ammonium and nitrate contamination is also evident in groundwater extending to the north of this landfill.

Based on the reviewed data, the risk from soil leachate sources on-site to controlled waters is assessed to be moderate / low, and from groundwater to controlled waters is assessed to be moderate.

Currently, there are no proposed temporary or permanent works at Brackenlands Farm Landfill. Any remediation requirements arising from future works in and on the boundary of the landfill will be under the EWC's responsibility and are not considered further in this report.

Recommendation

It is assumed that piling is required for construction of the box structure. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles (for example cruciform, I or H profile piles). Prior agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

4.10.6.5 Pool Wood Embankment ch.158+350 to 159+879

This asset is underlain by Glaciofluvial Deposits from ch.158+350 to 159+100 and between ch.159+700 and 159+900. From ch.159+100 to 159+700 the asset is underlain by Glaciolacustrine deposits, classified as unproductive strata. The Mercia Mudstone Group underlies the superficial deposits. This asset is located east of ES LQ site Birmingham Business Park (24-46).

Moderate concentrations of TPH ranging between 103mg/kg to 401mg/kg were reported for soil samples of Made Ground from ML158-CR007, ML158-WS015, ML158-WS016, ML159-CP003, ML159-CR003. Additionally, ML159-CP003 (within a former infilled pond) exhibited high concentrations of heavy fraction TPH (C21-40) within Made Ground, at 0.05m bgl (5270mg/kg) and 1.05m bgl (1240mg/kg). Topsoil from ML159-CP018 reported moderate concentrations of TPH (162mg/kg).

Despite the length of the asset there is only leachate data at ch.158+500 (ML158-CR007, ML158-WS013, ML158-WS014, ML158-WS015, ML158-WS016 and ML158-CP021), ch.159+300 (ML159-CP003, ML159-CP018, ML159-TP004) and ch.159+800 (ML159-CR003).

Groundwater data is available at ch.158+400 (ML158-CP020), ch.158+500 (ML158-CP021), ch.158+750 (ML158-CR018) and ch.159+550 (ML159-CR019); all screened the Glaciofluvial Deposits.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (unnamed ponds and Coleshill Pools) within 250m of the asset.

The following three locations recorded leachate exceedances of the WQS:

- ML158-WS016 in Made Ground at 3.0m depth for arsenic, boron, cadmium and vanadium;
- ML159-CP003 in Made Ground at 0.05m depth for copper and hexavalent chromium and at 1.05m for cadmium and nickel. The nickel exceedance is considered significant as it is one order of magnitude greater than the WQS;
- ML159-CP018 in topsoil for cadmium, chromium, copper and nickel.

ML158-WS016 is located in a proposed area of highway works north of the BIS Triangle which are assumed to be undertaken by the EWC. The data shows that the leachate exceedances are encountered in a deep area of Made Ground supporting a current highway roundabout. Further ground investigation is proposed to assess the precise contamination conditions within the scheme alignment.

ML158-CP003 is located within a former infilled pond. The data shows exceedances in shallow Made Ground samples with anthropogenic inclusions of glass, metal, pottery fragments, ash, slag, brick, rope, plastic and wood. It is underlain by a 4m thick layer of Glaciofluvial Deposits overlying Mercia Mudstone Group; both are predominantly clay. This sample location also exhibited high TPH concentrations. Further targeted investigation is proposed around this former pond area to establish risks to groundwater.

ML159-CP018 is located over a very thin area of Glaciofluvial Deposits underlain by weathered clay from the Mercia Mudstone Group. Risks from leachates to groundwater for this hotspot are therefore regarded as low.

Two groundwater samples have been taken in the location of the asset both responding to the glaciofluvial deposits.

Groundwater data from ML158-CP020 (located approximately 100m north of Brackenlands Farm Landfill) recorded a notable exceedance of the assessment criterion for EPH >C10-40 (1.22mg/l). It is dominated by the aliphatic >C21-35 fraction (0.605mg/l). Additionally, exceedances of the WQS for chromium, iron, lead, zinc, manganese, nitrate, simazine, dieldrin, potassium and isoproturon were recorded.

ML158-CP021 (located approximately 160m north of Brackenlands Farm landfill) recorded a notable exceedances of the WQS for arsenic, cadmium, chromium, coper, iron, lead, nickel, zinc, calcium, magnesium, ammoniacal nitrogen, manganese, nitrate, simazine, EPH >C10-40, aliphatic >C21-35, 2,4-Dichlorophenoxy Acetic Acid (2,4-D), Potassium and Isoproturon.

In both groundwater samples, there is significant exceedances for iron and manganese. The locations of these samples are between Brackenlands Farm landfill and Coleshill Pools (around ch.158+400).

A potential source of groundwater contamination in ML158-CP020 and ML158-CO021 may be Brackenlands Farm landfill to the south of the two groundwater locations. In addition, LQ site 24-41 Packington Landfill is to the east of the route from ch.157+300 to 158+400; it is beyond the LOD.

Currently, there are no proposed temporary or permanent works at Brackenlands Farm landfill. Any remediation requirements arising from future works will be the responsibility of the EWC.

Groundwater from ML158-CR018 reported exceedances of the WQS for cadmium, iron, zinc, manganese, simazine, EPH >C10-40, aliphatics >C21-35, bis(2-ethylhexyl)phthalate and isoproturon. It is located between LQ site Birmingham Business Park and Coleshill Pool, within a wooded area. The location is not near areas of Made Ground and the borehole log reports topsoil overlying natural ground material. A source of the contaminants is not clear, and may be reflective of a wider, poor quality groundwater body due to general historical development of the region.

Groundwater from ML159-CR019 reported exceedances of the WQS for cadmium, chromium, copper, iron, lead, nickel, vanadium, zinc, manganese, nitrate, simazine, EPH >C10-40, aliphatics >C21-35 and isoproturon. This location is within a group of agricultural fields and is not near areas of Made Ground. Its borehole log reports agriculturally reworked ground overlying natural ground material. As with ML158-CR018 a source of the contaminants is not clear, and may be reflective of a wider, poor quality groundwater body due to general historical development and agricultural activities in the region.

Based on the reviewed data, the risk from leached contaminants at ML159-CP003 to controlled waters is assessed to be moderate, and from ML158-WS016 to be moderate / low. Topsoil leachate risk at ML159-CP018 to controlled waters is considered low. Groundwater risk to controlled waters at ML158-CR018 is considered to be low-moderate.

Recommendations

It is recommended that the contaminated pond backfill material sampled within ML159-CP003 is removed and treated to address potential risks from TPH and nickel to controlled waters.

A risk register item is recommended for the removal and remediation of Made Ground in highway embankment fill at the southern end of Pool Wood Embankment to address risks from leachates to controlled waters. Further ground investigation is proposed to better establish risks from made ground to controlled waters within the scheme footprint.

4.10.6.6 M6 Motorway Box Structure ch.159+879 to 160+013

The asset is underlain by Glaciofluvial Deposits, excluding the route of the M6 cutting, which is in turn underlain by the Mercia Mudstone Group.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (unnamed drains) within 250m of the asset.

Six soil leachate samples from four locations (ML159-CR018, ML159-TP015, ML159-WS002 and ML159-WS002a) are available for this asset. These are located east of the asset and north-west of LQ site 24-58 (operational Highways Agency Depot), 19-18 (former Vehicle Depot) and 19-26 (Coleshill Water Reclamation Works historical landfill). WQS exceedances were recorded at:

- ML159-CR018 in Made Ground at 1.6m depth for chromium, chromium VI and vanadium, and at 3.6m depth for lead and zinc;
- ML159-TP015 in Made Ground at 0.15m depth for cadmium, copper, lead, vanadium and zinc, and in Glaciofluvial Deposits at 0.45m depth for lead, zinc and chromium VI;
- ML159-WS002 in Made Ground at 0.5m depth for zinc; and
- ML159-WS002a in Made Ground at 1.1m depth for cadmium and zinc.

The data generally indicate minor leachate exceedances of metals, with significant exceedances of lead in Made Ground and chromium VI in Glaciofluvial Deposits at ML159-TP015 (over a magnitude greater than its WQS).

A review of ML159-TP015 borehole log did not record a definitive source of the lead and chromium VI exceedances. This borehole will be in an area of a HS2 access road and landscaping. It is assumed the access road will be covered in hardstanding, and landscaping will reduce water infiltration to allow leachate generation; from reduced permeability, and greater water uptake of vegetation, respectively).

No groundwater samples were taken at this location therefore impact to groundwater cannot currently be assessed.

Based on the review of available data, the risk from soil leachate and groundwater to controlled water receptors are assessed to be moderate / low.

There were no groundwater samples taken at this location therefore the impact to groundwater cannot currently be assessed or whether there is an existing pathway between the Made Ground and groundwater.

Recommendations

It is assumed that piling is required in construction of the box structure. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles (for example cruciform, I or H profile piles). Prompt agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

Although the exceedances of the WQS in soil leachate are generally minor, there is very limited data for this asset. Further, targeted GI and risk assessment is proposed to further assess risks at this location.

4.10.6.7 M6 Motorway South Viaduct ch.160+013 to 160+148

This asset is underlain by localised Glaciofluvial Deposits overlying Mercia Mudstone Group bedrock. For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (unnamed drains) within 250m of the asset.

Eight soil leachate samples from five locations are available for this asset. These are located east of the asset within agricultural land bounded by a M42 interchange road providing access to the M6 in the south. WQS exceedances were recorded at the following locations:

- ML159-CR008a, Made Ground at 1.2m depth for zinc and chromium VI;
- ML160-CP041, Made Ground at 0.2m depth for cadmium, copper, lead and zinc, and in Head deposits at 0.6m depth for cadmium, copper, lead, zinc and chromium VI;
- ML160-CR030, Made Ground at 1.5m depth for zinc;
- ML160-CR035, Made Ground at 0.75m depth for cadmium, lead, zinc and chromium VI, and in Head deposits at 1.1m depth for cadmium, chromium, copper, lead, mercury, zinc and chromium VI; and
- ML160-WS003, Made Ground at 1.0m depth for zinc.

The soil leachate data for Made Ground and Head showed exceedances of the EQS and DWS for a range of heavy metals. Of the metal exceedances, significant chromium VI exceedances (over an order of magnitude greater than the WQS) were recorded in Made Ground and Head deposits at ML160-CR035. The source of this contamination is likely to be earthworks material used in the construction of the nearby M6 motorway junction, although the range of contaminants appears typical of natural soils and topsoils across the agricultural SL5/6 mainline area between Ch159+000 and the northern Delta area. The underlying clay strata is likely to be of low permeability, limiting the mobility of contamination in the subsurface, suggesting that risks from soils to controlled waters are low.

Further investigation is scheduled to assess the permeability and contamination status of groundwater. These exceedance locations are also in an area of a proposed HS2 access road and a balancing pond. Hardstanding is assumed to surface the access road, mitigating water infiltration and leachate generation. The construction of the balancing pond will likely remove sources of contaminants within shallow ground, and if lined with an impermeable geomembrane, it will mitigate against leachate generation.

No groundwater data was available.

Based on the review of available data the risk from soil leachate and groundwater to controlled water receptors are assessed to be moderate / low.

Recommendations

Further investigation is scheduled to assess the permeability and contamination status of groundwater.

The proposed balancing pond in the location of exceedances should be lined with an impermeable geomembrane, to mitigate against water infiltration into the subsurface and subsequent leachate generation.

It is assumed that piling is required in construction of the box structure. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles (for example cruciform, I or H profile piles). Prompt agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

4.10.6.8 Coleshill No. 1 Embankment ch.160+148 to 160+313 and M6 Motorway North Viaduct ch.160+313 to 160+404

These assets are underlain by Till and / or Mercia Mudstone Group. The embankment and viaduct are north of the M6.

For the WQS both the DWS and EQS are considered to be applicable for this asset as there are surface water features (unnamed drains) within 250m of the asset.

No soil leachate or groundwater data is available for these assets.

One surface water sample was taken at ML160-SW002, located at an unnamed drained within agricultural land bounded by the M42 interchange road going onto the M6 Motorway. This drain connects the area south-east of the assets occupied by LQ sites 24-58, 19-18 and 19-26 (approximately 330m away), to the River Cole in the north (approximately 800m away). This water sample recorded exceedances of the WQS for iron, manganese, EPH >C8-40, fluoranthene and benzo(a)pyrene. Exceedances recorded are minor except for iron, manganese and benzo(a)pyrene, which are an order of magnitude greater than their respective WQS.

Given the location of the unnamed drain the contaminants are likely reflective of the general development of the surrounding area, particularly highway drainage; Made Ground associated with the motorway construction is a potential source of contaminants. Another potential source are the LQ sites to the south-east. Risk from soil leachate and groundwater to controlled water receptors is qualitatively assessed to be low.

Recommendations

Given the lack of certainty of the source of contaminants within the unnamed drain, and the lack of soil leachate and groundwater data, further GI is proposed at the site to establish risks from made ground placed during historic motorway construction operations.

Upon the receipt of further GI data, a in accordance with EA (2001) should be undertaken for the viaduct (assuming piled foundations are the selected foundation solution). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles (for example cruciform, I or H profile piles). Prompt agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

4.10.6.9 Coleshill No. 1 Viaduct ch.160+404 to 160+855

No contamination data is available for this asset. There are no high risk LQ sites within the limits of deviation. However, an infilled former marl pit is located beyond the LoD in an area of proposed landscaping bunding. While the ES does not recognise this as posing a potential risk to the scheme, it is possible that the pit was backfilled with contaminated material. Nevertheless, the presence of low permeability glacial till suggests that risks from such contamination are likely to be Low.

Recommendations

Further ground investigation is recommended for this former marl pit to establish contamination risks.

4.10.6.10 Coleshill West Viaduct ch.160+855 to 161+314

This asset is underlain by Till and / or Mercia Mudstone Group. A timber yard (ES LQ 19-20) is located within the asset at ch.161+250. The viaduct is located over agricultural land between the M6 and M42 Motorways.

Moderate TPH concentrations were recorded at BD161-CR008 located within LQ site 19-20, likely reflective of its land use. The TPH concentrations are dominated by the heavier fractions of aliphatics >C16-C35 (178mg/kg) and aromatics >C21-35 (175mg/kg).

For the WQS both DWS and EQS are applicable for this asset as there are surface water features (unnamed drains) within 250m of the asset.

Three soil leachate samples from two locations are available for this asset. One location is within LQ site 19-20 and one to the north-east of it, both are within an area of agricultural land use. WQS exceedances were recorded at:

- BD161-CR008 in Made Ground at 0.5m depth for cadmium and zinc, and at 2m depth for zinc; and
- ML161-WS002 in Made Ground at 0.5m depth for copper, zinc and chromium VI.

These soil leachate exceedances likely reflect the general development and use of LQ site 19-20 (BD161-CR008) and agriculture (ML161-WS002). These locations are underlain by weathered Mercia Mudstone Group bedrock dominated by clay, suggesting a low permeability subsurface where contaminant mobility may be limited. The proposed viaduct construction is not envisaged to adversely affect leachate generation.

Two groundwater samples were collected from BD161-CR008; a shallow sample from Made Ground, and a deeper sample within the Mercia Mudstone Group. Both samples recorded exceedances of the WQS for aromatics >C21-35 and EPH >C8-40. These contaminants may have originated from the timber yard development. A migration pathway between the shallow and deep samples is likely given the same contaminants at similar concentrations were recorded in both samples.

However, one surface water sample was taken at BD160-SW001 on the River Cole west of the asset, and recorded exceedances of iron, cyanide, manganese, fluoranthene, aromatics >21-35 and EPH >C8-40. Exceedances of aromatics >C21-35 and EPH >C8-40 are at concentrations similar to the water samples at BD161-CR008, this suggest these contaminants may be reflective of a wider, poor quality groundwater body due to general historical development of the region. Furthermore, the organic exceedances suggest the heavier TPH fractions, likely to have low mobility within groundwater and the subsurface.

Based on the review of available data, the risks from soil and soil leachate, and groundwater to controlled water receptors are assessed to be moderate / low.

Recommendations

It is assumed that piling is required in construction of the box structure. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles (for example cruciform, I or H profile piles). Prompt agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

4.10.6.11 Coleshill No. 3 Embankment ch.161+314 to 162+348

This asset is underlain by Alluvium and the Mercia Mudstone Group. The embankment is proposed over agricultural land. There are no ES LQ sites associated with this asset.

Moderate concentrations of TPH in soil are recorded at BD161-TP002 (136mg/kg), BD161-TP035 (186mg/kg), ML161-CR009 (194mg/kg at 0.2m depth, and 317mg/kg at 0.5m depth) and ML161-CR021 (141mg/kg). All samples were obtained within Made Ground between 0.1m and 0.5m depth. BD161-TP002, ML161-CR009 and ML161-CR021 are located within or adjacent to Coleshill Hall Farm. TPH concentrations are likely to be the result of agricultural activity at the farm. ML161-CR021 is in an agricultural field next to the River Cole, west of Manor Drive.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (River Cole and an unnamed drain) within 250m of the asset.

There are 12 soil leachate sample results from nine locations available for this asset. These are BD161-CR010, BD161-TP002, BD161-TP008, BD161-TP035, BD161-WS003, BD162-TP003, ML161-CP032, ML161-CR009 and ML161-CR021. These are predominantly located within agricultural fields on either side of the asset. WQS exceedances were recorded at:

- BD161-CR010 in Made Ground at 0.5m depth for lead and zinc;
- BD161-TP002 in Made Ground at 0.15m depth for mercury, vanadium and zinc;
- BD161-TP008 in Made Ground at 0.15m depth for lead, zinc and chromium VI;
- BD161-TP035 in Made Ground at 0.1m depth for cadmium, copper, lead and zinc;
- BD161-WS003 in Made Ground at 0.2m depth for arsenic, copper, mercury, vanadium and zinc, and at 1.1m depth for arsenic, cadmium, chromium, copper, lead, mercury, vanadium and zinc;
- BD162-TP003 in Made Ground at 0.65m depth for cadmium, lead and zinc;
- ML161-CP032 in Made Ground at 0.9m depth for zinc;
- ML161-CR009 in Made Ground at 0.2m depth for cadmium, copper and zinc, and at 0.5m depth for cadmium and zinc; and
- ML161-CR021 in Made Ground at 0.5m depth for arsenic, cadmium, lead, vanadium and zinc.

These are generally minor exceedances except for cadmium concentration at ML161-CR021 (0.2mg/l) which is reported to significantly be greater than its WQS. Each location is underlain by ground material predominated with clay forming superficial deposits and bedrock. This suggest a low permeability subsurface where contaminant migration is limited. Furthermore, the exceedances are in an area with no identified LQ sites, and contaminants may be reflective of the general development of agriculture and potentially the M42 to the east.

There are two groundwater monitoring points in the Mercia Mudstone Group available for this asset; these are BD161-CR010 and BD161-CR021. Both of these locations are at the southern end of the embankment, and north of LQ site 19-20. These recorded the following exceedances of the WQS:

- BD161-CR010: magnesium, manganese, iron, vanadium, fluoranthene, benzo(a)pyrene, EPH >C8-40 and aromatics >C21-35; and

- BD161-CR021: calcium, magnesium, sulphate, sodium, potassium, naphthalene EPH >C8-40 and aromatics >C10-12. This sample also exhibited very high total dissolved solids.

TPH contamination is typically minor and is unlikely to be of significant mobility except for naphthalene which was encountered at a concentration of 9.6ug/l in deep Mercia Mudstone. The only potential source of this contamination identified in the GI were tarmac inclusions although further as yet unidentified sources could have resulted from former farming and timber yard (LQ site 19-20) activities. Overall the organic contamination in soils and groundwater are likely to be too small to warrant remedial activity, although further DQRA is required to confirm this assumption.

One surface water sample was tested from BD162-SW001 on the River Cole. This recorded exceedances of the WQS for iron, cyanide, manganese and EPH >C8-40. All exceedances are considered minor.

The evidence thus far collected from the existing GI is that the leachate contamination in this area is highly dispersed and except for an area of deep Made Ground identified in BD161-WS003, does not appear to be associated with any point sources. This appears to be typical of the agricultural SL5/6 area north of ch.159+000 up to the Delta. Instead the majority of leachate contamination is associated with shallow topsoil which may have been amended with additions of sewage sludge. Remediation of such material through stabilisation is likely to significantly impair its performance as a topsoil, and would otherwise have minimal impact on the regional contamination status of the area. Such work would appear to be inconsistent with sustainability goals and the overall aim to retain topsoil on site.

Based on the review of available data, the risks from soil and soil leachate to controlled water receptors is assessed to be moderate / low. The risk from groundwater to controlled water receptors is assessed to be moderate.

Recommendations

Further GI is proposed to assess the contamination status of groundwater in the area. Further GI is also required but not yet scheduled to assess the contamination status and volume of deep made ground around BD161-WS003. This discrete area of made ground may warrant remediation through stabilisation depending upon the results of further DQRA. A risk register item is recommended for the stabilisation of this made ground to mitigate potential risks to controlled waters.

4.10.6.12 M42 Coleshill Box Structure ch.162+436 to 162+656

This asset is underlain by localised Glaciofluvial Deposits overlying Mercia Mudstone Group bedrock. The viaduct will span over the M6 Toll and the M42 motorways, with the northern part of the structure located over a former sewage works (ES LQ 19-07).

A high concentration of aliphatics and aromatics >C5-40 (1,000mg/kg) was recorded in a soil sample from ML162-CR402 at 0.3m depth. Concentrations reduces with depth to 570mg/kg at 3m depth. This location is east of the M42 at the base of the motorway’s embankment, next to the River Cole. It is assumed that this motorway asset is to remain under the control of Highways England and therefore it would not be appropriate to recommend remediation to address potential in-situ risks from embankment material to controlled waters.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (River Cole) within 250m of the asset.

Six soil leachate results from three locations (ML162-CR004, ML162-CR402 and ML162-CR403) are available for this asset. These are located on either side of the M42 and M6 Toll motorways outside of the highway embankments (all outside the LOD).

Four exceedances of the WQS were recorded from leachate samples, these are:

- ML162-CR004 at 0.6m recorded an exceedance of the WQS for zinc in head deposits;

- ML162-CR403 recorded exceedances for ammoniacal nitrogen at 0.3 and 1.0m in the Glaciofluvial Deposits; and
- ML162-CR402 from Made Ground tested at a 10:1 liquid : solid ratio. This recorded an exceedance of the DWS for arsenic.

Arsenic contamination is likely to be of low mobility and of insufficient level to present significant risks to controlled waters. Ammonium contamination may be derived from agricultural practices and will be short lived in the environment or the historic sewage works nearby.

In common with other leachate tests in the area, zinc contamination levels were found to be significantly above the EQS. Since this contamination appears to be highly dispersed in natural and topsoil deposits across the area, it is unlikely to be reasonable or sustainable to recommend remedial action to address risks from this contamination.

There was one groundwater sample from outside the LOD and west of the asset (ML162-CR004a). This sample was from the Mercia Mudstone Group and had exceedances of the EQS and / or DWS for nitrite, sulphate, iron, magnesium, manganese, EPH >C8-40, TPH (aromatic >C21-35) and significantly elevated high suspended solids. It is considered that these exceedances are minor, except for iron which is significantly greater than the WQS (11.2mg/l). Iron is not considered to have a significant adverse impact to groundwater quality, and readily precipitates out in surface water. Given the predominance of metal contaminants at a location without an identifiable commercial / industrial land use, it is likely to be reflective of the wider background groundwater condition.

One surface water sample from the River Cole, ML162-SW001, recorded exceedances of the WQS for; fluoranthene, benzo(a)pyrene and aliphatics >C21-35. These exceedances are considered likely to be consistent with a highway source and reflective of the general regional development.

Based on the reviewed data, the risk from soil and soil leachate, and groundwater contaminants to controlled water receptors are assessed to be moderate / low. No remediation is considered necessary.

Recommendation

Further investigation of the former sewage works is proposed to establish potential sources of contamination.

It is assumed that piling is required in construction of the box structure. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles (for example cruciform, I or H profile piles). Prompt agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

4.10.6.13 M42 Coleshill North Viaduct ch.162+656 to 162+939

This asset is underlain by superficial River Terrace Deposits and bedrock of Mercia Mudstone. The viaduct duct spans over predominantly agricultural land north of the M42 Motorway, with the assets southern part located over a former sewage works (ES LQ 19-07).

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (River Cole) within 250m of the asset.

Three soil leachate results from ML162-CR024 are available for this asset, located within an agricultural field east of the motorway. It is approximately 160m north of the former sewage works. Exceedances of the WQS were recorded from a shallow topsoil sample (0.05m bgl) for minor exceedances of cadmium and zinc.

No groundwater testing results were available for this asset.

One surface water sample was taken from ML162-SW002 in a pond north of ML162-CR024. Exceedances of the WQS were recorded for; ammoniacal nitrogen, aliphatics >C16 – 21, >C21 - 35, anthracene and fluoranthene, which are likely to be consistent with area-wide agricultural practices.

Given the minor leachate exceedances and the lack of potentially contaminative sites (except LQ site 19-07) in this area, the risks from soil leachate to controlled water receptors is Low. The risk from groundwater to controlled water receptors is qualitatively assessed to be Moderate / low. The leached contaminant concentrations in-context of land use at and adjacent to the asset is unlikely to be significant enough to warrant remedial action.

Recommendation

Further investigation of the former sewage works is proposed to establish potential sources of contamination.

It is assumed that piling is required in construction of the viaduct structure. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles (for example cruciform, I or H profile piles). Prompt agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

4.10.6.14 Gilson Embankment ch.162+939 to 163+220

This asset is underlain by Glaciofluvial and Glaciolacustrine Deposits. It is located across several agricultural fields east of Gilson village and the M42 and M6 Toll motorways.

There is a small infilled pond (ES LQ 19-38) east of the asset which is located in an area of a proposed attenuation pond which has not been investigated. It is likely that this infill material will be excavated to accommodate the new attenuation pond.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (unnamed drain) within 250m of the asset.

Three soil leachate results from ML163-CR007 are available for this asset. This borehole is located in a field next to Gilson village. One from the Glaciofluvial deposits, the other two from Glaciolacustrine deposits. There were no exceedances of the WQS recorded.

No groundwater testing has been undertaken at the asset.

Contamination risk from soil leachate to controlled water receptors is considered to be Low. Risk from groundwater to controlled water receptors is qualitatively assessed to be Low. Remediation is not likely to be necessary.

4.10.6.15 Gilson Cutting ch.163+220 to 163+760

Gilson Cutting is underlain by Glaciolacustrine Deposits overlying Mercia Mudstone Group bedrock. The asset goes through several agricultural fields east of Junction 8 of the M42.

No soil leachate or groundwater testing has been undertaken at this asset.

No LQ site underlie the alignment of the cutting, and the proposed asset is not envisaged to adversely impact controlled water receptors, if any, it will remove unsuspected contaminant underlie the alignment of the cuttings within excavated material.

The risk from soil leachate and groundwater to controlled water receptors has been qualitatively assessed to be Low.

Remediation is unlikely to be required based on the available data.

4.10.6.16 Lichfield Road Embankment ch.163+760 to 164+035

Litchfield Road Embankment is underlain by Alluvium, River Terrace Deposits and Glaciofluvial Deposits, overlying Mercia Mudstone Group bedrock. This asset goes over an agricultural field at its southern end, and sport pitches for the rest of the asset. These pitches have been levelled with Made Ground. Immediately to the north of the Lichfield Road (A446) is the former Coleshill Gasworks Landfill (ES LQ 19-17).

High TPH concentration and moderate PAH concentration are recorded at ML163-CR020, for a soil sample obtained within Made Ground (0.5m depth). EPH >C8-40 was recorded to be at 2,480mg/kg. Speciation indicate the TPH to be the medium to heavy chain petroleum hydrocarbons of aliphatics C16-44 and aromatics C21-44. PAH was recorded at 19mg/kg. The borehole is in the centre of the sport pitches at the end of a track leading from the sport pitches club house. The source of the organic contaminants may residual contamination from Made Ground used to level the pitches.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (unnamed drain) within 250m of the asset.

There are 18 soil leachate results from eight locations for this asset. These are ML163-CP035, ML163-CP038, ML163-CR008, ML163-CR010, ML163-CR016, ML163-CR020, ML163-TP020 and ML163-TP021, all located within the field of sport pitches. Exceedances of the WQS were recorded for several samples, these are:

- ML163-CP035 in Alluvium at 1m depth for lead and zinc;
- ML163-CP038 in River Terrace Deposits at 0.5m depth for zinc;
- ML163-CR008 in Made Ground at 0.05m and 0.6m depth for zinc, and at 1.2m depth for cadmium, lead and zinc;
- ML162-CR008 in River Terrace Deposits at 1.5m depth for lead and zinc;
- ML163-CR010 in Made Ground at 0.4m depth for cadmium and zinc;
- ML163-CR010 in River Terrace Deposits at 2m depth for zinc;
- ML163-CR016 in Made Ground at 0.5m depth for mercury and zinc;
- ML163-CR016 in River Terrace Deposits at 1m depth for zinc;
- ML163-CR020 in Made Ground at 0.5m depth for chromium, copper, vanadium and cyanide;
- ML163-CR020 in River Terrace Deposits at 0.9m depth for arsenic, chromium and vanadium;
- ML163-CR021a in Made Ground at 0.4m depth for arsenic and lead, and at 0.9m for lead, mercury and zinc;
- ML163-CR021a in Alluvium at 1.5m depth for zinc and chromium VI;
- ML163-TP020 in Glaciofluvial Deposits at 1m depth for cadmium, chromium, lead, zinc and chromium VI;
- ML163-TP021 in Made Ground at 0.05m depth for cadmium, copper, lead, mercury and zinc; and
- ML163-TP021 in River Terrace Deposits at 0.5m depth for cadmium, chromium, lead and zinc.

These exceedances are generally minor except for zinc and chromium VI at 1m depth within ML163-TP020, lead and zinc at 0.05m depth within ML163-TP021 and lead at 0.5m depth within ML163-TP021. The exceptions are an order of magnitude greater than EQS.

Exceedances are generally recorded from samples of Made Ground, however, the underlying natural superficial deposits also recorded several exceedances. Aside from the presence of Made Ground used to level the pitches on-site, no other identifiable source of contaminants is on-site. Exceedances of metals found in the underlying fluvial deposits and Glaciofluvial Deposits suggest it may be reflective of widespread background concentrations. A review of each contaminants exceedance concentrations also show they are generally similar, reinforcing that the concentrations are generally reflective of widespread ground condition, and not from a point source.

One groundwater sample from ML163-CR021a screening the River Terrace Deposits recorded the following exceedances of the WQS: iron, calcium, magnesium, manganese, sulphate, aromatics >C21 – 35 and EPH >C8-40. This is located within the field of sport pitches next to Lichfield Road. Reported exceedances are minor except for iron and manganese, which are not considered to have a significant adverse impact to groundwater quality, and both readily precipitates out in surface water. Furthermore, the contaminant exceedances of groundwater does not exhibit evidence of impact from soil leachates.

LQ site Coleshill Gasworks Landfill (ES LQ 19-17) is located north and north-east of Lichfield Road. The level of contaminants within groundwater is limited and does not indicate the landfill as being the source.

The proposed land use at the locations of exceedances will be the embankment with areas of landscaping on either side. These will reduce surface water infiltration through to the subsurface, mitigating against leachate generation. A balancing pond is proposed immediately west of the northern part of the embankment. The construction of the balancing pond will involve excavating a thickness of Made Ground and underlying natural ground, which will remove a source of leachate contaminants.

Given the available data for this asset, the risk from soil leachate and groundwater to controlled water receptors is assessed to be Low-Moderate.

Recommendations

It is recommended that the cost plan includes for removal of Made Ground from around ML163-CR020 to address the TPH contamination hotspot (2,480mg/kg), which may present a risk of free phase contamination.

Further GI and risk assessment are proposed to define risks associated with this asset and possible remediation requirements.

4.10.6.17 Chattle Hill Box Structure ch.164+035 to 164+116

Chattle Hill Box Structure is underlain by River Terrace Deposits, Till and Glaciolacustrine Deposits, overlying Mercia Mudstone Group bedrock. The viaduct will span over Lichfield Road (A446). North and north-east of the road is the Coleshill Gasworks Landfill (ES LQ 19-17) which is now occupied by woodland (landfill's western extent) and industrial premises. South and west of the asset are sports pitches.

Moderate and high soil TPH concentrations were recorded at ML164-CR029, ML164-CR032, ML164-TP015, ND001-CP049 generally within Made Ground, except at ML164-TP015 where moderate TPH concentrations were recorded in River Terrace Deposits at 0.35m depth. Concentrations range between 204mg/kg and 5840mg/kg. ML164-CR029 recorded the highest TPH concentration, representing a contamination hotspot. Where TPH fractions were tested, it reported the concentrations to predominantly be aliphatics >C16-C35 (low groundwater mobility) and aromatics >C16-C44 (low groundwater mobility).

Moderate and high PAH concentrations were recorded at ML164-CR029 and ML164-TP015 within Made Ground, total PAH concentrations being 53mg/kg and 377mg/kg, respectively.

ML164-CR029 is located within LQ site 19-17 (Coleshill gas works historical landfill and former road haulage), ML164-CR032 and ND001-CP049 are located on the roadside between Lichfield Road and LQ site 19-17, and ML164-TP015 is located within one of sport pitches west of the asset. TPH and PAH concentrations at ML164-CR029, ML164-CR032 and ND001-CP049 are likely a result of the composition of the Made Ground used to development the industrial site over LQ site 19-17 and Lichfield Road. No landfill material was recorded on the borehole logs for these holes.

No definitive source can be identified for high TPH and PAH concentrations at ML164-TP015. The sample is shallow (0.05m) within Made Ground. Concentrations are likely reflective of the Made Ground used to level the sport pitches.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (unnamed drain) within 250m of the asset.

There are 15 soil leachate results from seven locations are available for this asset. These are ML164-CP021, ML164-CP023, ML164-CR029, ML164-CR030, ML164-CR032, ML164-TP015 and ND001-CP049.

ML164-CP021 and ML164-CR029 are located within LQ site 19-17. ML164-CP023, ML164-CR030 and ML164-TP015 are located within or at the boundary of the sport pitches. ML164-CR032 and ND001-CP049 are located on the roadside of Lichfield Road.

Several exceedances of the WQS were recorded for several samples, these are:

- ML164-CP021 in Made Ground at 0.5m depth for arsenic, chromium, copper, nickel and vanadium, and at 3m depth for zinc and chromium VI;
- ML164-CP023 in Made Ground at 0.05m depth for cadmium, copper, lead, mercury, zinc;
- ML164-CP023 in River Terrace Deposits at 1.5m depth for zinc;
- ML164-CR029 in Made Ground at 0.35m depth for chromium, copper, vanadium and chromium VI;
- ML164-CR029 in Till at 4m depth for arsenic;
- ML164-CR030 in River Terrace Deposits at 0.9m depth for cadmium, lead, zinc and chromium VI;
- ML164-CR032 in Made Ground at 0.5m depth for cadmium, copper, lead and zinc;
- ML164-TP015 in Made Ground at 0.05m depth for lead and zinc;
- ML164-TP015 in River Terrace Deposits at 0.35m depth for cadmium, copper, lead, mercury, zinc and chromium VI;
- ML164-TP015 in Glaciolacustrine Deposits at 1.1m depth for cadmium, copper, lead, vanadium, zinc, cyanide, and at 1.7m depth for cadmium, lead and zinc; and
- ND001-CP049 in Made Ground at 0.4m depth for cadmium, copper and zinc, and at 0.6m depth for cadmium, copper, lead, mercury, vanadium and zinc.

WQS exceedances were recorded in the Made Ground, sampled at all locations except ML164-CR030, for metals including arsenic, chromium, chromium VI, cadmium, copper, nickel, lead, mercury, vanadium and zinc.

WQS exceedances for metals; cadmium, chromium VI, copper, mercury, lead and zinc were recorded in leachate samples within the River Terrace Deposits (ML164-CP023, ML164-CR030 and ML164-TP015).

An exceedance of arsenic was recorded in leachate sample in Till (ML164-CR029).

Exceedances recorded are generally minor, except for copper at ML164-CP021 and cyanide at ML164-TP015, these are an order of magnitude greater than its WQS. It should be noted however that no free cyanide was detected in solid samples from ML164-TP015.

ML164-CP021 and ML164-CR029 located within LQ site 19-17 did not encounter landfill material. The source of the contaminants likely reflective of the composition of Made Ground. Arsenic exceedance within Till at 4m is likely to be reflective of natural concentrations. The Till underlying this location will also mitigate against vertical contaminant migration to the bedrock aquifer.

At locations ML164-TP015 and ML164-CP023 contaminant sources, especially within the River Terrace Deposits, will likely be removed as these are located within an area of a proposed balancing pond; assuming it will be excavated out, cutting off any leachate creation processes.

Locations at and south of the A446 are not within an LQ site but did contain a layer of Made Ground overlying the shallow natural superficial deposits. The Made Ground includes the inclusion of brick fragments, tarmac, charcoal, plastic, and “wire”. It is likely that the Made Ground, derived from sports pitches creation, is a source of the contamination. It is likely that the substantial thickness of Till underlying this area will mitigate against vertical migration of contaminants to the bedrock aquifer.

Two locations had groundwater samples taken at ML164-CR029 and ND001-CP049.

ML164-CR029 in the Mercia Mudstone Group recorded significant exceedances of iron (208mg/l), manganese (74mg/l) and sulphate (2850mg/l), and minor exceedances of calcium, ammoniacal nitrogen, chloroethene, aromatic >C21-35, sodium, potassium and EPH >C8-40. Iron and manganese are not considered to have a significant adverse effect to groundwater. Sulphate concentrations are likely due to the nature of the Mercia Mudstone bedrock which is pyritic.

ND001-CP049 in the Made Ground recorded a significant exceedance of iron (236mg/l) and manganese (3mg/l), along with minor exceedances of magnesium, manganese, sodium, sulphate, zinc, EPH >C8-40 and aromatics >C16 – 21. Iron and manganese are not considered to have a significant adverse effect to groundwater.

The source of metal groundwater contaminants, specifically iron, manganese and sulphate is to predominantly be due natural background sources. For the minor exceedances of organic compounds (maximum recorded concentration of 0.053mg/l) it is likely due to the industrial development at LQ site 19-17 and the surrounding region, reflective of a wider, poor quality groundwater condition.

Minimal works are associated with the Chattle Hill Box Structure in the Coleshill Gasworks Landfill other than utility works. Potential remediation requirements to address risks from the landfill are considered for Watton House East and West Viaducts in section 4.10.6.18 below.

Based on the review of available data, the risk from soil and soil leachate to controlled water receptors is assessed as Moderate, and the risk from groundwater to controlled water receptors as Moderate.

Recommendations

It is recommended that the cost plan includes for removal of Made Ground from around ML164-CR030 to address potential risks from leachates in soils to groundwater and stabilisation prior to recovery under an MMP. Elsewhere it assumed that the box structure and attenuation pond will significantly reduce leachate creation.

The TPH contamination hotspot at ML164-CR029 (5840mg/kg) is considered to present a risk of free phase contamination which is likely to warrant remedial action. This can be the removal of soil around the location and bioremediation / stabilisation for re-use in scheme.

Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles. Prompt agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

4.10.6.18 Watton House East and West Viaduct ch.164+116 to 164+327

Watton House East and West Viaducts are underlain by River Terrace Deposits and Till, overlying Mercia Mudstone bedrock. The viaducts span over predominantly wooded land and industrial park between Lichfield Road (A446) and the Birmingham to Nuneaton Railway (ES LQ 19-24). The land is within the boundary of the former Coleshill Gasworks Landfill (ES LQ 19-17), which extends east of the asset. North of the asset and LQ site 19-24 is occupied by Coleshill Sewage Treatment Works (ES LQ 19-25).

Moderate soil concentrations of TPH were recorded in Made Ground at ML164-CP003, ML164-CP004, ML164-CR009, ML164-CR011, ML164-CR046a and ML164-TP011. Depths range between 0.05m and

4m. Recorded concentrations range between 132mg/kg and 554mg/kg. Moderate concentrations of PAH were recorded in Made Ground at ML164-CP003 and ML164-CP004, at 2m and 1m depth, respectively. PAH concentrations range between 13.1mg/kg and 33mg/kg. These locations of are within the boundaries of the former Coleshill Gasworks Landfill or the Coleshill Sewage Treatment Works, and likely reflective of the composition of Made Ground and the historical development at these sites.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (unnamed drain) within 250m of the asset.

There are 17 soil leachate results from six locations are available for this asset. These are located within the former Coleshill Gasworks Landfill (ML164-CP003, ML164-CP004 and ML164-CR046a) or within the Coleshill Sewage Treatment Works (ML164-CR009, ML164-CR011 and ML164-TP011).

Several exceedances of WQS are recorded, these are:

- ML164-CP003 in Made Ground at 0.9m for arsenic, chromium, vanadium and chromium VI, and at 2m for chromium, copper and vanadium;
- ML164-CP003 in Till at 3.5m for arsenic;
- ML164-CP004 in Made Ground at 1m for arsenic, chromium, copper, selenium, vanadium, chromium VI and ammoniacal nitrogen, and at 4m for vanadium;
- ML164-CR009 in Made Ground at 0.05m for cadmium, copper, lead, mercury, zinc and chromium VI, and at 0.4m and 1.5m for zinc;
- ML164-CR011 in Made Ground at 0.3m for zinc, at 0.75m for cadmium, copper, lead, mercury and zinc;
- ML164-CR011 in River Terrace Deposits at 1.1m for mercury and chromium VI;
- ML164-CR046a in Made Ground at 0.8m for chromium and vanadium, at 1.2m for vanadium, and at 2.3m for chromium, lead, nickel and zinc;
- ML164-TP011 in Made Ground at 0.7m for cadmium; and
- ML164-TP011 in River Terrace Deposits for zinc.

Leachate exceedances were predominantly recorded within Made Ground, likely associated with the historical development at LQ sites 19-17 and 19-25. Most of the exceedances are minor, except for vanadium at ML164-CP003 in Made Ground (2m), at ML164-CP004 in Made Ground (1m and 3m) and ML164-CP004 in Made Ground (4m), and mercury at ML164-CR009 in near surface Made Ground (0.05m). These are over a magnitude greater than their WQS.

Two groundwater samples were available for this asset, which are from ML164-CR009 (screened the Mercia Mudstone bedrock) and ML164-CR046a (screened the Till).

Exceedances from ML164-CR009 include iron, zinc, calcium, manganese, sodium, potassium, ammoniacal nitrogen as N, sulphate, chloroethene, aromatics >C16-21, fluoranthene, aromatics >C21-35 and EPH >C8-40. Exceedances of iron, zinc, manganese, aromatics >C21-35 and EPH >C8-40 are a magnitude greater than their WQS. Sulphate concentration was recorded at a high concentration (2100mg/l), but this is likely reflective of the natural condition of Mercia Mudstone Group bedrock as it is pyritic.

ML164-CR046a recorded exceedances of arsenic, iron, nickel, vanadium, manganese, potassium, ammoniacal nitrogen as N, chloroethene, aromatics >C16-21, aromatics >C12-16, aromatics >C8-10, anthracene, benzene, naphthalene, aromatics >C10-12, fluoranthene, aromatics >C21-35, 1,3,5 Trichlorobenzene and EPH >C8-40. Exceedances for iron, ammoniacal nitrogen, chloroethene, aromatics >C10-12, aromatics >C12-C16, aromatics >C16-21, anthracene, naphthalene, fluoranthene and EPH >C8-40 are a magnitude greater than their WQS.

Given the presence LQ site 19-17 and 19-25 at the groundwater locations, recorded exceedances particularly the organic contaminants are likely to be associated with the former gasworks landfill and the sewage works. Furthermore, the industrial history of the region would likely have contributed to the groundwater quality of the region.

Given the available data the risk from soil and soil leachate to controlled water receptors is assessed to be Moderate / Low, and the risk from groundwater to controlled water receptors is assessed to be Moderate.

Recommendations

There is not considered to be a requirement for large scale soil remediation as the data indicates there are generally minor leachate exceedances in the unsaturated zone.

It is considered that the groundwater contamination in ML164-CR046a does warrant remediation. This could be a pump and treat system with an ex-situ water treatment plant or in-situ advanced chemical treatment of ground at the location.

There are also risks related to the creation of piling pathways allowing pollution of the underlying aquifer by heavy metals and hydrocarbons and risks to on and off-site receptors from phenols, TPHs and PAHs (principally naphthalene) in groundwater. It is recommended that remedial actions are included in the target cost to eliminate, reduce or control these risks.

Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles. Prompt agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

Further ground investigation is proposed in the former landfill to develop the remedial scope.

Remedial options to address groundwater contamination are included in Section 7.

4.10.6.19 Watton House Embankment ch.164+327 to 164+538

The Watton House Embankment is underlain by Alluvium and River Terrace Deposits, overlying Mercia Mudstone bedrock. The embankment supports the Mainline which traverses over and adjacent Coleshill sewage treatment works (ES LQ 19-25), an infilled engineered pond (ES LQ 19-16), and a smaller infilled natural pond (ES LQ 19-56). Neither of these ponds have yet been subject to investigation.

Moderate and high soil concentrations of TPH were recorded at ML164-CP036, ML164-CR013 and ML164-CR404, all within Made Ground except for the latter which was recorded for an Alluvium sample at 4m depth. These are located in vegetated land adjacent to the west of the sewage works and an infilled engineered pond. Concentrations generally range between 112mg/kg and 365mg/kg, except at ML164-CR013 at 1m bgl which recorded EPH >C8-40 at 8080mg/kg. This is considered to potentially pose a risk of free phase contamination which is likely to warrant remedial action. Moderate soil concentration of PAH was recorded at ML164-CR404 within Made Ground at 0.05m bgl (20mg/kg total PAH).

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (River Tame and unnamed drain) within 250m of the asset.

There are 13 soil leachate results from five locations available for this asset. These are ML164-CP010, ML164-CP036, ML164-CR013, ML164-CR044 and ML164-CR045. ML164-CP010 and ML164-CR044 are within the boundary of the sewage works, and the remaining three locations being adjacent to the west of the sewage works and infilled engineered pond.

Several exceedances of the WQS were recorded, these are:

- ML164-CP010 in Made Ground at 0.5m depth for mercury and zinc, and at 1m for cyanide;

- ML164-CP036 in Made Ground at 3m depth for zinc and chromium VI;
- ML164-CP036 in Alluvium at 5m depth for zinc;
- ML164-CR013 in Made Ground at 0.2m depth for arsenic, cadmium, chromium, copper, mercury, selenium, chromium VI and cyanide, and at 1m for cadmium and zinc;
- ML164-CR013 in Alluvium at 4m depth for arsenic, cadmium, chromium, copper, lead, vanadium and zinc;
- ML164-CR044 in Made Ground at 2m depth for arsenic, chromium, mercury, chromium VI and cyanide;
- ML164-CR045 In Made Ground at 0.8m depth for arsenic, chromium, zinc and chromium VI, and 1.2m for arsenic and vanadium; and
- ML164-CR045 in River Terrace Deposits at 3m depth for lead and zinc.

These exceedances are generally minor and predominantly recorded for samples of Made Ground. Except for exceedances of cyanide from ML164-CP010 at 1m bgl, cyanide from ML164-CR013 at 0.2m, cadmium, lead and zinc from ML164-CR013 at 4m, and cyanide from ML164-CR044 at 2m. These exceedances were an order of magnitude greater than their WQS. However no free cyanide was detected in soil samples indicating that the cyanide is present in stable low toxicity complexes.

Based on the results, the likely source for the majority of the contaminants would be the Made Ground at these locations, given the similarity of metal exceedances between the locations. Exceedances of metals within Alluvium at 4m depth at ML164-CR013 is likely reflective of the overlying Made Ground as the metal exceedances suggest it is impacted by the overlying Made Ground. ML164-CR013 is the location which exhibited high concentrations of soil TPH, and the soil leachate exceedances within Made Ground and Alluvium have the potential to impact groundwater.

One groundwater sample from ML164-CP036 screened within the Mercia Mudstone Group is available for this asset. The sample was taken within 50m west of the Coleshill sewage treatment works and is within the LOD. The sample showed high suspended solids and recorded exceedances of iron, zinc, manganese and EPH >C8-40; iron and manganese exceedances being an order of magnitude greater than its WQS. The high suspended solids alongside inorganic contaminants could be associated with sediment entrainment into the sample. The limited contaminants exhibited by the groundwater sample does not indicate it to be affected by soil leachate contamination available for the asset.

Given the available data the risk from soil and soil leachate to controlled water receptors is assessed to be Moderate / Low, and the risk from groundwater to controlled water receptors is assessed to be Low.

Recommendations

It is considered that risks from leachate metals and soil TPH in ML164-CR013 are likely to be enough to warrant remedial target cost items to reduce, eliminate or control impacts on controlled waters. This can be achieved from removal of Made Ground at and around the location and undertake bioremediation / stabilisation prior to re-use in scheme.

Elsewhere, within the asset area, the embankment is likely to result in the removal of a significant proportion of Made Ground beneath the site and reduce surface water infiltration; mitigating against leachate generation. This will also result in a betterment of groundwater quality beneath the site.

Further GI and risk assessment are required to define risks associated with this asset and possible remediation requirements.

4.10.6.20 Water Orton No.1, No.2 and No.3 Viaducts ch.000+791 (NC) to 001+018 (NC) (Formerly Watton Lane Embankment)

This section considers contamination risks beneath the section of the Water Orton Viaducts between the River Tame and the existing railway in the south. Under the Hybrid Bill the North Chord asset was to be the Watton Lane Embankment, but this has been replaced with an extended section of the Water Orton, No 1, 2 and 3 Viaducts. These assets are in the vicinity of two ES sites, a former works including coal and cement block factory (19-49) to the west and Coleshill sewage treatment works (19-25) to the east.

This asset is underlain by Alluvium and River Terrace Deposits, overlying Mercia Mudstone bedrock.

Moderate soil concentrations of TPH were recorded at ND000-CR001 and ND000-CR020 within Made Ground. Concentrations ranged between 153mg/kg and 334mg/kg.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (River Tame and unnamed drain) within 250m of the asset.

There are 11 soil leachate results from five locations available for this asset. These are ND000-CR001, ND000-CR020, ND000-TP035, ND001-CP002 and ND001-CR001; the first two are within the LOD with the latter three outside of the LOD.

Several exceedances of the WQS are recorded, these are:

- ND000-CR001 in Made Ground at 0.5m depth for zinc, and at 2m for mercury, zinc and chromium VI;
- ND000-CR020 in Made Ground at 0.4m depth for copper, mercury and zinc, at 1m for arsenic, copper, mercury, selenium and vanadium, and at 5m for zinc;
- ND000-TP035 in Made Ground at 0.4m for copper mercury, zinc, chromium VI and cyanide;
- ND000-TP035 in River Terrace Deposits at 0.8m depth for cadmium, copper, mercury, zinc and cyanide;
- ND001-CP002 in Made Ground at 0.5m depth for cadmium, copper, lead, mercury and zinc;
- ND001-CP002 in Alluvium at 1m depth for lead, vanadium and zinc; and
- ND001-CR001 in Made Ground at 0.5m depth for lead and zinc.

These exceedances are generally minor and from samples within the Made Ground. Exceedances of copper at ND000-CR020 at 1m bgl, and cyanide at ND000-TP035 at 0.4m bgl and ND000-TP035 at 0.8m bgl are a magnitude greater that their WQS. It should be noted that no free cyanide was detected in soil samples from ND000-TP035 indicating that it is present in low toxicity complexed forms.

Ten samples recorded minor exceedances of the WQS. For the eight samples taken from the Made Ground exceedances were all for metals and comprised: arsenic, copper, hexavalent chromium, lead, mercury, selenium, vanadium and zinc.

The nearest groundwater sample is from ML164-CP036 (for Watton House Embankment) from a standpipe responding to River Terrace Deposits and the Mercia Mudstone. This recorded minor exceedances of EPH>C8-40 and zinc, and major exceedances for iron and manganese, the latter of which are considered to be natural in origin. The anthropogenic groundwater contamination is unlikely to be sufficient to warrant remedial action.

The main contamination risks are likely to be result around ND000-TP035, ND000-CR020 and ND000-CR001 where the narrow viaduct and a small access road are unlikely to restrict leachate creation from soils.

Based on the available data the risk from soil and soil leachate to controlled water receptors is Moderate / Low, and the risk from groundwater to controlled water receptors is Low.

Recommendations

The area beneath the viaduct is scheduled under the Hybrid Bill to be purchased by HS2, although it is unclear whether this is still to be the case with the current design. While further groundwater monitoring is proposed to establish the risks of soil and leachate contamination on groundwater, it is recommended that a risk register item is included for the ex-situ stabilisation of Made Ground in the area to address potential risks to controlled waters.

Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles. Prompt agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

4.10.6.21 Water Orton No 3 Viaduct and Water Orton No1 Viaduct ch.001+018 (NC) to 001+653 (NC)

The Water Orton Viaducts are underlain by River Terrace Deposits and Glaciolacustrine Deposits, overlying Mercia Mudstone bedrock. This asset contains Water Orton, No 1, 2 and 3 Viaducts which run parallel to each other. The section of the asset considered in this section of the report is located between the Birmingham – Nuneaton Railway (ES LQ site 19-24) and the southern end of the assets to the west of the M42 crossing.

The viaducts goes over the ES LQ sites of the former Coleshill Gas Works Landfill (19-17) Birmingham to Nuneaton Line (19-24) and an infilled pond (19-46) are within the footprint of the viaduct at its northern end.

There are three ES LQ sites associated with this this section of the assets, LQ site 19-17 Coleshill Gas Works Landfill, 19-24 Birmingham to Nuneaton Line and 19-46 an infilled pond are within the footprint of the viaduct.

Moderate and high soil concentrations of TPH are recorded in Made Ground samples from ND001-CR002, ND001-CR013, ND001-CR014, ND001-CR022, ND001-CR031, ND001-CR040, ND001-CR042 and ND001-WS003. Concentrations recorded are generally moderate and range between 106mg/kg and 134mg/kg, except at ND001-CR014 and ND001-CR042 which recorded high concentrations at 2290mg/kg and 1130mg/kg, respectively. The locations with high concentrations potentially pose a risk of free phase contamination which is likely to warrant remedial action.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (Unnamed drain) within 250m of the asset.

There are 26 soil leachate results from 16 locations are available for this asset. These are NC120-CR401, ND001-CP043, ND001-CR002, ND001-CR011, ND001-CR013, ND001-CR014, ND001-CR017, ND001-CR022, ND001-CR031, ND001-CR040, ND001-CR041, ND001-CR042, ND001-CR043, ND001-TP002, ND001-WS002 and ND001-WS003. No testing has yet been performed within LQ identified LQ sites.

However, locations ND001-CP043, ND001-CR011, ND001-CR013, ND001-CR014, ND001-CR017, ND001-CR040, ND001-CR042, ND001-CR043, ND001-TP002, ND001-WS002 andND001-WS003 are within the field of sport pitches adjacent to Lichfield Road, where Made Ground was used to level the site.

Of the 26 samples, 25 recorded exceedances of the WQS, these are located predominantly in the field of sport pitches located between the A446 and the M42 Motorway. The following notable exceedances (an order of magnitude greater than the WQS) recorded:

- NC120-CR401: 3.1mg/l of ammoniacal nitrogen at 0.3m and 2.7mg/l at 1.0m in the River Terrace Deposits;

- ND001-CP043: 0.078mg/l of chromium VI and 0.265mg/l of lead at 0.5m in the River Terrace Deposits;
- ND001-CR011: 0.128mg/l of lead at 1.2m in River Terrace Deposits;
- ND001-CR013: 0.445mg/l of zinc at 0.5m in Made Ground;
- ND001-CR017: 0.186mg/l of chromium VI at 1.2m in the River Terrace Deposits;
- ND001-CR042: 0.107mg/l of chromium, 0.2mg/l of mercury and 0.106mg/l of chromium VI at 0.5m in Made Ground; and
- ND001-TP002: 0.377mg/l of cadmium at 0.5m in Made Ground.

Exceedances were generally recorded for samples of Made Ground. In-addition to the above, there were minor exceedances of the WQS for arsenic, cadmium, chromium (III and VI), copper, lead, vanadium and zinc.

The source of this contamination is likely to be the Made Ground used to construct playing fields in the area. However, the contamination levels appear to be consistent with topsoil in agricultural areas to the south of the asset which shows regular exceedances of WQS for copper, zinc and some other heavy metals.

One groundwater sample was taken at ND001-CR002 which screened the Glaciolacustrine Deposits, it is located by the Birmingham to Nuneaton Line. There were notable exceedance for iron (233mg/l), manganese (4.93mg/l) and sulphate (1580mg/l) as SO_4. Other minor exceedances included; calcium, magnesium, EPH >C8-40, aromatics >C16 – 21, sodium and potassium. Iron, manganese, sulphate, magnesium and calcium are likely to be natural in origin. Exceedances of TPH are likely reflective of the industrial development which occurred in the region, concentrations of which are unlikely to be sufficient to warrant remedial action.

Further groundwater testing is scheduled to assess the impact of widespread leachate exceedances of groundwater within the superficial deposits along the asset.

The main risks identified at this site relate to the creation of piling pathways allowing pollution of the underlying aquifer.

Based on the review of available data, the risk from soil, soil leachate and groundwater to controlled water receptors is Moderate / Low.

Recommendations

The area beneath the viaduct is not scheduled to fall under the permanent ownership of HS2. Nevertheless, widespread leachate exceedances have been observed in Made Ground associated with the Made Ground used to construct sport pitches on the site. Following the receipt of further scheduled GI data, DQRA will be required to assess the risks of leachate contamination, to controlled waters. In the meantime, it is recommended that a risk register item for removal and ex-situ stabilisation of soils beneath viaduct is entered. An alternative remediation option is to surface the area with impermeable material to restrict leachate generation.

Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles. Prompt agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

4.10.6.22 Marsh Lane Embankment ch.002+814 (NC) to 003+650 (NC)

Marsh Lane Embankment is underlain by River Terrace Deposits and Glaciolacustrine Deposits, overlying Mercia Mudstone group. It goes over predominately agricultural land to the south of Water

Orton. Three infilled ponds (ES LQ 19-45, 19-43 and 19-40) are located to the north of the alignment is land proposed to be subject to extensive landscaping as part of the scheme

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (Unnamed pools and ditches) within 250m of the asset.

Three soil leachate results from through locations are available for this asset, two inside the LOD (ND002-CR013 & ND003-CR004) and one outside the LOD (ND002-CP019 – located in ES LQ 19-40).

Several exceedances of the WQS were recorded, these are:

- ND002-CP019 in Made Ground at 1.5m depth for boron and zinc;
- ND002-CR013 in Made Ground at 0.2m depth for cadmium, copper, lead and zinc; and
- ND003-CR004 in Made Ground at 0.6m depth for cadmium, chromium, copper, lead, mercury, vanadium and zinc.

The heavy metal leachate data is broadly consistent with other agricultural land in the Delta. All of the leachate test holes were underlain either by Mercia Mudstone, glacial till, or in the case of ND002-CR013 a 200mm thick layer of alluvium. These strata are not considered to be sensitive to contamination and are likely to exhibit highly restricted contaminant mobility.

This contamination is not considered to be significant and no remediation is likely to be required.

No groundwater data was available for review.

The risk from soil leachate to controlled water receptors is assessed to be Low. The risk from groundwater to controlled water receptors is qualitatively assessed to be Low.

4.10.6.23 River Cole West Viaduct ch.162+130 (BS) to 162+235 (BS)

The River Cole West Viaduct is underlain by Alluvium overlying Mercia Mudstone bedrock. The viaduct goes over an agricultural field. There are no ES LQ sites in the vicinity of this asset and no contamination data. Risks from soils to controlled waters are therefore assumed to be Low, although it is acknowledged that the general area of the Delta is elevated with regard to heavy metals in leachates. The source of such contamination appears to be highly dispersed agricultural activity. As a result, it is unlikely to be feasible to address contamination sources which may be affecting groundwater in granular superficial deposits recorded in the area.

The asset is in the vicinity of the River Cole Diversion. This diversion is unlikely to pass through areas of distinctly different contamination characteristics to those currently pertaining. This suggests that the long-term net contamination impact of the proposed diversion is unlikely to be significantly different to the baseline.

Recommendations

Groundwater sampling is recommended from the area of the proposed river diversion to allow contamination dilution modelling. Since the source of contamination is regional, it is questionable whether a lining the diversion to restrict contaminant entry is likely to be beneficial.

Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles. Prompt agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

4.10.6.24 Green Lane Embankment ch.162+235 (BS) to 163+347 (BS)

Green Lane Embankment is underlain by localised areas of Head deposits and Glaciofluvial Deposits, overlying Mercia Mudstone bedrock. It goes through an area predominated by agricultural fields. The asset is located in the vicinity of some former hospital tanks (ES LQ 19-38) and a former electricity substation (ES LQ 19-35), although no construction is proposed over the latter feature.

Moderate concentration of TPH was recorded at BD163-CR006 in Made Ground (165mg/kg). This is located within an agricultural field within the asset's alignment.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (Unnamed ditch) within 250m of the asset.

Seven soil leachate results from five locations are available for this asset. These are BD162-CP044, BD162-CR003, BD162-CR020 and BD163-CR006 which are within the LOD, and BD163-WS001 which is outside the LOD.

Several exceedances of the WQS were recorded, these are:

- BD162-CP044 in Made Ground at 0.7m depth for cadmium, copper, lead and zinc;
- BD162-CR003 in Till at 0.5m depth for lead and zinc;
- BD162-CR020 in Made Ground at 0.5m depth for cadmium, chromium, copper, lead, zinc and chromium VI;
- BD162-CR020 in Till at 1m depth for cadmium, zinc and chromium VI; and
- BD163-WS001 in Made Ground at 0.2m depth for zinc, and at 0.5m for lead, zinc and chromium VI.

These exceedances were generally minor, except for zinc concentrations at BD162-CP044 and BD162-CR020 in Made Ground which were an order of magnitude greater than its WQS. The source of this contamination is likely to be the Made Ground and agricultural land use in the region, which may have been derived from historic sludge applications. Given similarity with heavy metal leachate data in the Delta Junction area, it may also be reflective of a regional contamination issue.

No groundwater data was available.

Leachate tests were undertaken in or over areas of Till overlying Mercia Mudstone bedrock which has a limited ability to transmit pollutants. BD162-CP044 recorded a thin horizon of glaciofluvial deposits (300mm thick) which is unlikely to represent a significant contamination migration pathway for leachates. BD163-WS001 recorded a 0.9m thick layer of Head composed of fine material but given the limited exceedances and lack of significant exceedances, a significant risk from contamination is unlikely. Contamination risks from soils to controlled waters are therefore regarded as Low and are unlikely to warrant remedial action.

4.10.6.25 M42 - M6 Motorway Link East and West Viaducts ch.163+347 (BS) to 163+550 (BS) and southern end of Attleboro Farm Embankment ch. 163+505

The M42 – M6 Motorway Link West Viaduct is underlain by Mercia Mudstone bedrock. The viaducts will span over the M42 Motorway in an area of agricultural fields. Note that a possible backfilled borrow pit (see Section 1.11.6) lies under the northern part of the viaduct and extends off to the west.

Moderate soil concentrations of TPH were recorded at BD163-CR014 and BD163-TP016, both within the area of the possible backfilled borrow pit. Concentrations were 107mg/kg and 272mg/kg.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (Unnamed pool) within 250m of the asset.

There are 13 soil leachate results available for this asset, from six locations. These are BD163-CP043, BD163-CR014, BD163-CR022, BD163-TP013, BD163-TP013a and BD163-TP016. These are within the possible backfilled borrow pit.

Several exceedances of the WQS were recorded, these are:

- BD163-CP043 in Made Ground at 3m and 5m depth for zinc;

- BD163-CR014 in Made Ground at 0.5m depth for lead, mercury, zinc and chromium VI, in 2m for zinc, and 4m for lead and zinc;
- BD163-CR022 in Made Ground at 7m depth for zinc and cyanide, and 9m and 12.8m for zinc;
- BD163-TP013 in Made Ground at 0.8m depth for zinc;
- BD163-TP013a in Made Ground at 1.5m for cadmium and zinc; and
- BD163-TP016 in Made Ground at 0.6m and 2.3m depth for zinc.

Most of these exceedances are minor, except for lead in BD163-CR014 at 4m depth, and cyanide in BD163-CR022 at 7m. These exceedances may be reflective of the material deposited within the potential backfilled borrow pit, however, given the numerous exceedances of heavy metals in the Delta Junction area, particularly zinc, it is more likely to be reflective of a regional contamination issue. It is furthermore noted that non free cyanide was detected in soil samples from BD163-CR022 indicating that it is present in low toxicity complex forms.

One groundwater sample was taken at BD163-CR017 (inside the LOD), the hole is located within an agricultural field. This sample was from the Mercia Mudstone Group and had significant exceedances of the WQS for iron, ammoniacal nitrogen and EPH >C8-40, and minor exceedances for arsenic, magnesium, manganese, potassium, TPH (aliphatic >C10-16, aromatic >C16-44).

A comparison of contaminants between soil leachate results from the borrow pit and the groundwater sample east of it suggest the two are not linked, due to the difference in determinants which exceed the WQSs. Boreholes within the borrow pit record Made Ground to generally overlie the Mercia Mudstone bedrock, suggesting if a pathway is present then the groundwater concentration would better reflect the leachate results of the borrow pit. It is likely that the groundwater contaminants are reflective of a wider, poor groundwater aquifer of the region.

A public right of way is proposed over the backfilled borrow pit (footpath M55). The far north-eastern corner of the borrow pit is to form the southern part of Attleboro Farm Embankment. This formation in this section of the embankment is to be subject to shallow dig and replace to a depth of 1.5m in an area of 5.7m of made ground.

Given the generally minor soil leachate exceedances at the borrow pits at an area with shallow footpath works, and the lack of identifiable source for the groundwater contamination, remediation is unlikely to be considered necessary at this asset without or outside of the area of the borrow pit.

Based on the available data the risk from soil and soil leachate to controlled water receptors is assessed to be Low. The risk from groundwater to controlled water receptors is assessed to be Moderate / Low.

Recommendations

The main risks identified at this site relate to the creation of piling pathways allowing pollution of the underlying aquifer. Further GI including obtaining groundwater quality data is proposed to define risks associated with this asset.

Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). The adoption of non-displacement cast-in-situ piling methods is generally preferable to minimise voiding between the pile and soil. However, displacement piling methods may be suitable provided that piles do not have re-entrant angles. Prompt agreement with the EA is required to agree the most acceptable solutions within the context of the assessment framework.

Further GI is proposed in the area of the borrow pit to be occupied by Attleboro Embankment to establish the presence of groundwater contamination. However even if contamination is encountered in this area it is considered unlikely that remediation to address groundwater contamination risks would be reasonable given the limited extent of deep groundworks proposed in this area.

4.10.6.26 Water Orton Cutting ch.163+882 (BS) to 165+585 (BS)

Water Orton Cutting is underlain by intermittent deposits of glacial Till and rare thin Glaciofluvial Deposits, and Mercia Mudstone which are likely to greatly limit of the mobility of aqueous contaminants. The asset cuts through an area of agricultural fields and there are no ES sites associated with this asset.

For the WQS both DWS and EQS are considered to be applicable for this asset as there are surface water features (Unnamed pool) within 250m of the asset.

One soil leachate result from BD164-CR011 at 0.7m in the Made Ground is available for this asset. It recorded minor exceedances of the WQS for cadmium, lead and zinc.

Two groundwater samples from BD164-CR003 are available for this asset. The borehole is located within an agricultural field, with both samples sampled from the Mercia Mudstone bedrock. It recorded several exceedances, these are:

- BD164-CR003 at 4.24m depth: significant exceedance of iron and manganese, and minor exceedances of magnesium, nitrate, EPH >C8-40; and
- BD164-CR003 at 7.75m depth: significant exceedance of iron, and minor exceedances of magnesium, manganese, nitrate, aromatics >C21-35 and EPH >C8-40.

Exceedances between the two groundwater samples are similar and indicate it's likely to be from the same aquifer.

A comparison between soil leachate results and groundwater results show little evidence of a link between soil contamination and groundwater contamination, however any soil sources are likely to be removed by the cutting works. No identifiable source can be linked to groundwater contamination, given the industrial history of the region, contaminants may be reflective of a wider, poor groundwater aquifer.

Based on the available information the risk from soil leachate to controlled water receptors is Very Low, and the risk from groundwater to controlled water receptors is Moderate / Low.

Recommendations

If the cutting is subject to drainage, a risk assessment will be required in accordance with the EA H1 Methodology to inform an Environmental Permit application. Further ground investigation is proposed to allow refinement of the conceptual model in this area.

4.11 Risks from soils and groundwater to Property (SPR Linkages S1a, S2a, S2b, S3a, S3b – P4, P6 – R6)

At present there are insufficient data to determine the aggressive chemical environment for concrete (ACEC) and design sulphate class (DSC) in accordance with the guidance presented in BRE Special Digest 1:2005[xlii]. The Detailed Design Ground Investigation Report envisaged to be produced during Stage 2 of the Scheme will contain information on concrete classification.

It is recommended that the GIR is read in-conjunction with this report.

4.12 Potable Water Supply Pipes

4.12.1 Risk to Modified Water Mains

Current development proposals include the modification of water mains at several locations along the route. These are:

- at the boundary of Sub-Lot 2 and 5, as presented in Figure 40;
- between ch.155+000 and ch.155+250, as presented in Figure 40;

- between ch.155+550 and ch.155+800 east of the alignment, as presented in Figure 40;
- between ch.155+750 and ch.156+400, extending from east of the alignment to Junction 6 of the M42 to the west, as presented in Figure 40;
- between ch.156+650 and ch.157+850 (within the BIS Triangle), as presented in Figure 40 and Figure 41;
- between ch.159+700 and ch.159+850, as presented in Figure 42;
- between ch.161+300 and 161+500, as presented in Figure 42;
- between ch.162+900 and 163+300, as presented in Figure 43;
- between ch.164+000 and 164+150, as presented in Figure 43;
- between ch.164+300 and 164+500, as presented in Figure 43;
- at the boundary of Sub-Lot 6 and 8 between ch.000+450(NC) and ch.001+050(NC), as presented in Figure 43;
- between ch.1+000(NC) and ch.001+050(NC), as presented in Figure 43;
- between ch.1+450(NC) and ch.001+600(NC), as presented in Figure 43; and
- between ch.2+900(NC) and ch.003+200(NC) extending north of the alignment to south of the Birmingham Spur alignment, as presented in Figure 43.

Figure 40: Modified Sections of Water Mains between ch.154+400 and ch.157+100

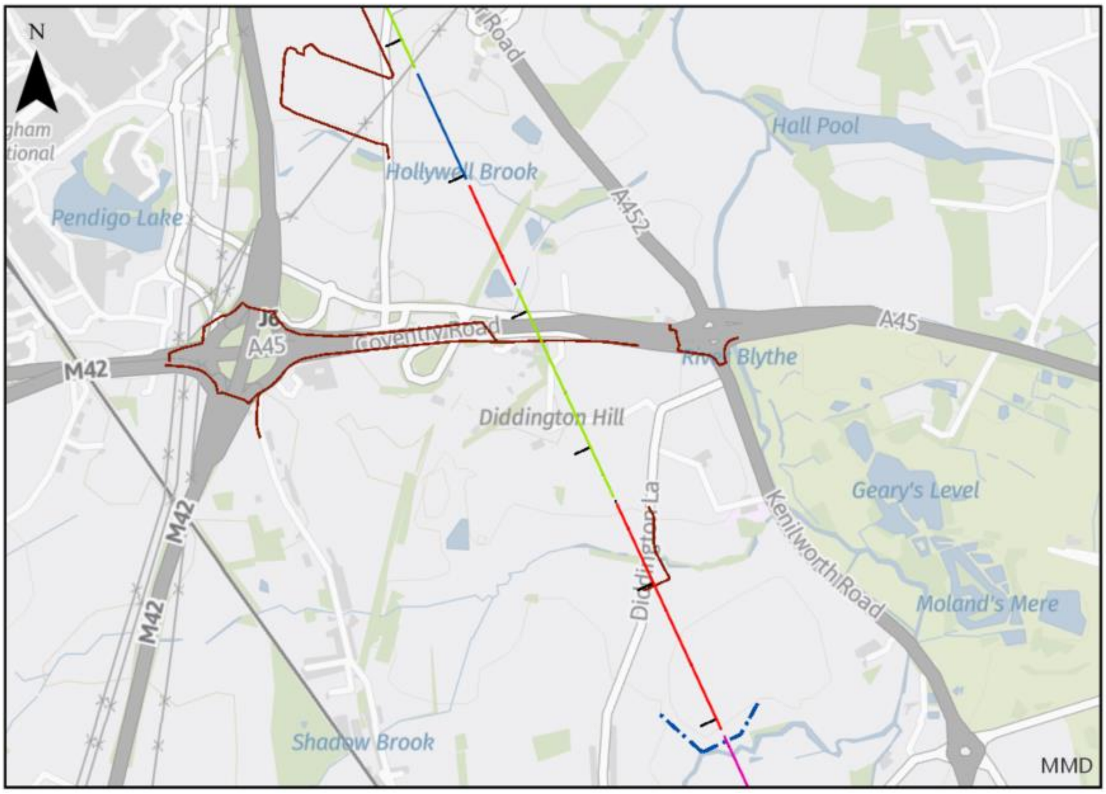


Figure 41: Modified Sections of Water Mains between ch.157+100 and ch.159+600

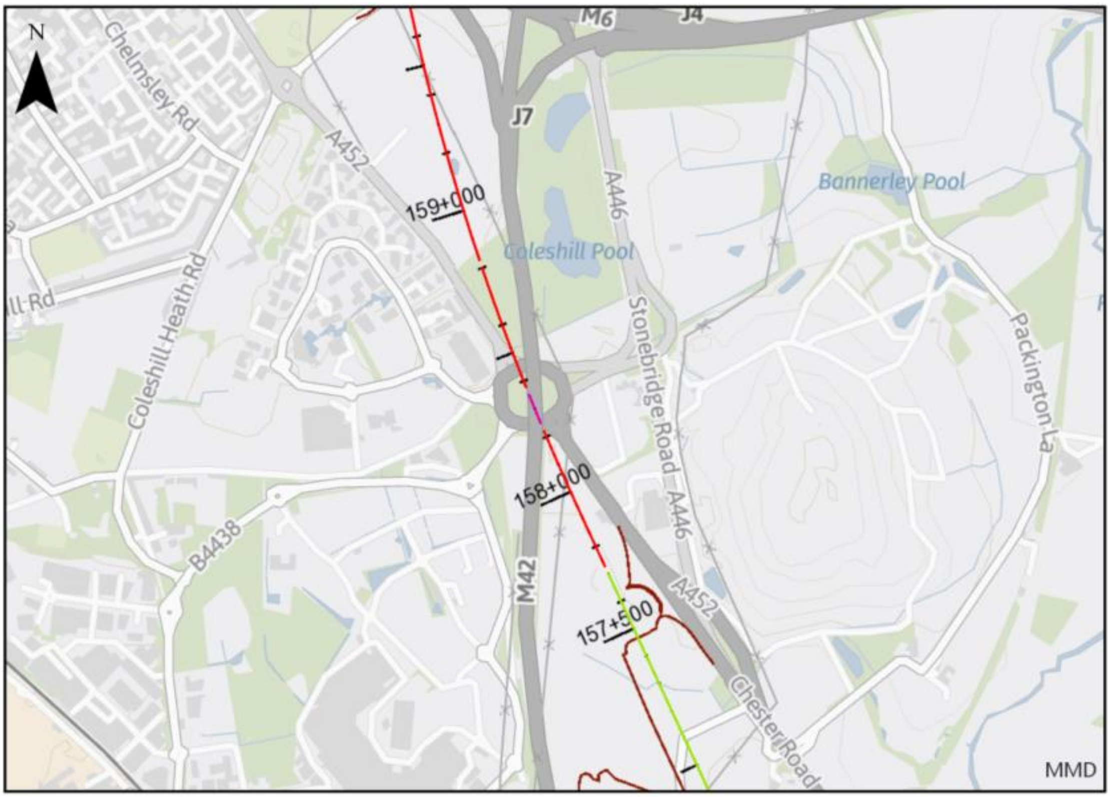
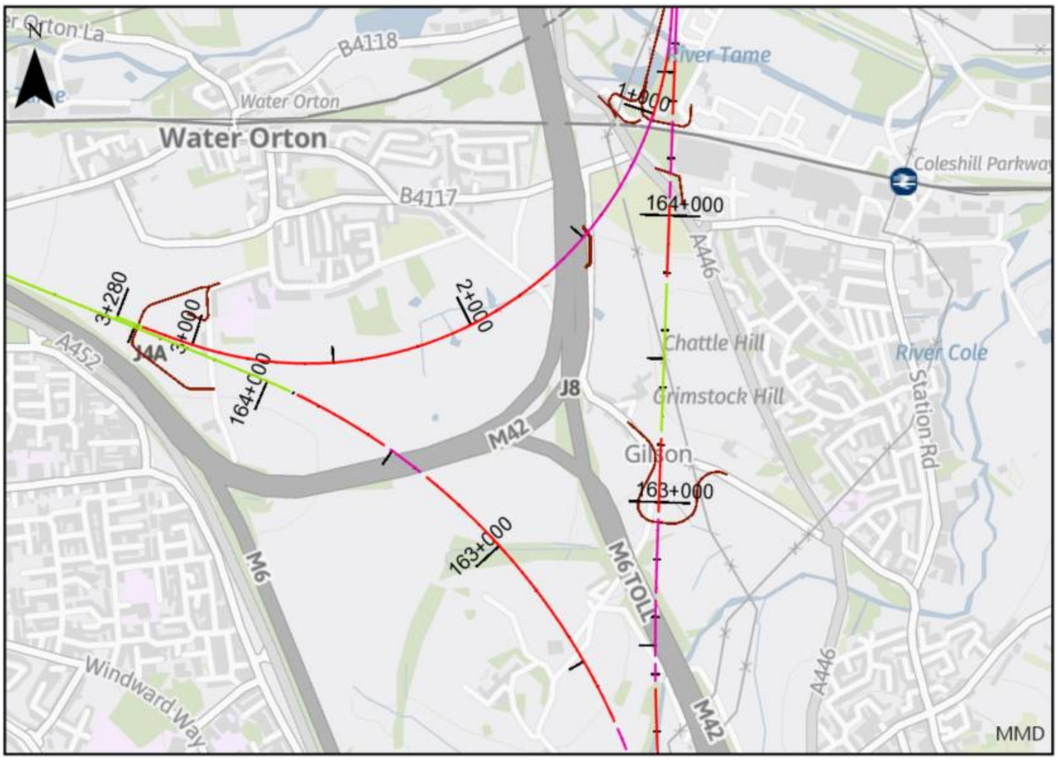


Figure 42: Modified Sections of Water Mains between ch.159+600 and ch.162+100

Figure 43: Modified Sections of Water Mains around the Delta Junction



UK Water Industry Research (UKWIR) guidance (Publication 10/WM/03/21[xliii]) states that polyethylene (PE) and polyvinyl chloride (PVC) water supply pipes are at risk from organic contaminants including mineral oils, VOCs and SVOCs, if pipes are laid within 15m of recorded contamination. Additionally, conductivity, pH and redox conditions can cause corrosion of metallic pipes.

For water main modification within the BIS Triangle, consultation with the water supply authority will be required to confirm the suitable materials for new supply pipes.

Recommendations

No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.

Of the identified water main modifications, several have soil contamination testing data in the vicinity to the pipeline route or the proposed works. The soil results have been reviewed and potentially suitable water main material are summarised in Table 37.

Modified water mains at the boundary of Sub-Lot 2 and 5, and between ch.155+550 and ch.155+800 east of the alignment did not have soil contamination data in their vicinity. Potentially suitable water main material for these locations is barrier pipe, as it is the most robust pipe material in-light of the lack of data.

Table 37: Potentially suitable materials for modified water mains.

Modified Water Main	Potentially suitable potable water main materials subject to further testing
Between ch.155+000 and ch.155+250	PE and PVC Barrier pipe (PE-Al-PE) Wrapped iron Copper
Between ch.155+750 and ch.156+400, extending from east of the alignment to Junction 6 of the M42 to the west	Barrier pipe (PE-Al-PE) Wrapped steel

Modified Water Main	Potentially suitable potable water main materials subject to further testing
Modified water main within the BIS Triangle	Consultation with the water supply authority will be required to confirm the suitable materials for new supply pipes.
Between ch.159+700 and ch.159+850	PE and PVC Barrier pipe (PE-Al-PE) Wrapped steel Wrapped iron
Between ch.161+300 and ch.161+500	Barrier pipe (PE-Al-PE) Wrapped iron Wrapped steel
Between ML ch.162+900 and ch.163+300	PVC Barrier pipe (PE-Al-PE) Wrapped iron
Between ML ch.164+000 and ch.164+150	Barrier pipe (PE-Al-PE) Wrapped steel Wrapped iron
Between ML ch.164+300 and ch.164+500	Barrier pipe (PE-Al-PE) Wrapped iron
At the boundary of Sub-Lot 6 and 8 between ch.000+450(NC) and ch.001+050(NC)	Barrier pipe (PE-Al-PE) Wrapped iron
Between ch.001+000(NC) and ch.001+050(NC)	Barrier pipe (PE-Al-PE) Wrapped iron
Between ch.001+450(NC) and ch.001+600(NC)	Barrier pipe (PE-Al-PE) Wrapped steel Wrapped iron
Between ch.002+900(NC) and ch.003+200(NC) extending north of the alignment to south of the Birmingham Spur alignment	PVC Barrier pipe (PE-Al-PE) Wrapped steel Wrapped iron

4.12.2 Risks to Proposed Water Mains

There are several clean water utility pipes to be installed as part of the scheme. An assessment of contaminant parameters which could impact pipe material has been undertaken for the assets with clean water utility pipes, in accordance with UKWIR guidance for the selection of water supply pipes. The new pipes are summarised in Table 38.

Table 38: New Clean Water Utility Pipes (excluding BIS triangle and People Mover)

Chainage	Associated Works
ch.154+850 to ch.155+050	Shadow Brook Underbridge satellite construction compound
ch.155+400 to ch.155+550	Diddington Lane Over bridge satellite construction compound
ch.155+600 to ch.155+700	A45/A452 (Stonebridge Island) satellite construction compound
ch.155+800 to ch.156+000	A45 Service Road Overbridges satellite construction compound
ch.156+000 to ch.156+150	vehicle recovery compound, A45/East Way Overbridges satellite construction compound, and Bickenhill Embankment
ch.156+100 to ch.156+200	A45/M42 Junction 6 Roundabout satellite construction compound
ch.157+250 to ch.157+550	A452/446 Roundabout satellite construction compound
ch.158+000	M42 Motorway Viaduct (East) satellite construction compound
ch.158+150 to ch.158+400	M42 Motorway Viaduct (West) satellite construction compound
ch.159+750 to ch.159+800	Coleshill Heath Road Underbridge satellite construction compound
ch.159+750 to ch.159+950	M6 Junction 4 satellite construction compound
ch.159+950 to ch.160+050	M6 Motorway main construction compound
ML ch.162+800 to ch.162+950	M42 Coleshill North Viaduct satellite construction compound and Gilson Road ATS
NC ch.000+900 to ch.001+000	Water Orton Viaduct 1 & 3 (North) satellite construction compound
NC ch.001+300 to ch.001+400	No associated works

Of the new pipes summarised above, only the following have contamination testing data in the vicinity to the pipeline route or the proposed works. These are:

- ch.155+800 to ch.156+000 A45 Service Road Overbridges satellite construction compound;
- ch.156+000 to ch.156+150 vehicle recovery compound, A45/East Way Overbridges satellite construction compound, and Bickenhill Embankment;
- ch.158+150 to ch.158+400 M42 Motorway Viaduct (West) satellite construction compound;
- ch.159+750 to ch.159+800 Coleshill Heath Road Underbridge satellite construction compound;
- ch.159+950 to ch.160+050 M6 Motorway main construction compound;
- ch.162+800 to ch.162+950: M42 Coleshill North Viaduct satellite construction compound and Gilson Road ATS;
- NC ch.000+900 to ch.001+000 Water Orton Viaduct 1 & 3 (North) satellite construction compound; and
- NC ch.001+300 to ch.001+400, no associated works.

Recommendations

No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.

The current data indicates that the following pipe materials may be suitable to address risks of contaminant entry into new water mains.

Table 39: Potentially suitable materials for new water mains

Proposed Water Main	Potentially suitable potable water main materials subject to further testing
ch.155+800 to ch.156+000 A45 Service Road Overbridges satellite construction compound	Barrier pipe (PE-Al-PE) Wrapped steel Wrapped iron Copper
ch.156+000 to ch.156+150 vehicle recovery compound, A45/East Way Overbridges satellite construction compound, and Bickenhill Embankment	PE and PVC Barrier pipe (PE-Al-PE) Wrapped Iron
BIS Triangle	Consultation with the water supply authority will be required to confirm the suitable materials for new supply pipes.
ch.158+150 to ch.158+400 M42 Motorway Viaduct (West) satellite construction compound	PE and PVC Barrier pipe (PE-Al-PE) Wrapped steel Wrapped iron Copper
ch.159+750 to ch.159+800 Coleshill Heath Road Underbridge satellite construction compound	PE and PVC Barrier pipe (PE-AL-PE) Wrapped steel Wrapped iron
ch.159+950 to ch.160+050 M6 Motorway main construction compound	PE and PVC Barrier pipe (PE-AL-PE) Wrapped iron
ch.162+800 to ch.162+950: M42 Coleshill North Viaduct satellite construction compound and Gilson Road ATS	PE and PVC Barrier pipe (PE-Al-PE) Wrapped iron
NC ch.000+900 to ch.001+000 Water Orton Viaduct 1 & 3 (North) satellite construction compound	PE and PVC Barrier pipe (PE-Al-PE) Wrapped iron
NC ch.001+300 to ch.001+400, no associated works	PVC Barrier pipe (PE-Al-PE) Wrapped steel Wrapped iron

5 UPDATED CONCEPTUAL MODEL

CSMs have been updated based on the available GI data at the time of writing. Where there is no GI for an area, a preliminary risk assessment (PRA) has been undertaken. Table 40 shows which table relates to which CSM / PRA.

A PRA has not been completed for assets which have no contamination data and do not have any identified sites potentially posing a risk (from the Environmental Statement). This is due to there being no identifiable source, therefore no source-pathway-receptor contaminant linkage. These assets comprise:

- Shadow Brook Underbridge – 155+100
- Diddington Lane Overbridge – 155+500
- Bickenhill Culvert – 156+115
- Hollywell Brook Underbridge – 156+430
- A452 / A446 Roundabout South Overbridge – 157+480
- A452 / A446 Roundabout North Overbridge –157+620
- A45 / M42 Junction 6 Roundabout – 156+050
- Interchange Autotransformer Station (ATS) – 157+750
- A452 Chester Road Roundabout Removal – 157+800
- A452 Link Road Overbridge – 157+900
- M6 Junction 4 Roundabout Widening – 157+900
- A452 / B4438 Roundabout Works – 158+150
- M42 Motorway Box Structure – 158+220 to 158+350
- Coleshill Heath Road Underbridge – 159+782
- Coleshill No. 1 Embankment – 160+148 to 160+313
- Coleshill No. 2 Embankment – 160+404 to 160+855
- B4114 Birmingham Road Underbridge – 161+352
- Manor Drive – 162+120
- M42 Coleshill South Viaduct – 162+348 to 162+436
- River Cole Diversion – 162+390
- B4117 Gilson Road ATS – 163+170
- Gilson Road ATS – 163+170
- Footpath M62 Overbridge – 163+280
- Watton House East Viaduct – 000+989 (NC) to 001+222 (NC)
- Water Orton Drop Inlet Culvert – 002+141 (NC)
- Coleshill East Viaduct – 160+825 (BS) to 161+371 (BS)
- Coleshill No. 5 Embankment – 161+301 (BS) to 161+620 (BS)
- Coleshill Manor Cutting – 161+620 (BS) to 161+901 (BS)
- Birmingham Spur Diveunder – 161+901 (BS) to 161+990 (BS)
- Manor Drive Embankment – 162+062 (BS) to 162+190 (BS)

- River Cole East Viaduct – 162+190 (BS) to 162+325 (BS)
- Coleshill Culvert – 162+986 (BS)
- Attleboro Culvert – 163+830 (BS)
- Attleboro Flyover – 164+140 (BS) to 164+355 (BS)
- Attleboro Lane Overbridge – 164+485 (BS)
- Attleboro Farm Embankment – 163+505 (BS) to 163+882 (BS) (southern end of asset included in M42 – M6 Motorway Link East and West Viaducts CSM).

Please note the following:

- The asset A45 Service Road Overbridge, Coventry Road Overbridge and East Way Overbridge are considered in the CSM for Diddington Cutting; and
- Water Orton No. 1 Viaduct is considered in the CSM for Water Orton No. 2 & 3 Viaduct.

Table 40: Overview of Conceptual Site Models / Preliminary Risk Assessments

Table	CSM/PRA	Description
Table 41	CSM	Diddington Lane Embankment (ch.154+435 to 155+290)
Table 42	CSM	Diddington Cutting (ch.155+290 to 156+080)
Table 43 and Table 44	CSM	BIS Triangle Remediation Strategy Report's Plausible Pollutant Linkages
Table 45	CSM	Packington Embankment (ch.157+700 to 158+220)
Table 46	CSM	M42 Motorway Box Structure (ch.158+220 to 158+350)
Table 47	CSM	Pool Wood Embankment (C223/C224) (ch.158+350 to 159+879)
Table 48	CSM	M6 Motorway Box Structures (ch.159+900 to 160+000)
Table 49	CSM	M6 Motorway South Viaduct (160+013 to 160+148)
Table 50	CSM	M6 Motorway North Viaduct (160+313 to 160+404)
Table 51	CSM	Coleshill West Viaduct (160+855 to 161+314)
Table 52	CSM	Coleshill No.3 Embankment (ch.161+314 to 162+348)
Table 53	CSM	M42 Coleshill Box Structure (ch.162+436 to 162+656)
Table 54	CSM	M42 Coleshill North Viaduct (ch.162+656 to 162+939)
Table 55	CSM	Gilson Embankment (ch.162+939 – 163+220)
Table 56	CSM	Gilson Cutting (ch.163+220 – 163+760)
Table 57	CSM	Lichfield Road Embankment (ch.163+760 – 164+035)
Table 58	CSM	Chattle Hill Box Structure (ch.164+035 – 164+116)
Table 59	CSM	Watton House East and West Viaduct (ch.164+116 – 164+327)
Table 60	CSM	Watton House Embankment (ch.164+327 – 164+538)
Table 61	CSM	Water Orton No. 1, 2 & 3 Viaduct (ch.000+791 (NC) – 001+018 (NC))
Table	CSM	Water Orton No. 1, 2 & 3 Viaduct (ch.001+018 (NC) – 001+653 (NC))
Table 62	CSM	Marsh Lane Embankment (002+814 (NC) to 003+650 (NC))
Table 63	CSM	River Cole West Viaduct (ch.162+130 (BS) to 162+235 (BS))
Table 64	CSM	Green Lane Embankment (ch.162+235 (BS) to 163+347 (BS))
Table 65	CSM	M42 – M6 Motorway Link East and West Viaducts (ch.163+347 to 163+520 (BS)) (includes southern end of Attleboro Embankment)
Table 66	CSM	Water Orton Cutting (ch.163+882 (BS) to165+585 (BS))

Table 41: CSM for Diddington Lane Embankment: ch.154+435 – 155+290

CSM for DIddington Lane Embankment (154+435 to 155+290)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	No LQ site underlies or is adjacent to the embankment. (ML154-TP023, ML155-RC007 and ML155-WS024)	154+435 to 155+290	Diddington Lane Embankment	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No gas data.	No LQ site underlies or is adjacent to the embankment.			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Medium Risk Rating: Low There is no gas data and a potential source of explosive or flammable gas does not underlie or is adjacent to the asset. The open-air environment and absence of buildings further minimizes the possibility of any gas build up (if any).	No.
Limited leachate data.	No exceedances of WQS			R7: Controlled waters – Groundwater (Alluvium Secondary A aquifer & Mercia Mudstone Group Secondary B aquifer) R8: Controlled waters – Off-site: Groundwater (Alluvium Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Unlikely Consequence: Negligible Risk Rating: Very low Only one leachate sample, but there is not considered to be a significant source of contamination in the area.	No
Insufficient data.	No LQ site underlies or is adjacent to the embankment.			R6: Property receptors.	P6: Direct Contact	Unknown. Please refer to the GIR for information on concrete classification.	Unknown.
pH value.	No LQ site underlies or is adjacent to the embankment.			R6: Property receptors.	P6: Direct Contact	Probability: Likely Consequence: Medium Risk Rating: Moderate Current contaminant data indicate suitable pipe materials for the modified water main between ch155+000 and ch.155+250 to be PE, PVC, barrier pipe, wrapped iron and copper. No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Where data is available, it suggests the use of PE, PVC, barrier pipe, wrapped iron, and copper pipework subject to UKWIR testing.
S1c: Asbestos contamination soils							
Asbestos not encountered.	No LQ site underlies or is adjacent to the embankment. (ML154-TP023, ML155-RC007 and ML155-WS024)	154+435 to 155+290	Diddington Lane Embankment	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H

<table>
<tr><th colspan="8">CSM for DIddington Lane Embankment (154+435 to 155+290)</th></tr>
<tr><th>Source</th><th>Environmental Statement Land Quality Site (Borehole(s))</th><th>Chainage (Sub-lot)</th><th>Proposed Construction</th><th>Receptor</th><th>Pathway</th><th>Risk Assessment: Highest Risk Identified</th><th>Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?</th></tr>
<tr><td colspan="8">S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites</td></tr>
<tr><td rowspan="2">No gas data.</td><td rowspan="2">No LQ site underlies or is adjacent to the embankment.</td><td rowspan="2">154+435 to 155+290</td><td rowspan="2">Diddington Lane Embankment</td><td>R1: On-site users – commercial.
R2: Off-site users – Residential
R3: Off-site users – commercial / public open space.</td><td rowspan="2">P4: Exposure to explosive gases.
P7: Inhalation of ground gases</td><td rowspan="2">Probability: Unlikely
Consequence: Minor
Risk Rating: Very low
No gas data. However, the open-air environment and absence of buildings minimises the possibility of any gas build-up (if any).</td><td>No.</td></tr>
<tr><td>R4: Construction Personnel.
R5: Maintenance Personnel.</td><td>The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.</td></tr>
<tr><td colspan="8">S3a: Contaminated Groundwater – Group A & B Sites; S3b: Contaminated Groundwater – Off-Site Group C & D Sites</td></tr>
<tr><td rowspan="2">No groundwater samples available.</td><td rowspan="2">ES LQ site 23-50 Jacksons Brickworks Landfill.</td><td rowspan="2">154+435 to 155+290</td><td rowspan="2">Diddington Lane Embankment</td><td>R1: On-site users – commercial.
R2: Off-site users – Residential
R3: Off-site users – commercial / public open space.</td><td>P2: Inhalation of vapour with / from contaminated waters
P3: Direct contact, ingestion from contaminated waters</td><td>Probability: Unlikely
Consequence: Medium
Risk Rating: Low
Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}</td><td>No</td></tr>
<tr><td>R7: Controlled waters – Groundwater (Alluvium Secondary A aquifer & Mercia Mudstone Group Secondary B aquifer)
R8: Controlled waters – Off-site: Groundwater (Alluvium Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer)
Surface Waters: unnamed ponds, unnamed tributary and Shadow Brook</td><td>P5a: Vertical and lateral migration via naturally created pathways
P5b: Vertical and lateral migration via man-made pathways
P8: Groundwater Migration</td><td>Probability: Unlikely
Consequence: Moderate
Risk Rating: Low
No groundwater data is available. However no significant sources of contamination have been identified on site based on the site history on site and risks of groundwater contamination are considered to be low.</td><td>No.</td></tr>
</table>

Table 42: CSM for Diddington Cutting: ch.155+290 – 156+080 (section outside of the BIS Triangle)

CSM for Diddington Cutting (155+290 to 156+080)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	LQ site 24-1 Jacksons Brickworks Landfill is within the footprint of the cutting. (ML155-CP019 ML155-CP024 ML155-CP044 ML155-CR001 ML155-CR005 ML155-CR022 ML155-CR403 ML155-CR404 ML155-CR405 ML155-TP018 ML155-TP025 ML155-TP041 ML155-WS001 ML155-WS002 ML155-WS042 ML155-WS044 ML156-CR401 and ML156-TP006)	155+290 to 156+080	Diddington Cutting	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No gas data.	LQ site 24-1 Jacksons Brickworks Landfill is within the footprint of the cutting.			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Medium Risk Rating: Low No gas data, however the open-air environment and absence of buildings minimises the possibility of any gas build up (if any).	No.
Leachate exceedances of the WQS for cadmium, chromium, copper, lead, mercury and zinc	23-50 Jacksons Brickworks Landfill and 24-12 Park Farm Quarry Site. (ML155-CP024, ML155-TP025, ML155-WS044)			R7: Controlled waters – Glaciofluvial Deposits Secondary A aquifer Mercia Mudstone Group Secondary B aquifer)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low Likelihood Consequence: Minor Risk Rating: Low Leachate exceedances are insufficient to represent significant risks to groundwater. The works will involve the removal of the majority of soil contamination sources. Further GI is proposed to assess risks from the former landfill area to groundwater.	No.
Insufficient data.	LQ site 24-1 Jacksons Brickworks Landfill is within the footprint of the cutting.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
SVOCs, and pH value.	LQ site 24-1 Jacksons Brickworks Landfill is within the footprint of the cutting. (ML155-CR022, ML155-CR005, ML155-TP018, ML155-TP025, ML155-CP019, ML155-WS002)			R6: Property receptors.	P6: Direct Contact	Probability: Likely Consequence: Medium Risk Rating: Moderate No soil data are within the vicinity of proposed clean water utility pipe at Diddington Lane Over bridge satellite construction compound, and A45/A452 (Stonebridge Island) satellite construction compound. No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Where data is available, it suggests the use of barrier pipe, wrapped iron, wrapped steel and copper at the new water main. At the modified water main the suitable pipe materials are barrier pipe and wrapped iron. These are subject to UKWIR testing. Where data is not available, specify barrier pipe material as a precaution, subject to UKWIR testing.
S1c: Asbestos contamination soils							
Asbestos not encountered.	LQ site 24-1 Jacksons Brickworks Landfill is within the footprint of the cutting. (ML155-CP019 ML155-CP024 ML155-CP044 ML155-CR001 ML155-CR005 ML155-CR022 ML155-CR403 ML155-CR404 ML155-CR405 ML155-TP018 ML155-TP025 ML155-TP041 ML155-WS001 ML155-WS002 ML155-WS042 ML155-WS044 ML156-CR401 and ML156-TP006)	155+290 to 156+080	Diddington Cutting	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Diddington Cutting (155+290 to 156+080)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No gas data.	LQ site 24-1 Jacksons Brickworks Landfill is within the footprint of the cutting.	155+290 to 156+080	Diddington Cutting	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Medium Risk Rating: Low No gas data, however the open-air environment and absence of buildings minimises the possibility of any gas build up (if any). The cutting will provide a ventilation pathway for ground gases.	No.
				R4: Construction Personnel R5: Maintenance Personnel			The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
WQS exceedances of metals and PAH.	LQ site 24-1 Jacksons Brickworks Landfill (ML155-CR003) within the footprint of the cutting.	155+290 to 156+080	Diddington Cutting	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area.	No
				R7: Controlled waters – Groundwater Glaciofluvial Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways	Probability: Likely Consequence: Minor Risk Rating: Low-Moderate Minor exceedances of cadmium, manganese, benzo(a)pyrene, benzo(b)fluoranthene and fluoranthene observed in groundwater. Further risk assessment in accordance with EA H1 Methodology required to support EP application if cutting is to be drained to surface waters.	No.

Table 43: BIS Triangle Summary of Unacceptable Plausible Pollutant Linkages

Plausible Pollutant Linkages (PPL)	Description	Site Area	Identified Receptor	Risk Rating
PPL1	Leaching of contaminants in fill to groundwater	Middle Bickenhill Landfill Infilled Sand and Gravel Pit	CW1	Moderate
PPL2	Leaching and migration of contaminants in fill to future attenuation ponds	Middle Bickenhill Landfill Infilled Sand and Gravel Pit	Inf1	Moderate
PPL3	Lateral migration of contaminants in groundwater	Middle Bickenhill Landfill Infilled Sand and Gravel Pit	CW2	Moderate
PPL4	Spread of Japanese knotweed rhizomes	Middle Bickenhill Landfill	Inf2	High
Key PPL1 – Leaching of contaminants in fill to groundwater PPL2 – Leaching and migration of contaminants in fill to future attention ponds PPL3 – Lateral migration of contaminants in groundwater PPL4 – Spread of Japanese knotweed rhizomes CW1 – Groundwater in underlying geology CW2 – Surface watercourses Inf1 – Attenuation pond Inf2 – Buildings and infrastructure				

Reproduced from the BIS Triangle Remediation Strategy Report (Table 4).

Table 44: BIS Triangle Summary of Unacceptable Plausible Pollutant Linkages (Construction / Future Maintenance)

Plausible Pollutant Linkages (PPL)	Description	Site Area	Identified Receptor	Risk Rating
PPL5	Exposure either via direct contact with contaminants in fill materials; through inhalation of soil derived particles and dust.	Middle Bickenhill Landfill Infilled Sand and Gravel Pit Locally within Backfilled Borrow Pits	HH1 and HH2	Low[1]
PPL6	Migration and accumulation of ground gases.	Middle Bickenhill Landfill Infilled Sand and Gravel Pit Locally within Backfilled Borrow Pits	HH1, HH2 and HH3	Low[1]
Key PPL5 – Exposure either via direct contact with contaminants in fill materials; through inhalation of soil derived particles and dust PPL6 – Migration and accumulation of ground gases HH1 – Construction workers HH2 – Future site users / maintenance workers HH3 – Built environment [1] – Providing mitigation measures are adopted.				

Reproduced from the BIS Triangle Remediation Strategy Report (Table 5).

Table 45: CSM for Packington Embankment: ch.157+700 – 158+220

CSM for Packington Embankment (157+700 to 158+220)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
PAHs	No LQ site underlies or is adjacent to the embankment. (ML157-CR021, ML158-CP002, ML158-CP005, ML158-CP402 and ML158-TP008)	157+700 to 158+220	Packington Embankment	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low A PAH hotspot is reported at ML158-CP005 of a sample of fill material. It is in LQ site 24-44 Brackenlands Farm Landfill. No temporary or permanent works is proposed at this location.	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate A PAH hotspot is reported at ML158-CP005 of a sample of fill material. It is in LQ site 24-44 Brackenlands Farm Landfill. No temporary or permanent works is proposed at this location. Construction workers will come into contact with soils which may contain elevated levels of other contaminants.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No flammable / explosive ground gases above their LEL.	No LQ site underlies or is adjacent to the embankment. (ML157-CP018-Pipe 1, ML157-CP022-Pipe 1, ML157-CR023-Pipe 1, ML157-CR026-Pipe 1, ML157-WS069-Pipe 1, ML158-CP002-1, ML158-WS008-Pipe 1, ML158-WS010-Pipe 1, ML158-WS011-Pipe 1).			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No elevated explosive ground gases recorded. Furthermore, the open-air environment and absence of buildings further minimizes the possibility of any gas build up (if any).	No.
Leachate (10:1) exceedances of the WQS for chromium (III)	One leachate sample (ML157-CR021) located within asset area. Several samples located in adjacent Brackenlands Farm Landfill.			R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer & Mercia Mudstone Group Secondary B aquifer) Surface Waters:	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Unlikely Consequence: Moderate Risk Rating: Low Only one sample taken within asset with minor exceedances of EQS.	No.
Insufficient data.	No LQ site underlies or is adjacent to the embankment.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
pH, Organics	No LQ site underlies or is adjacent to the embankment.			R6: Property receptors.	P6: Direct Contact	Probability: Unlikely Consequence: Medium Risk Rating: Low No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	No.
S1b: Contaminated Soils (off-site)							
Off-site exceedances of WQS for metals	LQ site 24-44 Brackenlands Farm Landfill (ML158-CP002) (off-site)	158+200	Packington Embankment	R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer & Mercia Mudstone Group Secondary B aquifer) Surface Waters: unnamed drains	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Likely Consequence: Medium Risk Rating: Moderate There is evidence for migration of contamination in groundwater around Brackenlands Farm Landfill. The impact on the asset is unclear at present.	No. It is understood that the MWCC are not to undertake and permanent or temporary works over Brackenlands Landfill. Responsibility for remediation of the landfill sources (if required) will rest with the EWC.
S1c: Asbestos contamination soils							
Asbestos	No LQ site underlies or is adjacent to the embankment. (ML157-CR021, ML158-CP002, ML158-CP005, ML158-CP402 and ML158-TP008)	157+700 to 158+220	Packington Embankment	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Asbestos is identified in ML158-TP008 as amosite and chrysotile ACM debris and loose fibres. Quantification testing indicate the asbestos to be 0.0023%. Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Packington Embankment (157+700 to 158+220)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
Elevated gas levels.	No LQ site underlies or is adjacent to the embankment. (ML157-CP018-Pipe 1, ML157-CP022-Pipe 1, ML157-CR023-Pipe 1, ML157-CR026-Pipe 1, ML157-WS069-Pipe 1, ML158-CP002-1, ML158-WS008-Pipe 1, ML158-WS010-Pipe 1, ML158-WS011-Pipe 1).	157+700 to 158+220	Packington Embankment	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Low-lowlihood Consequence: Medium Risk Rating: Moderate / Low Gas risks assessed to be CS2 for the Brackenlands Farm Landfill.	Responsibility for management of ground gases from Brackenlands Farm Landfill assumed to rest with EWC. Further monitoring required around the attenuation pond to the east of the of the BIS triangle to ensure no adverse impacts on ground gases following attenuation pond construction.
				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / Low Carbon dioxide concentrations in excess of the long-term and / or short-term OELs in six installations.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
WQS exceedances for TPH, EPH >C10-40, and metals	LQ site 24-44 Brackenlands Farm Landfill (ML158-CP002) (off-site)	158+200	Packington Embankment	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Likely Consequence: Medium Risk Rating: Moderate Groundwater exceedances of TPH and metals which may impact on drinking supplies.	No. It is understood that the MWCC are not to undertake any permanent or temporary works over Brackenlands Landfill. Responsibility for remediation of the landfill sources (if required) will rest with the EWC.
				R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer & Mercia Mudstone Group Secondary B aquifer) Surface Waters: unnamed drains	P8: Groundwater Migration	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / Low This location is off site with no construction works proposed. However, the site may be used as a construction compound. There is also potential for off site migration that could affect the proposed asset.	No. It is understood that the MWCC are not to undertake any permanent or temporary works over Brackenlands Landfill. Responsibility for remediation of the landfill sources (if required) will rest with the EWC.

Table 46: CSM for M42 Motorway Box Structure: ch.158+220 – 158+350

CSM for M42 Motorway Box Structure (158+220 to 158+350)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	No LQ site underlies or is adjacent to the viaduct. (ML158-CP007, ML158-CR003, ML158-WS012)	158+220 to 158+350	M42 Motorway Box Structure	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No flammable / explosive ground gases above their LEL.	No LQ site underlies or is adjacent to the viaduct. (ML158-CP007-1)			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No elevated explosive ground gases recorded. Furthermore, the open-air environment and absence of proposed buildings further minimizes the possibility of any gas build up (if any).	No.
WQS leachate exceedance for arsenic Moderate soil TPH concentrations.	ML158-CP007			R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer & Mercia Mudstone Group Secondary B aquifer) Surface Waters: unnamed drains, Coleshill Pool SSSI	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Unlikely Consequence: Severe Risk Rating: Moderate / Low Within Brackenlands Farm landfill, only one sample with exceedance for one determinant, unlikely that there is a significant source of contamination. Moderate soil concentration of TPH was also recorded.	No. The current data does not show significant leachate contamination within the viaduct footprint and therefore no remediation target cost items have been identified. If piling is the foundation solution for the viaduct's construction, a piling risk assessment in-accordance with EA guidance should be undertaken. Any remediation requirements associated with Brackenlands Farm Landfill will be under the EWC's responsibility and are not considered further in this report.
Insufficient data.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
No contaminants identified.	No LQ site underlies or is adjacent to the viaduct. (ML158-WS012)			R6: Property receptors.	P6: Direct Contact	Probability: Likely Consequence: Medium Risk Rating: Moderate Current contaminant data indicate suitable pipe materials for the new potable water main at the M42 Motorway Viaduct (West) satellite construction compound to be PE, PVC, barrier pipe, wrapped iron, wrapped steel and copper. No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Use of PE, PVC, barrier pipe, wrapped iron, wrapped steel and copper pipework subject to UKWIR testing
S1c: Asbestos contamination soils							
Asbestos not encountered.	No LQ site underlies or is adjacent to the viaduct. (ML158-CP007, ML158-CR003, ML158-WS012)	158+220 to 158+350	M42 Motorway Box Structure	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for M42 Motorway Box Structure (158+220 to 158+350)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
Elevated gas levels.	No LQ site underlies or is adjacent to the viaduct. (ML158-CP007-1)	158+220 to 158+350	M42 Motorway Box Structure	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Medium Risk Rating: Low ML158-CP007-1 (unflooded) located within LQ site 24-44 (80m east of asset) is assessed CS2. Given no proposed works will occur at LQ site 24-44, the open-air environment and absence of buildings, the probability of any gas build up is unlikely.	No.
				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / Low Carbon dioxide concentrations in excess of the long-term and / or short-term OELS.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3: Groundwater							
WQS exceedances for TPH, EPH >C10-40 and metals	LQ site 24-44 Brackenlands Farm Landfill (ML158-CP007)	158+220 to 158+350	M42 Motorway Box Structure	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer & Mercia Mudstone Group Secondary B aquifer) Surface Waters: unnamed drains & Coleshill Pool SSSI	P8: Groundwater Migration	Probability: Low Likelihood Consequence: Severe Risk Rating: Moderate There is the potential for off-site groundwater migration from Brackenlands Farm Landfill that could affect the proposed asset.	No. It is understood that the MWCC are not to undertake any permanent or temporary works over Brackenlands Landfill. Responsibility for remediation of the landfill sources (if required) will rest with the EWC. Risks of preferential leachate migration pathway creation should be controlled in-accordance with a piling risk assessment in-accordance with EA guidance.

Table 47: CSM for Pool Wood Embankment: ch.158+350 – 159+879

CSM for Pool Wood Embankment (158+350 to 159+879)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	No LQ site underlies or is adjacent to the embankment. (ML158-CP021, ML158-CR007, ML158-WS013, ML158-WS014, ML158-WS015, ML158-WS016, ML159-CP003, ML159-CP018, ML159-CR003, ML159-CR408, ML159-TP004)	158+350 to 159+879	Pool Wood Embankment	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No flammable / explosive ground gases above their LEL.	No LQ site underlies or is adjacent to the embankment. (ML158-CP020-1, ML158-CP021-1).			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No elevated explosive ground gases recorded. Furthermore, the open-air environment and absence of buildings further minimises the possibility of any gas build up (if any).	No.
Significant leachate exceedance and high TPH soil contamination	ML159-CP003 (within former infilled pond)	159+200 to 159+300		R7: Controlled waters – Groundwater (Glacio-fluvial deposits, Mercia Mudstone Group Secondary aquifers) Surface Waters: Coleshill Pools and unnamed ponds	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Likely Consequence: Moderate Risk Rating: Moderate ML159-CP003 (within an infilled pond) recorded high TPH soil concentrations along with soil leachate exceedances of copper, chromium VI, cadmium and nickel; with significant exceedance of nickel. Reported in Made Ground, the contamination directly overlies Glaciofluvial Deposits.	Infilled pond material is recommended to be removed and stabilisation prior to recovery in-accordance with MMP. This is to address potential risks from TPH and nickel to controlled waters.
WQS leachate exceedances for metals.	No LQ site underlies or is adjacent to the embankment. (ML158-CP021, ML158-CR007, ML158-WS013, ML158-WS014, ML158-WS015, ML158-WS016, ML159-CP003, ML159-CP018, ML159-CR003, ML159-TP004)			R7: Controlled waters – Groundwater (Mercia Mudstone Group Secondary B aquifer) Surface Waters: Coleshill Pools and unnamed ponds	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Likely Consequence: Minor Risk Rating: Moderate / low At ML158-WS016 within deep Made Ground associated with highway works at the southern end of Pool Wood Embankment reported exceedances of metals.	Removal of Made Ground within highway embankment material at the southern end of Pool Wood Embankment to address risks of metal leachates to controlled waters. Stabilisation of material prior to recovery in-accordance with MMP. Further investigation to be understand risks from Made Ground to controlled waters.
Insufficient data.	No LQ site underlies or is adjacent to the embankment.	158+350 to 159+879		R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
pH value.	No LQ site underlies or is adjacent to the embankment.			R6: Property receptors.	P6: Direct Contact	Probability: Low likelihood Consequence: Minor Risk Rating: Low No soil data within the vicinity of proposed clean water utility pipe at the asset M6 Junction 4 satellite construction compound. No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Where data is available, it suggests the use of PE, PVC, barrier pipe, wrapped steel and wrapped iron at the modified water main and new water main subject to UKWIR testing. Where data is not available, specify barrier pipe material as a precaution, subject to UKWIR testing.

CSM for Pool Wood Embankment (158+350 to 159+879)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1c: Asbestos contamination soils							
Asbestos.	No LQ site underlies or is adjacent to the embankment. (ML158-CP021, ML158-CR007, ML158-WS013, ML158-WS014, ML158-WS015, ML158-WS016, ML159-CP003, ML159-CP018, ML159-CR003, ML159-CR408, ML159-TP004)	158+350 to 159+879	Pool Wood Embankment	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Asbestos identified in ML158-WS016 as loose chrysotile fibres in soil; quantified to be 0.0011%. The hole is in the central island of the Birmingham Business Park roundabout with the A452, A446 and B4438. Please refer to Appendix H for asbestos risk assessment.	See Appendix H
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No elevated gas levels.	No LQ site underlies or is adjacent to the embankment. (ML158-CP020-1, ML158-CP021-1).	158+350 to 159+879	Pool Wood Embankment	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Negligible Risk Rating: Very Low No elevated gas levels were recorded. Additionally, the open-air environment and absence of buildings minimises the possibility of any gas build-up (if any).	No.
Elevated gas levels.				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / Low Carbon dioxide concentrations in excess of the long-term and short-term OELS in both installations.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
WQS exceedances in Glaciofluvial Deposits.	No LQ site underlies or is adjacent to the embankment. (ML158-CR018 and ML159-CR019)	158+350 – 159+879	Pool Wood Embankment	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Likely Consequence: Moderate Risk Rating: Moderate Groundwater exhibits exceedances of the DWS, and a potential source of groundwater contamination has been identified in the vicinity of a groundwater abstraction.	Infilled pond material is recommended to be removed and stabilisation prior to recovery in-accordance with MMP. This is to address potential risks from TPH and nickel to controlled waters.
WQS exceedances in Glaciofluvial Deposits east of the route.	Between Brackenlands Farm Landfill and Coleshill Pools (ML158-CP020 and ML158-CP021)			R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (Coleshill Pools)	P8: Groundwater Migration	Probability: Likely Consequence: Moderate Risk Rating: Moderate The locations are north of Brackenlands Farm landfill and Packington Landfill (outside of LOD). Furthermore, there appear to be no discrete areas of on-site contamination responsible for the observed groundwater exceedances. It is assumed that Brackenlands Farm Landfill represents an ongoing source of contamination to groundwater in the southern part of the asset.	No: There appear to be no confirmed on-site sources of groundwater contamination within the asset area. It is understood that the MWCC are not to undertake any permanent or temporary works over Brackenlands Landfill. Responsibility for remediation of the landfill sources (if required) will rest with the EWC.
WQS exceedances in Glaciofluvial Deposits along the route.	No LQ site underlies or is adjacent to the embankment. (ML158-CR018 and ML159-CR019)					Probability: Likely Consequence: Minor Risk Rating: Moderate / low Groundwater is currently impacted in shallow superficial deposits by TPHs and inorganic contaminants. These two locations are within areas not near Made Ground, with their respectively borehole logs recording topsoil or agricultural soil overlying natural ground material. The contaminants recorded may be reflective of a wider, poor quality groundwater body due to general historical development of the region.	No. No definitive source can be confirmed at the locations of the two groundwater samples.

Table 48: CSM for M6 Motorway Box Structure: ch.159+900 – 160+000

CSM for M6 Motorway Box Structure (159+900 to 160+000)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	No LQ site underlies or is adjacent to the viaduct. (ML159-CR018, ML159-CR018, ML159-CR410, ML159-CR410, ML159-TP015, ML159-TP015, ML159-WS002, ML159-WS002a)	159+900 160+000	M6 Motorway Box Structure	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No gas data.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimizes the possibility of any gas build up (if any).	No.
WQS exceedances of metals	No LQ site underlies or is adjacent to the viaduct. (ML159-CR018, ML159-WS002, ML159-WS002a and ML159-TP015)			R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (unnamed drains)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / Low Exceedances reported for holes east of the asset and north-west of LQ sites 24-58 (operational Highways Agency Depot), 19-18 (former Vehicle Depot) and 19-26 (Coleshill Water Reclamation Works historical landfill). The exceedances in in an area of HS2 access road and landscaping, which are assumed to reduce water infiltration to generate leachate. Although the exceedances are limited there is limited data for this asset.	No. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). Further, targeted GI and risk assessment may be required to further assess risks at this location.
Insufficient data.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
pH value.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P6: Direct Contact	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / Low No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Where data is available, it suggests the use of PE, PVC, barrier pipe, wrapped iron at the modified water main subject to UKWIR testing.
S1c: Asbestos contamination soils							
Asbestos not encountered.	No LQ site underlies or is adjacent to the viaduct. (ML159-CR018, ML159-CR018, ML159-CR410, ML159-CR410, ML159-TP015, ML159-TP015, ML159-WS002, ML159-WS002a)	159+900 160+000	M6 Motorway Box Structure	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No gas data.	No LQ site underlies or is adjacent to the viaduct.	159+900 160+000	M6 Motorway Box Structure	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Minor Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimizes the possibility of any gas build up (if any).	No.
				R4: Construction Personnel R5: Maintenance Personnel			The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.

CSM for M6 Motorway Box Structure (159+900 to 160+000)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S3a: Contaminated Groundwater							
No groundwater samples for asset	No LQ site underlies or is adjacent to the viaduct.	159+900 160+000	M6 Motorway Box Structure	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (unnamed drains)	P8: Groundwater Migration	Probability: Low Likelihood Consequence: Medium Risk Rating: Moderate / Low No samples for location. No ES sites within area.	Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). Further, targeted GI and risk assessment may be required to further assess risks at this location.

Table 49: CSM for M6 Motorway South Viaduct: ch.160+013 – 160+148

CSM for M6 Motorway South Viaduct (160+013 to 160+148)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	No LQ site underlies or is adjacent to the viaduct. (ML159-CR008a, ML160-CP041, ML160-CP041, ML160-CR030, ML160-CR035, ML160-CR035, ML160-WS003, ML160-WS003)	160+013 to 160+148	M6 Motorway South Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No gas data.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimises the possibility of any gas build up (if any).	No.
Leachate exceedances of WQS for metals	No LQ site underlies or is adjacent to the viaduct. (ML159-CR008a, ML160-CP041, ML160-CR030, ML160-CR035, ML160-WS003)			R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (unnamed drains)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low likelihood Consequence: Moderate Risk Rating: Moderate / low The data indicates generally elevated levels of heavy metal leachates particularly for zinc, cadmium and lead which appear to be typical of the agricultural sections of the SI5/6 alignment north of Ch159+000. No groundwater data is available to confirm if groundwater has been impacted. The exceedances are underlain by ground predominantly composed of clay, likely of low permeability. This will limit the mobility of contamination in the subsurface.	No: Leachate contamination appears to be dispersed over wide areas of agricultural land north of ch.159+000. The contamination appears to be distributed through topsoil, ploughed sub-soils and natural deposits across the region. Opportunities for source treatment are therefore considered to be limited, and potentially of little benefit. However, for the construction of the proposed balancing pond, an impermeable geomembrane should line the pond to mitigate against water infiltration and leachate generation within the subsurface. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). Further, targeted GI and risk assessment may be required to further assess risks at this location.
Insufficient data.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
No clean water utility pipe proposed.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P6: Direct Contact	Probability: Unlikely Consequence: Medium Risk Rating: Low No clean water utility pipe proposed at this asset.	No
S1c: Asbestos contamination soils							
Asbestos	No LQ site underlies or is adjacent to the viaduct. (ML159-CR008a, ML160-CP041, ML160-CP041, ML160-CR030, ML160-CR035, ML160-CR035, ML160-WS003, ML160-WS003)	160+013 to 160+148	M6 Motorway South Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Asbestos is identified in ML160-WS003 as free chrysotile fibres and quantified to be 0.002%. The hole is located in an agricultural field at Junction 7a of the M42. Please refer to Appendix H for asbestos risk assessment.	See Appendix H
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No gas data.	No LQ site underlies or is adjacent to the viaduct.	160+013 to 160+148	M6 Motorway South Viaduct	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Minor Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimises the possibility of any gas build up (if any).	No.
				R4: Construction Personnel R5: Maintenance Personnel			The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.

CSM for M6 Motorway South Viaduct (160+013 to 160+148)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S3a: Contaminated Groundwater							
No groundwater samples for asset	No LQ site underlies or is adjacent to the viaduct.	160+013 to 160+148	M6 Motorway South Viaduct	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (unnamed drains)	**P8:** Groundwater Migration	Probability: Low likelihood Consequence: Moderate Risk Rating: Moderate / Low No samples for location. No ES sites within area.	No

Table 50: CSM for Coleshill No. 1 Embankment and M6 Motorway North Viaduct: ch.160+148 –160+313 and 160+313 – 160+404

CSM for Coleshill No. 1 Embankment and M6 Motorway North Viaduct (160+148 to 160+313 and 160+313 to 160+404)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	No LQ site underlies or is adjacent to the viaduct. (ML160-CP010)	160+148 to 160+313 and 160+313 to 160+404	Coleshill No. 1 Embankment and M6 Motorway North Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No gas data.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimises the possibility of any gas build up (if any).	No.
No soil leachate data	No LQ site underlies or is adjacent to the viaduct.			R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer Mercia Mudstone Group Secondary B aquifer) Surface Waters: unnamed drains	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low likelihood Consequence: Minor Risk Rating: Low No samples for location. No ES sites within area.	No
Insufficient data.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
No clean water utility pipe proposed.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P6: Direct Contact	Probability: Unlikely Consequence: Medium Risk Rating: Low No clean water utility pipe proposed at this asset.	No
S1c: Asbestos contamination soils							
Asbestos not encountered.	No LQ site underlies or is adjacent to the viaduct. (ML160-CP010)	160+148 to 160+313 and 160+313 to 160+404	Coleshill No. 1 Embankment and M6 Motorway North Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No gas data.	No LQ site underlies or is adjacent to the viaduct.	160+148 to 160+313 and 160+313 to 160+404	Coleshill No. 1 Embankment and M6 Motorway North Viaduct	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Minor Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimises the possibility of any gas build up (if any).	No.
				R4: Construction Personnel R5: Maintenance Personnel			The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.

CSM for Coleshill No. 1 Embankment and M6 Motorway North Viaduct (160+148 to 160+313 and 160+313 to 160+404)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S3a: Contaminated Groundwater							
No groundwater samples for asset	No LQ site underlies or is adjacent to the viaduct.	160+148 to 160+313 and 160+313 to 160+404	Coleshill No. 1 Embankment and M6 Motorway North Viaduct	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (unnamed drains)	P8: Groundwater Migration	Probability: Low Likelihood Consequence: Minor Risk Rating: Low No samples for location. No ES sites within area.	No

Table 51: CSM for Coleshill West Viaduct: ch.160+855 – 161+314

CSM for Coleshill West Viaduct (160+855 to 161+314)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	LQ site 19-20 Timber Yard is within the footprint of the viaduct. (BD161-CR008, BD161-CR008, ML160-CR033, ML161-WS002)	160+855 to 161+314	Coleshill West Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No flammable / explosive ground gases above their LEL.	LQ site 19-20 Timber Yard is within the footprint of the viaduct. (BD161-CR008-1, BD161-CR008-2)			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No elevated explosive ground gases recorded. Furthermore, the open-air environment and absence of buildings further minimises the possibility of any gas build up (if any).	No.
Heavy metal leachates TPH in soil	LQ site 19-20 Timber Yard is within the footprint of the viaduct. (BD161-CR008, ML161-WS002)			R7: Controlled waters – Groundwater (Mercia Mudstone Group Secondary B aquifer) Surface Waters: unnamed drains	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Likely Consequence: Minor Risk Rating: Moderate / low Elevated levels of heavy metals have been detected in leachates and moderate levels of TPHS have been detected. There is evidence of a potential linkage with groundwater contamination in BD161-CR008 for TPHs although the contamination appears to be in the form of low mobility aromatic and aliphatic species impacting upon the Mercia mudstone aquifer. The contamination would not appear to be sufficient to warrant remediation of the source.	Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). Further, targeted GI and risk assessment may be required to further assess risks at this location.
Insufficient data.	LQ site 19-20 Timber Yard is within the footprint of the viaduct.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
No clean water utility pipe proposed.	LQ site 19-20 Timber Yard is within the footprint of the viaduct.			R6: Property receptors.	P6: Direct Contact	Probability: Unlikely Consequence: Medium Risk Rating: Low No clean water utility pipe proposed at this asset.	No
S1c: Asbestos contamination soils							
Asbestos.	LQ site 19-20 Timber Yard is within the footprint of the viaduct. (BD161-CR008, BD161-CR008, ML160-CR033, ML161-WS002)	160+855 to 161+314	Coleshill West Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Asbestos identified in BD161-CR008 as chrysotile and crocidolite cement and chrysotile free fibres, quantified to be 0.034%. The hole is located in LQ site 19-20 Timber Yard. Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Coleshill West Viaduct (160+855 to 161+314)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
Elevated gas levels.	LQ site 19-20 Timber Yard is within the footprint of the viaduct. (BD161-CR008-1, BD161-CR008-2)	160+855 to 161+314	Coleshill West Viaduct	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Medium Risk Rating: Low BD161-CR008-1 (flooded) located in LQ site 19-20 was assessed to be CS2. However, the open-air environment and absence of buildings minimises the possibility of any gas build-up.	No.
				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / Low Carbon dioxide concentrations in excess of the long-term and short-term OELS at BD161-CR008-1.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
WQS exceedances of Aromatics >C21-35 and EPH >C8-40	BD161-CR008: LQ site 19-20 Timber Yard is within the footprint of the viaduct.	160+855 to 161+314	Coleshill West Viaduct	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Mercia Mudstone Group Secondary B aquifer) Surface Waters: unnamed drains	P8: Groundwater Migration	Probability: Likely Consequence: Minor Risk Rating: Moderate / low TPH contamination within groundwater at BD161-CR008. The same contaminants at similar concentrations are also reported at River Cole west of the asset, suggesting it may be reflective of wider groundwater quality.	No.

Table 52: CSM for Coleshill No. 3 Embankment: ch.161+314 –162+348

CSM for Coleshill No. 3 Embankment (161+314 to 162+348)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	No LQ site underlies or is adjacent to the embankment. (BD161-CP028, BD161-CR010, BD161-TP002, BD161-TP008, BD161-TP035, BD161-TP036, BD161-WS003, BD162-TP003, BS161-CP401, BS162-CR401a, BS162-CR413, ML161-CP032, ML161-CR009, ML161-CR021, ML161-TP405, ML162-CR401, ML162-CR404)	161+314 to 162+348	Coleshill No. 3 Embankment	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No flammable / explosive ground gases above their LEL.	No LQ site underlies or is adjacent to the embankment. (BD161-CR010-1, ML161-CR022-1).			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No elevated explosive ground gases recorded. Furthermore, the open-air environment and absence of buildings further minimises the possibility of any gas build up (if any).	No.
Leachate exceedances of WQS for metals. Moderate TPH soil concentrations.	No LQ site underlies or is adjacent to the embankment (BD161-CR010, BD161-TP002, BD161-TP008, BD161-TP035, BD161-WS003, BD162-TP003, ML161-CP032, ML161-CR009, ML161-CR021)			R7: Controlled waters – Groundwater (Alluvium Secondary A aquifer Mercia Mudstone Group Secondary B aquifer) Surface Waters: unnamed drain and River Cole.	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / Low The data indicates generally elevated levels of heavy metal leachates particularly for zinc, cadmium and lead which appear to be typical of the agricultural sections of the SL5/6 alignment north of ch.159+000. However, there is little evidence of significant direct linkages between soil and groundwater contamination.	Risk register item recommended for the removal and stabilisation of Made Ground in area of deep made ground around BD161-WS003.
Insufficient data.	No LQ site underlies or is adjacent to the embankment.	161+314 to 162+348	Coleshill No. 3 Embankment	R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
pH value, SVOCs and mineral oil C11-C20.	No LQ site underlies or is adjacent to the embankment.	161+314 to 162+348	Coleshill No. 3 Embankment	R6: Property receptors.	P6: Direct Contact	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / Low No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Where data is available, it suggests the use of barrier pipe and wrapped iron at the modified water main subject to UKWIR testing.
S1c: Asbestos contamination soils							
Asbestos not encountered.	No LQ site underlies or is adjacent to the embankment. (BD161-CP028, BD161-CR010, BD161-TP002, BD161-TP008, BD161-TP035, BD161-TP036, BD161-WS003, BD162-TP003, BS161-CP401, BS162-CR401a, BS162-CR413, ML161-CP032, ML161-CR009, ML161-CR021, ML161-TP405, ML162-CR401, ML162-CR404)	161+314 to 162+348	Coleshill No. 3 Embankment	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Coleshill No. 3 Embankment (161+314 to 162+348)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
Ground gas.	No LQ site underlies or is adjacent to the embankment. (BD161-CR010-1, ML161-CR022-1).	161+314 to 162+348	Coleshill No. 3 Embankment	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Low likelihood Consequence: Minor Risk Rating: Low Gas characteristic situation CS-2 estimated for proposed pumping station	Yes: Foundation protection or passive venting of building required.
Elevated gas levels.				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / Low Carbon dioxide concentrations in excess of the long-term and short-term OELS in both installations.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
Groundwater in the Mercia Mudstone Group exceeding WQS for metals, EPH >C8-40, PAHs and TPH	No ES LQ sites. (BD161-CD010 and BD161-CR021)	161+314 to 162+348	Coleshill No. 3 Embankment	R4: Construction Personnel. R5: Maintenance Personnel.	P3: Direct contact, ingestion from contaminated waters.	Probability: Likely Consequence: Medium Risk Rating: Moderate Exceedances of metals, PAH and TPH observed in groundwater. Construction workers may come into contact with groundwater which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
				R7: Controlled waters – Groundwater (Alluvium Secondary A aquifer Mercia Mudstone Group Secondary B aquifer) Surface Waters: unnamed drain and River Cole.	P8: Groundwater Migration	Probability: Likely Consequence: Moderate Risk Rating: Moderate The minor exceedances within groundwater may be reflective of land use at LQ site 19-20 or the wider development in the SL5/6 area north of ch.159+000 up to the Delta.	Further GI and risk assessment is required to define risks associated with this asset and possible remediation requirements.

Table 53: CSM for M42 Coleshill Box Structure: ch.162+436 – 162+656

CSM for M42 Coleshill Box Structure (162+436 to 162+656)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	LQ site 19-07 Former sewage works is within the northern footprint of the viaduct.	162+436 to 162+656	M42 Coleshill Box Structure	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No gas data.	LQ site 19-07 Former sewage works is within the northern footprint of the viaduct.			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Minor Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimises the possibility of any gas build up (if any).	No.
Leachate WQS exceedances for arsenic* zinc and ammoniacal nitrogen (*arsenic exceedance from leachate test carried out at 10:1 ratio). Moderate and high TPH soil concentrations.	LQ site 19-07 Former sewage works is within the northern footprint of the viaduct			R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (River Cole) P8: Groundwater Migration	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / low Leachate determinant exceedances not observed in groundwater samples. Evidence of limited contamination from M42 and widespread agricultural activities which are considered to be largely beyond the control of HS2. Location of soil TPH concentrations likely to remain under Highways England control. Elevated ammonium may potentially be derived from former sewage works.	No. Further investigation of the area of this former sewage works is proposed to establish potential sources of contamination. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). Further, targeted GI and risk assessment may be required to further assess risks at this location.
Insufficient data.	LQ site 19-07 Former sewage works is within the northern footprint of the viaduct.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
No clean water utility pipe proposed.	LQ site 19-07 Former sewage works is within the northern footprint of the viaduct.			R6: Property receptors.	P6: Direct Contact	Probability: Unlikely Consequence: Medium Risk Rating: Low No clean water utility pipe proposed at this asset.	No.
S1c: Asbestos contamination soils							
Asbestos not encountered.	LQ site 19-07 Former sewage works is within the northern footprint of the viaduct. (ML158-CP007, ML158-CR003, ML158-WS012)	162+436 to 162+656	M42 Coleshill Box Structure	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No gas data.	LQ site 19-07 Former sewage works is within the northern footprint of the viaduct.	162+436 to 162+656	M42 Coleshill Box Structure	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Medium Risk Rating: Low	No.

CSM for M42 Coleshill Box Structure (162+436 to 162+656)

Source	Environmental Statement Land Quality Site (Borehole(s))	Chainage (Sub-lot)	Proposed Construction	Receptor	Pathway	Risk Assessment: Highest Risk Identified	Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?
				R4: Construction Personnel R5: Maintenance Personnel		No gas data, however the open-air environment and absence of buildings minimises the possibility of any gas build up.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
Mercia Mudstone groundwater WQS exceedances for nitrite, sulphate, iron, magnesium, manganese, EPH >C8-40 and TPH (aromatic >C21-35)	Outside the LOD (ML162-CR004a)	162+436 to 162+656	M42 Coleshill Box Structure	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (River Cole)	**P8:** Groundwater Migration	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / Low Groundwater data from the Mercia Mudstone shows exceedances typically associated with agricultural activity and included low mobility TPH species. The contamination is likely to be of low mobility in the subsurface. An additional potential source of contamination from a former sewage works requires further investigation.	No. Further investigation of the area of this former sewage works is proposed to establish potential sources of contamination.

Table 54: CSM for M42 Coleshill North Viaduct: ch.162+656 – 162+939

CSM for M42 Coleshill North Viaduct (162+656 to 162+939)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	LQ site 19-07 Former sewage works is within the footprint of the viaduct. (ML162-CR024 ML162-CR028)	162+656 to 162+939	M42 Coleshill North Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
Elevated methane concentration.	LQ site 19-07 Former sewage works is within the footprint of the viaduct. (ML162-CR024-01, ML162-CR024-1, ML162-CR025-01, ML162-CR025-1).			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Minor Risk Rating: Very low ML162-CR024-1 recorded methane concentration within its explosive limit. It is not located within a LQ site. No HS2 enclosed building is proposed over the methane hotspot and given the open-air environment the concentrations will disperse and dilute to atmospheric concentrations.	No.
Leachate WQS exceedance for cadmium and zinc	LQ site 19-07 Former sewage works is within the footprint of the viaduct ML162-CR024			R7: Controlled waters – Groundwater (River Terrace Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (River Cole)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low Likelihood Consequence: Minor Risk Rating: Low Leachate exceedances were minor, from shallow topsoil sample in an area of agricultural land use. Risks from former sewage works are currently unknown pending further proposed GI.	No. Further investigation of the area of this former sewage works is proposed to establish potential sources of contamination. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). Further, targeted GI and risk assessment may be required to further assess risks at this location.
Insufficient data.	LQ site 19-07 Former sewage works is within the footprint of the viaduct.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
pH value.	LQ site 19-07 Former sewage works is within the footprint of the viaduct.			R6: Property receptors.	P6: Direct Contact	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / Low No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Where data is available, it suggests the use of PVC, barrier pipe and wrapped iron at the new water main subject to UKWIR testing.
S1c: Asbestos contamination soils							
Asbestos not encountered.	LQ site 19-07 Former sewage works is within the footprint of the viaduct. (ML162-CR024 ML162-CR028)	162+656 to 162+939	M42 Coleshill North Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for M42 Coleshill North Viaduct (162+656 to 162+939)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No elevated gas levels.	LQ site 19-07 Former sewage works is within the footprint of the viaduct. (ML162-CR024-01, ML162-CR024-1, ML162-CR025-01, ML162-CR025-1).	162+656 to 162+939	M42 Coleshill North Viaduct	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Negligible Risk Rating: Very Low No elevated gas levels were recorded. Additionally, the open-air environment and absence of buildings minimises the possibility of any gas build-up (if any).	No.
Elevated gas levels.				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / Low Carbon dioxide concentrations in excess of the long-term and short-term OELS in both installations.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
No groundwater data	LQ site 19-07 Former sewage works is within the footprint of the viaduct.	162+656 to 162+939	M42 Coleshill North Viaduct	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (River Terrace Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (River Cole)	**P8:** Groundwater Migration	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / Low No groundwater data available for review. However, given the predominance of agriculture around this asset, groundwater quality will likely be reflective of the regional agricultural land use. An additional potential source of contamination from a former sewage works requires further investigation.	No. Further investigation of the area of this former sewage works is proposed to establish potential sources of contamination.

Table 55: CSM for Gilson Embankment: ch.162+939 – 163+220

CSM for Gilson Embankment (162+939 to 163+220)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	No LQ site underlies the embankment. LQ site 19-38 lies east of the embankment. (ML162-CR026, ML162-TP402, ML163-CR007, ML163-CR401)	162+939 to 163+220	Gilson Embankment	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No gas data.	No LQ site underlies the embankment. LQ site 19-38 lies east of the embankment.			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimises the possibility of any gas build up (if any).	No.
No leachate exceedances of the WQS	No LQ site underlies the embankment. LQ site 19-38 lies east of the embankment.			R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer Mercia Mudstone Group Secondary B aquifer) Surface Waters (Unnamed drain)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Unlikely Consequence: Minor Risk Rating: Low No exceedances recorded.	No
Insufficient data.	No LQ site underlies the embankment. LQ site 19-38 lies east of the embankment.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
pH value.	No LQ site underlies the embankment. LQ site 19-38 lies east of the embankment.			R6: Property receptors.	P6: Direct Contact	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / Low No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Where data is available, it suggests the use of PVC, barrier pipe and wrapped iron at the new water main subject to UKWIR testing.
S1c: Asbestos contamination soils							
Asbestos not encountered.	No LQ site underlies the embankment. LQ site 19-38 lies east of the embankment. (ML162-CR026, ML162-TP402, ML163-CR007, ML163-CR401)	162+939 to 163+220	Gilson Embankment	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Gilson Embankment (162+939 to 163+220)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No gas data.	No LQ site underlies the embankment. LQ site 19-38 lies east of the embankment.	162+939 to 163+220	Gilson Embankment	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Minor Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimises the possibility of any gas build up (if any).	No.
				R4: Construction Personnel R5: Maintenance Personnel			The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
No groundwater data	No LQ site underlies the embankment. LQ site 19-38 lies east of the embankment.	162+939 to 163+220	Gilson Embankment	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer Mercia Mudstone Group Secondary B aquifer) Surface Waters (River Cole)	P8: Groundwater Migration	Probability: Unlikely Consequence: Minor Risk Rating: Low LQ site 19-38 lies east of the asset. It is in an area of a proposed attenuation pond. It is likely that the fill material will be excavated to accommodate the pond, removing potential contaminant source.	No

Table 56: CSM for Gilson Cutting: ch.163+220 – 163+760

Source	Environmental Statement Land Quality Site (Borehole(s))	Chainage (Sub-lot)	Proposed Construction	Receptor	Pathway	Risk Assessment: Highest Risk Identified	Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?
CSM for Gilson Cutting (163+220 to 163+760)							
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	No LQ site underlies or is adjacent to the cutting. (ML163-CP401, ML163-TP009)	163+220 to 163+760	Gilson Cutting	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No gas data.	No LQ site underlies or is adjacent to the cutting.			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimises the possibility of any gas build up (if any).	No.
No leachate data	No LQ site underlies or is adjacent to the cutting.			R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways	Probability: Unlikely Consequence: Minor Risk Rating: Low No leachate data. No LQ site underlie the alignment of the cutting.	No
Insufficient data.	No LQ site underlies or is adjacent to the cutting.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
No clean water utility pipe proposed.	No LQ site underlies or is adjacent to the cutting.			R6: Property receptors.	P6: Direct Contact	Probability: Unlikely Consequence: Medium Risk Rating: Low No clean water utility pipe proposed at this asset.	No
S1c: Asbestos contamination soils							
Asbestos not encountered.	No LQ site underlies or is adjacent to the cutting. (ML163-CP401, ML163-TP009)	163+220 to 163+760	Gilson Cutting	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No gas data.	No LQ site underlies or is adjacent to the cutting.	163+220 to 163+760	Gilson Cutting	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Minor Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimises the possibility of any gas build up (if any).	No.
				R4: Construction Personnel R5: Maintenance Personnel			The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.

CSM for Gilson Cutting (163+220 to 163+760)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S3a: Contaminated Groundwater							
No groundwater data	No LQ site underlies or is adjacent to the cutting.	163+220 to 163+760	Gilson Cutting	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer)	P8: Groundwater Migration	Probability: Unlikely Consequence: Minor Risk Rating: Low No groundwater data. No LQ site underlie the alignment of the cutting.	No

Table 57: CSM for Lichfield Road Embankment: ch.163+760 – 164+035

CSM for Lichfield Road Embankment (163+760 to 164+035)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	No LQ site underlie the embankment. LQ site 19-17 lie north and north-east of the asset. (ML163-CP035, ML163-CP038, ML163-CR008, ML163-CR010, ML163-CR016, ML163-CR020, ML163-CR021a, ML163-TP020, ML163-TP021)	163+760 to 164+035	Lichfield Road Embankment	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No flammable / explosive ground gases above their LEL.	No LQ site underlie the embankment. LQ site 19-17 lie north and north-east of the asset. (ML163-CR010-1, ML163-CR010-2, ML163-CR014-01, ML163-CR014-1, ML163-CR015a-01, ML163-CR015a-02, ML163-CR015a-1, ML163-CR015a-2, ML163-CR021a-1, ML163-CR021a-2).			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No elevated explosive ground gases recorded. Furthermore, the open-air environment and absence of buildings further minimises the possibility of any gas build up (if any).	No.
Leachate exceedances of WQS for metals. High TPH soil concentrations. Moderate PAH soil concentrations.	No LQ site underlie the embankment. LQ site 19-17 lie north and north-east of the asset. (ML163-CP035, ML163-CP038, ML163-CR008, ML163-CR010, ML163-CR016, ML163-CR020, ML163-CR021a, ML163-TP020, ML163-TP021)			R7: Controlled waters – Groundwater (Alluvium Secondary A aquifer, River Terrace Deposits Secondary A aquifer Mercia Mudstone Group Secondary B aquifer) Surface Waters (Unnamed drain)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / Low Data shows elevated levels of inorganic leachates and soil TPH probably derived from fill to support existing playing fields. However, exceedances within natural ground material suggest it may be reflective of wider ground conditions. The embankment and landscaping proposed at the asset will mitigate against leachate generation, reducing water infiltration through to the subsurface. No proposed work is planned at the ML163-CR020 TPH hotspot, and localised removal of Made Ground likely to be required. There is no evidence of significant contamination in shallow groundwater from leachates and TPH.	Excavation and removal of soil at and around the TPH hotspot at ML163-CR020 and undertake bioremediation / stabilisation for re-use in scheme.
Insufficient data.	No LQ site underlie the embankment. LQ site 19-17 lie north and north-east of the asset.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
No clean water utility pipe proposed.	No LQ site underlie the embankment. LQ site 19-17 lie north and north-east of the asset.			R6: Property receptors.	P6: Direct Contact	Probability: Unlikely Consequence: Medium Risk Rating: Low No clean water utility pipe proposed at this asset.	No
S1c: Asbestos contamination soils							

CSM for Lichfield Road Embankment (163+760 to 164+035)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
Asbestos.	No LQ site underlie the embankment. LQ site 19-17 lie north and north-east of the asset. (ML163-CP035, ML163-CP038, ML163-CR008, ML163-CR010, ML163-CR016, ML163-CR020, ML163-CR021a, ML163-TP020, ML163	163+760 to 164+035	Lichfield Road Embankment	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Asbestos is identified at ML163-CR021a as chrysotile free fibres, with quantification testing reported it to be 0.003%. The hole was located in a playing field next to the A446. Please refer to Appendix H for asbestos risk assessment.	See Appendix H
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
Elevated gas levels.	No LQ site underlie the embankment. LQ site 19-17 lie north and north-east of the asset. (ML163-CR010-1, ML163-CR010-2, ML163-CR014-01, ML163-CR014-1, ML163-CR015a-01, ML163-CR015a-02, ML163-CR015a-1, ML163-CR015a-2, ML163-CR021a-1, ML163-CR021a-2).	163+760 to 164+035	Lichfield Road Embankment	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Medium Risk Rating: Low ML163-CR021a-2 (flooded) is assessed to be CS2. However gas levels are not considered to be sufficient to result in significant risks to on or off-site receptors.	No.
				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / Low Carbon dioxide concentrations in excess of the long-term and short-term OELS at four installations.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
WQS exceedances for iron, calcium, manganese, magnesium, sulphate as SO4, sodium, EPH >C8-40 and aromatics >C21 – 35.	No LQ site underlie the embankment. LQ site 19-17 lie north and north-east of the asset. (ML163-CR021a)	163+760 to 164+035	Lichfield Road Embankment	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Alluvium Secondary A aquifer, River Terrace Deposits Secondary A aquifer Mercia Mudstone Group Secondary B aquifer) Surface Waters (Unnamed drain)	P8: Groundwater Migration	Probability: Low Likelihood Consequence: Minor Risk Rating: Low Limited groundwater data suggest that existing groundwater contamination levels are minor, and not significantly impacted by soil leachate. Level of contaminants does not indicate it to be from LQ site 19-17 to the north and north-west.	Further GI and risk assessment is required to define risks associated with this asset and possible remediation requirements.

Table 58: CSM for Chattle Hill Box Structure: ch.164+035 – 164+116

CSM for Chattle Hill Box Structure (164+035 to 164+116)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the structure. (ML164-CP021, ML164-CP023, ML164-CR029, ML164-CR030, ML164-CR032, ML164-TP015, ND001-CP049)	164+035 to 164+116	Chattle Hill Box Structure	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Exceedances of PAHs are reported at ML164-TP015 which is within a grass playing field, and not within a designated LQ site. Proposed works around the hole include a balancing pond surrounded by landscaping. Given the low concentrations and assuming transient presence of end users, it is unlikely that a significant pathway will exist between the source and receptor.	No.
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate Exceedances of PAHs are reported at ML164-TP015, located within a grass playing field and not within a designated LQ site. Additionally, construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No flammable / explosive ground gases above their LEL.	LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the viaduct. (ML164-CR029-1, ML164-CR029-2, ND001-CP049-1, ND001-CP049-2			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No elevated explosive ground gases recorded. Furthermore, the open-air environment and absence of buildings further minimises the possibility of any gas build up (if any).	No.
Made Ground minor leachate exceedances of the WQS for metals (arsenic, chromium, chromium VI, cadmium, copper, nickel, lead, mercury, vanadium and zinc). Moderate and high TPH and PAH soil concentrations.	LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the structure. Locations within LOD not in the LQ (ML164-CP21, ML164-CP023, ML164-CR029, ML164-CR030, ML164-CR032, ML164-TP015 and ND001-CP049)			R7: Controlled waters – Groundwater (River Terrace Deposits Secondary A aquifer Mercia Mudstone Group Secondary B aquifer) Surface Waters (Unnamed drain)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Likely Consequence: Moderate Risk Rating: Moderate Principal risks are associated with elevated leachates noted in ML164-CR030 which appear to be impacting upon the River Terrace Gravels. The source of this contamination is likely to be Made Ground used to construct sports pitches. TPH contamination in ML164-CR029 is considered to present a potential risk of free phase contamination.	Yes: Removal of Made Ground around ML164-CR030 and stabilisation prior to recovery in accordance with MMP. Removal of soil contamination from around ML164-CR029 and bioremediation /stabilisation for re-use in scheme. Further investigation of the area of this former sewage works is proposed to establish potential sources of contamination. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001).
Insufficient data.	LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the viaduct.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
pH, SVOCs and mineral oil C11-C20.	LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the viaduct.			R6: Property receptors.	P6: Direct Contact	Probability: Likely Consequence: Medium Risk Rating: Moderate No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Where data is available, it suggests the use of barrier pipe, wrapped steel and wrapped iron at the modified water main subject to UKWIR testing.
S1c: Asbestos contamination soils							
Asbestos not encountered.	LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the viaduct. (ML164-CP021, ML164-CP023, ML164-CR029, ML164-CR030, ML164-CR032, ML164-TP015, ND001-CP049)	164+035 to 164+116	Chattle Hill Box Structure	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Chattle Hill Box Structure (164+035 to 164+116)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No elevated gas levels.	LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the viaduct. (ML164-CR029-1, ML164-CR029-2, ND001-CP049-1, ND001-CP049-2)	164+035 to 164+116	Chattle Hill Box Structure	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Medium Risk Rating: Low ML163-CR021a-2 (flooded) is assessed to be CS2. However gas levels are not considered to be sufficient to result in significant risks to on or off-site receptors.	No.
Elevated gas levels.				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / Low Carbon dioxide concentrations in excess of the long-term and short-term OELS at two installations.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Ground Water – On-site; S3b: Contaminated Ground Water – Off-site							
Elevated VOCs	LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the viaduct. (ML164-CR029, ND001-CP049)	164+035 to 164+116	Chattle Hill Box Structure	R2: Off-site users – Residential	P2: Inhalation of vapour with / from contaminated waters	Probability: Unlikely Consequence: Minor Risk Rating: Very low Groundwater concentrations of vinyl chloride exceeded its residential GAC_{gwvap} at ML164-CR029. Assuming the adjacent modern industrial units (built on LQ site 19-17) have adequate gas protection measures, and the lack of residential receptors in the vicinity, it is unlikely that a pathway will form. No groundwater abstractions recorded in the vicinity of the scheme.	No.
Exceedances of inorganics, metals and TPH.	LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the viaduct.			R4: Construction Personnel. R5: Maintenance Personnel.	P3: Direct contact, ingestion from contaminated waters.	Probability: Likely Consequence: Medium Risk Rating: Moderate Exceedances of inorganics, metals and TPH observed in groundwater. Construction workers may come into contact with groundwater which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
Exceedances of WQS for Inorganics in groundwater: manganese, iron, sulphate, calcium, ammoniacal nitrogen, sodium, potassium and zinc.	LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the viaduct. (ML164-CR029, ND001-CP049)			R7: Controlled waters – Groundwater (River Terrace Deposits Secondary A aquifer Mercia Mudstone Group Secondary B aquifer) Surface Waters (Unnamed drain)	P8: Groundwater Migration	Probability: Likely Consequence: Moderate Risk Rating: Moderate Groundwater is impacted in three different layers: Made Ground, River Terrace Deposits and Mercia Mudstone Group. Therefore, it is likely there is some connectivity between the layers. Although there are significant exceedances of iron, manganese and sulphate there is no apparent linkage between soil leachate and groundwater contamination. The assets' proximity to LQ site 19-17 (Coleshill gas works historical landfill and former road haulage) may potentially be a source of identified contaminants, however, no clear source is identifiable for the asset.	No, based on current information. Additional GI investigation in LQ site 19-17 may provide more information on the groundwater conditions at and around this asset.
Exceedances of WQS for organics in groundwater: chloroethene, EPH >C8 – 40, Aromatics >C16-21 & >C21 – 35.	LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the viaduct. (ML164-CR029, ND001-CP049)			R7: Controlled waters – Groundwater (River Terrace Deposits Secondary A aquifer Mercia Mudstone Group Secondary B aquifer) Surface Waters (Unnamed drain)	P8: Groundwater Migration	Probability: Likely Consequence: Moderate Risk Rating: Moderate Groundwater is impacted in three different layers: Made Ground, River Terrace Deposits and Mercia Mudstone Group. Therefore, it is likely there is some connectivity between the layers. Although there are significant exceedances of iron, manganese and sulphate there is no apparent linkage between soil leachate and groundwater contamination. The assets' proximity to LQ site 19-17 (Coleshill gas works historical landfill and former road haulage) may potentially be a source of identified contaminants, however, no clear source is identifiable for the asset.	No, based on current information. Additional GI investigation in LQ site 19-17 may provide more information on the groundwater conditions at and around this asset.

Table 59: CSM for Watton House East and West Viaduct: ch.164+116 – 164+327

CSM for Watton House East and West Viaduct (164+116 to 164+327)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	LQ ite 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (ML164-CP003, ML164-CP004, ML164-CR009, ML164-CR011, ML164-CR046a, ML164-TP011).	164+116 to 164+327	Watton House East and West Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
Elevated methane concentration.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (ML164-CP004-1, ML164-CP004-2, ML164-CR009-1, ML164-CR009-2, ML164-CR046a-1, ML164-CR046a-2			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Low likelihood Consequence: Minor Risk Rating: Low ML164-CR046a-1 recorded methane concentration above its low explosive limit. The installation is within LQ site 19-17. No HS2 enclosed building is proposed over these methane hotspots and given the open-air environment the concentrations will disperse and dilute to atmospheric concentrations.	No. Gas monitoring required during construction to ensure that works do not have an adverse impact on ground gas levels.
Leachate exceedances of the WQS for Metals & inorganics, including; arsenic, cadmium, chromium (III & VI), copper, lead, mercury, nickel, selenium, vanadium, zinc and ammoniacal nitrogen. Moderate soil concentrations of TPH and PAH in Made Ground.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (ML164-CP003, ML164-CP004, ML164-CR009, ML164-CR011, ML164-CR046a and ML164-TP011)			R7: Controlled waters – On-site: groundwater: River Terrace Deposits Secondary A aquifer and Mercia Mudstone Group Secondary B aquifer Surface Waters (Unnamed drain)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low likelihood Consequence: Moderate Risk Rating: Moderate / low Although the exceedances of the WQS in soil leachate are considered to be minor there is evidence of potential contamination from the former gasworks landfill, and the sewage treatment works.	No. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001). Further, targeted GI and risk assessment may be required to further assess risks at this location.
Insufficient data.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
No clean water utility pipe proposed.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct.			R6: Property receptors.	P6: Direct Contact	Probability: Unlikely Consequence: Medium Risk Rating: Low No clean water utility pipe proposed at this asset.	No
S1c: Asbestos contamination soils							
Asbestos.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (ML164-CP003, ML164-CP004, ML164-CR009, ML164-CR011, ML164-CR046a, ML164-TP011).	164+116 to 164+327	Watton House East and West Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Asbestos is identified at ML164-CP003 as chrysotile, no quantification testing was undertaken. The hole was located at an area of hardstand adjacent to a warehouse building by the A446. Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Watton House East and West Viaduct (164+116 to 164+327)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
Elevated gas levels.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (ML164-CP004-1, ML164-CP004-2, ML164-CR009-1, ML164-CR009-2, ML164-CR046a-1, ML164-CR046a-2)	164+116 to 164+327	Watton House East and West Viaduct	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / low ML164-CR009-1 (located in LQ site 19-25) and ML164-CR046a-1 (located in LQ site 19-17) both flooded are assessed to be CS2. The proposed Watton House West Viaduct and nearby Water Orton No. 3 Viaduct are unlikely to be affected by the ground gas regime. Off-site Assuming nearby modern industrial units (built on LQ site 19-17) have adequate gas protection measures, and ground gasses do not extend to the Jack O'Watton Business Park.	No. Further investigation to determine the extent and shallow ground gassing regime of LQ site 19-17 to the west of the alignment. This is to determine the requirement of any remediation measures (if necessary) to address potential gas migration. Gas monitoring is also required during construction to ensure that works do not have an adverse impact on ground gas levels.
				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / Low Carbon dioxide concentrations in excess of the long-term and short-term OELS at two installations.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Ground Water – On-site; S3b: Contaminated Ground Water – Off-site							
Elevated VOCs	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (ML164-CR009, ML164-CR046a)	164+116 to 164+327	Watton House East and West Viaduct	R2: Off-site users – Residential	P2: Inhalation of vapour with / from contaminated waters	Probability: Unlikely Consequence: Minor Risk Rating: Very low Groundwater concentrations of vinyl chloride exceeded its residential GAC_{gwvap} at ML164-CR009 and ML164-CR046a, with the latter also recorded an exceedance of trichloroethene. Assuming the adjacent modern industrial units (built on LQ site 19-17) have adequate gas protection measures, and the lack of residential receptors in the vicinity, it is unlikely that a pathway will form. No groundwater abstractions recorded in the vicinity of the scheme.	No.
Exceedances of inorganics, metals, VOC and TPH in groundwater.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct.			R4: Construction Personnel. R5: Maintenance Personnel.	P3: Direct contact, ingestion from contaminated waters.	Probability: Likely Consequence: Medium Risk Rating: Moderate Exceedances of inorganics, metals, VOC and TPH observed in groundwater. Construction workers may come into contact with groundwater which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
Exceedances of WQS in groundwater for Ammoniacal nitrogen, arsenic, nickel total sulphur, iron, manganese, zinc, benzene, EPH >C8-40, TPH, PAH, phenol, vinyl chloride	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (ML164-CR009, ML164-CR046a)			R7: Controlled waters – On-site: groundwater: River Terrace Deposits Secondary A aquifer and Mercia Mudstone Group Secondary B aquifer Surface Waters (Unnamed drain)	P8: Groundwater migration	Probability: Likely Consequence: Moderate Risk Rating: Moderate There is evidence of high levels of contamination of groundwater from the former gasworks landfill, particularly from naphthalene, phenol and TPH in ML164-CR046a.	Yes: Groundwater contamination in ML164-CR046a does warrant remediation. This could be achieved through a pump and treat system or in-situ advanced chemical treatment. There are also risks related to the creation of piling pathways allowing pollution of the underlying aquifer by heavy metals and hydrocarbons and risks to on and off-site receptors from phenols, TPHs and PAHs (principally naphthalene) in groundwater. It is recommended that remedial actions are included in the target cost to eliminate, reduce or control these risks.

Table 60: CSM for Watton House Embankment: ch.164+327 – 164+538

CSM for Watton House Embankment (164+327 to 164+538)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	LQ site 19-25 Coleshill Sewage Treatment works is within the footprint of the embankment. (ML164-CP010, ML164-CP036, ML164-CR013, ML164-CR044, ML164-CR045, ML164-CR404).	164+327 to 164+538	Watton House Embankment	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No flammable / explosive ground gases above their LEL.	LQ site 19-25 Coleshill Sewage Treatment works is within the footprint of the embankment. (ML164-CP010-1, ML164-CP036-1).			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No elevated explosive ground gases recorded. Furthermore, the open-air environment and absence of buildings further minimises the possibility of any gas build up (if any).	No.
Leachate exceedances of the WQS for metals: metals including: arsenic, cadmium, chromium, chromium VI, copper, lead, mercury, selenium, vanadium, zinc and cyanide. Moderate and high TPH soil concentrations. Moderate PAH soil concentration.	LQ site 19-25 Coleshill Sewage Treatment works is within the footprint of the embankment. (ML164-CP010, ML164-CP036, ML164-CR013, ML164-CR044 and ML164-CR045. ML164-CP010 and ML164-CR044)			R7: Controlled waters – On-site: groundwater: River Terrace Deposits Secondary A aquifer, Alluvium secondary A aquifer, Mercia Mudstone Group Secondary B aquifer Surface Waters (River Tame and unnamed drain)	P5a: Vertical and lateral migration P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / low Risks from inorganic leachates and soil TPH or PAH to controlled waters may occur, but the embankment construction will likely result in the removal of a significant proportion of Made Ground and mitigate against leachate generation. Significant exceedances at ML164-CR013 likely to require remedial target cost items.	Yes: Removal of made ground around ML164-CR013, and bioremediation / stabilisation for re-use in scheme.
Insufficient data.	LQ site 19-25 Coleshill Sewage Treatment works is within the footprint of the embankment.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
pH value, and SVOCs.	LQ site 19-25 Coleshill Sewage Treatment works is within the footprint of the embankment.			R6: Property receptors.	P6: Direct Contact	Probability: Likely Consequence: Medium Risk Rating: Moderate No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Where data is available, it suggests the use of barrier pipe, and wrapped iron at the modified water main subject to UKWIR testing.
S1c: Asbestos contamination soils							
Asbestos not encountered.	LQ site 19-25 Coleshill Sewage Treatment works is within the footprint of the embankment. (ML164-CP010, ML164-CP036, ML164-CR013, ML164-CR044, ML164-CR045, ML164-CR404).	164+327 to 164+538	Watton House Embankment	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Watton House Embankment (164+327 to 164+538)

Source	Environmental Statement Land Quality Site (Borehole(s))	Chainage (Sub-lot)	Proposed Construction	Receptor	Pathway	Risk Assessment: Highest Risk Identified	Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
Elevated gas levels.	LQ site 19-25 Coleshill Sewage Treatment works is within the footprint of the embankment. (ML164-CP010-1, ML164-CP036-1).	164+327 to 164+538	Watton House Embankment	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / low The gas characteristic situation is CS-2. The embankment has the potential to alter ground gas regime. Further investigation is recommended to determine the extent of the LQ site 19-17 to the west.	Further investigation to determine the extent and shallow ground gassing regime of LQ site 19-17 to the west of the alignment. This is to determine the requirement of any remediation measures (if necessary) to address potential gas migration. Gas monitoring is also required during construction to ensure that works do not have an adverse impact on ground gas levels.
				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / Low Carbon dioxide concentrations in excess of the long-term and short-term OELS at both installations.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater (on-site)							
Exceedances of iron, manganese, zinc and EPH >C8-40.	19-25 Coleshill Sewage Works (ML164-CP036)	164+327 to 164+538	Watton House Embankment	R4: Construction Personnel. R5: Maintenance Personnel.	P3: Direct contact, ingestion from contaminated waters.	Probability: Likely Consequence: Medium Risk Rating: Moderate Exceedances of metals and TPH observed in groundwater. Construction workers may come into contact with groundwater which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
				R2: Off-site users – Residential	P2: Inhalation of vapour with / from contaminated waters	Probability: Unlikely Consequence: Minor Risk Rating: Very low No groundwater abstractions recorded in the vicinity of the scheme.	No.
				R7: Controlled waters – On-site: groundwater: River Terrace Deposits Secondary A aquifer, Alluvium secondary A aquifer, Mercia Mudstone Group Secondary B aquifer Surface Waters (River Tame and unnamed drain)	P8: Groundwater migration	Probability: Low Likelihood Consequence: Minor Risk Rating: Low The sample taken had high suspended solids, this means there is potential that the exceedances are associated with the sediment rather than the groundwater. The embankment will mitigate against leachate generation, resulting in a betterment of the leaching condition at the asset.	No

Table 61: CSM for Water Orton No.1, 2, and 3 Viaducts: NC ch.000+791 – NC 001+018 (Formerly Watton Lane Embankment)

CSM for Water Orton No.1 , 2 and 3 Viaducts (000+791 (NC) to 001+018 (NC))							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	LQ site 19-25 Coleshill Sewage Treatment works and 19-24 Birmingham to Nuneaton Line are adjacent to the east and south of the embankment, respectively. (ND000-CR001, ND000-CR020, ND000-TP035, ND001-CP002, ND001-CR001).	NC 000+791 to NC 001+018	Water Orton Viaducts	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and any potential pathways will be cut by the station's foundations and floor footprint.	No
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
Methane	LQ site 19-25 Coleshill Sewage Treatment works and 19-24 Birmingham to Nuneaton Line are adjacent to the east and south of the embankment, respectively.			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No elevated explosive ground gases recorded. Furthermore, the open-air environment and absence of buildings further minimises the possibility of any gas build up (if any).	No. Gas monitoring required during construction to detect any adverse impacts of the scheme on the ground gas regime.
Leachate sample exceedances of WQS for metals: arsenic, cadmium, chromium VI, copper, lead, mercury, selenium, vanadium, zinc and cyanide. Moderate soil concentrations of TPH.	LQ site 19-25 Coleshill Sewage Treatment works and 19-24 Birmingham to Nuneaton Line are adjacent to the east and south of the embankment, respectively. (ND000-CR001, ND000-CR020, ND000-TP035, ND001-CP002, ND001-CR001)			R7: Controlled waters – On-site: groundwater: River Terrace Deposits Secondary A aquifer, Alluvium secondary A aquifer, Mercia Mudstone Group Secondary B aquifer Surface Waters (River Tame and unnamed drain)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low likelihood Consequence: Moderate Risk Rating: Moderate / low Leachates in Made Ground beneath the proposed viaduct and access road may present a risk to controlled waters	Yes: Risk register item for ex-situ stabilisation of Made Ground pending receipt of further proposed GI data. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001).
Insufficient data.	LQ site 19-25 Coleshill Sewage Treatment works and 19-24 Birmingham to Nuneaton Line are adjacent to the east and south of the embankment, respectively.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
pH value, phenols and mineral oil.	LQ site 19-25 Coleshill Sewage Treatment works and 19-24 Birmingham to Nuneaton Line are adjacent to the east and south of the embankment, respectively. (ND000-TP035, ND001-CP002, ND001-CR001)			R6: Property receptors.	P6: Direct Contact	Probability: Likely Consequence: Medium; Risk Rating: Moderate Current contaminant data indicate suitable pipe materials for the new potable water main at the Water Orton Viaduct 1 & 3 (North) satellite construction compound to be barrier pipe, wrapped iron and wrapped steel. No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Use of barrier pipe, wrapped iron and wrapped steel pipework at the new water main subject to UKWIR testing. Contaminant data suggest the use of barrier pipe and wrapped iron pipework at the modified water mains subject to UKWIR testing.
S1c: Asbestos contamination soils							
Asbestos.	LQ site 19-25 Coleshill Sewage Treatment works and 19-24 Birmingham to Nuneaton Line are adjacent to the east and south of the embankment, respectively. (ND000-CR001, ND000-CR020, ND000-TP035, ND001-CP002, ND001-CR001).	NC 000+791 to NC 001+018	Water Orton Viaducts	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Asbestos is identified at ND000-CR020 as amosite free fibres and quantified to be 0.001%. The hole is located in an area of vegetated land. Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Water Orton No.1 , 2 and 3 Viaducts (000+791 (NC) to 001+018 (NC))							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No gas data.	LQ site 19-25 Coleshill Sewage Treatment works and 19-24 Birmingham to Nuneaton Line are adjacent to the east and south of the embankment, respectively.	NC 000+791 to NC 001+018	Water Orton Viaducts	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Medium Risk Rating: Low No gas data, however the open-air environment and absence of buildings minimizes the possibility of any gas build up (if any).	No. Gas monitoring required during construction to detect any adverse impacts of the scheme on the ground gas regime.
				R4: Construction Personnel R5: Maintenance Personnel			The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
ML164-CP036 (for Watton House Embankment): iron, manganese, zinc and EPH >C8-40.	LQ site 19-25 Coleshill Sewage Treatment works and 19-24 Birmingham to Nuneaton Line are adjacent to the east and south of the embankment, respectively.	NC 000+791 to NC 001+018	Water Orton Viaducts	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – On-site: groundwater: River Terrace Deposits Secondary A aquifer, Alluvium secondary A aquifer, Mercia Mudstone Group Secondary B aquifer Surface Waters (River Tame and unnamed drain)	P8: Groundwater Migration	Probability: Low Likelihood Consequence: Minor Risk Rating: Low The sample taken had high suspended solids, this means there is potential that the exceedances are associated with the sediment rather than the groundwater. The embankment will mitigate against leachate generation, resulting in a betterment of the leaching condition at the asset.	No

Table: CSM for Water Orton No.1, 2, and 3 Viaducts : NC ch.001+018 – NC 001+653

CSM for Water Orton No. 1, 2 and 3 Viaducts (001+018 (NC) to 001+653 (NC))							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (NC120-CR401, NC137-CT401, NC145-CR401, ND001-CP043, ND001-CR002, ND001-CR005, ND001-CR011, ND001-CR013, ND001-CR014, ND001-CR017, ND001-CR022, ND001-CR031, ND001-CR040, ND001-CR041, ND001-CR042, ND001-CR043, ND001-TP002, ND001-WS002, ND001-WS003).	NC 001+018 to NC 001+653	Water Orton No.3 Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No flammable / explosive ground gases above their LEL.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (ND001-CP043-1, ND001-CR002-1, ND001-CR002-2, ND001-CR017-1).			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Minor Risk Rating: Very low No elevated explosive ground gases recorded. Furthermore, the open-air environment and absence of buildings further minimises the possibility of any gas build up (if any).	No.
Leachate sample exceedances of the WQS for inorganics and metals including; arsenic, cadmium, chromium (III and VI), copper, lead, vanadium, zinc and ammoniacal nitrogen. Moderate and high TPH soil concentrations.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. Made ground from sports pitches.			R7: Controlled waters – Groundwater (River Terrace Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (Unnamed drain)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / low Made ground associated with sports pitches appears to be the source of elevated leachates which may be impacting on controlled waters. Further GI is proposed to inform DQRA to confirm remediation requirements.	Yes: Risk register item for the stabilisation of Made Ground, or the construction of hard impermeable cover beneath the viaduct. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001).
Insufficient data.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
pH value and mineral oil.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (ND001-CP043, ND001-CR042).			R6: Property receptors.	P6: Direct Contact	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / Low Current contaminant data indicate suitable pipe materials for new water mains near the Water Orton No.3 Viaduct to be PVC, barrier pipe, wrapped iron, wrapped steel. No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Use of PVC, barrier pipe, wrapped iron, wrapped steel pipework for the new water main subject to UKWIR testing. Use of barrier pipe, wrapped iron or copper pipework for the modified water main subject to UKWIR testing.
S1c: Asbestos contamination soils							
Asbestos.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (NC120-CR401, NC137-CT401, NC145-CR401, ND001-CP043, ND001-CR002, ND001-CR005, ND001-CR011, ND001-CR013, ND001-CR014, ND001-CR017, ND001-CR022, ND001-CR031, ND001-CR040, ND001-CR041, ND001-CR042, ND001-CR043, ND001-TP002, ND001-WS002, ND001-WS003).	NC 001+018 to NC 001+653	Water Orton No.3 Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Asbestos is identified at ND001-CR005 as chrysotile, quantification was not undertaken. The hole is located in an area of vegetated land next to the A446. Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Water Orton No. 1, 2 and 3 Viaducts (001+018 (NC) to 001+653 (NC))							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
Elevated gas levels.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (ND001-CP043-1, ND001-CR002-1, ND001-CR002-2, ND001-CR017-1).	NC 001+018 to NC 001+653	Water Orton No.3 Viaduct	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Low likelihood Consequence: Minor Risk Rating: Low ND001-CR002-1 (unflooded) is located adjacent to LQ site 19-17. It was initially assessed to be CS2, upon further review of monitoring data, was lowered to CS1. Recommendation is made to investigate the extent of LQ site 19-17 to the west.	Further investigation to determine the extent and shallow ground gassing regime of LQ site 19-17 to the west of the alignment. This is to determine the requirement of any remediation measures (if necessary) to address potential gas migration. Gas monitoring required during construction to detect any adverse impacts of the scheme on the ground gas regime.
				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Medium Risk Rating: Moderate / Low Concentrations of carbon dioxide and carbon monoxide was recorded in excess of the long-term and short-term OELS at two installations.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
Groundwater exceedances of the WQS for: iron, manganese, sulphate, calcium, magnesium, EPH >C8-40, aromatics >C16-21, sodium and potassium.	LQ site 19-17 Coleshill Gas Works Landfill and 19-24 Birmingham to Nuneaton Line are within the footprint of the viaduct. (ND001-CR002)	NC 001+018 to NC 001+653	Water Orton No.3 Viaduct	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No.
				R7: Controlled waters – Groundwater (River Terrace Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (Unnamed drain	P8: Groundwater Migration	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / Low Anthropogenic contaminant levels are marginally elevated but are not considered to be sufficient to be likely to warrant remedial action.	No. More ground investigation required to determine groundwater quality along this asset.

Table 62: CSM for Marsh Lane Embankment: NC ch.002+814 – NC 003+650

CSM for Marsh Lane Embankment (002+814 (NC) to 003+650 (NC))							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	No LQ site underlies or is adjacent to the embankment. (ND002-CP019, ND002-CR013, ND003-CR004).	NC 002+814 to NC 003+650	Marsh Lane Embankment	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No flammable / explosive ground gases above their LEL.	No LQ site underlies or is adjacent to the embankment. (ND002-CR002-1, ND002-WS001-1).			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Minor Risk Rating: Very low No elevated explosive ground gases recorded. Furthermore, the open-air environment and absence of buildings further minimises the possibility of any gas build up (if any).	No.
Leachate exceedance of the WQS for boron, cadmium, chromium, copper, lead, mercury, vanadium and zinc.	No LQ site underlies or is adjacent to the embankment. (ND002-CR013, ND003-CR004, ND002-CP019)			R7: Controlled waters – Groundwater (River Terrace Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (Unnamed pools and ditches)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low Likelihood Consequence: Minor Risk Rating: Low Reported exceedances are minor and appears to be consistent with regional dispersed sources of contamination in agricultural land to the north of ch.159+000. Risks from leachates to underlying Mercia mudstone, glacial and till and thin alluvium aquifers are unlikely to be sufficient to warrant remedial action.	No.
Insufficient data.	No LQ site underlies or is adjacent to the embankment.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
pH value.	No LQ site underlies or is adjacent to the embankment.			R6: Property receptors.	P6: Direct Contact	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / Low No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Use of PVC, barrier pipe, wrapped steel or wrapped iron pipework for the modified water main subject to UKWIR testing.
S1c: Asbestos contamination soils							
Asbestos not encountered.	No LQ site underlies or is adjacent to the embankment. (ND002-CP019, ND002-CR013, ND003-CR004).	NC 002+814 to NC 003+650	Marsh Lane Embankment	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Marsh Lane Embankment (002+814 (NC) to 003+650 (NC))							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No elevated gas levels.	No LQ site underlies or is adjacent to the embankment. (ND002-CR002-1, ND002-WS001-1).	NC 002+814 to NC 003+650	Marsh Lane Embankment	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Negligible Risk Rating: Very Low No elevated gas levels were recorded. Additionally, the open-air environment and absence of buildings minimize the possibility of any gas build-up (if any).	No.
				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Negligible Risk Rating: Very Low No elevated gas concentrations were recorded in excess of the long-term and short-term OELS.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
No groundwater data	No LQ site underlies or is adjacent to the embankment.	NC 002+814 to NC 003+650	Marsh Lane Embankment	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (River Terrace Deposits Secondary A aquifer, Mercia Mudstone Group Secondary B aquifer) Surface Waters (Unnamed pools and ditches)	P8: Groundwater Migration	Probability: Low Likelihood Consequence: Minor Risk Rating: Low No groundwater data. No LQ site. The underlying aquifers are composed of Mercia Mudstone, Glacial Till and thin Alluvium none of which are likely to act a mobile contaminant pathways.	No.

Table 63: CSM for River Cole West Viaduct: BS ch.162+130 – BS 162+235

CSM for River Cole West Viaduct (162+130 (BS) to 162+235 (BS))							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	No LQ site underlies or is adjacent to the viaduct. (BS162-CR402 BS162-CR403).	BS 162+130 to BS 162+235	River Cole West Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No gas data.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Minor Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimizes the possibility of any gas build up (if any).	No.
No leachate data	No LQ site underlies or is adjacent to the viaduct.			R7: Controlled waters – Groundwater (Alluvium Secondary A aquifer & Mercia Mudstone Group Secondary B aquifer) Surface Waters (River Cole)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low likelihood Consequence: Minor Risk Rating: Low No LQ site or leachate data. Soil data shows low levels of TPHs and PAHs.	No.
Insufficient data.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
No clean water utility pipe proposed.	No LQ site underlies or is adjacent to the viaduct.			R6: Property receptors.	P6: Direct Contact	Probability: Unlikely Consequence: Medium Risk Rating: Low No clean water utility pipe proposed at this asset.	No.
S1c: Asbestos contamination soils							
Asbestos not encountered.	No LQ site underlies or is adjacent to the viaduct. (BS162-CR402 BS162-CR403).	BS 162+130 to BS 162+235	River Cole West Viaduct	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No gas data.	No LQ site underlies or is adjacent to the viaduct.	BS 162+130 to BS 162+235	River Cole West Viaduct	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Minor Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimize the possibility of any gas build up (if any).	No.
				R4: Construction Personnel R5: Maintenance Personnel			The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015. Excavation works should be planned and designed to minimize gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.

CSM for River Cole West Viaduct (162+130 (BS) to 162+235 (BS))							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S3a: Contaminated Groundwater							
No groundwater data	No LQ site underlies or is adjacent to the viaduct.	BS 162+130 to BS 162+235	River Cole West Viaduct	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Alluvium Secondary A aquifer & Mercia Mudstone Group Secondary B aquifer) Surface Waters (River Cole)	P8: Groundwater Migration	Probability: Low likelihood Consequence: Minor Risk Rating: Low No LQ site or groundwater data	No

Table 64: CSM for Green Lane Embankment: BS ch.162+235 – BS 163+347

CSM for Green Lane Embankment (162+235 (BS) to 163+347 (BS))							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	LQ site 19-35 Electricity Substation in Eastern Land Take, and 19-38 Former Tank in Western Land Take are adjacent to the east and west of the embankment, respectively. (BS162-CR402, BS162-CR403).	BS 162+235 to BS 163+347	Green Lane Embankment	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No gas data.	LQ site 19-35 Electricity Substation in Eastern Land Take, and 19-38 Former Tank in Western Land Take are adjacent to the east and west of the embankment, respectively.			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Minor Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimizes the possibility of any gas build up (if any).	No.
Leachate exceedances of the WQS for cadmium, chromium (II & VI), copper, lead and zinc. Moderate soil TPH concentrations.	LQ site 19-35 Electricity Substation in Eastern Land Take, and 19-38 Former Tank in Western Land Take are adjacent to the east and west of the embankment, respectively.			R7: Controlled waters – Groundwater (Mercia Mudstone Group Secondary B aquifer) Surface Waters (unnamed ditch)	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low Likelihood Consequence: Minor Risk Rating: Low Exceedances of cadmium, copper, chromium, lead and zinc recorded. These are considered to be typical of the agricultural area north of ML ch.159+000. The underlying aquifers comprise glacial till, Mercia mudstone and to the south, thin glaciofluvial deposits which are considered to be of low sensitivity to pollution.	No
Insufficient data.	LQ site 19-35 Electricity Substation in Eastern Land Take, and 19-38 Former Tank in Western Land Take are adjacent to the east and west of the embankment, respectively.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
No clean water utility pipe proposed.	LQ site 19-35 Electricity Substation in Eastern Land Take, and 19-38 Former Tank in Western Land Take are adjacent to the east and west of the embankment, respectively.			R6: Property receptors.	P6: Direct Contact	Probability: Unlikely Consequence: Medium Risk Rating: Low No clean water utility pipe proposed at this asset.	No.
S1c: Asbestos contamination soils							
Asbestos not encountered.	LQ site 19-35 Electricity Substation in Eastern Land Take, and 19-38 Former Tank in Western Land Take are adjacent to the east and west of the embankment, respectively. (BS162-CR402, BS162-CR403).	BS 162+235 to BS 163+347	Green Lane Embankment	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Green Lane Embankment (162+235 (BS) to 163+347 (BS))							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No gas data.	LQ site 19-35 Electricity Substation in Eastern Land Take, and 19-38 Former Tank in Western Land Take are adjacent to the east and west of the embankment, respectively.	BS 162+235 to BS 163+347	Green Lane Embankment	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Minor Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimizes the possibility of any gas build up (if any).	No.
				R4: Construction Personnel R5: Maintenance Personnel			The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
No groundwater data	LQ site 19-35 Electricity Substation in Eastern Land Take, and 19-38 Former Tank in Western Land Take are adjacent to the east and west of the embankment, respectively.	BS 162+235 to BS 163+347	Green Lane Embankment	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Mercia Mudstone Group Secondary B aquifer) Surface Waters (unnamed ditch)	P8: Groundwater Migration	Probability: Low Consequence: Minor Risk Rating: Low No groundwater data. However, the Mercia Mudstone, Glacial Till and thin Glaciofluvial deposits in the area are not considered to present significant contaminant transport pathways for pollution.	No.

Table 65: CSM for M42 – M6 Motorway Link East and West Viaducts: BS ch.163+347 – BS 163+550 (includes southern end of Attleboro Farm Embankment)

CSM for M42 – M6 Motorway Link East and West Viaducts (163+347 (BS) to 163+550 (BS)) (includes southern end of Attleboro Farm Embankment)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
No contaminants identified.	Possible backfilled borrow pit to the west. (BD163-CP043, BD163-CR014, BD163-CR022, BD163-TP013, BD163-TP013a, BD163-TP016).	BS 163+347 to BS 163+550	M42 – M6 Motorway Link East and West Viaducts	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low No exceedances of human health criteria recorded, and end users are assumed to have a transient presence (if any).	No
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No gas data.	Possible backfilled borrow pit to the west.			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimizes the possibility of any gas build up (if any).	No.
Leachate exceedances of the WQS for cadmium, chromium VI, lead, mercury, zinc and cyanide. Moderate soil concentrations of TPH.	Possible backfilled borrow pit to the west. (BD163-CP043, BD163-CR014, BD163-CR022, BD163-TP013, BD163-TP013a and BD163-TP016, BD163-CR017)			R7: Controlled waters – Groundwater (Mercia Mudstone Group Secondary B aquifer) Surface Water: Unnamed pools	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Low likelihood Consequence: Minor Risk Rating: Low Generally minor exceedances of the WQS recorded for Made Ground samples in a possible backfilled borrow pit, west of the asset. However, given the limited number of contaminants and the fact that groundwater for this asset does not appear to have been impacted by recorded leachate results, remediation is not considered necessary at this asset.	No. Risks from piling operations may be addressed through a piling risk assessment in accordance with EA (2001).
Insufficient data.	Possible backfilled borrow pit to the west.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
No clean water utility pipe proposed.	Possible backfilled borrow pit to the west.			R6: Property receptors.	P6: Direct Contact	Probability: Unlikely Consequence: Medium Risk Rating: Low No clean water utility pipe proposed at this asset.	No.
S1c: Asbestos contamination soils							
Asbestos not encountered.	Possible backfilled borrow pit to the west. (BD163-CP043, BD163-CR014, BD163-CR022, BD163-TP013, BD163-TP013a, BD163-TP016).	BS 163+347 to BS 163+550	M42 – M6 Motorway Link East and West Viaducts	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No gas data.	Possible backfilled borrow pit to the west.	BS 163+347 to BS 163+550	M42 – M6 Motorway Link East and West Viaducts	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Minor Risk Rating: Very low No gas data, however the open-air environment and absence of buildings minimizes the possibility of any gas build up (if any).	No.
				R4: Construction Personnel R5: Maintenance Personnel			The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.

CSM for M42 – M6 Motorway Link East and West Viaducts (163+347 (BS) to 163+550 (BS)) (includes southern end of Attleboro Farm Embankment)							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S3a: Contaminated Groundwater							
WQS exceedances for arsenic, magnesium, manganese, potassium, iron, ammoniacal nitrogen and TPH.	Possible backfilled borrow pit to the west. (BD163-CR017)	BS 163+347 to BS 163+550	M42 – M6 Motorway Link East and West Viaducts	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Mercia Mudstone Group Secondary B aquifer) Surface Water: Unnamed pools	P8: Groundwater Migration	Probability: Low likelihood Consequence: Moderate Risk Rating: Moderate / low Groundwater reported several exceedances of metals and organics. A comparison with soil leachate data from the borrow pit does not indicate that the pit is the source for groundwater contamination. Given the lack of an identifiable source at and around the sampling location, it is likely reflective of a wider, poor groundwater quality of the region, given the industrial history.	No.

Table 66: CSM for Water Orton Cutting: BS ch.163+882 – BS 165+585

CSM for Water Orton Cutting (163+882 (BS) to 165+585 (BS))							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S1a: Contaminated Soils (on-site); S1b: Contaminated Soils (off-site)							
Barium exceedance against PoS(resi) criteria.	No LQ site underlies or is adjacent to the cutting. (BD164-CR011).	BS 163+882 to BS 165+585	Water Orton Cutting	R1: On-site users – commercial. R3: Off-site users – commercial / public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Low likelihood Consequence: Minor Risk Rating: Low An exceedance of barium at BD164-CR011 at 0.7m depth. It is within the alignment of the cutting, which will likely remove the source.	No
				R4: Construction Personnel. R5: Maintenance Personnel.		Probability: Likely Consequence: Medium Risk Rating: Moderate No exceedances of human health criteria encountered, however construction workers will come into contact with soils which may contain elevated levels of contamination.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, COSHH Regulations 2017 and appropriate application of the safety in design provisions required under the CDM Regulations 2015.
No flammable / explosive ground gases above their LEL.	No LQ site underlies or is adjacent to the cutting. (BD164-CR003-1).			R6: Property receptors.	P4: Exposure to explosive gases.	Probability: Unlikely Consequence: Negligible Risk Rating: Very low No elevated explosive ground gases recorded. Furthermore, the open-air environment and absence of buildings further minimises the possibility of any gas build up (if any).	No.
Leachate exceedances of the WQS for; cadmium, lead and zinc	No LQ site underlies or is adjacent to the cutting.			R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer, Head deposits Secondary B aquifer Mercia Mudstone Group Secondary B aquifer) Surface Water: Unnamed pools	P5a: Vertical and lateral migration via naturally created pathways P5b: Vertical and lateral migration via man-made pathways P8: Groundwater Migration	Probability: Unlikely Consequence: Minor Risk Rating: Very low Minor leachate exceedances and no LQ site.	No.
Insufficient data.	No LQ site underlies or is adjacent to the cutting.			R6: Property receptors.	P6: Direct Contact	Unknown. At present there is insufficient data to determine the ACEC and DSC for each strata type.	Unknown.
No soil results within the vicinity of proposed clean water utility pipes.	No LQ site underlies or is adjacent to the cutting.			R6: Property receptors.	P6: Direct Contact	Probability: Likely Consequence: Medium Risk Rating: Moderate No soil data are within the vicinity of proposed clean water utility pipe at the asset (M6 Motorway Main construction compound). No UKWIR specific testing has been carried out. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of the water supply pipes is known, to determine an appropriate pipe material for development.	Specify barrier pipe material as a precaution given the lack of specific data. This is subject to UKWIR testing.
S1c: Asbestos contamination soils							
Asbestos not encountered.	No LQ site underlies or is adjacent to the cutting. (BD164-CR011).	BS 163+882 to BS 165+585	Water Orton Cutting	R1: On-site users – commercial. R3: Off-site users – commercial/public open space.	P1: Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Please refer to Appendix H for asbestos risk assessment.	See Appendix H

CSM for Water Orton Cutting (163+882 (BS) to 165+585 (BS))							
Source	**Environmental Statement Land Quality Site (Borehole(s))**	**Chainage (Sub-lot)**	**Proposed Construction**	**Receptor**	**Pathway**	**Risk Assessment: Highest Risk Identified**	**Remediation likely to be required for stage 1 target cost to address in-situ contamination risks (where data is sufficient)?**
S2a: Ground Gases – On-Site Group A Sites; S2b: Ground Gases – Off-Site Group C sites							
No elevated gas levels.	No LQ site underlies or is adjacent to the cutting. (BD164-CR003-1).	BS 163+882 to BS 165+585	Water Orton Cutting	R1: On-site users – commercial R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P7: Inhalation of Ground Gases	Probability: Unlikely Consequence: Negligible Risk Rating: Very Low No elevated gas levels were recorded. Additionally, the open-air environment and absence of buildings minimises the possibility of any gas build-up (if any).	No.
				R4: Construction Personnel R5: Maintenance Personnel		Probability: Low likelihood Consequence: Negligible Risk Rating: Very Low No elevated gas concentrations were recorded in excess of the long-term and short-term OELS.	The risk to construction and maintenance personnel will be mitigated by adherence to the measures specified in the CoCP, the COSHH Regulations and appropriate application of the safety in design provisions required under the CDM Regulations. Excavation works should be planned and designed to minimise gas exposure to personnel where possible. Hot cutting techniques should only be deployed in accordance with a risk assessment. Gas monitoring is likely to be required during these works.
S3a: Contaminated Groundwater							
Exceedances of the WQS for iron, manganese, nitrate, magnesium and TPH.	No LQ site underlies or is adjacent to the cutting (BD164-CR003)	BS 163+882 to BS 165+585	Water Orton Cutting	R1: On-site users – commercial. R2: Off-site users – Residential R3: Off-site users – commercial / public open space.	P2: Inhalation of vapour with / from contaminated waters P3: Direct contact, ingestion from contaminated waters	Probability: Unlikely Consequence: Medium Risk Rating: Low Site not currently located in area of actual or future groundwater abstraction recharge area. No exceedances of GAC_{gwvap}	No
				R7: Controlled waters – Groundwater (Glaciofluvial Deposits Secondary A aquifer, Head deposits Secondary B aquifer Mercia Mudstone Group Secondary B aquifer) Surface Water: Unnamed pools	P8: Groundwater Migration	Probability: Low Likelihood Consequence: Moderate Risk Rating: Moderate / low River Tame is over 200m from the asset so low likelihood of being impacted. Glaciofluvial Deposits and Head Deposits are not laterally extensive and unlikely to be used as a source for drinking water. Only one groundwater location was sampled, so it's not possible to determine if contamination is localised.	No.

6 DETAILED QUANTITATIVE RISK ASSESSMENT

At present there is insufficient data available to undertake a DQRA for individual contamination hotspots. The purpose of this Geo-environmental Report is to undertake a GQRA to refine the contamination conceptual model and determine further GI requirements. It is envisaged this GI will be used to develop the risk assessment and contamination conceptual model as part of later design stages.

7 OUTLINE REMEDIATION STRATEGY

The following section discusses potential remediation options, which may mitigate the risk posed by the potential contaminant linkages identified in the CSMs. However, it should be recognised that further GI and assessment is required to determine site specific remedial measures.

Additional reference has been made to the remediation strategy report for the BIS Triangle (written by Laing O'Rourke and Murphy, working on behalf of HS2). The summary of the report's remediation objectives and approach will be incorporated and summarised in this Section.

7.1 Remedial Objectives

The risk assessment and CSMs presented in Section 5 along with information presented in the BIS Triangle remediation strategy report identified several contaminant linkages which may require remedial works to reduce risks to sensitive receptors to acceptable levels.

Remedial objectives are site specific objectives that relate to the reduction or control of the risks associated with one or more contaminant linkages. The objectives are to:

- Eliminate or reduce to an acceptable level the risks posed by the contaminant sources to receptors; and
- Provide a practical, cost-effective solution that can be delivered in a timely manner.

7.2 Preliminary Remedial Options Appraisal

There are three ways to reduce or control unacceptable risk to sensitive site receptors:

- Remove or treat the contaminant source(s);
- Remove or modify the transport pathway(s); or
- Remove or modify the behaviour of the receptor(s).

Remedial options appraisal requires identifying feasible remediation options and carrying out an evaluation of their suitability. It is possible to remove or reduce the concentrations of contaminants using a variety of physical, chemical or biological means either in-situ or ex-situ. Pathways can be modified by providing a barrier to prevent transport of a source to a receptor. A receptor can be removed by modifying a land use to exclude that receptor.

Potentially feasible remedial options for areas outside of the BIS Triangle for inclusion in the stage 1 target cost are presented in Table 67. A summary of the potential remediation options with their respective advantages and disadvantages are shown in Appendix E. Reference should be made to the CSMs and Section 4.12 for measures to address risks to potable water mains, and Sections 4.2 and 4.6 for mitigation measures to protect construction and maintenance workers from contamination.

Remediation objectives and the approach presented in the BIS Triangle Remediation Strategy Report[vi] have been summarised in Table 68. Please refer to the report for further information on remediation options summarised, and the material reuse criteria.

7.2.1 Outside of the BIS Triangle

Table 67: Potential Remedial Options to address in-situ contamination risks

Contaminant Linkage	Remediation Location Details	Contaminant Linkage Description	Remediation Options for Target Costing
Pool Wood Embankment			
S1a-P5a/P5b/P8 – R7	ML159-CP003 (within former infilled pond).	Significant leachate exceedance of nickel and high TPH soil concentrations representing potential risk to controlled waters.	Removal of fill material within former pond, and stabilisation of material prior to recovery in accordance with MMP.
S1a-P5a/P5b/P8 – R7	ML158-WS016 (deep Made Ground associated with highways).	Moderate leachate contamination of metals representing potential risk to controlled waters.	Risk register item: Removal of contaminated Made Ground and stabilisation prior to recovery in accordance with MMP.
M6 Motorway South Viaduct			
S1a-P5a/P5b/P8 – R7	Proposed balancing pond east of alignment.	Leachate generation and contamination of controlled waters.	Proposed balancing pond should be lined with an impermeable geomembrane to minimise leachate generation.
Lichfield Road Embankment			
S1a-P5a/P5b/P8- R7	ML163-CR020 (sport pitches Made Ground)	High soil TPH concentrations, representing potential risk to controlled waters.	Excavation and removal of Made Ground, and bioremediation / soil stabilisation prior to recovery in-accordance with MMP.
Coleshill No. 3 Embankment			
S1a – P5a/P5b/P8 – R7	BD161-WS003	Risks from heavy metals in soils to groundwater.	Risk Register Item: Removal of Made Ground and stabilisation of material prior to recovery under MMP.
S2a – P7 – R1, R2, R3	Proposed Pumping Station	Risks from carbon dioxide and methane to pumping station	See section 4.5.9.
Chattle Hill Box Structure			
S1a – P5a/P5b/P8 – R7	ML164-CR030	Elevated cadmium, zinc and chromium representing potential leachate risks to groundwater.	Removal of hotspot, stabilisation and recovery in accordance with MMP. An alternative remediation option is to surface the area with impermeable material to restrict leachate generation.
S1a – P5a/P5b/P8 – R7	ML164-CR029	Elevated levels of soil TPH presenting potential risks of free phase contamination.	Removal of Made Ground and bioremediation / soil stabilisation prior to recovery in-accordance with MMP.
Watton House East and West Viaduct			
S3a – P8 – R7	ML164-CR046a	Risks from ammoniacal nitrogen, arsenic, nickel, total sulphur, iron, manganese, zinc, benzene, naphthalene, TPH, PAH, phenol, vinyl chloride in groundwater to off-site controlled water receptors	In-situ advanced chemical oxidation / reduction, or extraction and disposal of contaminated groundwater (via treatment plant).
Watton House Embankment			
S1a – P5a/P5b/P8 – R7	ML164-CR013	Risks principally from cadmium, chromium, copper, zinc, and lead leachates and TPH in soil to controlled waters	Removal of contaminated material, and bioremediation / ex-situ stabilisation prior to recovery under MMP.
Water Orton Viaducts			
S1a – P5a/P5b/P8 – R7	ND000-CR020, ND000-CR001, ND000-TP035	Risks from metals including: arsenic, cadmium, chromium, hexavalent chromium, copper, mercury, selenium, vanadium and zinc in soils to controlled waters.	Risk register item for excavation, and ex-situ stabilisation of Made Ground to address potential risks to controlled waters.
S1a – P5a/P5b/P8 – R7	Made Ground in sport pitches between ch.NC1+200 to 1+500	Elevated levels of inorganic leachates presenting risks to controlled waters.	It is recommended that a risk register item for removal and ex-situ stabilisation of soils beneath the viaduct is entered. An alternative remediation option is to surface the area with impermeable material to restrict leachate generation.
Cuttings requiring dewatering			
S3a-P8-R7	Various locations, TBC	Contamination risks resulting from the dewatering of cuttings and discharge to surface waters.	Risks require further assessment in accordance with the EA H1 methodology as part of Environmental Permit applications.

			Water treatment requirements to be determined following dilution modelling.
Piling Works			
S1a – P5a/P5b/P8 – R7	Various locations	Creation of preferential leachate migration pathways from piling works resulting in contamination of groundwater.	Risks to be assessed for at risk piling works in accordance with a Piling Risk Assessment.
Waste material generated by the scheme where contamination is present or suspected			
Risks to human health, and the environment	Various locations	Various contaminants	Recovery of waste in accordance with Development Route A in the Material Management Framework. Risk based criteria protective of human and environmental receptors to be defined in accordance with a Remediation Strategy.

7.2.2 Within the BIS Triangle

7.2.2.1 Remedial Options Appraisal

A remedial options appraisal report[xliv] for the BIS Triangle assessed the validity of remediation objectives and actions required to address existing land quality issues within the BIS Triangle. Identified remediation options were numerically scored against the criteria of applicability, technical feasibility, effectiveness, cost, enabling works, duration and sustainability. This was undertaken for options which will address soil contaminants, Japanese knotweed or groundwater contaminants.

The options considered for soil remediation include:

- Excavation and disposal;
- Complex material sorting and reuse;
- Screening / handpicking;
- Capping / cover system;
- Stabilisation and solidification;
- Thermal treatment;
- Soil flushing;
- Soil washing; and bioremediation.

The scoring has ranked complex material sorting and reuse, and capping / cover system as equally as the preferred option, with excavation and disposal coming in second, and stabilisation and solidification as third. These options were assessed to be applicable for all contaminants of concern identified in the appraisal report.

Complex material sorting and reuse was reported to reduce the volume of contaminated materials which would require off-site disposal. This method would need to be carried out in-conjunction with additional treatment of contaminated soils (where necessary) to reduce concentrations for reuse.

Capping / cover system is reported to be applicable at both Middle Bickenhill Landfill and the sand and gravel pit. It will minimise infiltration rates thereby decrease the potential for leaching of contaminants.

Stabilisation and solidification of treated material can be placed back into excavations or reused as engineered fill in other areas of the site.

For the treatment of Japanese knotweed, options considered include:

- Source excavation and off-site disposal;
- Soil sifting / incineration of biological matter;
- Source excavation and chemical treatment; and
- Source excavation and deep burial.

The scoring has ranked source excavation and deep burial / encapsulation as the preferred option, with source excavation and off-site disposal and soil sifting / incineration of biological matter equally in second.

Source excavation and deep burial / encapsulation is applicable if there are suitable areas of the site where burial can occur to achieve final levels. It would avoid off-site disposal which would be costly and unsustainable.

Source excavation and off-site disposal is reported to be technically feasible and an effective method. However, the anticipated volume of Japanese knotweed contaminated soil is large, hence this would be prohibitively expensive and unsustainable method of remediation.

Soil sifting / incineration of biological matter is reported as a viable option. However, the method is time consuming and incineration is expected to be costly given the anticipated large volume of Japanese knotweed contaminated soil.

The options considered for groundwater remediation include:

- Monitored natural attenuation;
- Pump and treat;
- Enhanced natural attenuation; and
- Air sparging.

The scoring has ranked monitored natural attenuation as the preferred option, with pump and treat in second.

Monitored natural attenuation is reported to be applicable for all organic contaminants in groundwater, but not heavy metals as the latter do not degrade. Given the overall low concentrations of metals recorded in groundwater, this method along with long-term groundwater monitoring could be used in conjunction with other soil remediation techniques as confirmation that groundwater conditions have improved following project completion.

Pump and treat is reported to be applicable for all contaminants of concern in groundwater. Given the large area of Middle Bickenhill Landfill and the presence of a shallow groundwater body within the underlying sand and gravels, this option may be costly through disposal charges and long-term running cost.

7.2.2.2 Remediation Strategy Report

The findings of the remedial options appraisal have been further developed in the remediation strategy report for the BIS Triangle. The remediation options and approach has been summarised in this Section.

Table 68: BIS Triangle Remediation Objectives and Approach

Remediation Objectives	Proposed Approach	Obligations of MWCC Contract
Objective 1: Eradication of Japanese knotweed at Middle Bickenhill landfill.	Japanese knotweed will require eradication through a combination of vegetation clearance and incineration, followed by controlled excavation of knotweed stands and soils impacted by rhizomes. Japanese knotweed contaminated soil will be buried at depth in-accordance with EA regulations and covered with a root barrier membrane prior to infilling of the excavation. Japanese knotweed contaminated soil will have to meet pre-determined reuse criteria depending on chemical and geotechnical qualities, and most viable burial locations pre-determined (including the possibility of reburial back into the Middle Bickenhill landfill). Agreement with the EA will be required.	Japanese Knotweed present in Middle Bickenhill Landfill and therefore management actions likely to be required to construct Bickenhill Cutting. MWCC to validate the extent of infestation and volume of rhizome contaminated soils. Where the landfill exists within the MWCC construction area, Japanese Knotweed will require removal. This would be through a combination of herbicide, rhizome picking or (as advocated in the Remediation Strategy) deep burial >5m with a root barrier membrane.

	Control measures will be required to follow the INNS Biosecurity and Management Plan (provided in Appendix G of the remediation strategy report).	
Objective 2: Manage contamination risks and impacts to Controlled Waters.	Management of risk to Controlled Waters at Middle Bickenhill landfill and the infilled sand and gravel quarry will be achieved through a combination of: • Controlled excavation, segregation, treatment and reuse of soils meeting soil reuse criteria in areas of earthworks. Where excavated material does not meet the reuse criteria, these will require disposal as a waste; • Capping of Made Ground materials with either hardstanding, building or other materials to limit infiltration; • Localised dewatering and treatment of contaminated groundwater during remediation excavations; • Long-term groundwater trend monitoring; • Development of long-term groundwater management plans, as appropriate, where new rail infrastructure cuts through the Middle Bickenhill landfill; and • Protection of attenuation ponds located in areas of contamination.	MWCC to construct Bickenhill Cutting over Middle Bickenhill Landfill and may construct part of an attenuation pond over the former sand and gravel pit. Where landfill material is left in place within MWCC assets, capping of Made Ground materials with either hardstanding, building or other materials to limit infiltration is required. A long term groundwater management plan is required for the Bickenhill Cutting following long-term groundwater trend monitoring. This plan will deal with methods to deal with the drainage of contaminated groundwater in the permanent and temporary state. If groundwater drainage is required, treatment is likely to be necessary prior to discharge including: • Non-aqueous phase liquid removal (oils etc.) • Sedimentation/settlement and particulate removal • Sand filtration and polishing with activated carbon. Attenuation ponds should be assumed to be impermeably lined.
Objective 3: Ensure all Made Ground and natural soils on-site are suitable for their intended use.	All materials reused on-site must be chemically and geotechnically suitable for their intended use in-line with the Definition of Waste: Development Industry Code of Practice Version 2, CL:AIRE (2011). Fill material within the Middle Bickenhill landfill and infilled sand and gravel pit are unlikely to be suitable for use without significant processing and treatment. Made Ground will be excavated from the line of the new railway with the primary objective to sort and reuse the material on areas of the site outside of the operational infrastructure, ensuring that this does not result in the spread of contamination.	MWCC to follow the requirements of the remediation strategy for the re-use of landfill materials. However, it is acknowledged that there are limited opportunities for the recovery of landfill materials as structural fill, and the most likely re-use options are use in landscaping or backfill to quarry voids.
Objective 4: Manage potential exposure risks to site operatives and neighbouring site users from exposure to contamination (including asbestos) and ground gases during construction works.	To comply with Health and Safety legislation and the Control of Asbestos Regulations, rigorous management procedures will be required during the works to ensure that the workforce and the general public are not exposed to asbestos, chemical contamination or flammable or asphyxiant gases and vapours during the works.	MWCC to comply with Remediation Strategy requirements in full. Ground monitoring is required around all areas of elevated ground gases (including Middle Bickenhill Landfill, the former sand and gravel pit and backfilled borrow pits) during and after the works to manage risks to construction workers and to understand ground gas risks to the permanent works. It is recommended that the monitoring strategy is developed in liaison with a multi-party stakeholder group including the MWCC, EWC and SDSC.
Objective 5: Manage potential exposure risks from contaminated soil and groundwater and elevated ground gases to future site users and maintenance workers following completion of development works.	To protect future site users and future maintenance and ground workers from exposure to site contamination and potentially harmful ground gases, measures will be required to ensure that potential exposure pathways are removed, mitigated or managed. This will include: • Use of clean cover materials in areas of soft landscaping; • Use of clean fill materials and marker layers for utility corridors (including drains) where these pass through the areas of contamination; • Gas protection measures for new structures in areas where ground gases are elevated; • Venting of hardstanding / cover system formed over gassing ground;	MWCC to comply with Remediation Strategy requirements in full. Clean low permeability cover layers are likely to be required over areas of landfill left in place beneath MWCC areas. Due to the impacts of cover systems on ground gases, consideration will need to be given to the incorporation of gas venting in these areas. Water supply pipes will need to agree with the utility providers.

	• Consideration of venting and gas mitigation for drainage which passes through gassing ground; and • Adoption of suitably upgraded water supply pipes in line with the requirements of Severn Trent Water (if required).	

Source: Adapted and summarised from the BIS Triangle Remediation Strategy Report[vi].

7.2.2.3 Remediation Design Principles within the BIS Triangle

This sub-section summarises further information on the implementation of the remediation approach presented in the remediation strategy report.

Excavated soils and recovered materials as part of earthworks within and outside of remediation areas will have to meet the chemical reuse criteria (presented in Appendix D of the remediation strategy) prior to the assessment of their engineering properties.

The extent of excavation for the remediation area will include the railway cutting, access roads and embankments through the Middle Bickenhill landfill, and the attenuation pond within the infilled sand and gravel pit.

Excavation within Middle Bickenhill landfill where the railway track cuts through and to the outer edge of the cutting will be to the base of the landfill. Due to the presence of Japanese Knotweed rhizomes, a significant proportion of residual landfill material beyond the cutting is likely to require removal in accordance with the Site Specific INNS Biosecurity Plan and Species -Specific Management Plan (LM, 2019)[xlv] unless complete eradication has been completed using herbicides.

Options for reuse of excavated landfill material currently under consideration are:

- Reuse beneath landscaping areas either within the MWCC construction or outside;
- Infill to existing quarry voids to make up the ground level for station infrastructure.

Either option is likely to require remediation to address contamination risks (s7.2.2.4).

Should Bickenhill Cutting require land drainage, a long-term groundwater management plan will be required following long-term groundwater trend monitoring. Discharge of land drainage to surface waters will need to be in accordance with an Environmental Permit supported by an EA H1 Risk Assessment.

Since the landfill material recovery options span across multiple contractor work packages, it is recommended that ongoing workshops are maintained between the EWC, MWCC, SDSC and HS2, in order to coordinate and optimise material recovery within the BIS Triangle.

7.2.2.4 Treatment and Disposal of Contaminated Soils

The Remediation Strategy defines three suites of soil and leachate acceptability criteria for re-use of material at the following locations:

- <50m from Surface Watercourse;
- 50m to 250m from surface watercourse; and
- >250m from surface watercourse.

Certain remediation criteria appear to be very low – notably for TPH Aromatic EC8-12 and a combination of methods, demonstrated through lab and field scale trials may be necessary to achieve the required standards.

The type of treatment will be determined by the Contractor, and methodologies detailed in the Contractor's Remediation Method Statement. Ex-situ treatment will be carried out under a specialist Contractor's Environmental Permit (Mobile Treatment Licence). Two potentially suitable treatment methods are presented:

- Stabilisation / solidification: two separate processes sometimes used together, both reduce the mobility of contaminants in soils. Stabilisation reduces contaminant availability by chemical immobilisation, and solidification physically restricts contaminant movement by creating a solid mass; and
- Bioremediation: excavated soils are placed in windrows, land farms or biopiles which are covered and regularly turned to oxygenate the soils; enhancing the biodegradation of organic contaminants.

Where on-site treatment is not viable, contaminated soils failing the reuse criteria will require off-site disposal at a suitably licenced soil treatment or waste disposal facility, in-accordance with current regulations and legislation. All disposed waste shall be classified, and an appropriately licenced waste management facility determined for the treatment and / or disposal of the material.

Details of off-site material movements will be in-accordance with the Duty of Care Regulations. An auditable trial of dates, volumes and destination of removed material from the site will be maintained. Appropriate environmental and health and safety protocols will be followed during loading, movement and stockpiling of material destined for disposal.

8 CONCLUSIONS

8.1 Summary of Key Pollutant Linkages

This section summaries the identified pollutant linkages and should not be used without further context provided throughout this report, and in particular Section 4 and Section 5.

8.1.1 Human Health Risks

The results of chemical analysis on 326 soil samples were screened against the selected GSC for a commercial and PoS(park) land use scenario. Several locations have also been screened against the GSC for PoS(resi) due to the proximity to residential properties. This assessment has reported exceedances of generic human health assessment values for commercial and PoS(park) land end use at the following locations (outwith the BIS Triangle):

- Within LQ site 24-44 (Brackenlands Farm landfill) at ML158-CP005, exceedances of PAHs; and
- At a proposed balancing pond part of Chattle Hill Box Structure at ML164-TP015, exceedances of PAHs.

An exceedance against the GSC for PoS(resi) has been reported for BD164-CR011 at an area which will be occupied by the Water Orton Cutting.

Long term human health risks from soils are considered to be **Very Low – Low** from non asbestos contaminants.

The long-term human health risk at BD164-CR011 (Water Orton Cutting) is assessed to be **Moderate / Low**.

8.1.1.1 Risks to Construction and Maintenance Workers

The acute health risks to construction and maintenance workers cannot be quantified and have been qualitatively assessed to be **Moderate**.

8.1.2 Ground Gas Risks

Post fieldwork monitoring of ground gas was undertaken at 109 installations, 71 of which are flooded.

The assessment of ground gas risk to building occupants have been undertaken in-accordance with BS8485:2015+A1:2019. It indicated 11 installations to be assessed as CS2 (low) hazard potential or greater.

Around the northern part of the BIS triangle near to MWCC assets, there are four installations assessed to be CS2 or greater, two are within LQ site 24-44. Upon further review of monitoring data at these installations, two installations' CS have been lowered, to CS2 (from CS4) and to CS1 (from CS2).

Outside of the BIS Triangle there are seven installations assessed as CS-2, four of which are within LQ sites (one in a timber Yard at ch.ML 161+250, two in Colehill gasworks landfill, and two in LQ site Coleshill Sewage Works. Upon further review of monitored data at these installations, four installations' CS have been lowered to CS1.

The risk to off-site receptors at LQ site 19-17 and 19-25 are considered to be **Moderate / Low**.

The risk at locations within the BIS Triangle has been assessed as **Low** providing appropriate gas protection measures are incorporated (if required) into proposed buildings and structures (including the interchange station) within the BIS Triangle. Further monitoring will be required during the construction and post construction phases to determine the risks following redistribution of earthworks arisings.

8.1.2.1 Radon

The route of Sub-Lots 5 and 6 is within the lowest band of radon potential. Radon risks are therefore regarded as **Low**.

8.1.2.2 New Buildings Structures

Four new enclosed buildings are proposed along the route. These are the People Mover Depot, Birmingham Interchange Station, Interchange ATS and Gilson Road ATS, with the former three within the BIS Triangle.

Gilson Road ATS, which is outside of the BIS Triangle is assessed to be CS1 representing a **Very Low** risk.

The gas risk at the location of a proposed pumping station at Coleshill No3 Embankment is assumed to be **Low** (CS-2).

8.1.2.3 Risks to Construction and Maintenance Workers

Monitored gas data have been compared against OELs and indicated exceedances of short-erm and long-term OELs for carbon dioxide and carbon monoxide.

The risk is assessed to be **Moderate** or **Moderate / Low**. Construction and maintenance personnel will implement appropriate mitigation measures to minimise the risk.

Of the locations which recorded exceedances of the OELs, greater concentrations were recorded at and / or adjacent to LQ sites 24-23, 24-44, 19-20, LQ site 19-25. Other location which recorded greater gas concentrations that are not within LQ sites include agricultural fields within the BIS Triangle and within Delta Junction, a car parks associated with the NEC or Birmingham International Station, and sport pitches adjacent of Lichfield Road.

8.1.2.4 Risks from Flammable / Explosive Ground Gases to Property

Five installations recorded methane concentrations above its lower explosive limit. The installations are ML156-CP008-1(within the LQ site 24-23), ML156-CR025-Pipe 1, ML156-CR046-Pipe 1 (all of which are in the BIS Triangle or People Mover area), ML162-CR024-1 and ML164-CR046a-1 (within Coleshill Gasworks Landfill).

No HS2 enclosed buildings are proposed at these installations, and the risk is assessed to be **Low**. However further monitoring is proposed understand risks to off-site receptors around Coleshill Gasworks Landfill.

8.1.2.5 Risks from Volatile Contaminants to Human Health

Limited number of VOCs within groundwater at ML164-CR009, ML164-CR029 and ML164-CR046a exceed the residential GAC_{gwvap}. No residential receptors are in the vicinity of the holes and the risk is assessed to be **Very Low**.

8.1.3 Risks to Property Receptors

At present there is insufficient data to determine the ACEC and DSC in-accordance with the guidance presented in BRE Special Digest 1:2005. A summary of the ACEC and DSC per stratum will be summarised in the Detailed Design Ground Investigation Report, envisaged to be produced during Stage 2 of the Scheme.

No UKWIR specific testing has been carried out for the selection of appropriate water supply pipe material. It is recommended that a specific water supply pipe assessment is undertaken once the final alignment and depth of water supply pipes is known, to determine an appropriate pipe material for development.

Where there is contamination testing, an indicative assessment of potentially suitable pipe material suggests that organic contamination and / or pH levels may restrict the choice of pipe materials at the modified water main locations between:

- Between ch.155+000 and ch.155+250;
- Between ch.155+750 and ch.156+400;
- Modified water main within the BIS Triangle;
- Between ch.159+700 and ch.159+850;
- Between ch.161+300 and ch.161+500;
- Between ch.162+900 and ch.163+300;
- Between ch.164+000 and ch.164+150;
- Between ch.164+300 and ch.164+500;
- At the boundary of Sub-Lot 6 and 8 between ch.0+450(NC) and ch.1+050(NC);
- Between ch.1+000(NC) and ch.1+050(NC);
- Between ch.1+450(NC) and ch.1+600(NC); and
- Between ch.2+900(NC) and ch.3+200(NC).

And at the proposed new water main locations at:

- Ch.155+800 to ch.156+000 A45 Service Road Overbridges satellite construction compound;
- Ch.156+000 to ch.156+150 vehicle recovery compound, A45/East Way Overbridges satellite construction compound, and Bickenhill Embankment;
- Within the BIS Triangle
- Ch.158+150 to ch.158+400 M42 Motorway Viaduct (West) satellite construction compound;
- Ch.159+750 to ch.159+800 Coleshill Heath Road Underbridge satellite construction compound;
- Ch.159+950 to ch.160+050 M6 Motorway main construction compound;
- Ch.162+800 to ch.162+950: M42 Coleshill North Viaduct satellite construction compound and Gilson Road ATS;
- NC ch.0+950 to 1+000 Water Orton Viaduct 1 & 3 (North) satellite construction compound; and
- NC ch.1+300 to ch.1+400.

The risk to potable water supply pipes at these locations is assumed to be **Moderate / Low, or Moderate** prior to the selection of appropriate pipe material.

8.1.4 Controlled Water Risks – Soil and Soil Leachate

Assessment of risks to controlled waters from soil and soil leachate identified the following assets as being at **Moderate** risk:

- Pool Wood Embankment; ML159-CP003 within former infilled pond. WQS leachate exceedances for metals and high TPH soil concentrations. Infilled pond material recommended to be removed and stabilised prior to recovery; and
- Chattle Hill Box Structure: LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the viaduct. Principal risk from elevated leachates noted in ML164-CR030. High TPH concentrations recorded in ML164-CR029 which is considered to present a potential risk of free phase contamination. It is recommended to remove Made Ground around ML164-CR030 and stabilisation prior to recovery, and remove soil contamination around ML164-CR029 and bioremediation / stabilisation for re-use.

8.1.5 Controlled Water Risks – Groundwater and Surface Water

Assessment of the risks to controlled waters from groundwater identified the following assets as being at **Moderate** risk:

- Diddington Cutting; LQ site 24-1 Jacksons Brickworks Landfill (ML155-CR003) within the footprint of the cutting. Minor exceedances of metals and PAHs. As this asset is a proposed cutting up to 8m thick in some places it is likely that potentially impacted soils will be removed as part of the works, removing some of the source material, reducing impact on groundwater;
- M42 Motorway Box Structure; LQ site 24-44 Brackenlands Farm Landfill (ML158-CP007). WQS exceedances for TPH and metals and the potential for off-site groundwater migration from Brackenlands Farm Landfill. Responsibility for remediation of the landfill sources will rest with the EWC;
- Pool Wood Embankment; between Brackenlands Farm Landfill and Coleshill Pools WQS WQS exceedances in Glaciofluvial Deposits east of the route. No confirmed on-site sources of groundwater contamination within the asset area.
- Coleshill No. 3 Embankment; No ES LQ sites. (BD161-CD010 and BD161-CR021), Groundwater in the Mercia Mudstone Group exceeding WQS for metals, PAHs and TPH.
- Chattle Hill Box Structure; LQ site 19-17 Coleshill Gas Works Landfill is adjacent to the north of the viaduct (ML164-CR029, ND001-CP049). WQS exceedances of metals, inorganics and organics. No clear source is identifiable for this asset, however, additional GI in LQ site 19-17 may provide more information on the groundwater condition at and around this asset; and
- Watton House East and West Viaduct; 19-17 Coleshill gas works historical landfill and 19-24 Birmingham to Nuneaton Line (ML164-CR009, ML164-CR046a). Exceedances of WQS for inorganics, metals and organics. Groundwater contamination in ML164-CR046a within the former gasworks landfill warrants remediation. This could be achieved through a pump and treat system or in-situ advanced chemical treatment.

The report identified the presence of a plume of organic and inorganic groundwater contamination apparently sourced from Brackenlands Farm Landfill, which may impact on groundwater quality in the vicinity of MWCC assets. Since the MWCC is not undertaking any temporary or permanent works over the landfill, it is assumed that responsibility for addressing these contaminant sources will rest with the EWC.

8.2 Summary of Remediation Requirements

8.2.1 Within BIS Triangle

The follow remediation options have been identified to address contamination risks within the BIS Triangle, as reported within its remediation strategy report. These have been summarised in Section 7.2 above. The reader should refer to the remediation strategy report for further information.

Eradication of Japanese knotweed at Middle Bickenhill landfill will be through a combination of vegetation clearance and incineration, followed by excavation and burial of contaminated soils. Where eradication through herbicide treatment is not possible infested soils should either be completely removed or partially removed with a root-barrier installed. This implies that outside of the proposed rail corridor, a finite thickness of rhizome contaminated material may need to be removed to a depth of some 1-3mbgl to accommodate a root barrier membrane.

Rhizome contaminated material must be buried beneath a root barrier to a depth of between 2 and 5m below finished ground level.

The management of contamination risks to controlled waters will be achieved through:

- Controlled excavation, segregation, treatment and reuse of soils;
- Capping of Made Ground to limit infiltration;
- Localised dewatering and treatment of groundwater;
- Long-term groundwater monitoring and management; and
- Protection of attenuation ponds.

Made Ground and natural soils reused on-site must be chemically and geotechnically suitable for their intended use.

For the management of potential exposure risks to site operatives and neighbouring site users, compliance with Health and Safety legislation and Control of Asbestos Regulations, rigorous management procedures will be required during works.

For the management of potential exposure risks from contaminated soil and groundwater, and elevated ground gases to future site users and maintenance workers, measures required will include:

- Use of clean cover in areas of soft landscaping;
- Use of clean fill and marker layers for utility corridors through contaminated areas;
- Gas protection for new structures;
- Venting of hardstanding / cover system over gassing ground;
- Consideration of venting and gas mitigation for drainage through gassing ground; and
- Adoption of suitable pipe material in-line with requirements of Severn Trent Water.

It is proposed that groundwater remediation will be demonstrated through Monitored Natural Attenuation (MNA). Contaminants which failed the DQRA included boron, zinc, hexavalent chromium, ammoniacal nitrogen and phenol. It is anticipated by the EWC that removal of portions of the Middle Bickenhill Landfill would improve the contamination status of groundwater in the area achieving MNA objectives. The following significant risks associated with adopting the MNA approach have been identified:

- The DQRA does not take into account changes in the hydraulic regime following earthworks;
- Heavy metals which form contaminants of concern to be addressed by MNA do not undergo biodegradation. Achievement of betterment (however defined as a verification metric for MNA) is therefore based solely on the removal of contaminated groundwater and soil as a result of the earthworks. The precise impact of the earthworks on heavy metal concentrations in groundwater is conjectural;
- In the event that MNA does not work, there are few acceptable options to address heavy metal contamination in-situ. Permeable reactive barriers are as possible option but these are not recommended on durability grounds.

It is concluded that further contaminant transport and fate modelling is necessary to establish the scope of groundwater remediation. This should be based on a credible post-earthworks groundwater model for the entire area of Middle Bickenhill landfill. This should form the basis of a revised remediation strategy for groundwater. The modeling should be developed on behalf of, and for the reliance of all parties developing the Middle Bickenhill Landfill area.

The groundwater model should also be used to determine the rate of contaminated groundwater discharged from Bickenhill Cutting for the purposes of an Environmental Permit application and to specify any groundwater treatment systems. In order to minimize the volume of contaminated groundwater discharging through the land-drainage system there is a potential case (subject to groundwater modelling) to install a hydraulic barrier around the edge of area in which the full depth of the landfill will removed from the HS2 railway corridor.

8.2.1.1 High-level Validation and Verification Requirements

The BIS Triangle Remediation Strategy identifies a range of validation requirements which are not reproduced in full here.

This sub-section summarises the validation and verification requirements reported in the remediation strategy. Information presented here should not be used without reference to the remediation strategy for further information.

Validation requirements will include:

- A programme of monitoring, sampling and analysis will carried by the Contractor for the duration of remediation works:
  - Collection of baseline groundwater, surface water and ground gas data prior to the start of construction works;
  - Validation sampling of excavated soils and sampling of imported materials (where required) to ensure that materials are suitable for reuse;
  - Collection of groundwater and surface water samples to confirm the remediation works have not adversely affected Controlled Waters;
  - Ground gas monitoring to be carried out by the Contractor in areas where elevated ground gases have previously been recorded, during excavation works and following the completion of earthworks. These data will help in informing the requirements for gas protection measures for buildings and / or gas venting at areas of hardstanding;
  - Discharge monitoring (if required as part of the groundwater management approach adopted by the Contractor);
  - Atmospheric monitoring of fugitive dusts (including asbestos);
  - Noise monitoring related to equipment and working methods; and
  - Japanese knotweed inspections;
- Validation sampling undertaken by the Contractor will be in accordance with BS10175:2011 The Investigation of Potentially Contaminated Sites and EA guidance on the Verification of Remediation of Land Contamination, 2010; and
- The Contractor will send validation samples to United Kingdom Accreditation Service (UKAS) and Monitoring Certification Scheme (MCERTS) accredited laboratories.

8.2.2 Outside of BIS Triangle

The follow remediation options have been identified for costing to address contamination risks outside of the BIS Triangle. These requirements will be confirmed following completion of GI and DQRA.

At Pool Wood Embankment, fill material within the former infilled pond at ML159-CP003 is likely to be removed and stabilised prior to recovery. At ML158-WS016 a risk register item is recommended for the removal and stabilization of potential contaminated made ground prior to recovery.

At M6 Motorway South Viaduct the proposed balancing pond is likely to require lining with an impermeable geomembrane.

At Lichfield Road Embankment contaminated ground at and around ML163-CR020 is likely to be removed and bioremediated or stabilized prior to recovery.

At Coleshill No. 3 Embankment contaminated ground at and around BD161-WS003 is likely to require be removed and stabilisation prior to recovery.

At Chattle Hill Box Structure contaminated ground at and around ML164-CR030 is likely to require removal and stabilisation prior to recovery. Contaminated ground at and around ML164-CR029 is also likely to require removal, bioremediated / stabilization prior to recovery.

At Watton House East and West Viaduct groundwater at ML164-CR046 may require treatment using an in-situ advanced chemical oxidation / reduction, or extraction and disposal of contaminated groundwater to address risks to off-site controlled waters.

At Watton House Embankment contaminated ground at and around ML164-CR013 is likely to require removal, bioremediation or stabilisation prior to recovery.

At Water Orton Viaduct contaminated ground at and around ND000-CR020, ND000-CR001 and ND000-TP035 is likely to require removal and stabilisation. Made Ground at the sport pitches between NC1+200 and 1+500 beneath the viaduct may require removal and stabilisation prior to reuse or the area could be surfaced with an impermeable material to reduce leachate generation.

At Water Orton Cutting contaminated soil at BD164-CR011 is likely to require removal and replacement with clean fill.

Risk to potable water supply pipes should be assessed by undertaking UKWIR specific testing for the selection of appropriate water supply pipe material. Where site soils may pose a risk, remedial measures can include remediation of affected soils to reduce contaminant concentrations, replacement of soil with clean fill and geotextile lining for pipe trenching, and selection of appropriate barrier pipe as per UKWIR assessment.

The concrete classification of buried structures should be appropriately selected based on the assessed ACEC and DSC in-accordance with BRE Special Digest 1:2005 guidance for each location.

Ground gas protection requirements for additional structures should be obtained by assessing the ground gas regime of the structure's location. Ground gas protection measures should be selected by the Rail Systems Contractor and Stations Design Services Contractor with reference to BS8485:2015+A1:2019 document.

The pumping station at Coleshill No 3 embankment is likely to require gas protection appropriate to a CS-2 (see section 4.5.9)

Where there is a cutting which requires dewatering, further risk assessment in-accordance with the EA H1 methodology as part of the Environmental Permit application is required. Water treatment requirements will be determined following dilution modelling.

Where piling is required a Piling Risk Assessment shall be undertaken.

8.2.2.1 High-level Validation and Verification Requirements

Impermeable Geomembrane

For the installation of geomembranes in attenuation ponds, the design, installation, and verification should be carried out by suitably qualified and experienced contractors. As part of the installation works, verification of the integrity of the geotextile material and welding will be required.

Soil Stabilisation

For sites which will have excavation and stabilisation of material, detailed guidance is provided in the Environment Agency's "Guidance on the use of stabilisation/solidification for the treatment of contaminated soil" (2004)[xlvi]. A high-level verification plan can include sampling of affected soils before and after stabilisation/solidification, and prior to the material being reused or landfilled. Lab and field trials may be necessary to demonstrate the effectiveness of binders, and the required binder composition and proportion in the soil.

Bioremediation

Site trials may be necessary to determine the correct biopile aeration and nutrient requirements to optimise the efficiency of bioremediation. Biopiles will require regular turning to ensure effective aeration accompanied by composite sampling to obtain a representative indication of the effectiveness of the treatment.

Remediated material is expected to be sampled at a rate of 1 sample per 250m^3 or 1 sample per 500m^3 prior to placement back onto site. Acceptability criteria will either be hotspot specific (where the material is to be placed back into its original hotspot location) or compliant with acceptability scenarios outlined in the Material Management Framework in Appendix J. Section 8.4 below considers the overarching requirements for verification of material to be re-used in accordance with the Material Management Framework.

Pump and Treat and In-situ Chemical Treatment

For the implementation of a pump and treat system or in-situ chemical treatment it is expected that a pilot trial will occur in the first place, to gauge the applicability of the method. This will determine the oxidation treatability and field test (including pump tests) to assess the recoverability and the zone of influence of treatment wells. The remediation criteria would need be selected, either a quantified limit (such as WQS) or a betterment objective based on a proportional reduction in contaminant levels, or method based (e.g. three rounds of oxidation treatment over 6 months).

Several extraction wells with a high-rate of pumping are likely to be required if the plume is large. If clean water or treated water are to be injected back into the aquifer, the injection well or wells will generally be installed immediately up-gradient of the source. The treatment wells and monitoring wells will need to be clearly distinguished, with monitoring wells normally placed down-gradient of the treatment area, and / or between the treatment area and identified sensitive receptors.

Where the permeability of the ground is poor, the treatment radius for each borehole may be limited, which will require a greater number of treatment wells to be installed. For pump and treat it may only be able to extract limited volumes of contaminants due to the capillary forces acting on non-aqueous phase liquids.

Upon the completion of treatment, an appropriate groundwater monitoring plan shall be implemented to observe the success of the remediation treatment and verify that the remediation objective has been fulfilled.

8.3 Earthworks Considerations & Material Re-use Issues

At the point of excavation, surplus arisings may be classified as waste unless they can be treated to allow re-use as an engineering fill or for the purposes of land restoration. The waste recovery process will be managed either through the Definition of Waste: Development Industry Code of Practice (DoWCoP) (CL:AIRE, 2011)[i] and the Technical Standard – Materials Management Framework[xlvii]. Material Management Plans will be developed to describe the waste recovery process – including measures to mitigate contamination risks at the point of placement.

Waste materials generated on-site are to be recovered for re-use within the scheme under a "Site of Origin" scenario, with the "Site" being defined at the Phase 1 Northern Lot contract area. Clean naturally occurring material may be transferred between HS2 Contract areas without treatment under a Direct Transfer scenario. Treatment of contaminated material generated off-site may be facilitated at an authorised Hub site.

The flow chart in Appendix J describes the BBV reporting and management process for waste streams generated within the MWCC Phase 1 Northern Contract and for imported fills. Two Development Route Options are illustrated: Route A for potentially contaminated material, and Route B for material not suspected of contamination. Clean natural occurring material includes:

- Soil, both topsoil and subsoil;

- Parent material;
- Clays, silts, sands and gravels;
- Underlying geology; and
- Made Ground consisting of the above materials only.

These materials must be sourced from:

- Greenfield sites not subject to past contaminative use; or
- Brownfield sites where the natural soils have been extensively characterised and proven to be clean.

Where elevated levels of naturally occurring contamination are present in recovered materials, and material is to be placed over a different geological formation, a hydrogeological risk assessment may be necessary to ensure that risks to water quality are minimised. A route-wide review of regional geochemical variations attributable to natural and non-natural sources is to be undertaken to understand potential limitations on the placement of natural material.

Material that has not met the definition of recovery under the DoWCoP (certainty of use, quantity of use, suitability for use and protection of human health and environment) will not have been recovered and should be disposed as a waste to a suitability permitted landfill / treatment centre.

8.3.1 Development Route A

For Route A, a Remediation Strategy will provide the framework for the recovery of waste and for ensuring that the material does not present an unacceptable risk to humans and the environment at the point of placement.

A key element of the Remediation Strategy will be the modelling of a finite number of acceptability criteria suites. The Remediation Strategy will define, not only the suites, but the geo-environmental conditions where each acceptability criteria suite is applicable to achieve acceptable risks at the point of placement.

The acceptability criteria will be the lowest risk-based criteria protective of human health and controlled waters. Human health acceptability criteria will be generated in accordance with the CLEA and DEFRA SP1010 frameworks. Controlled water acceptability criteria will be generated in accordance with the gov.uk Groundwater Protection pages (formerly GP3) using ConSim. Since controlled water risks are likely to exhibit variability, a total of 8 suites are proposed based on modelling of a range of depths to the saturated zone and unsaturated zone permeabilities.

Table 69: Material Management Planning Acceptability Criteria Suites

Groundwater Risk Scenarios				
		Permeability		
		L	M	H
Groundwater Depth	L	1	3	6
	M	2	4	

	H	5	7	
8: Specific Assessment where required				

Values of groundwater depth and permeability shall be generated following a scheme-wide review of representative parameters. Suite 8 will be for site specific acceptability criteria for re-use of material in areas that do not fit with the suite 1-7 modelling conditions.

Chemical testing is required at a rate of not less than 1 sample per 250m^3 or 1 sample per 500m^3 of re-used material for the purposes of verifying acceptability.

8.3.2 Development Options A and B: Physical Acceptability

In addition to chemical criteria, the following physical criteria will need to met by re-used material along Development Routes Options A and B:

- No visibly contaminated material;
- No free flowing oil;
- No odorous material;
- pH range between 2 and 11.5;
- All material to meet Earthworks Specification acceptable material classes; and
- In addition to those above, topsoil should meet the agricultural class defined by soil resource management plans.

8.3.3 Within BIS Triangle

An underlying aim (as stated in the remediation strategy report) is to "*maximise sustainability by retaining the maximum quantity of suitable material on-site*" to "*minimise off-site disposal of materials where such materials can safely and usefully be retained*". Within the BIS Triangle it is intended to apply the principles of materials management in-line with the DoWCoP Version 2, CL:AIRE (2011).

The DoWCoP will be used to develop a Material Management Plan (MMP) for the BIS Triangle in-accordance with the HS2 framework[xlvii]. The MMP will initially be prepared by the EWC and will be handed over to the Main Works Civils Contractor (MWCC) (when the EWC are no longer the Principal Contractor) for development and to incorporate the remediation. The MMP will be updated by the MWCC whilst they are Principal Contractor prior to handover to the Main Works Station Contractor.

The suitability for reuse of site won soils within the BIS Triangle is based on quantitative risk assessment on the leaching of contaminants to underlying groundwater and subsequent migration to surface water receptors. Remediation criteria are derived for two general scenarios at three distances from surface water receptors. Site won soils will be categorised into an appropriate category. The general scenarios and distances are:

- material placed beneath areas of hard cover such as buildings, car parks and access roads – based on leaching of soil contaminants from the unsaturated zone and dilution by groundwater flow beneath the site (Level 2), and subsequent migration in groundwater to a surface water receptor located at <50m, 50m to 250m and >250m distance (Level 3); and
- material placed beneath embankments with some hard cover from roads – leaching of soil contaminants from the unsaturated zone and dilution by groundwater flow beneath the site (Level 2), and subsequent migration in groundwater to a surface water receptor located at <50m, 50m to 250m and >250m distance (Level 3).

Material classifications and their descriptions from the remediation strategy report are reproduced in Table 70 below.

Table 70: BIS Triangle Remediation Strategy Report Material Classifications (Descriptions)

Material Classification	Definition	Anticipated Source	Intended Use
Unacceptable Material (UM)	Material considered unacceptable for retention or reuse on site due to the presence of unacceptable levels of asbestos, waste and / or chemical contamination or soils exhibiting poor geotechnical properties such as those containing deleterious materials e.g. wood, plastic and putrescible materials etc. Chemical concentrations will be above the highest values generated within the RTW fate and transport modelling, namely those associated with locations of re-use 250m away from a surface water receptor and beneath hard cover. These materials will therefore not meet any of the general fill requirements and would likely be classified as Hazardous Waste and will therefore require pre-treatment (e.g. screening out the inert components) prior to disposal. Some UM will be suitable for remediation treatment appropriate to the contaminants of concern above their respective location specific soils re-use criteria e.g. hydrocarbon, metal or PAH impacted soils etc. and then can potentially be re-used subject to meeting their respective location specific soil re-use criteria following treatment.	Made Ground or underlying natural soils containing high levels of contaminants in close proximity to historic releases or sources of contamination e.g. some site won soils arising from MBL.	Soils which are unsuitable for treatment e.g. waste, or those whose contaminant concentrations can't be lowered to less than their respective location specific soils re-use criteria shall be removed from site as waste. Soils which can be treated to lower contaminant concentrations below their respective location specific re-use criteria can be re-used on site. The material should also comply with any geotechnical re-use criteria applicable to that location.
General Fill Material – 1 (GFM-1)	GFM material for placement under areas of hardstanding and containing contaminant concentrations which are below the re-use criteria in Table D1, Appendix D (of the remediation strategy report). This material can be reused beneath hardstanding in any setting where all contaminant concentrations fall below their respective location specific soils re-use criteria without treatment, or, depending on the details of the MMP, be re-used in a more sensitive setting following treatment and re-validation of the contaminant concentrations. Material types will be split into three location settings, including at distances of <50m, >50m to 250m and >250m from a surface water feature.	Made Ground containing low to moderate levels of contaminants, likely arising from the remediation areas (MBL and sand and gravel quarry) or other areas of Made Ground (e.g. backfilled borrow pits).	Materials will be suitable for use within any setting against which the contaminant concentrations are lower than the location specific re-use criteria generated for that setting. It can be used as general fill beneath hardstanding (GFM-1) or within soft surfaced areas (GFM-2) e.g. beneath embankments at appropriate distances from surface water features. The material should also comply with any geotechnical re-use criteria applicable to that location.
General Fill Material – 2 (GFM-2)	GFM material for placement under areas of soft surfaced embankments and containing contaminant concentrations which are below the re- use criteria in Table D2, Appendix D (of the remediation strategy report). This material can be reused in any setting where all contaminant concentrations fall below their respective location specific soils re-use criteria without treatment, or, depending on the details of the MMP, be re-used in a more sensitive setting following treatment and re-validation of the contaminant concentrations. Material types will be split into three location settings, including at distances of <50m, >50m to 250m and >250m from a surface water feature.		
Cover Material (CM)	Material with contaminant concentrations which meet the GAC for a proposed park/open space scenario, as set out in the HS2 guidelines document4, landscape architect requirements and the British Standard for Topsoil (BS3882:2015) This would also include topsoil recovered from site which has been confirmed as suitable for use through validation testing.	Some Made Ground material (crushed inert materials recovered from the buried foundations and slabs) and natural strata present at depth below the Made Ground that may be excavated to ensure there is sufficient CM for the works.	Primary infrastructure service corridor infill. 300mm cover layers for new landscaping. Meeting the Net Materials Import requirement.

Material Classification	Definition	Anticipated Source	Intended Use
		Imported soils (naturally derived soils or stone).	

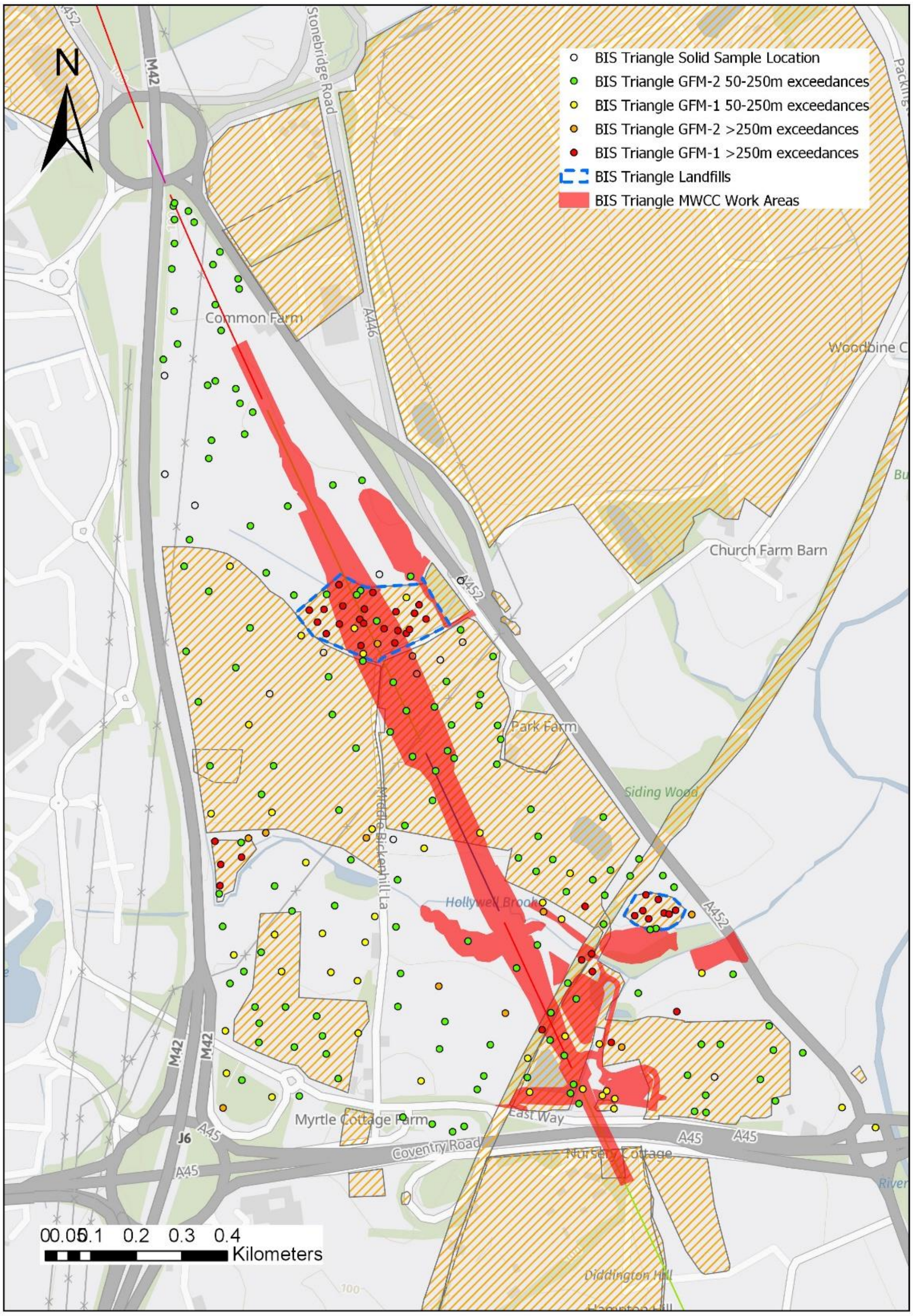
A review has been conducted to determine the potential locations of material across the site, that, if excavated may be subject to remediation in order to meet acceptability criteria for GFM-1 and GFM-2 general fill. The acceptability criteria increase in the following order for all determinants:

GFM-2 (placed 50-250m from watercourse) < GFM-1 (placed 50-250m from watercourse) < GFM-2 placed over 250m from watercourse < GFM-1 (placed over 250m from watercourse)

As a result the highest acceptability criteria are for GFM-1 placed over 250m from watercourse.

The figure below illustrate the location of samples and exceedances within the MWCC works areas:

Figure 44: BIS Triangle Location of SSAC Exceedances



Beyond the landfills, the majority of exceedances for the lowest acceptability criteria within the MWCC work areas are for vanadium. Within Middle Bickenhill landfill and the former sand and gravel quarry, the lowest acceptability criteria are exceeded by a much wider range of contaminants including: Vanadium, Zinc, Copper, Barium, Mercury, Cadmium, Nickel, Lead, with localised exceedances for TPHs. Fluoranthene exceedances are also commonly encountered in Middle Bickenhill landfill.

Exceedances of the highest SSACs within the MWCC work areas were restricted to the Middle Bickenhill Landfill, and within and around the former railway line (ES LQ 24-4). The exceedances were exclusively for copper and zinc.

The data suggests that should excavated material be reused in the MWCC as general fill beneath hard or soft surfaced embankments, some form of cement stabilisation is likely to be necessary to render the heavy metal contaminated material suitable for re-use. Bioremediation may also be required for some materials but only as a secondary treatment method to address localised hotspots of organic contamination. This is in line with the findings of the Remediation Strategy.

8.4 Obstructions / Buried Constraints

Buried obstructions may be present across the site within Made Ground and natural superficial deposits. Remnant foundations may also be present associated with former buildings and structures within the LoD and LLAU for the Proposed Scheme. A summary of buried obstructions identified during the GI will be assessed as part of the GIR.

8.5 Asbestos

Please refer to Appendix H for asbestos risk assessment and recommendations.

Factual details of laboratory-reported asbestos are presented in full in Section 4.4 and summarised as follows. Asbestos was identified in 13 samples (out of 169 samples analyzed) and quantified in 9 samples, with the BIS Triangle remediation strategy report reporting additional localised asbestos presence within LQ site 24-23, 23-34 and 24-16. Widespread presence of asbestos was reported in Middle Bickenhill Landfill. Identified asbestos included amosite or chrysotile fibres, amosite and chrysotile ACM, and chrysotile or crocidolite cement. Quantification testing has reported concentrations of asbestos between <0.001% and 0.034%.

9 RECOMMENDATIONS

9.1 Limitations to the Investigation

A summary of LQ sites which have been subject to GI is presented in Table 8.

To date exploratory positions have been advanced in eight LQ sites, although the spacing of exploratory positions is typically greater than that specified in the GI scoping study[xlviii]. The data obtained are therefore considered insufficient to inform stage 1 target costing without significant assumptions and uncertainties. A Schedule 2 GI spreadsheet accompanied with GIS maps has been formulated containing detailed recommendations for further GI to allow Geo-environmental Reports and GQRA screening of potentially contaminated sites to be completed in design stage 2. Further details of the objectives and scope of proposed GIs are summarised in Section 9.

9.2 Ground Investigation Objectives

The objectives of further GI and assessment is set out in BBV's Land Contamination GI Scoping Strategy[xlix] (2018) (Document no.: 1MC08-BBV-EV-SUR-N002-1000002).

A total of four further phases of GI are envisaged by the strategy:

- Stage 1 Missing Ground Investigation
- Stage 2 Supplementary Ground Investigation
- Stage 2 Detailed Ground Investigation
- Stage 3 Remediation Validation / Verification Investigations

The missing GI refers to investigation included in the HS2 tender scope which was subsequently de-scoped. This investigation was intended to conform with HS2 specifications which included the provision of contamination data to meet land contamination risk assessment and geotechnical objectives for stage 1. The missing GI locations inside or within 250m of potentially contaminated land sites identified in the ES have been identified for contamination investigation.

The contamination investigation objectives of the Stage 2 Supplementary GI are as follows:

- To obtain sufficient data to progress the stage 2 geo-environmental reports and to allow remediation optioneering and costing to be assessed for each potentially contaminated site identified in the ES (typically >500m^2, where sites are accessible, and the development involves significant ground break) with reduced risk factors compared to stage 1;
- To address key gaps identified in the gateway 6 (GW6) stage 1 geo-environmental reports and to refine conceptual models presented in preliminary risk assessments;
- To allow GQRA screening of all potentially contaminated sites typically >500m^2 identified in the ES subject to significant ground break as part of the permanent works to a sufficient level to determine the requirement for remediation strategies;
- To allow initial phases of DQRA;
- To determine requirements for further GI to inform remediation strategies (where existing GI data gaps are identified);

- To obtain baseline contamination data for construction compounds ONLY where these are located over land potentially posing a contaminative risk to the Proposed Scheme identified in the ES[1];
- To further progress the development of a database of the baseline principal aquifer pesticide contamination status; and
- To contribute to the pre-remediation gas and groundwater monitoring database

Following completion of the Stage 2 Supplementary GI, the contamination investigation in totality is envisaged to fulfil the overall aims of an Exploratory Investigation under BS10175:2011, as follows:

- "*[To] reduce uncertainty in knowledge of the site, including determine the accuracy or otherwise of contamination-related and other hypotheses developed in the preliminary investigation, thereby enabling the initial conceptual model to be refined;*
- *[To] provide information that helps the design of any subsequent detailed investigation."*

This section of the geo-environmental report summarizes the scope of the stage 2 supplementary GI only.

The Stage 2 Detailed Ground Investigation is intended to provide data to progress the detailed design of remediation elements and will be scoped at the completion of stage 2 Geo-environmental Reports. The Stage 3 Remediation Validation / Verification Ground Investigation will be required to monitor and confirm that the remediation objectives and standards have been met. It is not possible at the current stage to determine the scope of the Stage 2 Detailed Ground Investigation and the Stage 3 investigations.

9.2.1 Stage 2 Supplementary Ground Investigation Scoping Methodology

Document 1MC08-BBV-EV-SUR-N002-1000002 provides a detailed scoping methodology for the Stage 2 supplementary GI. The methodology identifies the existing and proposed GI for each ES LQ site, and hotspot identified in the geo-environmental reports. The existing and proposed GI comprises the following:

- GI already completed; and
- GI proposed in the missing GI and supplementary combined GI which meet both geotechnical and contamination objectives.

The requirements and general purpose of additional contamination only investigation has then been determined based on the proposed development, anticipated ground break, anticipated contamination hazards and accessibility, in order to meet the supplementary GI objectives.

9.2.2 Proposed GI Scope

Table 71 summarises total number of exploratory holes proposed for Sub-Lot 5 and 6:

Table 71: Proposed GI Hole Summary

	GI Package		
Hole Type	**Missing**	**Supplementary Combined**	**Supplementary Contamination Only**
Inspection Pit	1	26	26
Trial Pit	6	54	10
Cable Percussion	6	31	18
Cable Percussion / Rotary Hole	29	129	26
Rotary coring	-	69	37
Cone Penetration Testing	5	81	31
Surface Water	-	2	2

[1] Note that exclusion of GI in compounds where no contamination risks have been identified previously will require the Contractor to assume that construction-sites are to be returned to a clean natural state following works completion.

The key targeted areas for the proposed GI are ES LQ sites within Sub-Lot 5 & 6 identified to have gaps in information. The Key targets are presented in Appendix G.

There are a number of LQ sites which fall within the LoD and have been identified as the highest risk sites which require investigation to fill knowledge gaps and have proposed GI within.

Table 72: High risk sites within LoD

Chainage		ES LQ	ES LQ Description	GI Notes
Start	End			
155+200	155+900	24-1	Jacksons Brickworks Landfill (historical)	10.no existing exploratory holes with contamination data in this area, which will have permanent shallow works. 9no. exploratory hole to be located within this site.
155+800	155+800	24-3	Cottage Farm	There is no existing exploratory hole with contamination data in this area. 3no. exploratory holes to be located within this site.
155+900	155+900	24-13	Former Smithy	There is no existing exploratory hole with contamination data in this area, which will be in temporary use or for access. 1no. exploratory holes to be located within this site.
156+000	156+000	24-11	Infilled pit	There is no existing exploratory hole with contamination data in this area. 1.no exploratory hole to be located within this site.
156+000	156+000	24-2	Infilled pond	There is no existing exploratory hole with contamination data in this area, which will be in temporary use or for access. 1no. exploratory holes to be located within this site.
158+400	159+200	24-46	Birmingham Business Park	10.no existing exploratory holes with contamination data in this area, which will have permanent shallow works. 2no. exploratory holes to be located within this site.
159+800	159+900	24-58	Highways Agency Depot (operational)	10.no existing exploratory holes with contamination data in this area, which will be in temporary use or for access. 6no. exploratory holes to be located within this site.
161+220	161+260	19-20	Timber yard, formerly a saw mill	9no. existing exploratory holes with contamination data in this area, which will have permanent shallow works. 5no. exploratory holes to be located within this site.
162+580	162+660	19-07	Former sewage works	1no. existing exploratory hole with contamination data in this area, which will comprise permanent shallow works. 7no. exploratory holes to be located within this site as part of supplementary GI.
162+980	162+980	19-08	Infilled pond	1no. existing exploratory hole with contamination data in this area, which will be in temporary use or for access. 2no. exploratory holes to be located within this site.
163+000	163+000	19-38	Former tank in western land take, chainage 162+680 (Birmingham Spur)	There is no existing exploratory hole with contamination data in this area, which will be in temporary use or for access. 5no. exploratory holes to be located within this site.
163+350	163+350	19-41	Infilled pond in eastern land take; chainage 163+350	There is no existing exploratory hole with contamination data in this area, which will have permanent shallow works. 1no. exploratory hole to be located within this site.
164+080	164+850	19-17	Coleshill Gas Works historical landfill	35no. existing exploratory holes with contamination data in this area, which will have permanent shallow works. 17no. exploratory holes to be located within this site.
164+200	164+800	19-36	Coleshill Sewage Works on route, in eastern and western land take; chainage 164+700 to 164+930	19no. existing exploratory holes with contamination data in this area, which will have permanent shallow works. 40no. exploratory holes to be located within this site.
164+370	164+550	19-56	Infilled pit	There is no existing exploratory hole with contamination data in this area, which will be in temporary use or for access. 1no. exploratory holes to be located within this site.
0+800 (NC)	0+800 (NC)	19-52	Infilled pit in land take area; chainage 0+800	There is no existing exploratory hole with contamination data in this area, which will be in temporary use or for access. 2no. exploratory holes to be located within this site.
1+000 (NC)	1+000 (NC)	19-49	Former works including coal and cement block factories now Jack O'Watton Business park	There is no existing exploratory hole with contamination data in this area, which will be in temporary use or for access. 2no. exploratory holes to be located within this site.

Chainage		ES LQ	ES LQ Description	GI Notes
Start	End			
1+200 (NC)	1+200 (NC)	19-46	Infilled pond	There is no existing exploratory hole with contamination data in this area, which will have permanent shallow works. 1no. exploratory hole to be located within this site.
2+400 (NC)	2+400 (NC)	19-43	Infilled pond	There is no existing exploratory hole with contamination data in this area, which will have permanent shallow works. 1no. exploratory hole to be located within this site.
2+700 (NC)	2+700 (NC)	19-40	Infilled pond; chainage 2+700 (North chord)	There is no existing exploratory hole with contamination data in this area, which will have permanent shallow works. 1no. exploratory hole to be located within this site.

Additionally, the following recommendations should be noted during GI works

- 77no. existing installations have been scheduled for further groundwater sampling;
- 39no. existing installations have been scheduled for further gas monitoring;
- Exploratory positions should be located at the spacings recommended in the Land Contamination GI Scoping Strategy document[xlix], where reasonably practicable;
- A specific water supply pipe assessment should be undertaken in accordance with UKWIR guidance[xliii] where new water supply pipes are proposed;
- The Land Contamination GI Scoping document will identify requirements for further investigation or monitoring such as areas that could not be fully investigated, where there is a requirement for delineation investigations, and where pumping trials are needed. In some cases, it may be necessary to implement long-term monitoring. Such a decision and all the associated monitoring work shall be fully documented and a monitoring plan, which incorporates objectives, methods and criteria, needs to be produced. The Monitoring Plan shall identify the frequency at which interim monitoring reports shall be produced, and how the findings of the long-term monitoring are to be incorporated into the final Geo-environmental Report; and
- Further groundwater sampling and monitoring should also be undertaken to determine a baseline.

9.3 General Recommendations to Progress Remediation Design

The following general recommendations are made to progress remediation strategies and remediation option appraisals:

- A comprehensive GQRA and target costing process needs to be completed following receipt of GI data for potentially contaminated land sites identified in the ES. Only at this stage can the areas for and scope of DQRA be identified. The preparatory GQRA screening process will also be required to determine areas of concern for Remediation Strategies.
- Please refer to Appendix H for asbestos risk assessment addressing the risk from ACMs in the site soils and any required remedial measures.
- All remediation will ultimately be subject to Local Authority and / or Regulator approval.

10 UNCERTAINTIES AND LIMITATIONS

This report is subject to the following limitations:

- Where gaps in GI data are identified this precludes GQRA for certain contaminant linkages. For these linkages a preliminary qualitative risk assessment has been undertaken based on available desk-based information.
- Sufficient information is not yet available to complete an accurate DQRA and requirements for further risk assessment will be determined when the appropriate level of GI information is available. The scope of remediation works estimated in this report could change following DQRA.
- This report excludes assessment of the risks from radioactive substances.
- This report does not consider Unexploded Ordnance (UXO) risks. The UXO Desk Study Report commissioned by HS2 and produced by Zetica[l] should be referred to for details of UXO risks and risk mitigation techniques.
- This report does not consider risks and remediation requirements for invasive plant species which may be present at the site. These are to be considered at the remediation strategy stage in accordance with the EWC authored INNS Biosecurity and Management Plan[li]
- In certain areas of the scheme we have relied upon information from draft and preliminary GI factual reports. A review has been conducted on this data to check its integrity, and where it contains errors and inconsistencies it has been excluded from analysis. Where it has been used in our assessment it should be noted that preliminary and draft data may be subject to change following finalisation of the factual reports. This may affect the factual data interpretation.
- This report does not include a summary of mineral safeguarding or a mineral resourcing assessment which will be reviewed in a separate pre-extraction mineral resources assessment report.
- This report excludes consideration of the waste classification of materials pending completion of the mass haul strategy and materials management plan;
- Should the development proposals detailed in the Design Element Statement change then the conclusions and recommendations provided in this report should be reviewed to ensure that they remain appropriate.
- Where no GI data is available, no remediation actions can be confirmed. Potential risks from uninvestigated ES LQ sites are recorded in the risk register.
- Responsibility for risk assessment and remediation / mitigation measures to address contamination risks specifically associated with temporary works rests with the temporary works designer, BBV, and is out-with the scope of this report.
- Please refer to our disclaimer in Appendix I for general limitations.

11 LIST OF ABBREVIATIONS AND ACRONYMS

ACEC – Aggressive Chemical Environment for Concrete
ACM – Asbestos Containing Material
AGS – Association of Geotechnical & Geoenvironmental Specialist
AOD – Above Ordnance Datum
ATS – Autotransformer Station
BBV – Balfour Beatty Vinci
BGS – British Geological Survey
BIA – Birmingham Interchange Station and People Mover Area A
BIB – Birmingham Interchange Station and People Mover Area B
BIC – Birmingham Interchange Station and People Mover Area C
BID – Birmingham Interchange Station and People Mover Area D
BIS – Birmingham Interchange Station
BS – Birmingham Spur
BTEX – Benzene, Toluene, Ethylbenzene, Xylene
C4SLs – Category 4 Screening Levels
CDM – Construction Design and Management
Ch – Chainage
CIRIA – Construction Industry Research and Information Association
CLEA – Contaminated Land Exposure Assessment
CLR11 – Contaminated Land Report 11
COC – Contaminants of Concern
CoCP – Code of Construction Practice
COSHH – Control of Substances Hazardous to Health
CS – Characteristic Gas Situation
CSM – Conceptual Site Model
DEFRA – Department for Environment, Food and Rural Affairs
DJA – Delta Junction Area A
DJB – Delta Junction Area Z
DOC – Dissolved Organic Carbon
DoWCoP – Definition of Waste: Development Industry Code of Practice
DQRA – Detailed Quantitative Risk Assessment
DSC – Design Sulphate Class
DWS – Drinking Water Standards
EA – Environment Agency
EAL – Environmental Assessment Limit
EMRs – Environmental Minimum Requirements
EQS – Environmental Quality Standards
ES – Environmental Statement
EWC – Enabling Works Contractor

GAC – Generic Assessment Criteria
GACgwvap – Groundwater Vapour Generic Assessment Criteria
GI – Ground Investigation
GIR – Ground Investigation Report
GQRA – Generic Quantitative Risk Assessment
GSC – Generic Screening Criteria
GSV – Gas Screening Value
GW6 – Gateway 6
HCV – Health Criteria Value
HI – Hazard Index
HQ – Hazard Quotient
HS2 – High Speed Two
LEL – Lower Explosive Limit
LLAU – Limits of Land to be Acquired or Used
LLTC – Low Level of Toxicological Concern
LoD – Limits of Deviation
LQ – Land Quality
LQA – Land Quality Assessment
LQM – Land Quality Management Ltd
m bgl – metres below ground level
M-BAT – Metal Bioavailability Tool
MCERTS – Monitoring Certification Scheme
MTBE – Methyl tert-butyl ether
MWCC – Main Works Civils Contractor
MWSC – Main Works Service Contractor
NBC – Normal Background Concentrations
NC – North Chord
NEC – National Exhibition Centre
NGR – National Grid Reference
NPA – North Package Area A
NPB – North Package Area B
NVS – Nitrate Vulnerable Zone
OELs – Occupational Health Exposure Limits
PAHs – Polycyclic Aromatic Hydrocarbons
PCBs – Poly-chlorinated Biphenyls
PDF – Portable Document Format
PE – Polyethylene
PoS – Public Open Space
PPE – Personal Protective Equipment
ppm – Parts per Million
PRA – Preliminary Risk Assessment
PVC – Polyvinyl chloride
S4ULs – Suitable for Use Levels
SoBRA – Society of Brownfield Risk Assessment

SOM – Soil Organic Matter
SPOSH – Significant Possibility of Significant Harm
SSAC – Site Specific Assessment Criteria
SSSI – Site of Special Scientific Interest
SVOCs – Semi-volatile Organic Compounds
TAME – Tert-Amyl Methyl Ether
TPH – Total Petroleum Hydrocarbons
TPHCWG – Total Petroleum Hydrocarbon Criteria Working Group
UBX – Ufton to Birmingham Interchange Package X
UEL – Upper Explosive Limit
UKAS – United Kingdom Accreditation Service
UKWIR – United Kingdom Water Industry Research
UXO – Unexploded Ordnance
VOCs – Volatile Organic Compounds

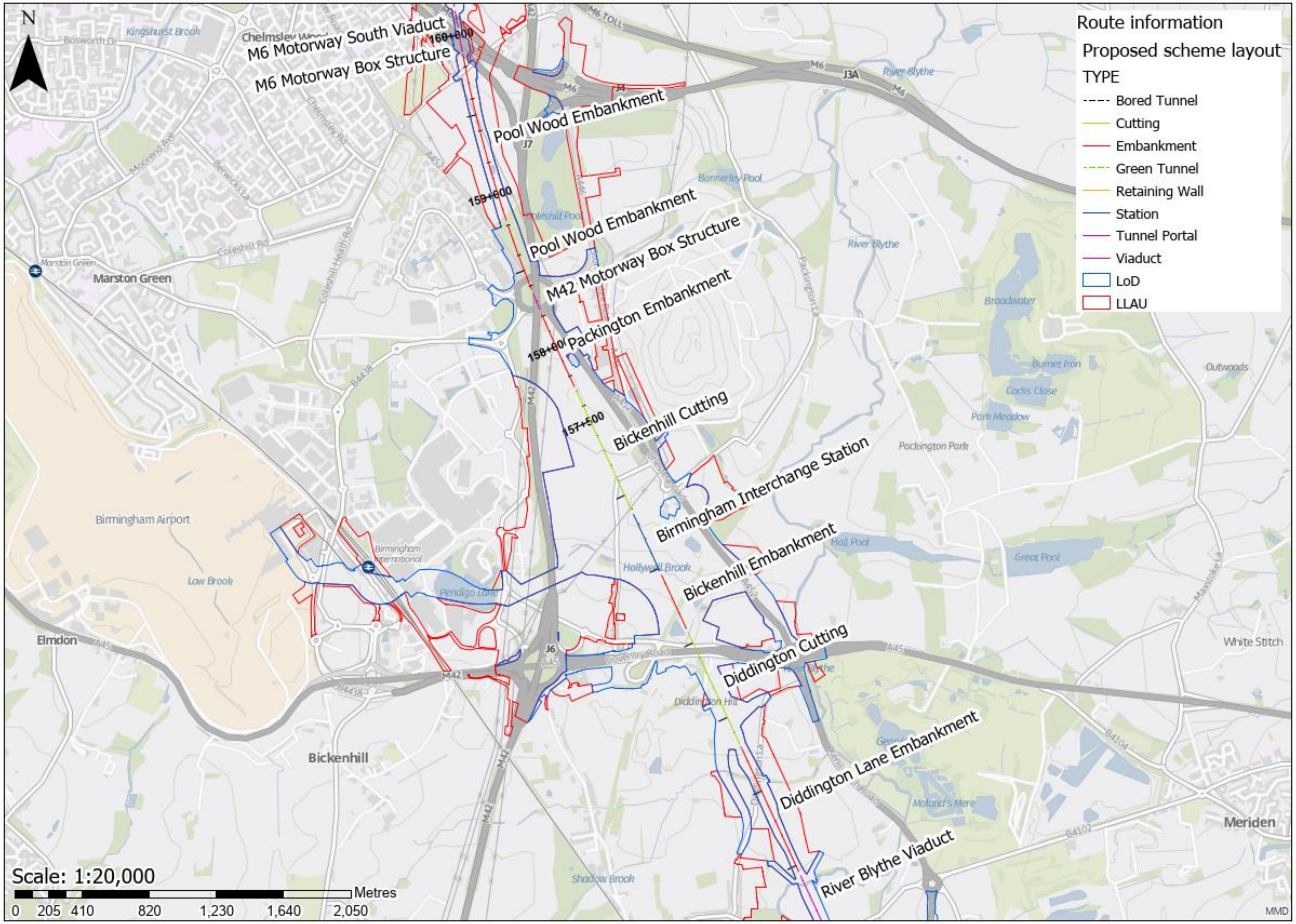
Appendix A. Drawings

List of drawings are shown in Table 73.

Table 73: List of drawings

Figure	Description
Figure 45	Proposed scheme layout plan
Figure 46	Artificial ground and superficial geology of the Sub-Lot 5 and 6 route (1:10,000 British Geological Survey mapping)
Figure 47	Bedrock geology of the Sub-Lot 5 and 6 route (1:10,000 British Geological Survey mapping)
Figure 48	Contamination data available and ES LQ sites
Figure 49	Ground gas and groundwater monitoring locations
Figure 50	Proposed ground investigations (all exploratory holes where geo-environmental testing is proposed)

Figure 45: Proposed scheme layout plans



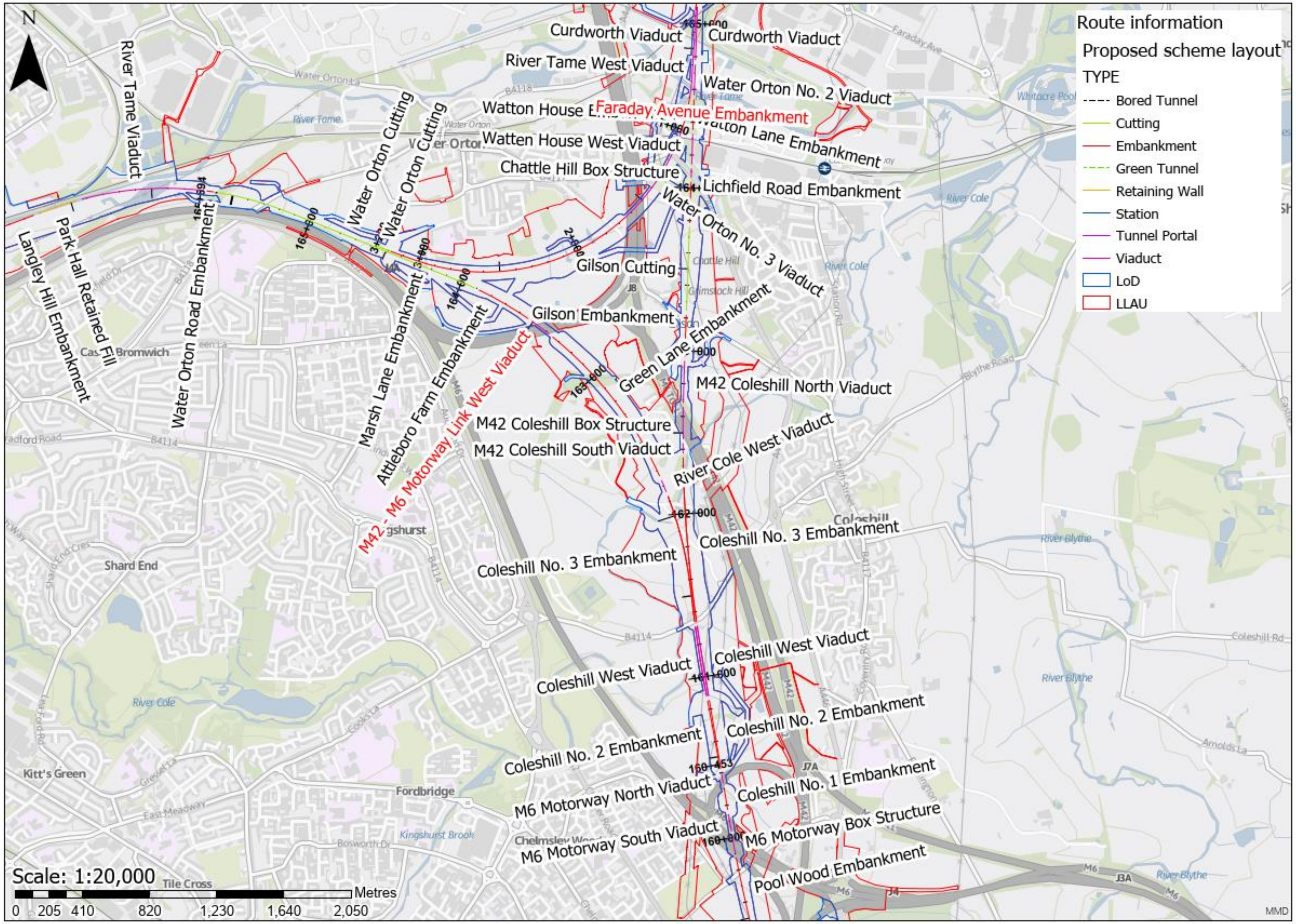
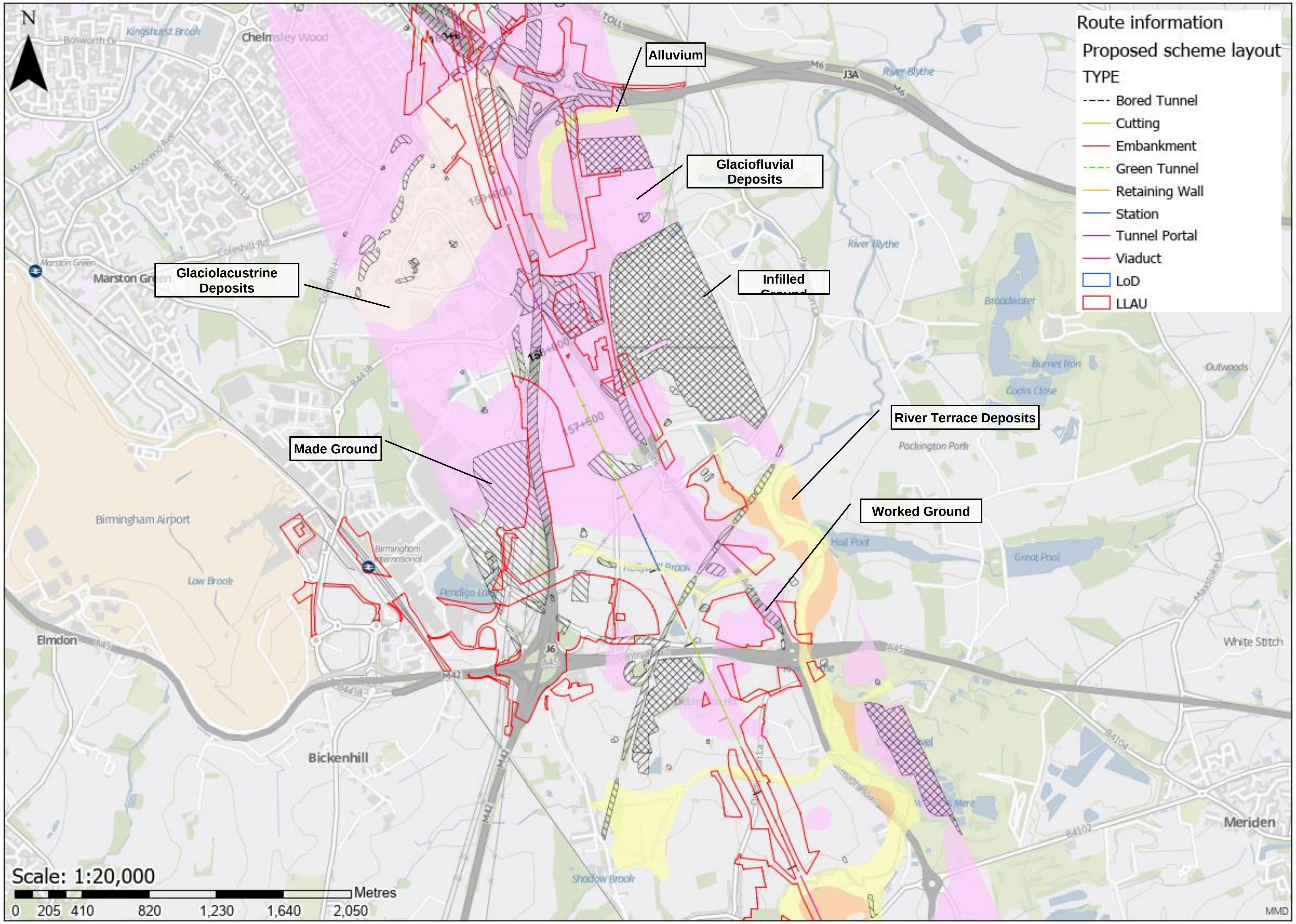

N
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
Curdworth Viaduct
Curdworth Viaduct
River Tame West Viaduct
Water Orton No. 2 Viaduct
Faraday Avenue Embankment
Watton Lane Embankment
Watten House West Viaduct
Chattle Hill Box Structure
Lichfield Road Embankment
Water Orton No. 3 Viaduct
River Tame Viaduct
Water Orton Cutting
Water Orton Cutting
Park Hall Retained Fill
Langley Hill Embankment
Water Orton Road Embankment
Marsh Lane Embankment
Attleboro Farm Embankment
M42 - M6 Motorway Link West Viaduct
Gilson Cutting
Gilson Embankment
Green Lane Embankment
M42 Coleshill North Viaduct
M42 Coleshill Box Structure
M42 Coleshill South Viaduct
River Cole West Viaduct
Coleshill No. 3 Embankment
Coleshill No. 3 Embankment
Coleshill West Viaduct
Coleshill West Viaduct
Coleshill No. 2 Embankment
Coleshill No. 2 Embankment
M6 Motorway North Viaduct
Coleshill No. 1 Embankment
M6 Motorway South Viaduct
M6 Motorway Box Structure
Pool Wood Embankment
Castle Bromwich
Shard End
Kitt's Green
Fordbridge
Tile Cross
Scale: 1:20,000
Metres
0 205 410 820 1,230 1,640 2,050
MMD

Figure 46: Artificial ground and superficial geology of the route (1:10,000 British Geological Survey mapping)



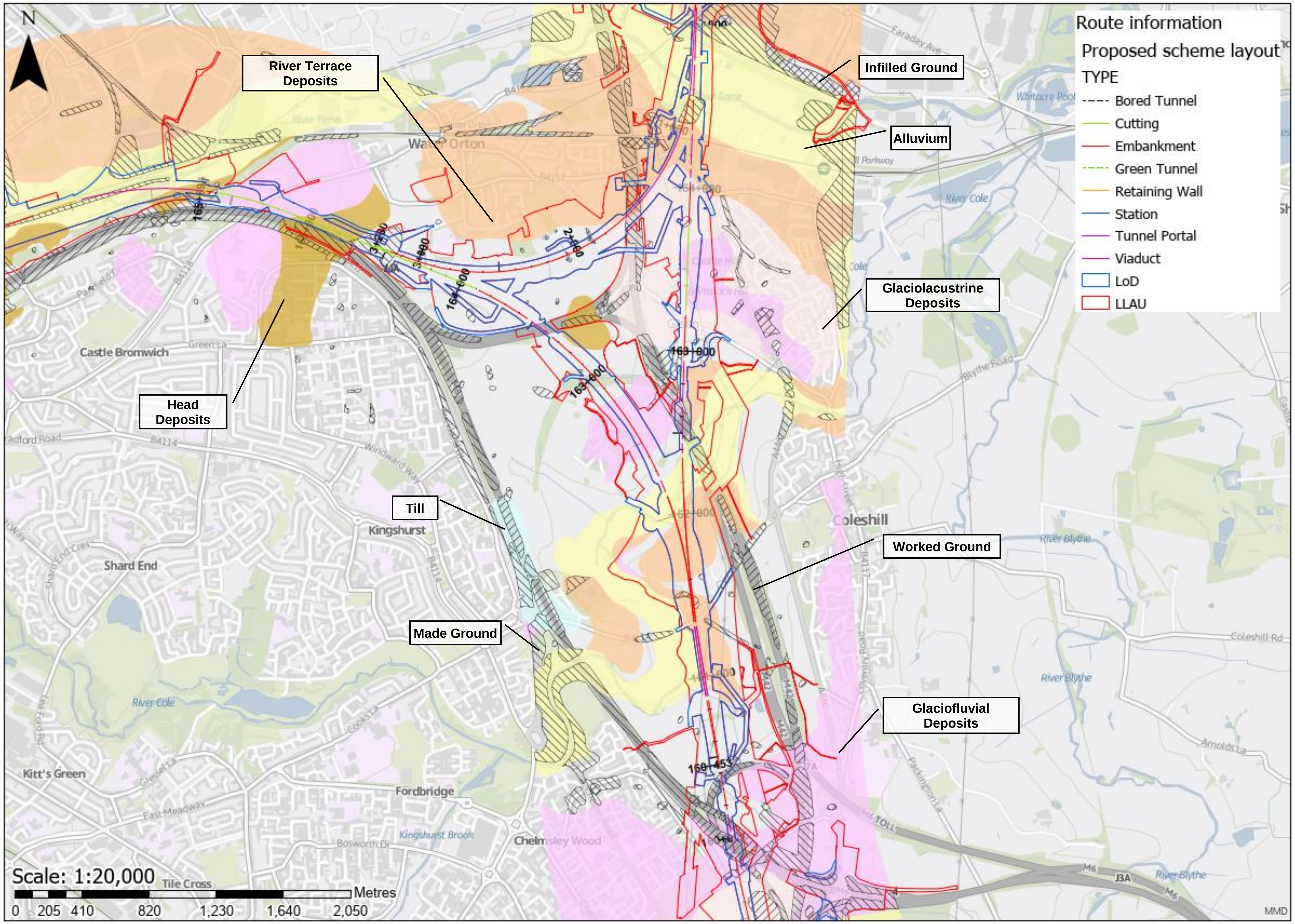
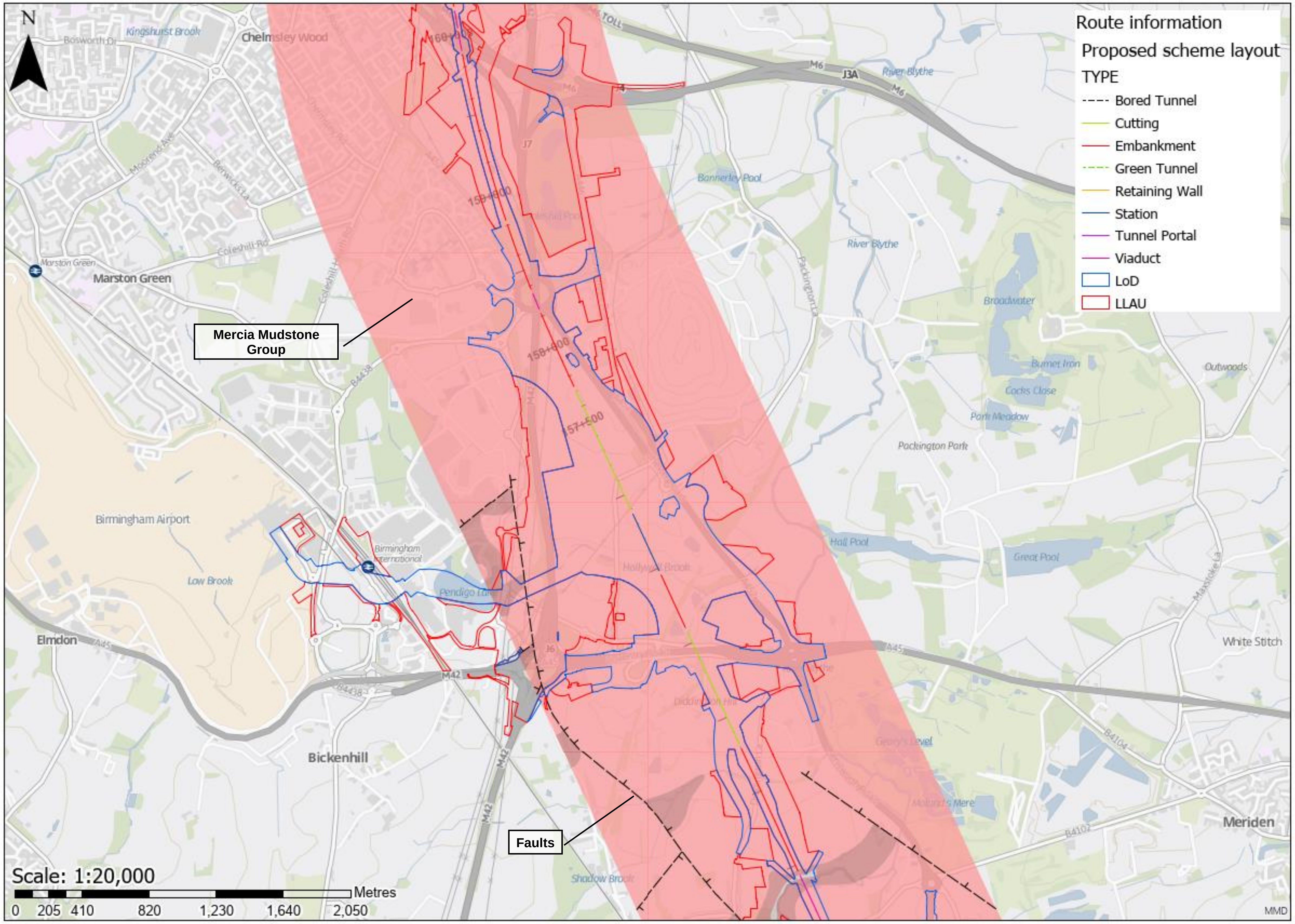

N
River Terrace Deposits
Infilled Ground
Alluvium
Glaciolacustrine Deposits
Head Deposits
Till
Worked Ground
Made Ground
Glaciofluvial Deposits
Castle Bromwich
Kingshurst
Shard End
Coleshill
Kitt's Green
Fordbridge
Chelmsley Wood
Water Orton
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
Scale: 1:20,000
Metres
0 205 410 820 1,230 1,640 2,050
MMD

Figure 47: Bedrock geology of the route (1:10,000 British Geological Survey mapping)



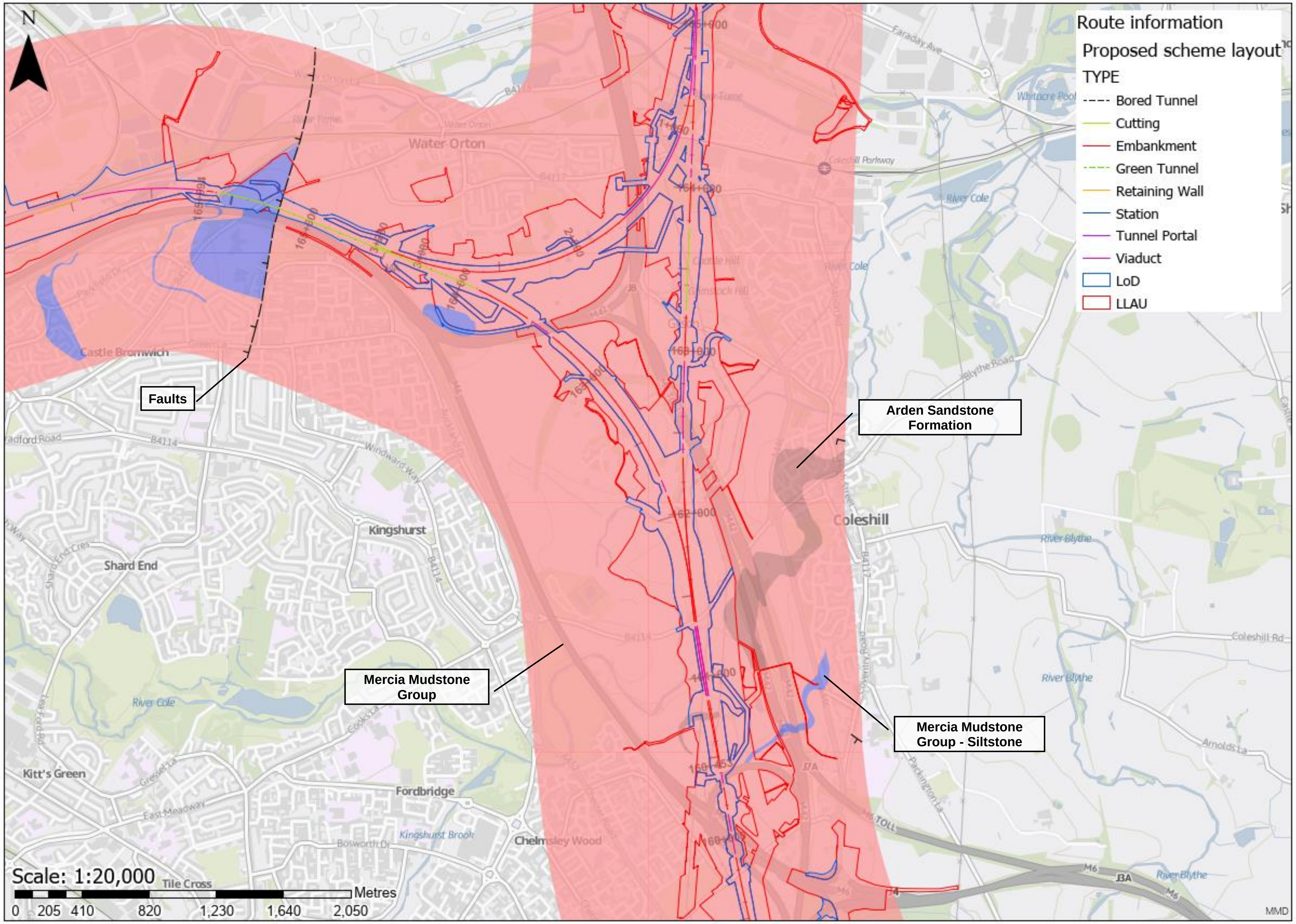
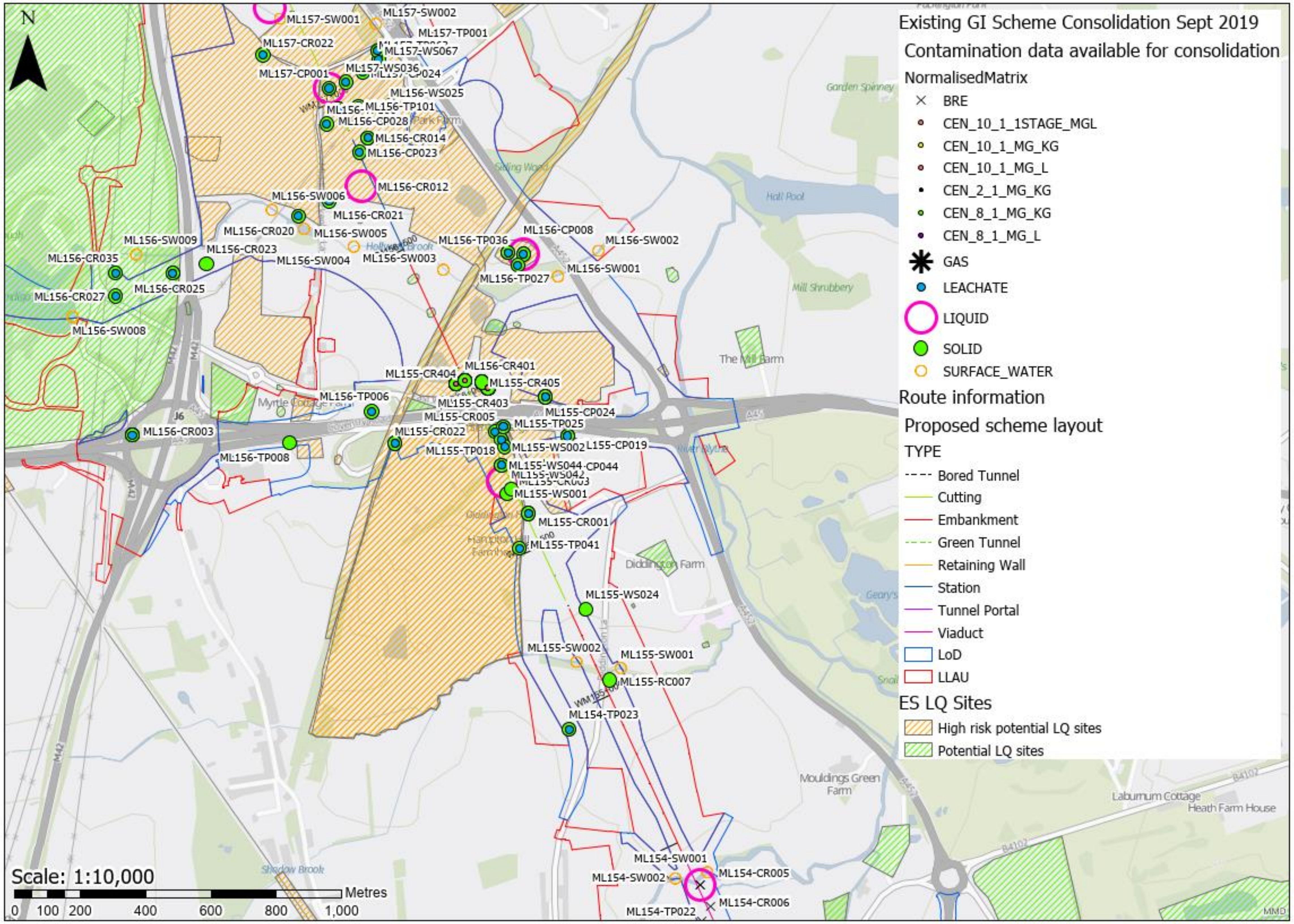
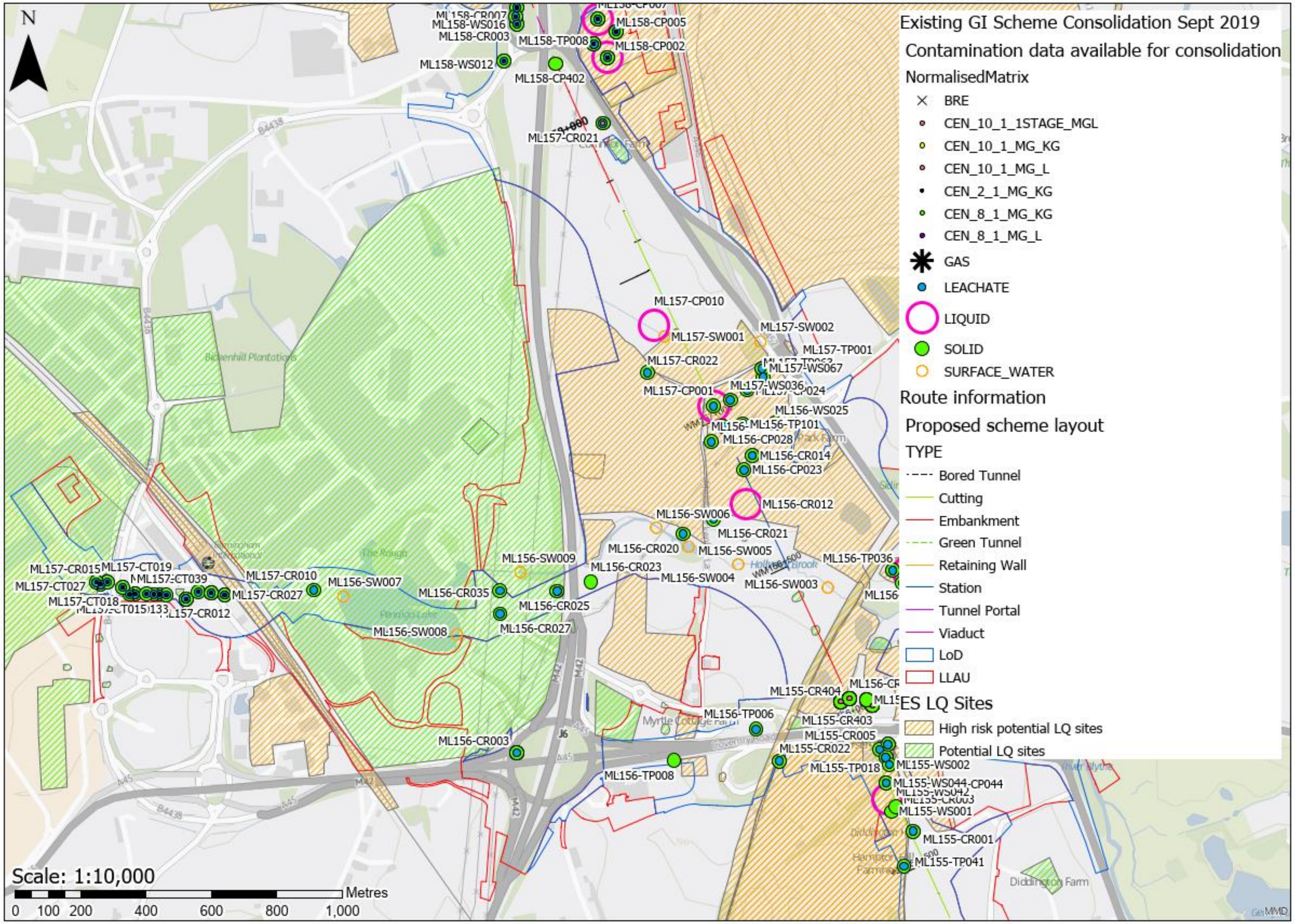
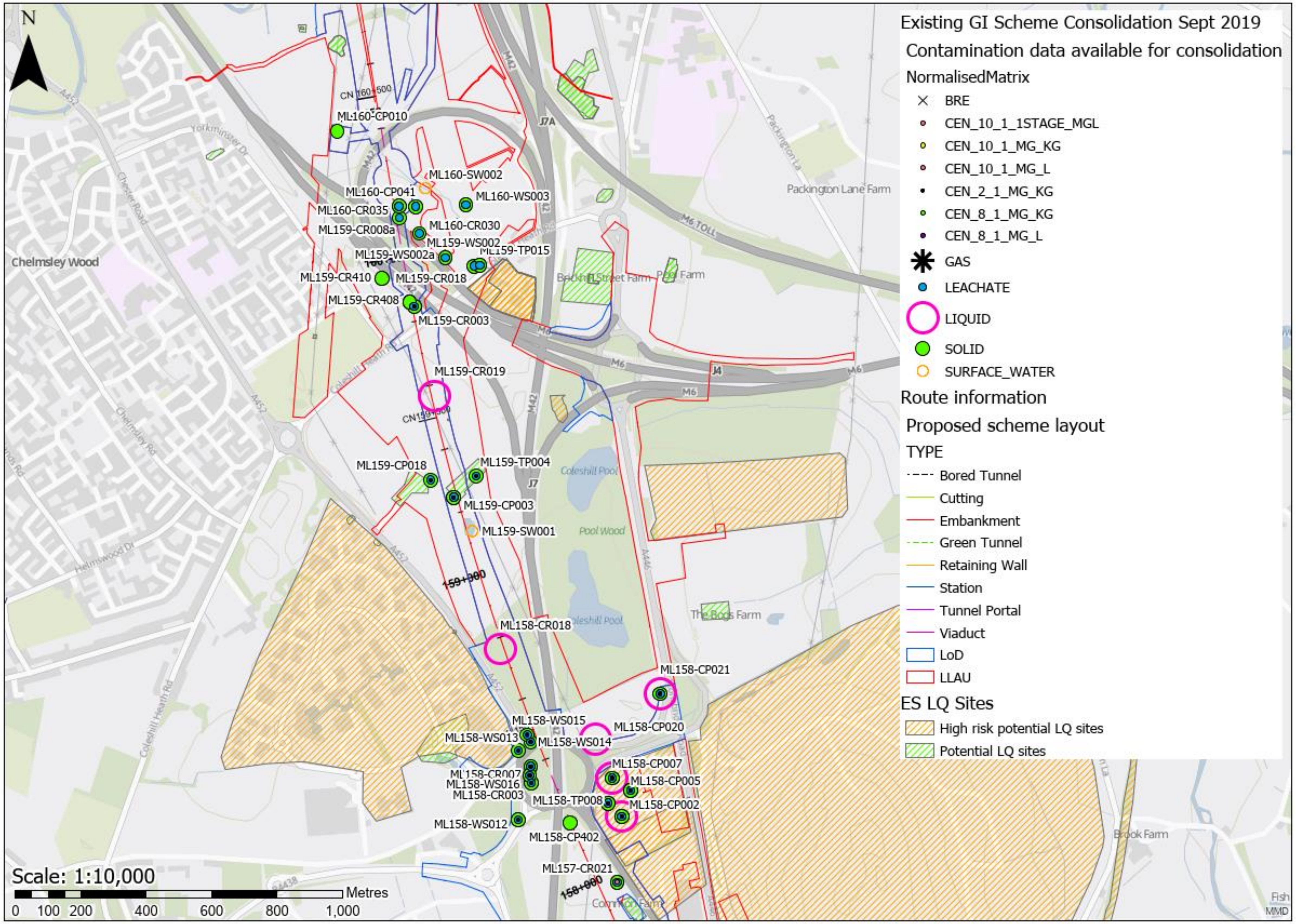
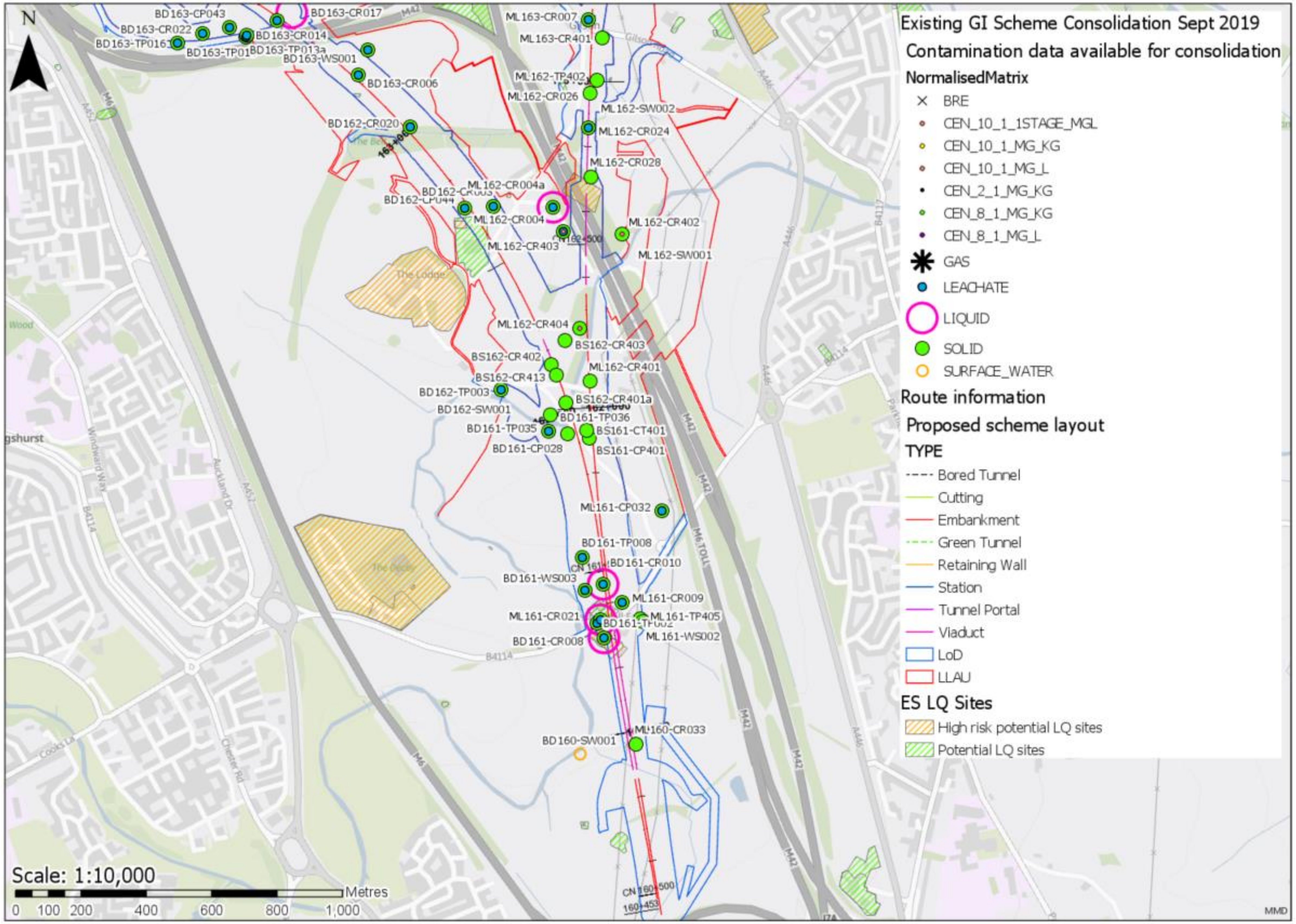

N
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
Faults
Arden Sandstone Formation
Mercia Mudstone Group
Mercia Mudstone Group - Siltstone
Water Orton
Castle Bromwich
Kingshurst
Shard End
Coleshill
Kitt's Green
Fordbridge
Chelmsley Wood
River Cole
River Blythe
Scale: 1:20,000
Metres
0 205 410 820 1,230 1,640 2,050
MMD

Figure 48: Contamination data available and ES LQ Sites




Existing GI Scheme Consolidation Sept 2019
Contamination data available for consolidation
NormalisedMatrix
BRE
CEN_10_1_1STAGE_MGL
CEN_10_1_MG_KG
CEN_10_1_MG_L
CEN_2_1_MG_KG
CEN_8_1_MG_KG
CEN_8_1_MG_L
GAS
LEACHATE
LIQUID
SOLID
SURFACE_WATER
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
ES LQ Sites
High risk potential LQ sites
Potential LQ sites
Scale: 1:10,000
0 100 200 400 600 800 1,000 Metres
N


Existing GI Scheme Consolidation Sept 2019
Contamination data available for consolidation
NormalisedMatrix
BRE
CEN_10_1_1STAGE_MGL
CEN_10_1_MG_KG
CEN_10_1_MG_L
CEN_2_1_MG_KG
CEN_8_1_MG_KG
CEN_8_1_MG_L
GAS
LEACHATE
LIQUID
SOLID
SURFACE_WATER
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
ES LQ Sites
High risk potential LQ sites
Potential LQ sites
Scale: 1:10,000
0 100 200 400 600 800 1,000 Metres
N
ML160-CP010
ML160-SW002
ML160-CP041
ML160-WS003
ML160-CR035
ML160-CR030
ML159-CR008a
ML159-WS002
ML159-WS002a
ML159-TP015
ML159-CR410
ML159-CR018
ML159-CR408
ML159-CR003
ML159-CR019
ML159-CP018
ML159-TP004
ML159-CP003
ML159-SW001
ML158-CR018
ML158-CP021
ML158-WS015
ML158-WS013
ML158-WS014
ML158-CP020
ML158-CP007
ML158-CR007
ML158-WS016
ML158-CR003
ML158-CP005
ML158-TP008
ML158-CP002
ML158-WS012
ML158-CP402
ML157-CR021
Chelmsley Wood
Packington Lane Farm
Coleshill Pool
Pool Wood
The Bogs Farm
Brook Farm
M6 TOLL
M42
M6
J4
J7
J7A


Existing GI Scheme Consolidation Sept 2019
Contamination data available for consolidation
NormalisedMatrix
BRE
CEN_10_1_1STAGE_MGL
CEN_10_1_MG_KG
CEN_10_1_MG_L
CEN_2_1_MG_KG
CEN_8_1_MG_KG
CEN_8_1_MG_L
GAS
LEACHATE
LIQUID
SOLID
SURFACE_WATER
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
ES LQ Sites
High risk potential LQ sites
Potential LQ sites
Scale: 1:10,000
0 100 200 400 600 800 1,000 Metres
N
BD163-CP043
BD163-CR017
BD163-CR022
BD163-TP016
BD163-TP01
BD163-CR014
BD163-TP013a
BD163-WS001
BD163-CR006
ML163-CR007
ML163-CR401
ML162-TP402
ML162-CR026
ML162-SW002
ML162-CR024
ML162-CR028
BD162-CR020
ML162-CR004a
ML162-CR004
ML162-CR403
ML162-CR402
ML162-SW001
ML162-CR404
BS162-CR403
BS162-CR402
ML162-CR401
BS162-CR413
BD162-TP003
BD162-SW001
BS162-CR401a
BD161-TP036
BD161-TP035
BS161-CT401
BD161-CP028
BS161-CP401
ML161-CP032
BD161-TP008
BD161-CR010
BD161-WS003
ML161-CR009
ML161-CR021
ML161-TP405
BD161-CR008
ML161-WS002
BD160-SW001
ML160-CR033
MMD

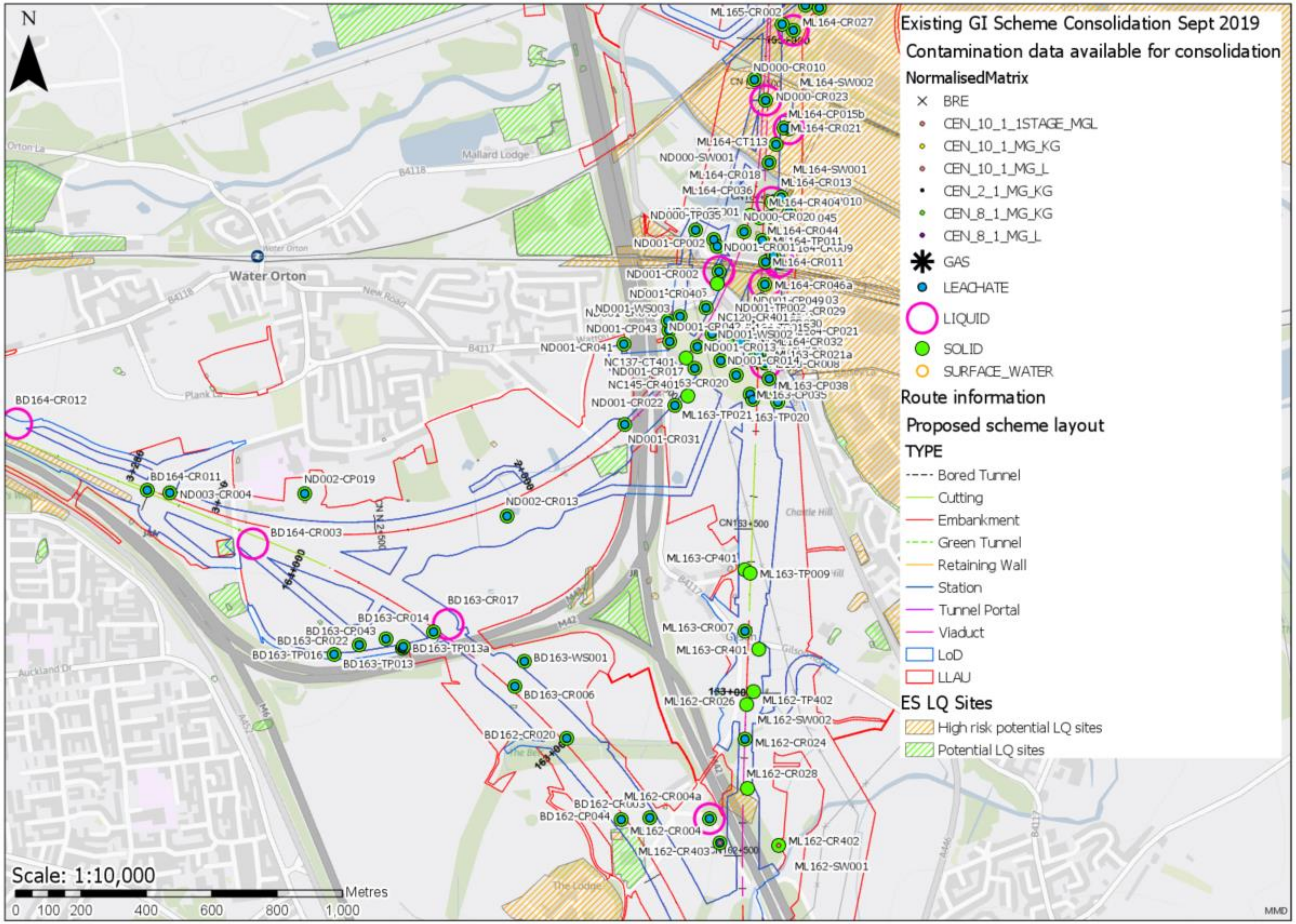
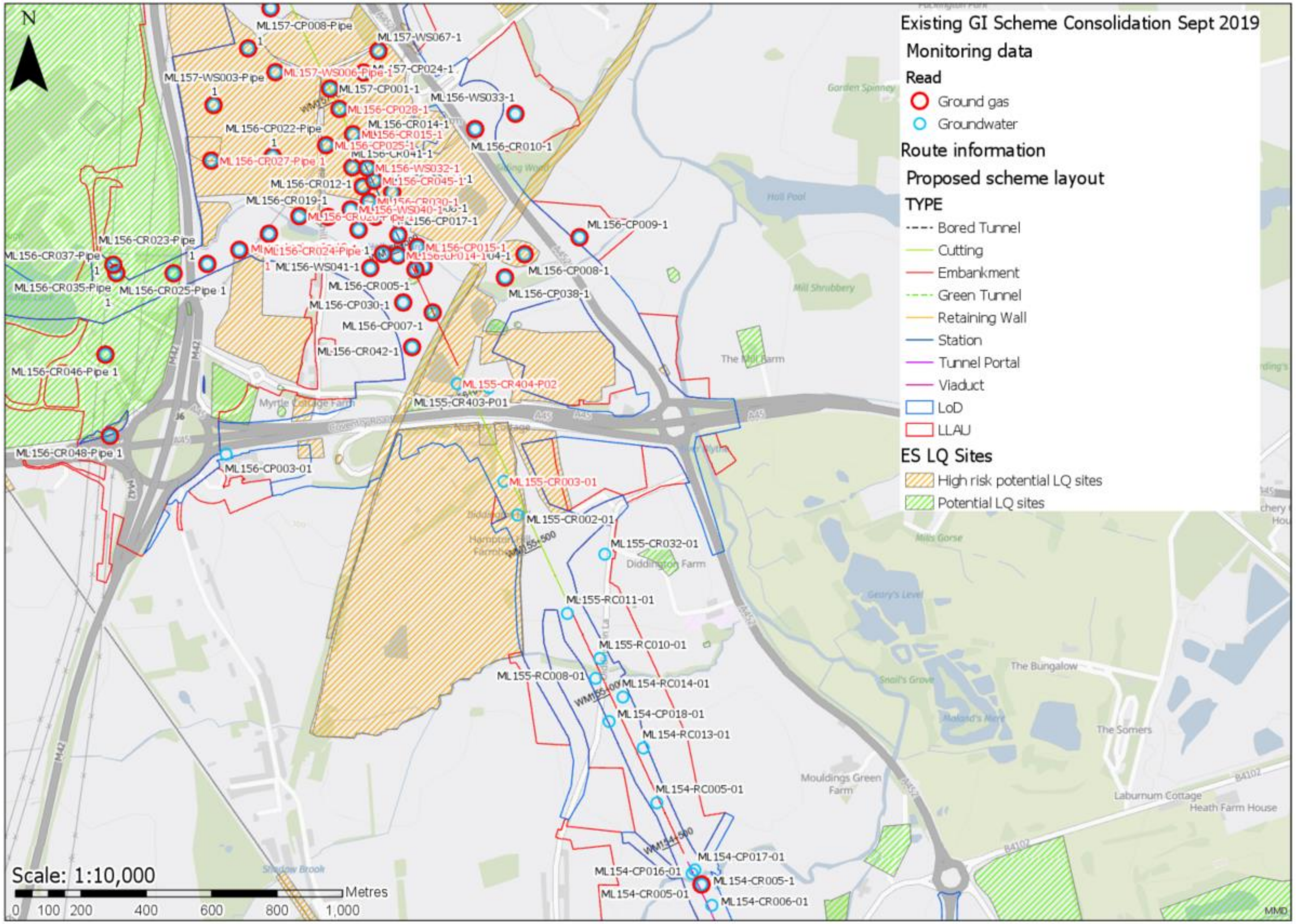
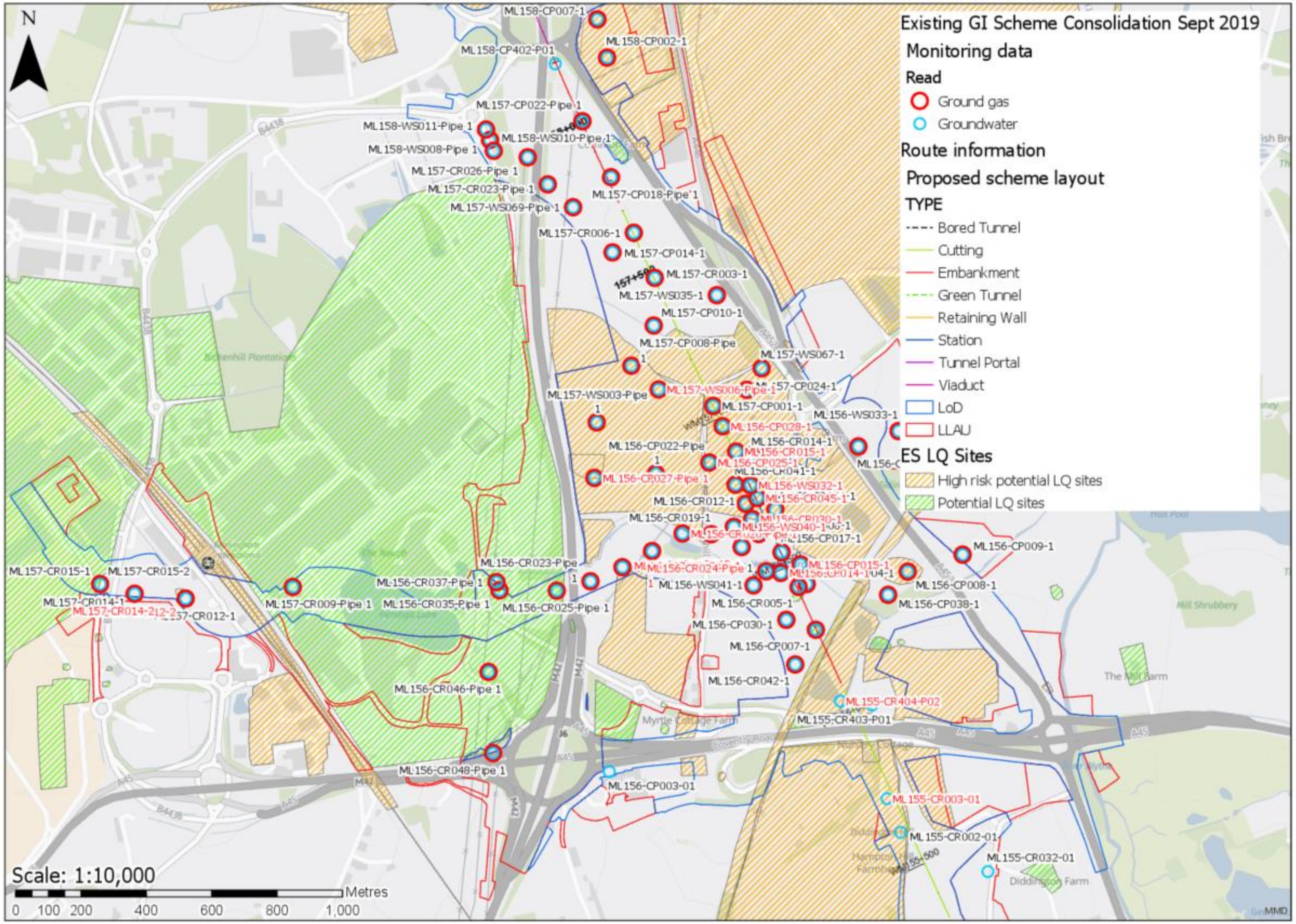
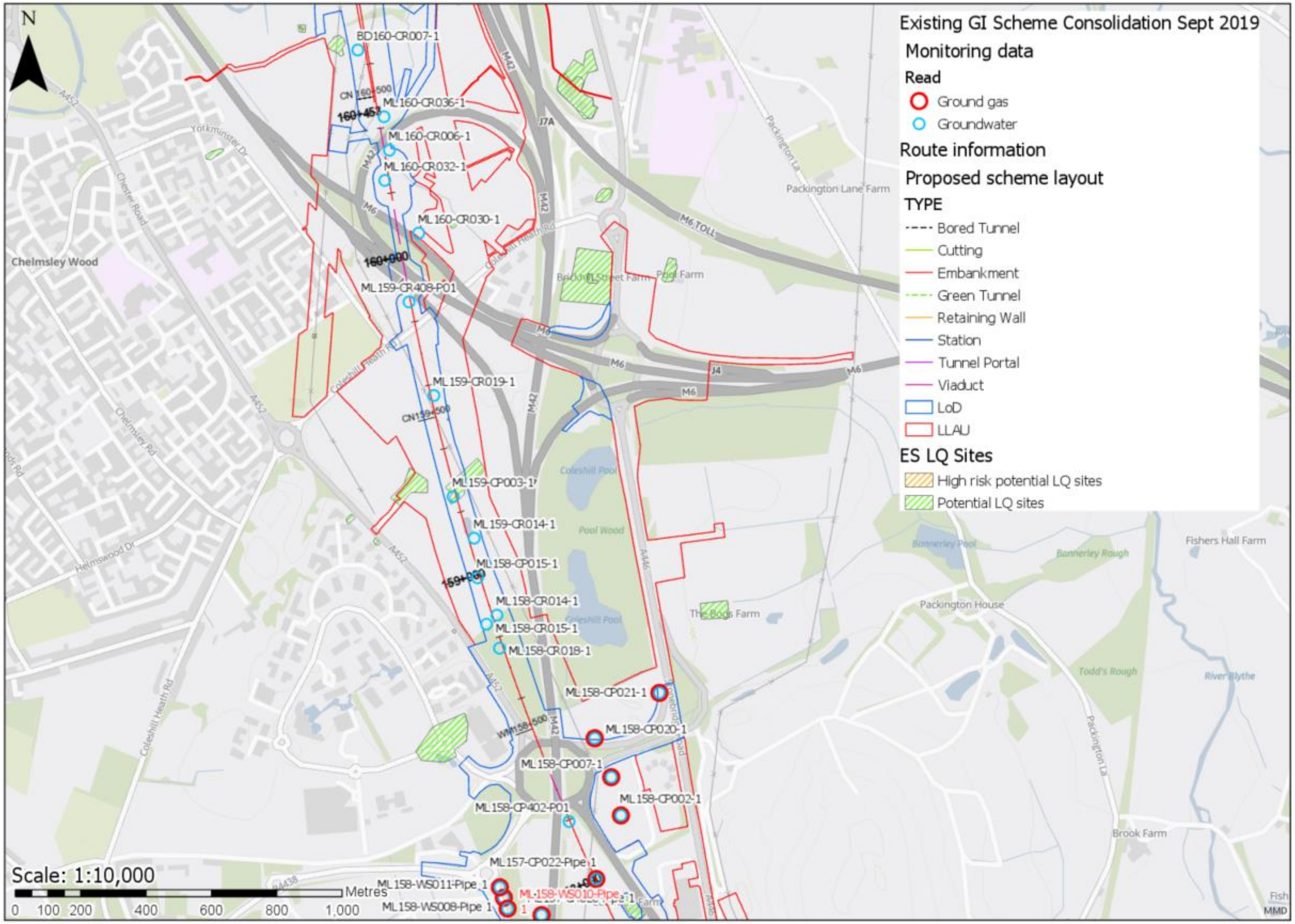
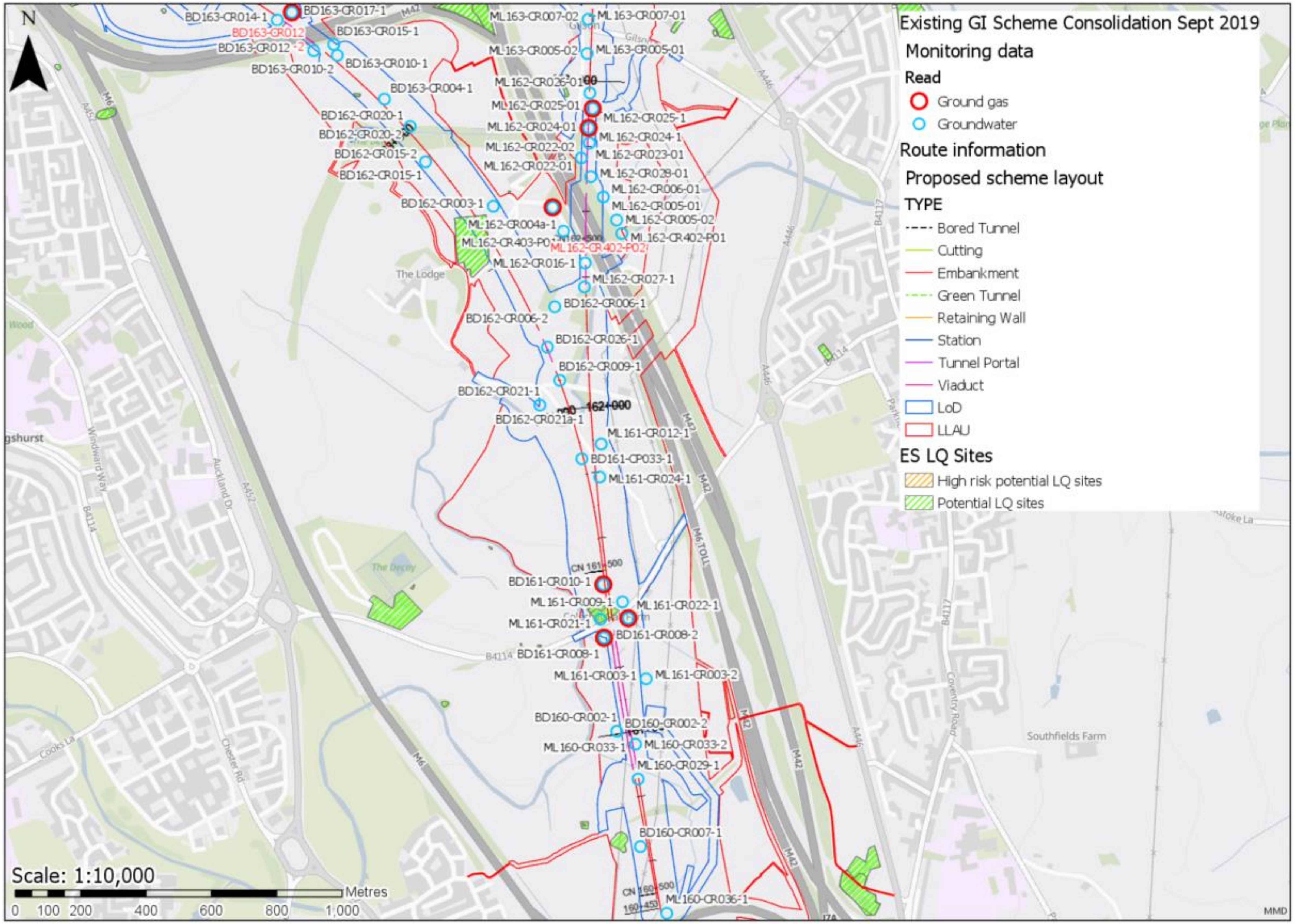

N
Existing GI Scheme Consolidation Sept 2019
Contamination data available for consolidation
NormalisedMatrix
BRE
CEN_10_1_1STAGE_MGL
CEN_10_1_MG_KG
CEN_10_1_MG_L
CEN_2_1_MG_KG
CEN_8_1_MG_KG
CEN_8_1_MG_L
GAS
LEACHATE
LIQUID
SOLID
SURFACE_WATER
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
ES LQ Sites
High risk potential LQ sites
Potential LQ sites
Scale: 1:10,000
Metres
0 100 200 400 600 800 1,000
Water Orton
Mallard Lodge
BD164-CR012
BD164-CR011
ND003-CR004
ND002-CP019
ND002-CR013
BD164-CR003
BD163-CR017
BD163-CR014
BD163-CP043
BD163-CR022
BD163-TP016
BD163-TP013
BD163-TP013a
BD163-WS001
BD163-CR006
BD162-CR020
BD162-CP044
ML162-CR004a
ML162-CR004
ML162-CR403
ML162-CR402
ML162-SW001
ML162-CR028
ML162-CR024
ML162-SW002
ML162-TP402
ML162-CR026
ML163-CR401
ML163-CR007
ML163-TP009
ML163-CP401
ND001-CR031
ND001-CR022
ML163-TP021
ML163-CR038
ND001-CR041
ND001-CP043
ND001-CR017
ND001-CR002
ND001-CP002
ND000-TP035
ND000-SW001
ML164-CR018
ML164-CP036
ML164-CT113
ND000-CR010
ND000-CR023
ML164-SW002
ML164-CP015b
ML164-CR021
ML164-SW001
ML164-CR013
ML164-CR044
ML164-CR011
ML164-CR046a
ML165-CR002
ML164-CR027
MMD

Figure 49: Ground gas and groundwater monitoring locations




Existing GI Scheme Consolidation Sept 2019
Monitoring data
Read
Ground gas
Groundwater
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
ES LQ Sites
High risk potential LQ sites
Potential LQ sites
Scale: 1:10,000
Metres
0 100 200 400 600 800 1,000
N


N
Existing GI Scheme Consolidation Sept 2019
Monitoring data
Read
Ground gas
Groundwater
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
ES LQ Sites
High risk potential LQ sites
Potential LQ sites
BD160-CR007-1
ML160-CR036-1
ML160-CR006-1
ML160-CR032-1
ML160-CR030-1
ML159-CR408-P01
ML159-CR019-1
ML159-CP003-1
ML159-CR014-1
ML158-CP015-1
ML158-CR014-1
ML158-CR015-1
ML158-CR018-1
ML158-CP021-1
ML158-CP020-1
ML158-CP007-1
ML158-CP002-1
ML158-CP402-P01
ML157-CP022-Pipe 1
ML158-WS011-Pipe 1
ML158-WS008-Pipe 1
ML-158-WS010-Pipe 1
160+453
160+000
159+000
Chelmsley Wood
Packington Lane Farm
Packington House
Fishers Hall Farm
Brook Farm
Coleshill Pool
Pool Wood
Bannerley Pool
Bannerley Rough
Todd's Rough
River Blythe
M6 TOLL
M42
M6
J4
J7A
A452
A446
Scale: 1:10,000
0 100 200 400 600 800 1,000 Metres


Existing GI Scheme Consolidation Sept 2019
Monitoring data
Read
Ground gas
Groundwater
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
ES LQ Sites
High risk potential LQ sites
Potential LQ sites
Scale: 1:10,000
Metres
0 100 200 400 600 800 1,000
N

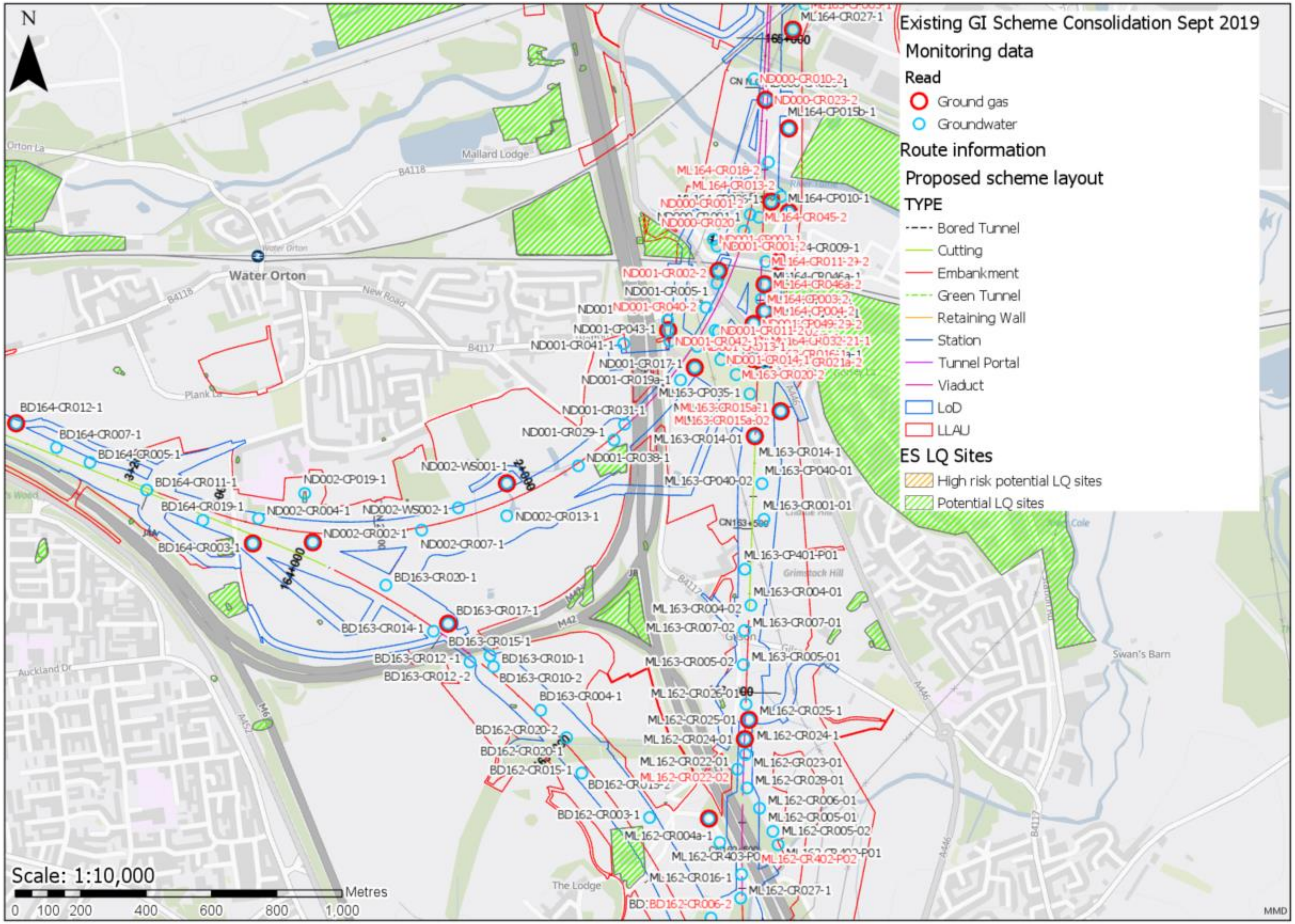
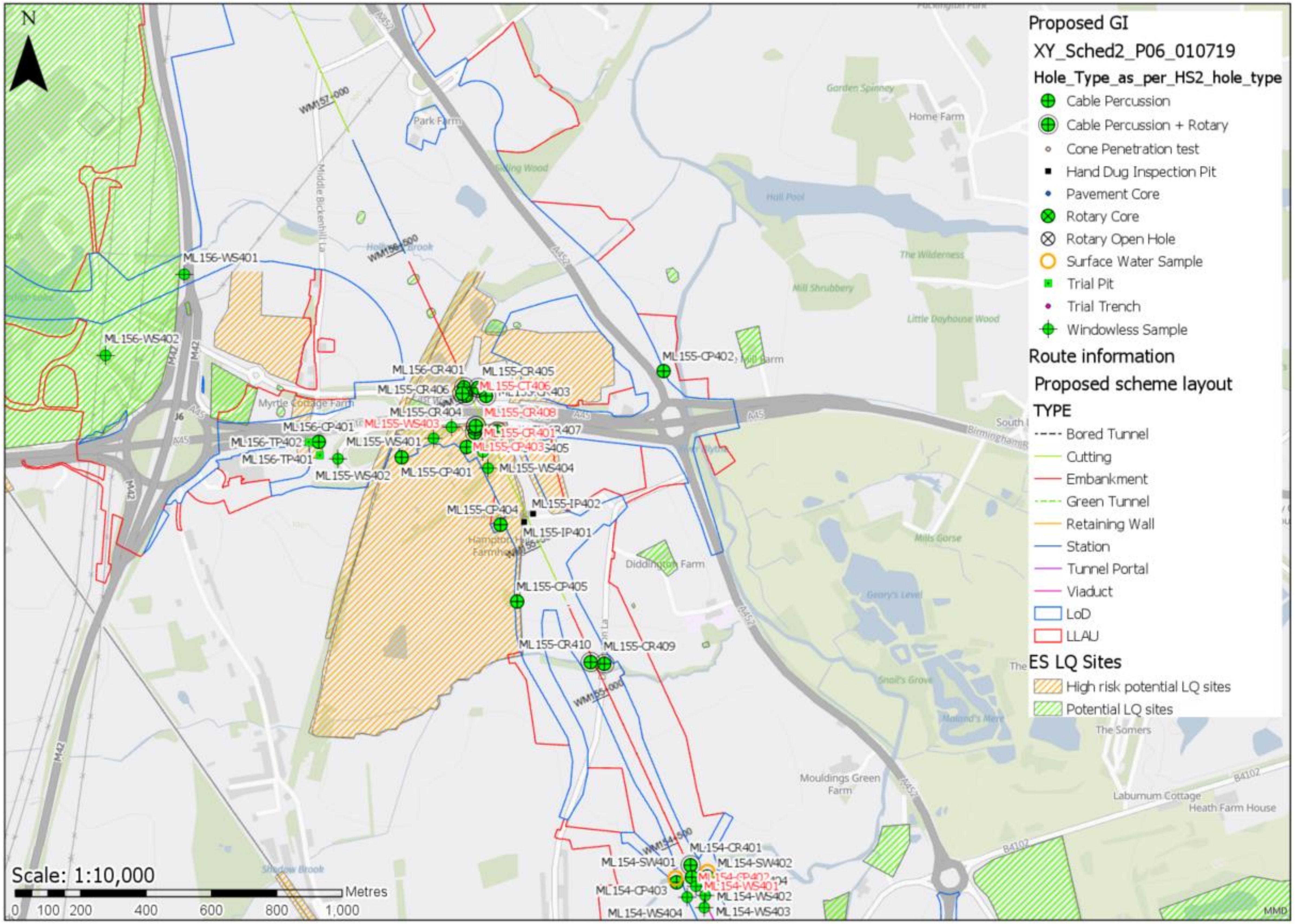
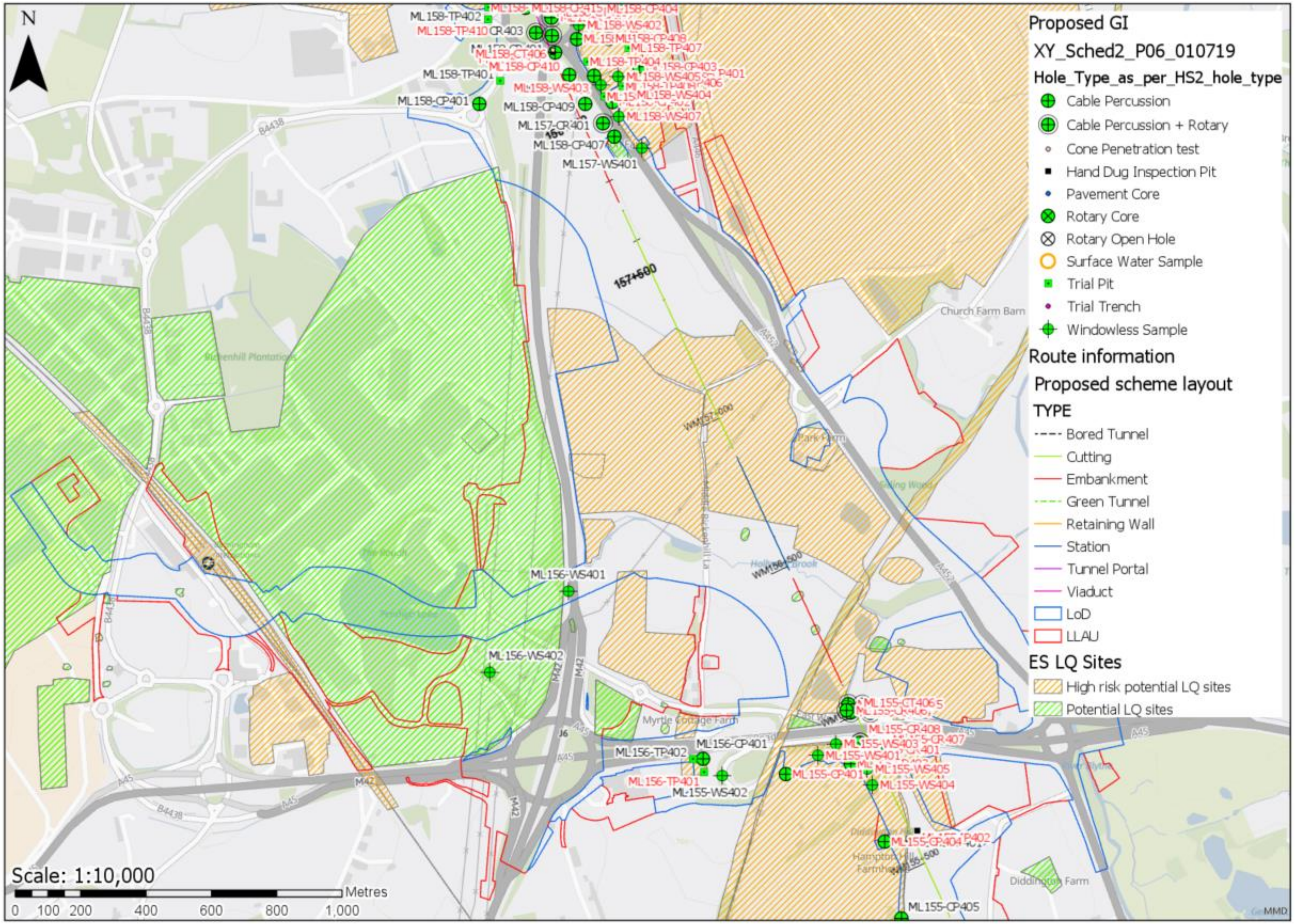
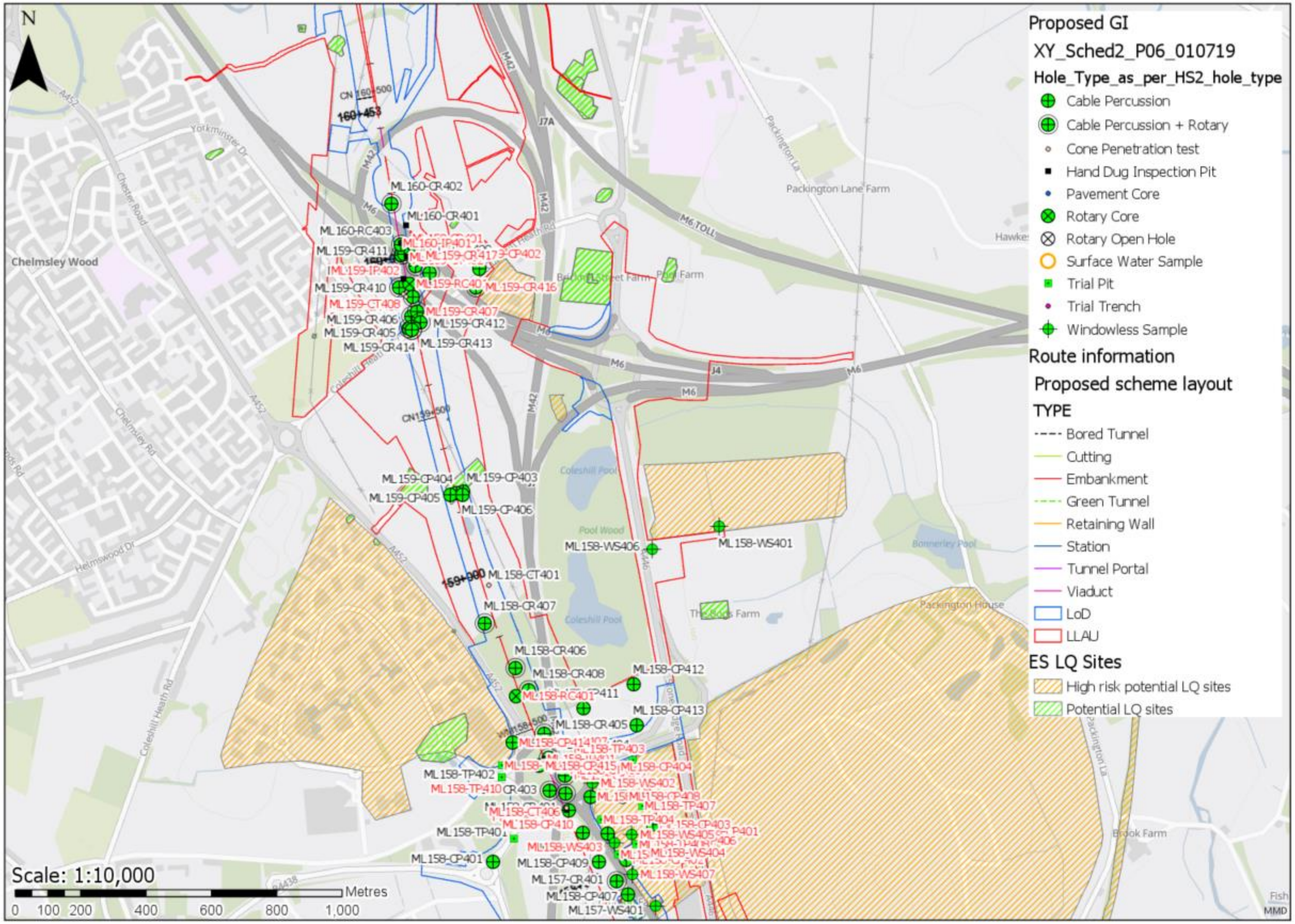
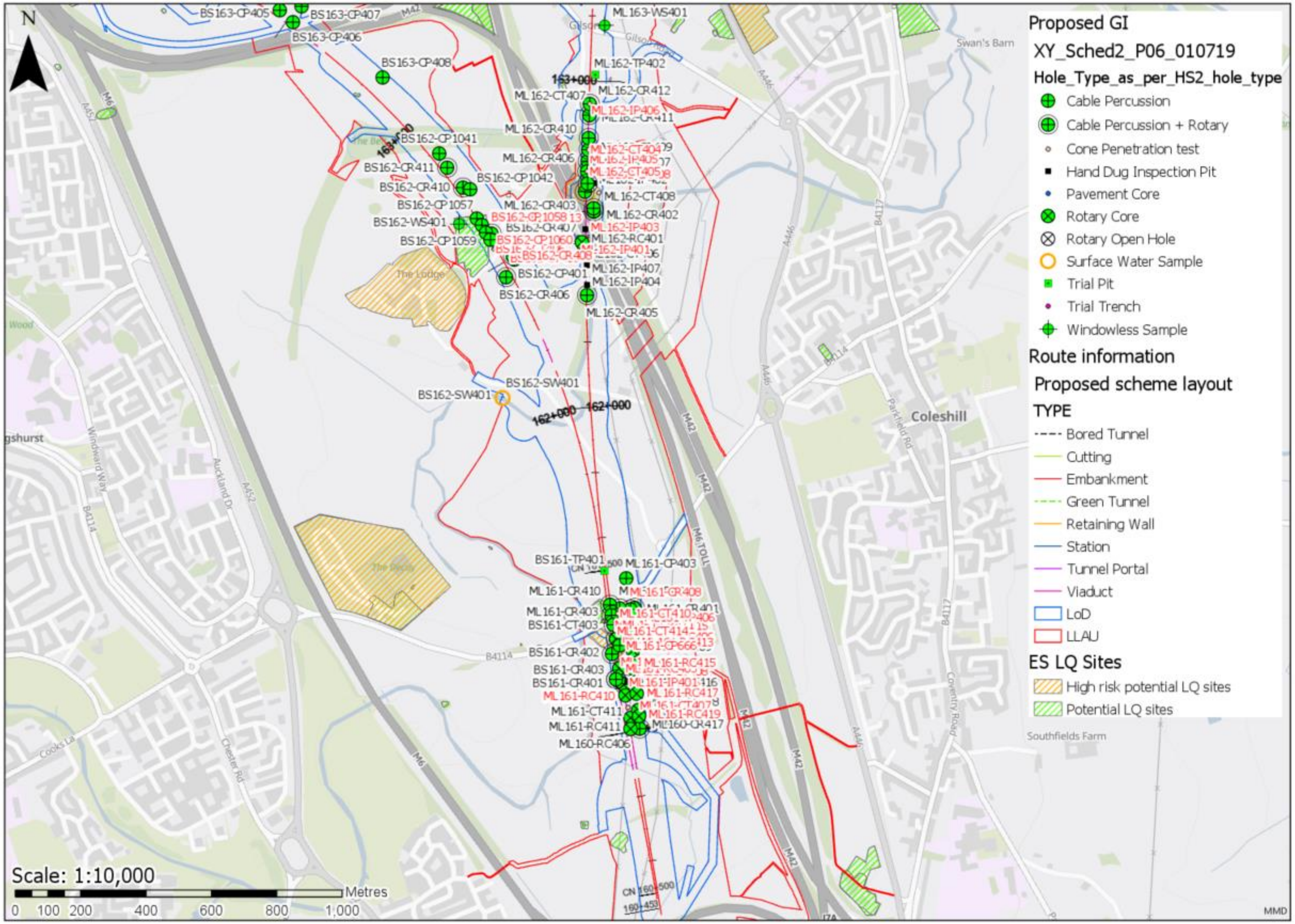

Existing GI Scheme Consolidation Sept 2019
Monitoring data
Read
Ground gas
Groundwater
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
ES LQ Sites
High risk potential LQ sites
Potential LQ sites
Scale: 1:10,000
0 100 200 400 600 800 1,000 Metres
N
Water Orton
MMD

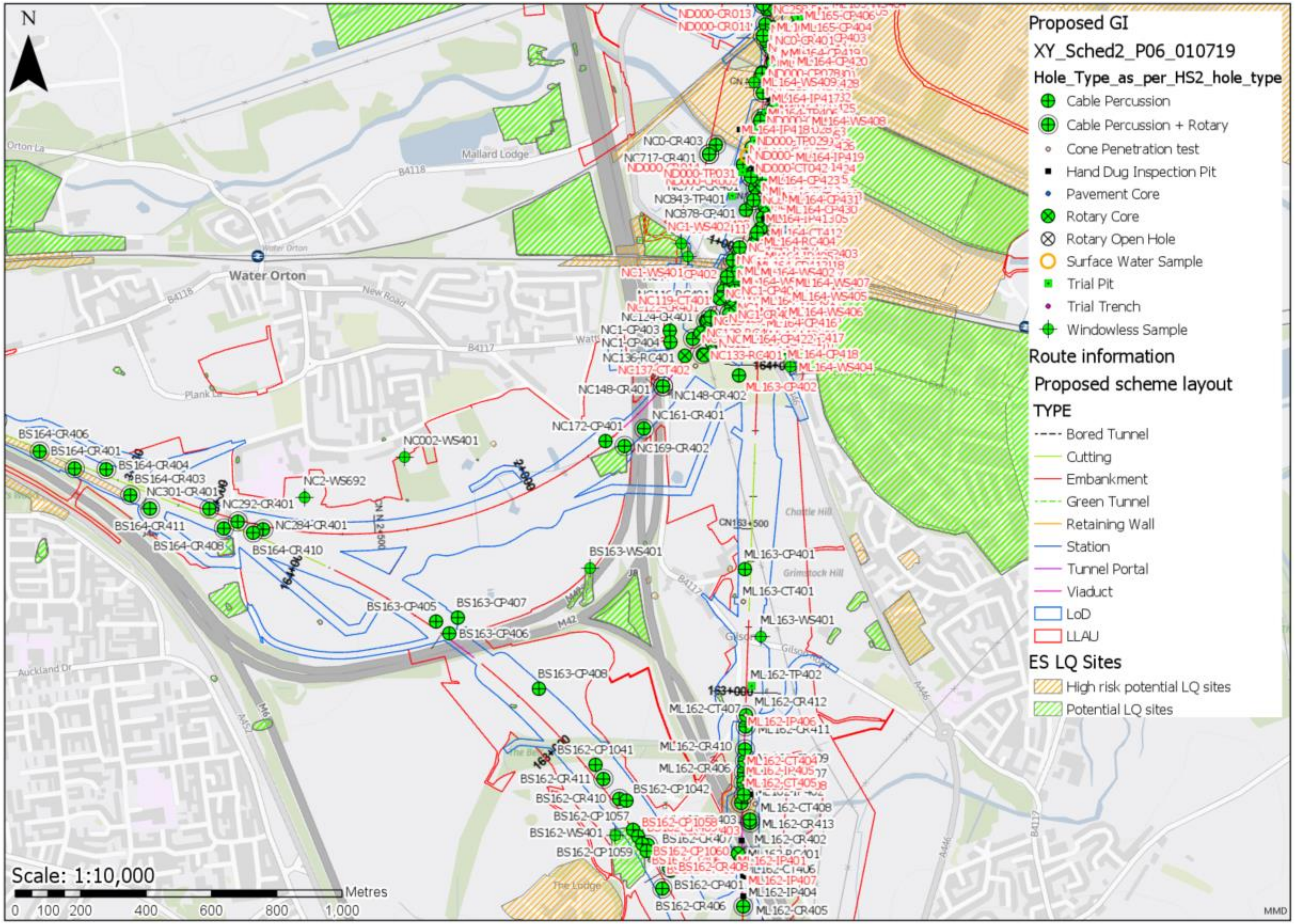
Figure 50: Proposed ground investigations (all exploratory holes where geo-environmental testing is proposed)




N
Proposed GI
XY_Sched2_P06_010719
Hole_Type_as_per_HS2_hole_type
Cable Percussion
Cable Percussion + Rotary
Cone Penetration test
Hand Dug Inspection Pit
Pavement Core
Rotary Core
Rotary Open Hole
Surface Water Sample
Trial Pit
Trial Trench
Windowless Sample
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
ES LQ Sites
High risk potential LQ sites
Potential LQ sites
Scale: 1:10,000
Metres
0 100 200 400 600 800 1,000
ML158-TP402
ML158-TP410
ML158-CT406
ML158-CP410
ML158-TP401
ML158-CP401
ML158-CP409
ML157-CR401
ML158-CP407
ML157-WS401
ML158-WS402
ML158-TP407
ML158-WS403
ML158-WS407
ML158-WS404
157+500
ML156-WS401
ML156-WS402
ML156-TP402
ML156-CP401
ML156-TP401
ML155-WS402
ML155-CT406
ML155-CR408
ML155-WS403
ML155-WS401
ML155-CP401
ML155-WS405
ML155-WS404
ML155-CP404
ML155-CP405
Church Farm Barn
Myrtle Cottage Farm
Diddington Farm
B4438
A452
A45
M42
J6


Proposed GI
XY_Sched2_P06_010719
Hole_Type_as_per_HS2_hole_type
Cable Percussion
Cable Percussion + Rotary
Cone Penetration test
Hand Dug Inspection Pit
Pavement Core
Rotary Core
Rotary Open Hole
Surface Water Sample
Trial Pit
Trial Trench
Windowless Sample
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
ES LQ Sites
High risk potential LQ sites
Potential LQ sites
Scale: 1:10,000
Metres
0 100 200 400 600 800 1,000
N
Chelmsley Wood
Packington Lane Farm
ML160-CR402
ML160-CR401
ML160-RC403
ML159-CR411
ML159-CR410
ML159-CR406
ML159-CR405
ML159-CR414
ML159-CR412
ML159-CR413
ML159-CR416
ML159-CP404
ML159-CP403
ML159-CP405
ML159-CP406
ML158-WS406
ML158-WS401
ML158-CT401
ML158-CR407
ML158-CR406
ML158-CR408
ML158-CP412
ML158-CP413
ML158-CR405
ML158-TP402
ML158-TP410
ML158-CP401
ML158-CP409
ML157-CR401
ML158-CP407
ML157-WS401
M6 TOLL
M42
M6


Proposed GI
XY_Sched2_P06_010719
Hole_Type_as_per_HS2_hole_type
Cable Percussion
Cable Percussion + Rotary
Cone Penetration test
Hand Dug Inspection Pit
Pavement Core
Rotary Core
Rotary Open Hole
Surface Water Sample
Trial Pit
Trial Trench
Windowless Sample
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
ES LQ Sites
High risk potential LQ sites
Potential LQ sites
Scale: 1:10,000
Metres
0 100 200 400 600 800 1,000
N
Coleshill
MMD


N
Proposed GI
XY_Sched2_P06_010719
Hole_Type_as_per_HS2_hole_type
Cable Percussion
Cable Percussion + Rotary
Cone Penetration test
Hand Dug Inspection Pit
Pavement Core
Rotary Core
Rotary Open Hole
Surface Water Sample
Trial Pit
Trial Trench
Windowless Sample
Route information
Proposed scheme layout
TYPE
Bored Tunnel
Cutting
Embankment
Green Tunnel
Retaining Wall
Station
Tunnel Portal
Viaduct
LoD
LLAU
ES LQ Sites
High risk potential LQ sites
Potential LQ sites
Scale: 1:10,000
Metres
0 100 200 400 600 800 1,000
Water Orton
Mallard Lodge
Chattle Hill
Grimstock Hill
Auckland Dr
M42
M6
A446
B4118
B4117
NC0-CR403
NC717-CR401
NC843-TP401
NC878-CR401
NC1-WS401
NC1-CP403
NC1-CP404
NC136-RC401
NC148-CR401
NC148-CR402
NC161-CR401
NC172-CP401
NC169-CR402
NC002-WS401
NC2-WS692
NC292-CR401
NC284-CR401
NC301-CR401
NC133-RC401
BS164-CR406
BS164-CR401
BS164-CR404
BS164-CR403
BS164-CR411
BS164-CR408
BS164-CR410
BS163-WS401
BS163-CP405
BS163-CP407
BS163-CP406
BS163-CP408
BS162-CP1041
BS162-CR411
BS162-CR410
BS162-CP1042
BS162-CP1057
BS162-WS401
BS162-CP1059
BS162-CP401
BS162-CR406
ML163-CP401
ML163-CT401
ML163-WS401
ML162-TP402
ML162-CR412
ML162-CT407
ML162-CR410
ML162-CR406
ML162-CT408
ML162-CR413
ML162-CR402
ML162-IP404
ML162-CR405
ML164-WS404
ML163-CP402
ML164-CP418
CN163+500
163+000
164+000
MMD

Appendix B. Potential Sources of Groundwater and Surface Water Contamination

Table 74: Additional Groundwater Risks

Potential source	Detail	Temporary* or permanent works	Mitigation measures
Contaminated soil	Associated with previous use of the land	Temporary and permanent	GQRA
Contaminated groundwater	Associated with previous use of the land	Temporary and permanent	GQRA
Naturally occurring poor quality soil	e.g. elevated metals	Temporary and permanent	GQRA
Naturally occurring poor quality groundwater	e.g. elevated sulphate	Temporary and permanent	GQRA
Deposited materials	e.g. contaminated embankment material	Temporary and permanent	Robust materials management including DQRA and appropriate permitting to ensure new sources of contamination are not created in line with the EMRs and CoCP
Contamination during construction	Contamination of soils, surface waters or groundwater from fuel spills, dust, waste storage etc	Temporary	Mitigation via the robust implementation of a Pollution incident control plan, as part of the contractors' EMS, as detailed in the CoCP and via the Surface water and groundwater management requirements as per the CoCP
Contamination during operation	Contamination of soils, surface water or groundwater via road runoff	Permanent	GQRA/ DQRA of quality of water to be discharged during design phase (unless from uncontaminated land drainage) with appropriate controls designed to prevent impacts in line with the CoCP.
Dewatering during construction	Mobilisation of contamination or deflection of plumes to impact controlled waters receptors	Temporary	Appropriate hydrogeological risk assessments associated with excavation work and dewatering impacts on surface water, groundwater and abstractions as per the CoCP design to ensure protection of aquifer.
New structures (e.g. tunnel) creating barriers for groundwater flow	Deflection of contaminated groundwater plumes	Permanent	Appropriate hydrogeological risk assessment and design to ensure protection of aquifer
Borehole drilling (monitoring boreholes, pump tests)	Allow materials to enter subsurface e.g. drilling fluids	Temporary	Assessment of substances to be used to ensure suitability or alternative approach to using these substances in line with the CoCP.
Borehole drilling (monitoring boreholes, pump tests)	Creation of preferential pathway	Permanent	Appropriate design to ensure preferential pathways are not created and ensure protection of aquifer
Tunnel construction	Mobilisation of contamination/ deflection of plumes	Temporary	Assessment of potential impacts in design phase
Tunnel construction	Turbidity - impact on public water supply boreholes and affect treatment of bacteria	Temporary	Assessment of potential impacts in temporary design phase, monitoring during construction phase with controls in place
Tunnel construction	Use of polymers	Temporary	Assessment of substances to be used to ensure suitability or alternative approach to using these substances in line with the CoCP.
Tunnel construction	Creation of preferential pathways	Permanent	Assessment during design for requirement for breaks

Potential source	Detail	Temporary* or permanent works	Mitigation measures
Cut and cover tunnel construction	Imported material	Permanent	Robust materials management including DQRA and appropriate permitting to ensure new sources of contamination are not created in line with the EMRs and CoCP
Cut and cover tunnel construction	Import of higher permeability material resulting in mobilisation of contamination	Permanent	Robust materials management including DQRA and appropriate permitting to ensure material is suitable, in line with the EMRs and CoCP
Piling and ground improvement	Creation of preferential pathways	Permanent	Foundation Works Risk Assessment, early engagement with the EA and groundwater monitoring (as per the CoCP)
Piling and ground improvement	Turbidity - impact on public water supply BHs (affects treatment of bacteria)	Permanent	Foundation Works Risk Assessment and early engagement with the EA and Water Company and groundwater monitoring (as per the CoCP)
Cuttings	Mobilisation of contamination due to disturbance	Temporary	GQRA
Materials re-use	Imported material	Permanent	Robust materials management including DQRA and appropriate permitting to ensure new sources of contamination are not created in line with the EMRs and CoCP
Drainage works	Creation of preferential pathways (e.g. groundwater to surface waters)	Permanent	Assessment of potential impacts in design phase through hydrogeological conceptualisation and risk assessment

* Risk assessment and remediation design for temporary works not considered in this report.

Appendix C. GI Summary

Table 75: Monitoring Installation Response Zones

Location ID	Ref	Depth Top	Depth Base	Geology Code	Diameter (mm)	Pipe Type
BD160-CR002	1	2	4	ALV	50	SLOTTED
BD160-CR002	2	8.5	11.5	MMG	19	SLOTTED
BD160-CR007	1	15	18	MMG	50	SLOTTED
BD161-CP033	1	9	10	MMG	50	SLOTTED
BD161-CR008	1	1.5	2	MGR	50	SLOTTED
BD161-CR008	2	29	32	MMG	35	SLOTTED
BD161-CR010	1	4	7	MMG	35	SLOTTED
BD162-CR003	1	11	14	MMG	35	SLOTTED
BD162-CR006	1	4	7	MMG	50	SLOTTED
BD162-CR006	2	27.5	29.5	MMG	19	SLOTTED
BD162-CR009	1	2	5	RTD1	35	SLOTTED
BD162-CR015	1	2	5	TILMP	50	SLOTTED
BD162-CR015	2	24	27	MMG	19	SLOTTED
BD162-CR020	1	8	10	MMG	35	SLOTTED
BD162-CR020	2	17	20	MMG	35	SLOTTED
BD162-CR021	1	12	15	MMG	35	SLOTTED
BD162-CR021a	1	2	5	RTD1	50	SLOTTED
BD162-CR026	1	3	6	GFDUD	50	SLOTTED
BD163-CR004	1	17	20	NCR	35	SLOTTED
BD163-CR010	1	4	6	MMG	35	SLOTTED
BD163-CR010	2	15	18	MMG	35	SLOTTED
BD163-CR012	1	4.5	6.5	MMG	50	SLOTTED
BD163-CR012	2	11	13	NCR	19	SLOTTED
BD163-CR014	1	11.5	13.5	MMG	35	SLOTTED
BD163-CR015	1	11.5	14.5	MMG	50	SLOTTED
BD163-CR017	1	0	28	MMG	19	PIEZOMETER_TIP
BD163-CR020	1	9.5	11.5	NCR	35	SLOTTED
BD164-CR003	1	4	7	MMG	50	SLOTTED
BD164-CR011	1	0	22	MGR	19	PIEZOMETER_TIP
BD164-CR019	1	5	8	MMG	50	SLOTTED
ML154-CP018	1	1.5	2.5	MMG	50	SLOTTED
ML154-RC005	1	7	10	MMG	50	SLOTTED
ML154-RC013	1	7	10	MMG	50	SLOTTED
ML154-RC014	1	3	6	MMG	50	SLOTTED
ML155-CR002	1	1	4	ALV	50	SLOTTED
ML155-CR003	1	3	6	NCR	50	SLOTTED
ML155-CR032	1	0.8	1.8	ALV	50	SLOTTED
ML155-CR403	P01	12	16	BCMU	50	SLOTTED
ML155-CR404	P01	11	14	BCMU	35	SLOTTED
ML155-CR404	P02	1	4	MGR	35	SLOTTED
ML155-CR405	P01	9	12	BCMU	50	SLOTTED

Location ID	Ref	Depth Top	Depth Base	Geology Code	Diameter (mm)	Pipe Type
ML155-RC008	1	2.5	8.5	NCR	50	SLOTTED
ML155-RC010	1	10	13	MMG	50	SLOTTED
ML155-RC011	1	12	18	MMG	50	SLOTTED
ML156-CP003	1	1	4	MGR	50	SLOTTED
ML156-CP007	1	1	2	GFDUD	50	SLOTTED
ML156-CP008	1	1	4.3	MGR	50	SLOTTED
ML156-CP009	1	1	3	GFDUD	50	SLOTTED
ML156-CP014	1	1	1.7	ALV	50	SLOTTED
ML156-CP015	1	1	2.5	ALV	50	SLOTTED
ML156-CP017	1	1	4	ALV	50	SLOTTED
ML156-CP022	Pipe 1	1	4	GFDMP	50	SLOTTED
ML156-CP025	1	7	11	MMG	50	SLOTTED
ML156-CP027	Pipe 1	0.5	1.7	MGR	50	SLOTTED
ML156-CP028	1	5	10	GFDUD	50	SLOTTED
ML156-CP030	1	1	4	MMG	50	SLOTTED
ML156-CP038	1	2	6	MMG	50	SLOTTED
ML156-CR004	1	9.5	15.5	MMG	50	SLOTTED
ML156-CR005	1	10	15	MMG	50	SLOTTED
ML156-CR008	1	15	20	MMG	35	SLOTTED
ML156-CR010	1	5	10	GFDUD	35	SLOTTED
ML156-CR012	1	20	25	MMG	50	SLOTTED
ML156-CR014	1	20	25	MMG	35	SLOTTED
ML156-CR015	1	12	20	MMG	35	SLOTTED
ML156-CR017	1	9.5	15	MMG	35	SLOTTED
ML156-CR018	1	1	3.5	ALV	50	SLOTTED
ML156-CR019	1	10	15	MMG	50	SLOTTED
ML156-CR020	Pipe 1	15.5	22.4	MMG	50	SLOTTED
ML156-CR022	Pipe 1	20	25	MMG	50	SLOTTED
ML156-CR023	Pipe 1	15	25	MMG	50	SLOTTED
ML156-CR024	Pipe 1	15.9	17.4	MMG	50	SLOTTED
ML156-CR025	Pipe 1	3.5	6.5	MMG	50	SLOTTED
ML156-CR030	1	15	20	MMG	50	SLOTTED
ML156-CR035	Pipe 1	9	12	MMG	50	SLOTTED
ML156-CR037	Pipe 1	15	18	MMG	50	SLOTTED
ML156-CR041	1	14.5	20.5	MMG	50	SLOTTED
ML156-CR042	1	12	17	MMG	35	SLOTTED
ML156-CR044	1	15	20	MMG	50	SLOTTED
ML156-CR045	1	19.5	25.1	MMG	35	SLOTTED
ML156-CR046	Pipe 1	3.2	5	MMG	50	SLOTTED
ML156-CR048	Pipe 1	8.5	11.5	MGR	50	SLOTTED
ML156-CR401	P01	3	6	BCMU	35	SLOTTED
ML156-WS032	1	1	3	GFDUD	35	SLOTTED
ML156-WS033	1	1	4	GFDUD	50	SLOTTED
ML156-WS040	1	1	2.8	MMG	50	SLOTTED

Location ID	Ref	Depth Top	Depth Base	Geology Code	Diameter (mm)	Pipe Type
ML156-WS041	1	1	3	MMG	50	SLOTTED
ML157-CP001	1	2	10	GFDUD	50	SLOTTED
ML157-CP008	Pipe 1	1.5	8	MGR	50	SLOTTED
ML157-CP010	1	1	6	ALV	50	SLOTTED
ML157-CP014	1	2	7	GFDUD	35	SLOTTED
ML157-CP018	Pipe 1	1	3.5	GFDMP	50	SLOTTED
ML157-CP022	Pipe 1	0.5	5	GFDMP	50	SLOTTED
ML157-CP024	1	2	10	GFDUD	50	SLOTTED
ML157-CR003	1	15	20.5	MMG	35	SLOTTED
ML157-CR006	1	10	20	MMG	35	SLOTTED
ML157-CR009	Pipe 1	24	29.8	MMG	50	SLOTTED
ML157-CR012	1	11	16	MMG	50	SLOTTED
ML157-CR012	2	2	5	MMG	50	SLOTTED
ML157-CR014	1	15	18	NCR	19	SLOTTED
ML157-CR014	2	4	9	MMG	50	SLOTTED
ML157-CR015	1	16	21	MMG	19	SLOTTED
ML157-CR015	2	5	10	MMG	50	SLOTTED
ML157-CR023	Pipe 1	13	17	MMG	50	SLOTTED
ML157-CR026	Pipe 1	14	18.5	MMG	50	SLOTTED
ML157-WS003	Pipe 1	1.5	3	GFDMP	50	SLOTTED
ML157-WS006	Pipe 1	1.5	4	MGR	50	SLOTTED
ML157-WS035	1	1	5	GFDUD	50	SLOTTED
ML157-WS067	1	1	5	GFDUD	50	SLOTTED
ML157-WS069	Pipe 1	1.5	2.5	GFDMP	50	SLOTTED
ML158-CP002	1	1	3.5	MGR	50	SLOTTED
ML158-CP007	1	5	8	GFDUD	50	SLOTTED
ML158-CP015	1	5.5	7.5	GFDUD	35	SLOTTED
ML158-CP020	1	2	5	GFDUD	50	SLOTTED
ML158-CP021	1	2	5	GFDUD	50	SLOTTED
ML158-CP402	P01	2	6.7	GFDUD	50	SLOTTED
ML158-CR014	1	5	7.5	GFDUD	50	SLOTTED
ML158-CR015	1	5	8	GFDUD	50	SLOTTED
ML158-CR018	1	4	7	GFDUD	50	SLOTTED
ML158-WS008	Pipe 1	1	4	GFDMP	50	SLOTTED
ML158-WS010	Pipe 1	1.5	5	GFDMP	50	SLOTTED
ML158-WS011	Pipe 1	1.5	3	GFDMP	50	SLOTTED
ML159-CP003	1	1.5	4.5	GFDUD	50	SLOTTED
ML159-CR014	1	8	9.5	GFDUD	50	SLOTTED
ML159-CR019	1	7	12	GFDUD	50	SLOTTED
ML159-CR408	P01	10	13	SIM	50	SLOTTED
ML159-CR410	P01	8.5	10.5	BCMU	50	SLOTTED
ML160-CR006	1	12	15	MMG	35	SLOTTED
ML160-CR029	1	3	6	MMG	50	SLOTTED
ML160-CR030	1	5.5	8.5	MMG	50	SLOTTED

Location ID	Ref	Depth Top	Depth Base	Geology Code	Diameter (mm)	Pipe Type
ML160-CR032	1	3.5	6.5	MMG	35	SLOTTED
ML160-CR033	1	6	8	MMG	35	SLOTTED
ML160-CR033	2	32	35	MMG	35	SLOTTED
ML160-CR036	1	6.5	9.5	MMG	50	SLOTTED
ML161-CR003	1	2.5	5.5	MMG	35	SLOTTED
ML161-CR003	2	37	39	MMG	35	SLOTTED
ML161-CR009	1	4.5	7.5	MMG	50	SLOTTED
ML161-CR012	1	6	9	MMG	35	SLOTTED
ML161-CR021	1	26	29	MMG	50	SLOTTED
ML161-CR022	1	1	3	RTD1	50	SLOTTED
ML161-CR024	1	14	16	MMG	35	SLOTTED
ML162-CR004a	1	0	26.5	MGR	19	PIEZOMETER_TIP
ML162-CR005	1	6	13.5	MMG	35	SLOTTED
ML162-CR005	2	2	3.1	RTD1	35	SLOTTED
ML162-CR006	1	2	7.5	RTD1	35	SLOTTED
ML162-CR016	1	3.5	5.5	MMG	50	SLOTTED
ML162-CR022	1	18	21	MMG	35	SLOTTED
ML162-CR022	2	1.5	2.5	ALV	35	SLOTTED
ML162-CR024	1	1.5	4	ALV	50	SLOTTED
ML162-CR025	1	2	4	ALV	50	SLOTTED
ML162-CR027	1	2	4	RTD1	50	SLOTTED
ML162-CR028	1	2.8	4.9	RTD1	50	SLOTTED
ML162-CR402	P01	10	13	MMG	19	SLOTTED
ML162-CR402	P02	1	3.5	MGR	19	SLOTTED
ML162-CR403	P01	5	8	GFDMP	50	SLOTTED
ML163-CP035	1	2	4	RTD1	50	SLOTTED
ML163-CP040	2	3	8.6	GLLD	50	SLOTTED
ML163-CR001	1	9	12	GLLD	50	SLOTTED
ML163-CR005	1	13	16	MMG	35	SLOTTED
ML163-CR005	2	3	6	GLLD	35	SLOTTED
ML163-CR007	1	17.7	19	MMG	35	SLOTTED
ML163-CR007	2	6.1	8	GLLD	35	SLOTTED
ML163-CR010	1	1	4	RTD1	50	SLOTTED
ML163-CR010	2	15	18	TILMP	35	SLOTTED
ML163-CR014	1	3.7	9	GLLD	50	SLOTTED
ML163-CR015a	1	14.7	17.7	MMG	35	SLOTTED
ML163-CR015a	2	1.5	4.8	GFDUD	35	SLOTTED
ML163-CR016	1	12	15	TILMP	50	SLOTTED
ML163-CR020	1	4	7	RTD1	50	SLOTTED
ML163-CR020	2	17	20	TILMP	35	SLOTTED
ML163-CR021a	1	2	4	RTD1	50	SLOTTED
ML163-CR021a	2	14	17	MMG	35	SLOTTED
ML164-CP003	1	0	9.5	MGR	19	PIEZOMETER_TIP
ML164-CP003	2	0	11	MGR	35	PIEZOMETER_TIP

Location ID	Ref	Depth Top	Depth Base	Geology Code	Diameter (mm)	Pipe Type
ML164-CP004	1	1	3	MGR	50	SLOTTED
ML164-CP004	2	12	13	MMG	35	SLOTTED
ML164-CP010	1	1	2.5	MGR	50	SLOTTED
ML164-CP021	1	8.5	9.5	MMG	35	SLOTTED
ML164-CP036	1	6	8	RTD1	50	SLOTTED
ML164-CR009	1	7	10	MMG	50	SLOTTED
ML164-CR009	2	0	24.7	MGR	19	PIEZOMETER_TIP
ML164-CR011	1	8	10	MMG	35	SLOTTED
ML164-CR011	2	0	25.5	MGR	19	PIEZOMETER_TIP
ML164-CR013	1	4	6	ALV	35	SLOTTED
ML164-CR013	2	0	20	MGR	19	PIEZOMETER_TIP
ML164-CR029	1	1.5	2.5	MGR	50	SLOTTED
ML164-CR029	2	0	24.7	MGR	19	PIEZOMETER_TIP
ML164-CR030	1	13.15	16.5	TILMP	35	SLOTTED
ML164-CR032	1	11.5	13.5	MMG	50	SLOTTED
ML164-CR032	2	0	20	MGR	19	PIEZOMETER_TIP
ML164-CR045	1	6	8	RTD1	35	SLOTTED
ML164-CR045	2	0	25	MGR	19	PIEZOMETER_TIP
ML164-CR046a	1	1.5	3	MGR	50	SLOTTED
ML164-CR046a	2	0	19.7	MGR	19	PIEZOMETER_TIP
NC120-CR401	P01	20	25	SIM	50	SLOTTED
NC120-CR401	P02	2	5	RTD2	50	SLOTTED
ND000-CR001	1	6.5	7.5	RTD1	35	SLOTTED
ND000-CR001	2	12	14	MMG	35	SLOTTED
ND000-CR020	1	13	15	TILMP	50	SLOTTED
ND001-CP002	1	4.5	6.5	TILMP	50	SLOTTED
ND001-CP043	1	1.5	4.5	RTD1	50	SLOTTED
ND001-CP049	1	1	2	MGR	50	SLOTTED
ND001-CP049	2	12	14	TILMP	35	SLOTTED
ND001-CR001	1	8	10	MMG	50	SLOTTED
ND001-CR001	2	0	25.5	MGR	19	PIEZOMETER_TIP
ND001-CR002	1	2	5	RTD1	50	SLOTTED
ND001-CR002	2	0	25	MGR	19	PIEZOMETER_TIP
ND001-CR005	1	0	20	MGR	19	PIEZOMETER_TIP
ND001-CR011	1	3	4	GLLD	50	SLOTTED
ND001-CR011	2	0	17	MMG	35	PIEZOMETER_TIP
ND001-CR013	1	4	7	GFDUD	50	SLOTTED
ND001-CR014	1	8	11	TILMP	50	SLOTTED
ND001-CR017	1	3	6	RTD1	50	SLOTTED
ND001-CR019a	1	27.5	29.5	MMG	50	SLOTTED
ND001-CR029	1	0	12.5	TILMP	35	PIEZOMETER_TIP
ND001-CR031	1	3	6	ALV	50	SLOTTED
ND001-CR038	1	11.5	14.5	NCR	35	SLOTTED
ND001-CR040	1	5.5	6.5	GLLD	50	SLOTTED

Location ID	Ref	Depth Top	Depth Base	Geology Code	Diameter (mm)	Pipe Type
ND001-CR040	2	15	18	TILMP	35	SLOTTED
ND001-CR041	1	2	5	RTD1	50	SLOTTED
ND001-CR042	1	0	20	MGR	19	PIEZOMETER_TIP
ND001-CR043	1	20	23	NCR	50	SLOTTED
ND002-CP019	1	3	5	TILMP	50	SLOTTED
ND002-CR002	1	3	4	MMG	50	SLOTTED
ND002-CR004	1	3	4	MMG	50	SLOTTED
ND002-CR007	1	1	4	ALV	35	SLOTTED
ND002-CR013	1	6	9	MMG	50	SLOTTED
ND002-WS001	1	1	3	ALV	50	SLOTTED
ND002-WS002	1	1	2	ALV	50	SLOTTED

Where: ALV = Alluvium, BCUM = Branscombe Mudstone Formation, GFDMP = Glaciofluvial Deposits Mid Pleistocene, GFDUD = Glaciofluvial Deposits Devensian, GLLD = Glaciolacustrine Deposits, MGR = Made Ground, MMG = Mercia Mudstone Group, NCR = No core recovery, RTD1 = River Terrace Deposits 1, RTD2 = River Terrace Deposits 2, SIM = Sidmouth Mudstone Formation, TILMP = Till Mid Pleistocene.

Table 76: GI Contractors AGS Data Summary

AGS File Names
BIA_Final Factual Report Data_P01.ags
BIB_Final Factual Report Data_P01.ags
BIC_Final Factual Report AGS_P02_191217.ags
BID_Final Factual Report Data_200118.ags
DJA_Final_Factual_AGS_120118.ags
TA8137BP33.ags
TA8137CP41.ags
DJZ_Final Factual Report AGS_25012018
NPA_Final Factual Report Phase A Addendum_20181019.ags
NPB_FinalPhaseBAGS3_131118.ags
UBX_FinalAGS24_221217.ags

Table 77: Summary of Obstructions Encountered

Location ID	Ground Level	Location Type	Easting	Northing	Termination Reason
ML156-CR028	91.42	CP	419584.7	283473.9	Abandoned due to possible services and SPT attempt bouncing.
ML157-TP074	97.32	TP	420064.4	284068.0	Large boulders of concrete and wood. Localised sidewall instability.

Appendix D. Contamination Data Spreadsheets

Chemical Test Results (Soil)

A summary of soil test results and GSC used in the risk assessment can be found in the below tables. Where contaminant concentrations exceed the GSC these are highlighted in red. The original test certificates are presented in the GI Contractors Factual Report, where available.

Max of Normalised Results					Location ID	Asset	Sample Depth	Geology Code													
					BD161-CP028	BD161-CR008	BD161-CR008	BD161-CR010	BD161-TP002	BD161-TP008	BD161-TP035	BD161-TP036	BD161-WS003	BD161-WS003	BD162-CP044	BD162-CR003	BD162-CR020	BD162-CR020	BD162-TP003	BD163-CP043	BD163-CP043
					Coleshill No. 3 Embankment	Coleshill West Viaduct	Coleshill West Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Green Lane Embankment	Green Lane Embankment	Green Lane Embankment	Green Lane Embankment	Coleshill No. 3 Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment
					1.2	0.5	2	0.5	0.15	0.15	0.1	2	0.2	1.1	0.7	0.5	0.5	1	0.65	1	1.7
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TILMP	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	MGR	TILMP	MGR	TILMP	MGR	MGR	MGR
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500					<0.0010		<0.0010										
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000					<0.0010		<0.0010										
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800					<0.0010		<0.0010										
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100					<0.0010		<0.0010										
1,1-Biphenyl	mg/kg	SOLID	18000	17000																	
1,1-Dichloroethane	mg/kg	SOLID	260	20000					<0.0010		<0.0010										
1,1-Dichloroethene	mg/kg	SOLID	24	3500					<0.0010		<0.0010										
1,1-Dichloropropene	mg/kg	SOLID	-	-					<0.0010		<0.0010										
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770					<0.0030		<0.0040										
1,2,3-Trichloropropane	mg/kg	SOLID	-	-					<0.0010		<0.0010										
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700					<0.0030		<0.0040										
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310					<0.0010		<0.0010										
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-					<0.0010		<0.0010										
1,2-Dibromoethane	mg/kg	SOLID	-	-					<0.0010		<0.0010										
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000					<0.0010		<0.0010										
1,2-Dichloroethane	mg/kg	SOLID	0.67	21					<0.0010		<0.0010										
1,2-Dichloropropane	mg/kg	SOLID	3.1	160					<0.0010		<0.0010										
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380					<0.0010		<0.0010										
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																	
1,3-Dichlorobenzene	mg/kg	SOLID	30	390					<0.0010		<0.0010										
1,3-Dichloropropane	mg/kg	SOLID	-	-					<0.0010		<0.0010										
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000					<0.0010		<0.0010										
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																	
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																	
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																	
2,2-Dichloropropane	mg/kg	SOLID	-	-					<0.0010		<0.0010										
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																	
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-																	
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																	
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-																	
2,4-Dichlorophenol	mg/kg	SOLID	-	-																	
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																	
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200																	
2,4-Dinitrophenol	mg/kg	SOLID	-	-																	
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930																	
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																	
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470																	
2-Chloronaphthalene	mg/kg	SOLID	370	1200																	
2-Chlorophenol	mg/kg	SOLID	-	-																	
2-Chlorotoluene	mg/kg	SOLID	-	-					<0.0010		<0.0010										
2-isopropylphenol	mg/kg	SOLID	-	-																	
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-																	
2-Methylnaphthalene	mg/kg	SOLID	-	-																	
2-Methylphenol	mg/kg	SOLID	-	-																	
2-Nitroaniline	mg/kg	SOLID	-	-																	
2-Nitrophenol	mg/kg	SOLID	-	-																	
2-Phenylphenol*	mg/kg	SOLID	-	-																	
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																	
3/4 Methylphenol	mg/kg	SOLID	-	-																	
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																	
3-Nitroaniline	mg/kg	SOLID	-	-																	
4,4-DDE	mg/kg	SOLID	-	-																	
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																	
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-																	
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																	
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-																	
4-Chloroaniline	mg/kg	SOLID	-	-																	
4-Chlorophenol	mg/kg	SOLID	-	-																	
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																	
4-Chlorotoluene	mg/kg	SOLID	-	-					<0.0010		<0.0010										
4-Isopropyltoluene	mg/kg	SOLID	-	-					<0.0010		<0.0010										
4-Methylphenol	mg/kg	SOLID	-	-																	
4-Nitroaniline	mg/kg	SOLID	-	-																	
4-Nitrophenol	mg/kg	SOLID	-	-																	
6-Benzyladenine*	mg/kg	SOLID	-	-																	
9,10-Anthraquinone*	mg/kg	SOLID	-	-																	
Abamectin*	mg/kg	SOLID	-	-																	
Acenaphthene	mg/kg	SOLID	84000	29000		<0.0900	<0.1000	<0.0900	<0.0900	<0.0900	<0.1100		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Acenaphthene-d10	%	SOLID	-	-																	
Acenaphthylene	mg/kg	SOLID	83000	29000		<0.0900	<0.1000	<0.0900	<0.0900	<0.0900	<0.1100		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Acephate	mg/kg	SOLID	-	-																	
Acetamiprid*	mg/kg	SOLID	-	-																	
Acetochlor*	mg/kg	SOLID	-	-																	
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																	
Aclonifen*	mg/kg	SOLID	-	-																	
Acrinathrin*	mg/kg	SOLID	-	-																	
Additional Asbestos Components*	N/A	SOLID	-	-																	
Alachlor	mg/kg	SOLID	-	-																	
Aldicarb Sulfone	mg/kg	SOLID	-	-																	
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																	
Aldicarb*	mg/kg	SOLID	-	-																	
Aldrin	mg/kg	SOLID	170	30																	
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-																	
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																	
Aliphatics >C10-12	mg/kg	SOLID	9700	21000		5.43														<4.0000	
Aliphatics >C12-16	mg/kg	SOLID	59000	25000		12														<4.0000	
Aliphatics >C12-44	mg/kg	SOLID	-	-																	
Aliphatics >C16-21	mg/kg	SOLID	-	-																	
Aliphatics >C16-C35	mg/kg	SOLID	-	-		178														16.1	
Aliphatics >C21-35	mg/kg	SOLID	-	-																	
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000		29.8														<6.3000	
Aliphatics >C5-6	mg/kg	SOLID	3200	95000		<0.2000														<0.2000	
Aliphatics >C6-8	mg/kg	SOLID	7800	150000																	
Aliphatics >C8-10	mg/kg	SOLID	2000	14000		5.78														<4.0000	
Aliphatics >C8-C44*	mg/kg	SOLID	-	-		231														<22.0000	
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																	
Ametryn	mg/kg	SOLID	-	-																	
Aminocarb*	mg/kg	SOLID	-	-																	
Amitraz*	mg/kg	SOLID	-	-																	
Anthracene	mg/kg	SOLID	520000	150000		0.17	<0.1000	<0.0900	0.12	<0.0900	<0.1100		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																	
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																	
Aromatics >C10-12	mg/kg	SOLID	16000	9200		<4.0000														<4.0000	
Aromatics >C12-16	mg/kg	SOLID	36000	10000		17.9														<4.0000	
Aromatics >C12-44	mg/kg	SOLID	-	-																	
Aromatics >C16-21	mg/kg	SOLID	28000	7600		39.6														<4.0000	
Aromatics >C21-35	mg/kg	SOLID	28000	7800		175														10.7	
Aromatics >C35-44	mg/kg	SOLID	28000	7800		8.48														<6.3000	
Aromatics >C40-44	mg/kg	SOLID	-	-																	
Aromatics >C5-7	mg/kg	SOLID	26000	76000		<0.0100														<0.0100	
Aromatics >C6-7	mg/kg	SOLID	-	-																	
Aromatics >C7-8	mg/kg	SOLID	56000	87000																	
Aromatics >C8-10	mg/kg	SOLID	3500	7200		<4.0000														<4.0000	
Aromatics >C8-C44*	mg/kg	SOLID	-	-		247														<22.0000	
Arsenic	mg/kg	SOLID	640	170		11.1	3.4	4.1	4.3	4	28		4.5	5	4.3	4.5	4	5.8	11.3	5.9	
Asbestos	-	SOLID	-	-																	
Asbestos (Presence of)	N/A	SOLID	-	-																	
Asbestos (Presence of)	---	SOLID	-	-																	
Asbestos Analysts Comments	N/A	SOLID	-	-																	
Asbestos Analysts Comments	---	SOLID	-	-																	
Asbestos fibre count	---	SOLID	-	-																	
Asbestos Gravimetric Quantification	%	SOLID	-	-																	
Asbestos PCOM Quantification	%	SOLID	-	-																	
Asbestos Quantification (Total %)	%	SOLID	-	-		0.034		#VALUE!	#VALUE!	#VALUE!	#VALUE!		#VALUE!		#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!
Asbestos Quantification Stage 1	N/A	SOLID	-	-																	
Asbestos: Actinolite*	N/A	SOLID	-	-																	
Asbestos: Actinolite*	No units	SOLID	-	-																	
Asbestos: Amosite*	N/A	SOLID	-	-																	
Asbestos: Amosite*	No units	SOLID	-	-																	
Asbestos: Anthophyllite*	N/A	SOLID	-	-																	
Asbestos: Anthophyllite*	No units	SOLID	-	-																	
Asbestos: Chrysotile*	N/A	SOLID	-	-																	
Asbestos: Chrysotile*	No units	SOLID	-	-																	
Asbestos: Crocidolite*	N/A	SOLID	-	-																	
Asbestos: Crocidolite*	No units	SOLID	-	-																	
Asbestos: Tremolite*	N/A	SOLID	-	-																	
Asbestos: Tremolite*	No units	SOLID	-	-																	
Atraton	mg/kg	SOLID	-	-																	
Atrazine	mg/kg	SOLID	9300	2300																	
Azaconazole*	mg/kg	SOLID	-	-																	
Azinphos-ethyl	mg/kg	SOLID	-	-																	
Azinphos-methyl	mg/kg	SOLID	-	-																	
Azobenzene	mg/kg	SOLID	-	-																	
Azoxystrobin*	mg/kg	SOLID	-	-																	
Barium	mg/kg	SOLID	22000	5800		221	176	71.9	119	82	353		111	148	28.4	85.5	74.3	119	108	92.3	
Benalaxyl*	mg/kg	SOLID	-	-																	
Bendiocarb*	mg/kg	SOLID	-	-																	
Benfluralin*	mg/kg	SOLID	-	-																	
Benfuracarb*	mg/kg	SOLID	-	-																	
Benzene	mg/kg	SOLID	27	190		0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400		0.27	<0.1000	<0.0900	0.8	<0.0900	0.55		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																	
Benzo(a)anthracene	mg/kg	SOLID	170	49		0.27	<0.1000	<0.0900	700	<0.0900	0.4		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Benzo(a)pyrene	mg/kg	SOLID	76	21		0.27	<0.1000	<0.0900	1.08	<0.0900	0.66		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Benzo(b)fluoranthene	mg/kg	SOLID	44	13		0.42	<0.1000	<0.0900	1.25	<0.0900	1		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																	
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370		0.15	<0.1000	<0.0900	0.46	<0.0900	0.32		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Benzoic Acid	mg/kg	SOLID	-	-																	
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																	
Benzyl Alcohol	mg/kg	SOLID	-	-																	

Max of Normalised Results																									
					BD163-CP043	BD163-CP043	BD163-CP043	BD163-CR006	BD163-CR014	BD163-CR014	BD163-CR014	BD163-CR022	BD163-CR022	BD163-CR022	BD163-TP013	BD163-TP013a	BD163-TP016	BD163-TP016	BD163-WS001	BD163-WS001	BD164-CR011	BS161-CP401	BS161-CP401	BS161-CP401	BS161-CP401
					Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Green Lane Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Green Lane Embankment	Green Lane Embankment	Water Orton Cutting	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment
					2	3	5	0.8	0.5	2	4	7	9	12.8	0.8	1.5	0.6	2.3	0.2	0.5	0.7	0.05	0.3	0.5	1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	TOP	RTD2	RTD2	RTD2
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500																		<0.0500		<0.0500	
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000																		<0.0500		<0.0500	
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800																		<0.0500		<0.0500	
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100																		<0.0500		<0.0500	
1,1-Biphenyl	mg/kg	SOLID	18000	17000																					
1,1-Dichloroethane	mg/kg	SOLID	260	20000																		<0.0500		<0.0500	
1,1-Dichloroethene	mg/kg	SOLID	24	3500																		<0.0500		<0.0500	
1,1-Dichloropropene	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770																					
1,2,3-Trichloropropane	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700																		<0.1000		<0.1000	
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310																		<0.0500		<0.0500	
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-																					
1,2-Dibromoethane	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000																		<0.0500		<0.0500	
1,2-Dichloroethane	mg/kg	SOLID	0.67	21																		<0.0500		<0.0500	
1,2-Dichloropropane	mg/kg	SOLID	3.1	160																		<0.0500		<0.0500	
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380																					
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
1,3-Dichlorobenzene	mg/kg	SOLID	30	390																		<0.0500		<0.0500	
1,3-Dichloropropane	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000																		<0.0500		<0.0500	
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																					
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																					
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																					
2,2-Dichloropropane	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																					
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																					
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
2,4-Dichlorophenol	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																					
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200																		<0.1000		<0.1000	
2,4-Dinitrophenol	mg/kg	SOLID	-	-																					
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930																		<0.1000		<0.1000	
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																					
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470																		<0.1000		<0.1000	
2-Chloronaphthalene	mg/kg	SOLID	370	1200																		<0.1000		<0.1000	
2-Chlorophenol	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
2-Chlorotoluene	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
2-isopropylphenol	mg/kg	SOLID	-	-																					
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-																					
2-Methylnaphthalene	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
2-Methylphenol	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
2-Nitroaniline	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
2-Nitrophenol	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
2-Phenylphenol*	mg/kg	SOLID	-	-																					
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																					
3/4 Methylphenol	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																					
3-Nitroaniline	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
4,4-DDE	mg/kg	SOLID	-	-																					
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																					
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																					
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
4-Chloroaniline	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
4-Chlorophenol	mg/kg	SOLID	-	-																					
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
4-Chlorotoluene	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
4-Isopropyltoluene	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
4-Methylphenol	mg/kg	SOLID	-	-																					
4-Nitroaniline	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
4-Nitrophenol	mg/kg	SOLID	-	-																					
6-Benzyladenine*	mg/kg	SOLID	-	-																					
9,10-Anthraquinone*	mg/kg	SOLID	-	-																					
Abamectin*	mg/kg	SOLID	-	-																					
Acenaphthene	mg/kg	SOLID	84000	29000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Acenaphthene-d10	%	SOLID	-	-																					
Acenaphthylene	mg/kg	SOLID	83000	29000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Acephate	mg/kg	SOLID	-	-																					
Acetamiprid*	mg/kg	SOLID	-	-																					
Acetochlor*	mg/kg	SOLID	-	-																					
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																					
Aclonifen*	mg/kg	SOLID	-	-																					
Acrinathrin*	mg/kg	SOLID	-	-																					
Additional Asbestos Components*	N/A	SOLID	-	-																					
Alachlor	mg/kg	SOLID	-	-																					
Aldicarb Sulfone	mg/kg	SOLID	-	-																					
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																					
Aldicarb*	mg/kg	SOLID	-	-																					
Aldrin	mg/kg	SOLID	170	30																					
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-																		10	16	4	4
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																					
Aliphatics >C10-12	mg/kg	SOLID	9700	21000		<5.0000										<5.0000									
Aliphatics >C12-16	mg/kg	SOLID	59000	25000		<5.0000										<5.0000									
Aliphatics >C12-44	mg/kg	SOLID	-	-																					
Aliphatics >C16-21	mg/kg	SOLID	-	-																					
Aliphatics >C16-C35	mg/kg	SOLID	-	-		35.6										23.3									
Aliphatics >C21-35	mg/kg	SOLID	-	-																					
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000		<6.7300										<6.6500									
Aliphatics >C5-6	mg/kg	SOLID	3200	95000		<0.2000										<0.2000									
Aliphatics >C6-8	mg/kg	SOLID	7800	150000																					
Aliphatics >C8-10	mg/kg	SOLID	2000	14000		<5.0000										<5.0000									
Aliphatics >C8-C44*	mg/kg	SOLID	-	-		40										26									
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																					
Ametryn	mg/kg	SOLID	-	-																					
Aminocarb*	mg/kg	SOLID	-	-																					
Amitraz*	mg/kg	SOLID	-	-																					
Anthracene	mg/kg	SOLID	520000	150000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	0.76	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																					
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																					
Aromatics >C10-12	mg/kg	SOLID	16000	9200		<5.0000										<5.0000									
Aromatics >C12-16	mg/kg	SOLID	36000	10000		<5.0000										<5.0000									
Aromatics >C12-44	mg/kg	SOLID	-	-																					
Aromatics >C16-21	mg/kg	SOLID	28000	7600		8.22										<5.0000									
Aromatics >C21-35	mg/kg	SOLID	28000	7800		22.6										30									
Aromatics >C35-44	mg/kg	SOLID	28000	7800		<6.7300										<6.6500									
Aromatics >C40-44	mg/kg	SOLID	-	-																					
Aromatics >C5-7	mg/kg	SOLID	26000	76000		<0.0100										<0.0100									
Aromatics >C6-7	mg/kg	SOLID	-	-																					
Aromatics >C7-8	mg/kg	SOLID	56000	87000																					
Aromatics >C8-10	mg/kg	SOLID	3500	7200		<5.0000										<5.0000									
Aromatics >C8-C44*	mg/kg	SOLID	-	-		37.6										37									
Arsenic	mg/kg	SOLID	640	170		7.2	6.5	6.2	6.2	5	4.8	5.8	4.7	2.7	5.8	5.6	3.9	3.3	7.1	5.6	5.1	4	4	5	4
Asbestos	-	SOLID	-	-																		#VALUE!	#VALUE!	#VALUE!	
Asbestos (Presence of)	N/A	SOLID	-	-																					
Asbestos (Presence of)	---	SOLID	-	-																					
Asbestos Analysts Comments	N/A	SOLID	-	-																					
Asbestos Analysts Comments	---	SOLID	-	-																					
Asbestos fibre count	---	SOLID	-	-																					
Asbestos Gravimetric Quantification	%	SOLID	-	-																					
Asbestos PCOM Quantification	%	SOLID	-	-																					
Asbestos Quantification (Total %)	%	SOLID	-	-	#VALUE!			#VALUE!	#VALUE!			<0.0010	#VALUE!		#VALUE!	#VALUE!			#VALUE!		#VALUE!				
Asbestos Quantification Stage 1	N/A	SOLID	-	-																					
Asbestos: Actinolite*	N/A	SOLID	-	-																					
Asbestos: Actinolite*	No units	SOLID	-	-																					
Asbestos: Amosite*	N/A	SOLID	-	-																					
Asbestos: Amosite*	No units	SOLID	-	-																					
Asbestos: Anthophyllite*	N/A	SOLID	-	-																					
Asbestos: Anthophyllite*	No units	SOLID	-	-																					
Asbestos: Chrysotile*	N/A	SOLID	-	-																					
Asbestos: Chrysotile*	No units	SOLID	-	-																					
Asbestos: Crocidolite*	N/A	SOLID	-	-																					
Asbestos: Crocidolite*	No units	SOLID	-	-																					
Asbestos: Tremolite*	N/A	SOLID	-	-																					
Asbestos: Tremolite*	No units	SOLID	-	-																					
Atraton	mg/kg	SOLID	-	-																					
Atrazine	mg/kg	SOLID	9300	2300																					
Azaconazole*	mg/kg	SOLID	-	-																					
Azinphos-ethyl	mg/kg	SOLID	-	-																					
Azinphos-methyl	mg/kg	SOLID	-	-																					
Azobenzene	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
Azoxystrobin*	mg/kg	SOLID	-	-																					
Barium	mg/kg	SOLID	22000	5800		113	121	158	150	122	150	101.6	165	117	64	106	118	83	84.9	83.6	4150	65	71	68	42
Benalaxyl*	mg/kg	SOLID	-	-																					
Bendiocarb*	mg/kg	SOLID	-	-																					
Benfluralin*	mg/kg	SOLID	-	-																					
Benfuracarb*	mg/kg	SOLID	-	-																					
Benzene	mg/kg	SOLID	27	190		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100	<0.0100	<0.0100
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	0.95	0.11	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																					
Benzo(a)anthracene	mg/kg	SOLID	170	49		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	1.87	0.13	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Benzo(a)pyrene	mg/kg	SOLID	76	21		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	1.64	0.15	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Benzo(b)fluoranthene	mg/kg	SOLID	44	13		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	1.91	0.17	0.1	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	0.79	0.1	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Benzoic Acid	mg/kg	SOLID	-	-																					
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																					
Benzyl Alcohol	mg/kg	SOLID	-	-																					

Max of Normalised Results					
					BS161-CP401
					Coleshill No. 3 Embankment
					2.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD2
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500	<0.0500
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000	<0.0500
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800	<0.0500
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100	<0.0500
1,1-Biphenyl	mg/kg	SOLID	18000	17000	
1,1-Dichloroethane	mg/kg	SOLID	260	20000	<0.0500
1,1-Dichloroethene	mg/kg	SOLID	24	3500	<0.0500
1,1-Dichloropropene	mg/kg	SOLID	-	-	<0.0500
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770	
1,2,3-Trichloropropane	mg/kg	SOLID	-	-	<0.0500
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700	<0.1000
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310	<0.0500
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-	
1,2-Dibromoethane	mg/kg	SOLID	-	-	<0.0500
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000	<0.0500
1,2-Dichloroethane	mg/kg	SOLID	0.67	21	<0.0500
1,2-Dichloropropane	mg/kg	SOLID	3.1	160	<0.0500
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380	
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-	<0.0500
1,3-Dichlorobenzene	mg/kg	SOLID	30	390	<0.0500
1,3-Dichloropropane	mg/kg	SOLID	-	-	<0.0500
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000	<0.0500
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-	
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-	
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-	
2,2-Dichloropropane	mg/kg	SOLID	-	-	<0.0500
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-	
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-	<0.1000
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-	
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-	<0.1000
2,4-Dichlorophenol	mg/kg	SOLID	-	-	<0.1000
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-	
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200	<0.1000
2,4-Dinitrophenol	mg/kg	SOLID	-	-	
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930	<0.1000
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-	
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470	<0.1000
2-Chloronaphthalene	mg/kg	SOLID	370	1200	<0.1000
2-Chlorophenol	mg/kg	SOLID	-	-	<0.1000
2-Chlorotoluene	mg/kg	SOLID	-	-	<0.0500
2-isopropylphenol	mg/kg	SOLID	-	-	
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-	
2-Methylnaphthalene	mg/kg	SOLID	-	-	<0.1000
2-Methylphenol	mg/kg	SOLID	-	-	<0.1000
2-Nitroaniline	mg/kg	SOLID	-	-	<0.1000
2-Nitrophenol	mg/kg	SOLID	-	-	<0.1000
2-Phenylphenol*	mg/kg	SOLID	-	-	
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-	
3/4 Methylphenol	mg/kg	SOLID	-	-	<0.1000
3-hydroxycarbofuran*	mg/kg	SOLID	-	-	
3-Nitroaniline	mg/kg	SOLID	-	-	<0.1000
4,4-DDE	mg/kg	SOLID	-	-	
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-	
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-	<0.1000
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-	
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-	<0.1000
4-Chloroaniline	mg/kg	SOLID	-	-	<0.1000
4-Chlorophenol	mg/kg	SOLID	-	-	
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-	<0.1000
4-Chlorotoluene	mg/kg	SOLID	-	-	<0.0500
4-Isopropyltoluene	mg/kg	SOLID	-	-	<0.0500
4-Methylphenol	mg/kg	SOLID	-	-	
4-Nitroaniline	mg/kg	SOLID	-	-	<0.1000
4-Nitrophenol	mg/kg	SOLID	-	-	
6-Benzyladenine*	mg/kg	SOLID	-	-	
9,10-Anthraquinone*	mg/kg	SOLID	-	-	
Abamectin*	mg/kg	SOLID	-	-	
Acenaphthene	mg/kg	SOLID	84000	29000	<0.1000
Acenaphthene-d10	%	SOLID	-	-	
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.1000
Acephate	mg/kg	SOLID	-	-	
Acetamiprid*	mg/kg	SOLID	-	-	
Acetochlor*	mg/kg	SOLID	-	-	
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-	
Aclonifen*	mg/kg	SOLID	-	-	
Acrinathrin*	mg/kg	SOLID	-	-	
Additional Asbestos Components*	N/A	SOLID	-	-	
Alachlor	mg/kg	SOLID	-	-	
Aldicarb Sulfone	mg/kg	SOLID	-	-	
Aldicarb sulphoxide*	mg/kg	SOLID	-	-	
Aldicarb*	mg/kg	SOLID	-	-	
Aldrin	mg/kg	SOLID	170	30	
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-	5
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-	
Aliphatics >C10-12	mg/kg	SOLID	9700	21000	
Aliphatics >C12-16	mg/kg	SOLID	59000	25000	
Aliphatics >C12-44	mg/kg	SOLID	-	-	
Aliphatics >C16-21	mg/kg	SOLID	-	-	
Aliphatics >C16-C35	mg/kg	SOLID	-	-	
Aliphatics >C21-35	mg/kg	SOLID	-	-	
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000	
Aliphatics >C5-6	mg/kg	SOLID	3200	95000	
Aliphatics >C6-8	mg/kg	SOLID	7800	150000	
Aliphatics >C8-10	mg/kg	SOLID	2000	14000	
Aliphatics >C8-C44*	mg/kg	SOLID	-	-	
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47	
Ametryn	mg/kg	SOLID	-	-	
Aminocarb*	mg/kg	SOLID	-	-	
Amitraz*	mg/kg	SOLID	-	-	
Anthracene	mg/kg	SOLID	520000	150000	<0.1000
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-	
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-	
Aromatics >C10-12	mg/kg	SOLID	16000	9200	
Aromatics >C12-16	mg/kg	SOLID	36000	10000	
Aromatics >C12-44	mg/kg	SOLID	-	-	
Aromatics >C16-21	mg/kg	SOLID	28000	7600	
Aromatics >C21-35	mg/kg	SOLID	28000	7800	
Aromatics >C35-44	mg/kg	SOLID	28000	7800	
Aromatics >C40-44	mg/kg	SOLID	-	-	
Aromatics >C5-7	mg/kg	SOLID	26000	76000	
Aromatics >C6-7	mg/kg	SOLID	-	-	
Aromatics >C7-8	mg/kg	SOLID	56000	87000	
Aromatics >C8-10	mg/kg	SOLID	3500	7200	
Aromatics >C8-C44*	mg/kg	SOLID	-	-	
Arsenic	mg/kg	SOLID	640	170	4
Asbestos	-	SOLID	-	-	
Asbestos (Presence of)	N/A	SOLID	-	-	
Asbestos (Presence of)	---	SOLID	-	-	
Asbestos Analysts Comments	N/A	SOLID	-	-	
Asbestos Analysts Comments	---	SOLID	-	-	
Asbestos fibre count	---	SOLID	-	-	
Asbestos Gravimetric Quantification	%	SOLID	-	-	
Asbestos PCOM Quantification	%	SOLID	-	-	
Asbestos Quantification (Total %)	%	SOLID	-	-	
Asbestos Quantification Stage 1	N/A	SOLID	-	-	
Asbestos: Actinolite*	N/A	SOLID	-	-	
Asbestos: Actinolite*	No units	SOLID	-	-	
Asbestos: Amosite*	N/A	SOLID	-	-	
Asbestos: Amosite*	No units	SOLID	-	-	
Asbestos: Anthophyllite*	N/A	SOLID	-	-	
Asbestos: Anthophyllite*	No units	SOLID	-	-	
Asbestos: Chrysotile*	N/A	SOLID	-	-	
Asbestos: Chrysotile*	No units	SOLID	-	-	
Asbestos: Crocidolite*	N/A	SOLID	-	-	
Asbestos: Crocidolite*	No units	SOLID	-	-	
Asbestos: Tremolite*	N/A	SOLID	-	-	
Asbestos: Tremolite*	No units	SOLID	-	-	
Atraton	mg/kg	SOLID	-	-	
Atrazine	mg/kg	SOLID	9300	2300	
Azaconazole*	mg/kg	SOLID	-	-	
Azinphos-ethyl	mg/kg	SOLID	-	-	
Azinphos-methyl	mg/kg	SOLID	-	-	
Azobenzene	mg/kg	SOLID	-	-	<0.1000
Azoxystrobin*	mg/kg	SOLID	-	-	
Barium	mg/kg	SOLID	22000	5800	100
Benalaxyl*	mg/kg	SOLID	-	-	
Bendiocarb*	mg/kg	SOLID	-	-	
Benfluralin*	mg/kg	SOLID	-	-	
Benfuracarb*	mg/kg	SOLID	-	-	
Benzene	mg/kg	SOLID	27	190	<0.0100
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	<0.1000
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-	
Benzo(a)anthracene	mg/kg	SOLID	170	49	<0.1000
Benzo(a)pyrene	mg/kg	SOLID	76	21	<0.1000
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	<0.1000
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-	<0.1000
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	<0.1000
Benzoic Acid	mg/kg	SOLID	-	-	
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-	
Benzyl Alcohol	mg/kg	SOLID	-	-	

Max of Normalised Results																											
					BS161-CT401	BS162-CR401a	BS162-CR401a	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR413
					Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	Coleshill No. 3 Embankment
					0.1	0.35	1	0.3	1	2	4	6.5	9.5	10.5	13.5	16.5	0.1	0.3	1	2	5.5	7.5	10.5	12	15	18.5	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	RTD1	RTD2	RTD2	RTD2	RTD2	SIM	SIM	SIM	SIM	SIM	TOP	RTD	RTD	RTD	SIM	SIM	SIM	SIM	SIM	SIM	TOP
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500		<0.0500	<0.0500																				
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000		<0.0500	<0.0500																				
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800		<0.0500	<0.0500																				
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100		<0.0500	<0.0500																				
1,1-Biphenyl	mg/kg	SOLID	18000	17000														<0.0100									
1,1-Dichloroethane	mg/kg	SOLID	260	20000		<0.0500	<0.0500																				
1,1-Dichloroethene	mg/kg	SOLID	24	3500		<0.0500	<0.0500																				
1,1-Dichloropropene	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770																							
1,2,3-Trichloropropane	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700		<0.1000	<0.1000																				
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310		<0.0500	<0.0500																				
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-																							
1,2-Dibromoethane	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000		<0.0500	<0.0500																				
1,2-Dichloroethane	mg/kg	SOLID	0.67	21		<0.0500	<0.0500																				
1,2-Dichloropropane	mg/kg	SOLID	3.1	160		<0.0500	<0.0500																				
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380																							
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
1,3-Dichlorobenzene	mg/kg	SOLID	30	390		<0.0500	<0.0500																				
1,3-Dichloropropane	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000		<0.0500	<0.0500																				
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-														<0.0100									
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-														<0.0100									
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-														<0.0100									
2,2-Dichloropropane	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																							
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-														<0.0100									
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-		<0.1000	<0.1000											<0.0100									
2,4-Dichlorophenol	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-														<0.0100									
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200		<0.1000	<0.1000																				
2,4-Dinitrophenol	mg/kg	SOLID	-	-																							
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930		<0.1000	<0.1000																				
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-														<0.0100									
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470		<0.1000	<0.1000																				
2-Chloronaphthalene	mg/kg	SOLID	370	1200		<0.1000	<0.1000																				
2-Chlorophenol	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
2-Chlorotoluene	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
2-isopropylphenol	mg/kg	SOLID	-	-																							
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-														<0.0100									
2-Methylnaphthalene	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
2-Methylphenol	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
2-Nitroaniline	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
2-Nitrophenol	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
2-Phenylphenol*	mg/kg	SOLID	-	-														<0.0100									
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																							
3/4 Methylphenol	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
3-hydroxycarbofuran*	mg/kg	SOLID	-	-														<0.0100									
3-Nitroaniline	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
4,4-DDE	mg/kg	SOLID	-	-														<0.0100									
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																							
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																							
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
4-Chloroaniline	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
4-Chlorophenol	mg/kg	SOLID	-	-																							
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
4-Chlorotoluene	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
4-Isopropyltoluene	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
4-Methylphenol	mg/kg	SOLID	-	-																							
4-Nitroaniline	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
4-Nitrophenol	mg/kg	SOLID	-	-																							
6-Benzyladenine*	mg/kg	SOLID	-	-														<0.0100									
9,10-Anthraquinone*	mg/kg	SOLID	-	-														<0.0100									
Abamectin*	mg/kg	SOLID	-	-														<0.0100									
Acenaphthene	mg/kg	SOLID	84000	29000		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Acenaphthene-d10	%	SOLID	-	-																							
Acenaphthylene	mg/kg	SOLID	83000	29000		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Acephate	mg/kg	SOLID	-	-														<0.0100									
Acetamiprid*	mg/kg	SOLID	-	-														<0.0100									
Acetochlor*	mg/kg	SOLID	-	-														<0.0100									
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-														<0.0100									
Aclonifen*	mg/kg	SOLID	-	-														<0.0100									
Acrinathrin*	mg/kg	SOLID	-	-														<0.0100									
Additional Asbestos Components*	N/A	SOLID	-	-																							
Alachlor	mg/kg	SOLID	-	-														<0.0100									
Aldicarb Sulfone	mg/kg	SOLID	-	-														<0.0100									
Aldicarb sulphoxide*	mg/kg	SOLID	-	-														<0.0100									
Aldicarb*	mg/kg	SOLID	-	-														<0.0100									
Aldrin	mg/kg	SOLID	170	30														<0.0100									
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-		3	2	36	<1.0000									10	<1.0000								36
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																							
Aliphatics >C10-12	mg/kg	SOLID	9700	21000																							
Aliphatics >C12-16	mg/kg	SOLID	59000	25000																							
Aliphatics >C12-44	mg/kg	SOLID	-	-																							
Aliphatics >C16-21	mg/kg	SOLID	-	-																							
Aliphatics >C16-C35	mg/kg	SOLID	-	-																							
Aliphatics >C21-35	mg/kg	SOLID	-	-																							
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000																							
Aliphatics >C5-6	mg/kg	SOLID	3200	95000																							
Aliphatics >C6-8	mg/kg	SOLID	7800	150000																							
Aliphatics >C8-10	mg/kg	SOLID	2000	14000																							
Aliphatics >C8-C44*	mg/kg	SOLID	-	-																							
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47														<0.0100									
Ametryn	mg/kg	SOLID	-	-														<0.0100									
Aminocarb*	mg/kg	SOLID	-	-														<0.0100									
Amitraz*	mg/kg	SOLID	-	-														<0.0100									
Anthracene	mg/kg	SOLID	520000	150000		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																							
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																							
Aromatics >C10-12	mg/kg	SOLID	16000	9200																							
Aromatics >C12-16	mg/kg	SOLID	36000	10000																							
Aromatics >C12-44	mg/kg	SOLID	-	-																							
Aromatics >C16-21	mg/kg	SOLID	28000	7600																							
Aromatics >C21-35	mg/kg	SOLID	28000	7800																							
Aromatics >C35-44	mg/kg	SOLID	28000	7800																							
Aromatics >C40-44	mg/kg	SOLID	-	-																							
Aromatics >C5-7	mg/kg	SOLID	26000	76000																							
Aromatics >C6-7	mg/kg	SOLID	-	-																							
Aromatics >C7-8	mg/kg	SOLID	56000	87000																							
Aromatics >C8-10	mg/kg	SOLID	3500	7200																							
Aromatics >C8-C44*	mg/kg	SOLID	-	-																							
Arsenic	mg/kg	SOLID	640	170		41	21	18	13									17	35								22
Asbestos	-	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!									#VALUE!	#VALUE!								#VALUE!
Asbestos (Presence of)	N/A	SOLID	-	-																							
Asbestos (Presence of)	---	SOLID	-	-																							
Asbestos Analysts Comments	N/A	SOLID	-	-																							
Asbestos Analysts Comments	---	SOLID	-	-																							
Asbestos fibre count	---	SOLID	-	-																							
Asbestos Gravimetric Quantification	%	SOLID	-	-																							
Asbestos PCOM Quantification	%	SOLID	-	-																							
Asbestos Quantification (Total %)	%	SOLID	-	-																							
Asbestos Quantification Stage 1	N/A	SOLID	-	-																							
Asbestos: Actinolite*	N/A	SOLID	-	-																							
Asbestos: Actinolite*	No units	SOLID	-	-																							
Asbestos: Amosite*	N/A	SOLID	-	-																							
Asbestos: Amosite*	No units	SOLID	-	-																							
Asbestos: Anthophyllite*	N/A	SOLID	-	-																							
Asbestos: Anthophyllite*	No units	SOLID	-	-																							
Asbestos: Chrysotile*	N/A	SOLID	-	-																							
Asbestos: Chrysotile*	No units	SOLID	-	-																							
Asbestos: Crocidolite*	N/A	SOLID	-	-																							
Asbestos: Crocidolite*	No units	SOLID	-	-																							
Asbestos: Tremolite*	N/A	SOLID	-	-																							
Asbestos: Tremolite*	No units	SOLID	-	-																							
Atraton	mg/kg	SOLID	-	-														<0.0100									
Atrazine	mg/kg	SOLID	9300	2300														<0.0100									
Azaconazole*	mg/kg	SOLID	-	-														<0.0100									
Azinphos-ethyl	mg/kg	SOLID	-	-														<0.0100									
Azinphos-methyl	mg/kg	SOLID	-	-														<0.0100									
Azobenzene	mg/kg	SOLID	-	-		<0.1000	<0.1000											<0.0100									
Azoxystrobin*	mg/kg	SOLID	-	-														<0.0100									
Barium	mg/kg	SOLID	22000	5800		240	190	83	43									100	57								110
Benalaxyl*	mg/kg	SOLID	-	-														<0.0100									
Bendiocarb*	mg/kg	SOLID	-	-														<0.0100									
Benfluralin*	mg/kg	SOLID	-	-														<0.0100									
Benfuracarb*	mg/kg	SOLID	-	-														<0.0100									
Benzene	mg/kg	SOLID	27	190		<0.0100	<0.0100	<0.0100	<0.0100									<0.0100	<0.0100								<0.0100
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																							
Benzo(a)anthracene	mg/kg	SOLID	170	49		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Benzo(a)pyrene	mg/kg	SOLID	76	21		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Benzo(b)fluoranthene	mg/kg	SOLID	44	13		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Benzoic Acid	mg/kg	SOLID	-	-																							
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																							
Benzyl Alcohol	mg/kg	SOLID	-	-																							

Max of Normalised Results																														
					BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	ML154-TP023	ML155-CP019	ML155-CP019	ML155-CP019	ML155-CP024	ML155-CP024	ML155-CP024	ML155-CP044	ML155-CP044	ML155-CP044	ML155-CR001	ML155-CR001	ML155-CR005	ML155-CR022	ML155-CR022	ML155-CR403	ML155-CR403	ML155-CR403
					Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting
					0.1	0.5	1	4	6.5	9.5	10.5	13.5	1	0.1	1	2	0.05	0.6	3	0.05	0.5	1	0.05	1	0	0.5	0.9	0.3	0.5	1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	RTD1	RTD1	RTD1	SIM	SIM	SIM	SIM	TILMP	TOP	TILMP	TILMP	TOP	GFDMP	GFDMP	TOP	TILMP	TILMP	TOP	ALV	MGR	MGR	MGR	MGR	MGR	BCMU
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,1-Biphenyl	mg/kg	SOLID	18000	17000																										
1,1-Dichloroethane	mg/kg	SOLID	260	20000										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,1-Dichloroethene	mg/kg	SOLID	24	3500										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,1-Dichloropropene	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770																										
1,2,3-Trichloropropane	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-																										
1,2-Dibromoethane	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,2-Dichloroethane	mg/kg	SOLID	0.67	21										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,2-Dichloropropane	mg/kg	SOLID	3.1	160										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380																										
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,3-Dichlorobenzene	mg/kg	SOLID	30	390										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,3-Dichloropropane	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																										
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																										
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																										
2,2-Dichloropropane	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																										
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																										
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
2,4-Dichlorophenol	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																										
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
2,4-Dinitrophenol	mg/kg	SOLID	-	-																										
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																										
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
2-Chloronaphthalene	mg/kg	SOLID	370	1200										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
2-Chlorophenol	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
2-Chlorotoluene	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
2-isopropylphenol	mg/kg	SOLID	-	-																										
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-																										
2-Methylnaphthalene	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
2-Methylphenol	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
2-Nitroaniline	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
2-Nitrophenol	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
2-Phenylphenol*	mg/kg	SOLID	-	-																										
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																										
3/4 Methylphenol	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																										
3-Nitroaniline	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
4,4-DDE	mg/kg	SOLID	-	-																										
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																										
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																										
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
4-Chloroaniline	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
4-Chlorophenol	mg/kg	SOLID	-	-																										
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
4-Chlorotoluene	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
4-Isopropyltoluene	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
4-Methylphenol	mg/kg	SOLID	-	-																										
4-Nitroaniline	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
4-Nitrophenol	mg/kg	SOLID	-	-																										
6-Benzyladenine*	mg/kg	SOLID	-	-																										
9,10-Anthraquinone*	mg/kg	SOLID	-	-																										
Abamectin*	mg/kg	SOLID	-	-																										
Acenaphthene	mg/kg	SOLID	84000	29000		<0.1000	<0.1000						<0.1000	<0.1000	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.1	<0.1000	<0.1000	<0.1000	
Acenaphthene-d10	%	SOLID	-	-																										
Acenaphthylene	mg/kg	SOLID	83000	29000		<0.1000	<0.1000						<0.1000	<0.1000	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	
Acephate	mg/kg	SOLID	-	-																										
Acetamiprid*	mg/kg	SOLID	-	-																										
Acetochlor*	mg/kg	SOLID	-	-																										
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																										
Aclonifen*	mg/kg	SOLID	-	-																										
Acrinathrin*	mg/kg	SOLID	-	-																										
Additional Asbestos Components*	N/A	SOLID	-	-																										
Alachlor	mg/kg	SOLID	-	-																										
Aldicarb Sulfone	mg/kg	SOLID	-	-																										
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																										
Aldicarb*	mg/kg	SOLID	-	-																										
Aldrin	mg/kg	SOLID	170	30																										
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-		5	3						<1.0000	6	10					7		<1.0000	2	<1.0000	78	140	37	25	25	
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																										
Aliphatics >C10-12	mg/kg	SOLID	9700	21000																			<1.0000	<1.0000		<1.0000		<1.0000	<1.0000	
Aliphatics >C12-16	mg/kg	SOLID	59000	25000																			<2.0000	<2.0000		<2.0000		<2.0000	<2.0000	
Aliphatics >C12-44	mg/kg	SOLID	-	-																										
Aliphatics >C16-21	mg/kg	SOLID	-	-																			<1.0000	<1.0000		1		<1.0000	<1.0000	
Aliphatics >C16-C35	mg/kg	SOLID	-	-																										
Aliphatics >C21-35	mg/kg	SOLID	-	-																			<4.0000	<4.0000		46		<4.0000	<4.0000	
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000																			<1.0000	<1.0000		4		<1.0000	<1.0000	
Aliphatics >C5-6	mg/kg	SOLID	3200	95000																			<0.1000	<0.1000		<0.1000		<0.0100	<0.0100	
Aliphatics >C6-8	mg/kg	SOLID	7800	150000																			<0.1000	<0.1000		<0.1000		<0.0100	<0.0100	
Aliphatics >C8-10	mg/kg	SOLID	2000	14000																			<0.1000	<0.1000		<0.1000		<0.0100	<0.0100	
Aliphatics >C8-C44*	mg/kg	SOLID	-	-																										
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																										
Ametryn	mg/kg	SOLID	-	-																										
Aminocarb*	mg/kg	SOLID	-	-																										
Amitraz*	mg/kg	SOLID	-	-																										
Anthracene	mg/kg	SOLID	520000	150000		<0.1000	<0.1000						<0.1000	<0.1000	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.3	<0.1000	<0.1000	<0.1000	
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																										
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																										
Aromatics >C10-12	mg/kg	SOLID	16000	9200																			<1.0000	<1.0000		<1.0000		<1.0000	<1.0000	
Aromatics >C12-16	mg/kg	SOLID	36000	10000																			<1.0000	<1.0000		1		<1.0000	<1.0000	
Aromatics >C12-44	mg/kg	SOLID	-	-																										
Aromatics >C16-21	mg/kg	SOLID	28000	7600																			<1.0000	<1.0000		3		<1.0000	<1.0000	
Aromatics >C21-35	mg/kg	SOLID	28000	7800																			<1.0000	<1.0000		<1.0000		<1.0000	<1.0000	
Aromatics >C35-44	mg/kg	SOLID	28000	7800																			<1.0000	<1.0000		<1.0000		<1.0000	<1.0000	
Aromatics >C40-44	mg/kg	SOLID	-	-																										
Aromatics >C5-7	mg/kg	SOLID	26000	76000																										
Aromatics >C6-7	mg/kg	SOLID	-	-																			<0.1000	<0.1000		<0.1000		<0.0100	<0.0100	
Aromatics >C7-8	mg/kg	SOLID	56000	87000																			<0.1000	<0.1000		<0.1000		<0.0100	<0.0100	
Aromatics >C8-10	mg/kg	SOLID	3500	7200																			<0.1000	<0.1000		<0.1000		<0.0100	<0.0100	
Aromatics >C8-C44*	mg/kg	SOLID	-	-																										
Arsenic	mg/kg	SOLID	640	170		17	16						8	4	4		4.4	3.2	1.7	4		4	5	6	10	12	4	3	4	
Asbestos	-	SOLID	-	-		#VALUE!	#VALUE!						#VALUE!	#VALUE!						#VALUE!			#VALUE!		#VALUE!	#VALUE!		#VALUE!		
Asbestos (Presence of)	N/A	SOLID	-	-																										
Asbestos (Presence of)	---	SOLID	-	-																										
Asbestos Analysts Comments	N/A	SOLID	-	-																										
Asbestos Analysts Comments	---	SOLID	-	-																										
Asbestos fibre count	---	SOLID	-	-																										
Asbestos Gravimetric Quantification	%	SOLID	-	-																										
Asbestos PCOM Quantification	%	SOLID	-	-																										
Asbestos Quantification (Total %)	%	SOLID	-	-																										
Asbestos Quantification Stage 1	N/A	SOLID	-	-																										
Asbestos: Actinolite*	N/A	SOLID	-	-																										
Asbestos: Actinolite*	No units	SOLID	-	-																										
Asbestos: Amosite*	N/A	SOLID	-	-																										
Asbestos: Amosite*	No units	SOLID	-	-																										
Asbestos: Anthophyllite*	N/A	SOLID	-	-																										
Asbestos: Anthophyllite*	No units	SOLID	-	-																										
Asbestos: Chrysotile*	N/A	SOLID	-	-																										
Asbestos: Chrysotile*	No units	SOLID	-	-																										
Asbestos: Crocidolite*	N/A	SOLID	-	-																										
Asbestos: Crocidolite*	No units	SOLID	-	-																										
Asbestos: Tremolite*	N/A	SOLID	-	-																										
Asbestos: Tremolite*	No units	SOLID	-	-																										
Atraton	mg/kg	SOLID	-	-																										
Atrazine	mg/kg	SOLID	9300	2300																										
Azaconazole*	mg/kg	SOLID	-	-																										
Azinphos-ethyl	mg/kg	SOLID	-	-																										
Azinphos-methyl	mg/kg	SOLID	-	-																										
Azobenzene	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Azoxystrobin*	mg/kg	SOLID	-	-																										
Barium	mg/kg	SOLID	22000	5800		68	35						180	54	67		55.2	57.4	74.9	41		43	45	70	210	150	54	19	97	
Benalaxyl*	mg/kg	SOLID	-	-																										
Bendiocarb*	mg/kg	SOLID	-	-																										
Benfluralin*	mg/kg	SOLID	-	-																										
Benfuracarb*	mg/kg	SOLID	-	-																										
Benzene	mg/kg	SOLID	27	190		<0.0100	<0.0100						<0.0100	<0.0100	<0.0100		<0.0010	<0.0010	<0.0010	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400		<0.1000	<0.1000						<0.1000	<0.1000	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	0.8	0.3	<0.1000	<0.1000	<0.1000	
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																										
Benzo(a)anthracene	mg/kg	SOLID	170	49		<0.1000	<0.1000						<0.1000	0.1	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	0.8	0.6	<0.1000	<0.1000	<0.1000	
Benzo(a)pyrene	mg/kg	SOLID	76	21		<0.1000	<0.1000						<0.1000	0.1	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	0.9	0.5	<0.1000	<0.1000	<0.1000	
Benzo(b)fluoranthene	mg/kg	SOLID	44	13		<0.1000	<0.1000						<0.1000	<0.1000	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	1.3	0.5	<0.1000	<0.1000	<0.1000	
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-										0.2	<0.1000					<0.1000			<0.1000	<0.1000						
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370		<0.1000	<0.1000						<0.1000	0.1	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	0.3	0.3	<0.1000	<0.1000	<0.1000	
Benzoic Acid	mg/kg	SOLID	-	-																										
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																										
Benzyl Alcohol	mg/kg	SOLID	-	-																										

Max of Normalised Results																																		
					ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-RC007	ML155-TP018	ML155-TP018	ML155-TP025	ML155-TP025
					Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting
					2	4.11	5.3	6.83	12.09	13.43	15.42	16.7	18.6	0.05	0.3	1	3	5.24	7.2	9.18	10.6	12	14.35	0.3	0.5	2	9.2	16.06	19.5	1.7	0	0.5	0	0.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	MGR	MGR	MGR	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	GFDMP	GFDMP	GFDMP	BCMU	BCMU	BCMU	MMG	MGR	MGR	TOP	TILMP
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500																														
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000																														
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800																														
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100																														
1,1-Biphenyl	mg/kg	SOLID	18000	17000																														
1,1-Dichloroethane	mg/kg	SOLID	260	20000																														
1,1-Dichloroethene	mg/kg	SOLID	24	3500																														
1,1-Dichloropropene	mg/kg	SOLID	-	-																														
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770																														
1,2,3-Trichloropropane	mg/kg	SOLID	-	-																														
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700																														
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310																														
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-																														
1,2-Dibromoethane	mg/kg	SOLID	-	-																														
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000																														
1,2-Dichloroethane	mg/kg	SOLID	0.67	21																														
1,2-Dichloropropane	mg/kg	SOLID	3.1	160																														
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380																														
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																														
1,3-Dichlorobenzene	mg/kg	SOLID	30	390																														
1,3-Dichloropropane	mg/kg	SOLID	-	-																														
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000																														
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																														
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																														
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																														
2,2-Dichloropropane	mg/kg	SOLID	-	-																														
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																														
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-																														
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																														
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-																														
2,4-Dichlorophenol	mg/kg	SOLID	-	-																														
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																														
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200																														
2,4-Dinitrophenol	mg/kg	SOLID	-	-																														
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930																														
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																														
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470																														
2-Chloronaphthalene	mg/kg	SOLID	370	1200																														
2-Chlorophenol	mg/kg	SOLID	-	-																														
2-Chlorotoluene	mg/kg	SOLID	-	-																														
2-isopropylphenol	mg/kg	SOLID	-	-																														
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-																														
2-Methylnaphthalene	mg/kg	SOLID	-	-																														
2-Methylphenol	mg/kg	SOLID	-	-																														
2-Nitroaniline	mg/kg	SOLID	-	-																														
2-Nitrophenol	mg/kg	SOLID	-	-																														
2-Phenylphenol*	mg/kg	SOLID	-	-																														
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																														
3/4 Methylphenol	mg/kg	SOLID	-	-																														
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																														
3-Nitroaniline	mg/kg	SOLID	-	-																														
4,4-DDE	mg/kg	SOLID	-	-																														
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																														
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-																														
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																														
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-																														
4-Chloroaniline	mg/kg	SOLID	-	-																														
4-Chlorophenol	mg/kg	SOLID	-	-																														
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																														
4-Chlorotoluene	mg/kg	SOLID	-	-																														
4-Isopropyltoluene	mg/kg	SOLID	-	-																														
4-Methylphenol	mg/kg	SOLID	-	-																														
4-Nitroaniline	mg/kg	SOLID	-	-																														
4-Nitrophenol	mg/kg	SOLID	-	-																														
6-Benzyladenine*	mg/kg	SOLID	-	-																														
9,10-Anthraquinone*	mg/kg	SOLID	-	-																														
Abamectin*	mg/kg	SOLID	-	-																														
Acenaphthene	mg/kg	SOLID	84000	29000	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	<0.1000	<0.1000
Acenaphthene-d10	%	SOLID	-	-																														
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	<0.1000	<0.1000
Acephate	mg/kg	SOLID	-	-																														
Acetamiprid*	mg/kg	SOLID	-	-																														
Acetochlor*	mg/kg	SOLID	-	-																														
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																														
Aclonifen*	mg/kg	SOLID	-	-																														
Acrinathrin*	mg/kg	SOLID	-	-																														
Additional Asbestos Components*	N/A	SOLID	-	-																														
Alachlor	mg/kg	SOLID	-	-																														
Aldicarb Sulfone	mg/kg	SOLID	-	-																														
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																														
Aldicarb*	mg/kg	SOLID	-	-																														
Aldrin	mg/kg	SOLID	170	30																														
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-	50									4	2	3								4	6						10	<1.0000	45	61
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																														
Aliphatics >C10-12	mg/kg	SOLID	9700	21000	<1.0000																											<1.0000		
Aliphatics >C12-16	mg/kg	SOLID	59000	25000	<2.0000																											<2.0000		
Aliphatics >C12-44	mg/kg	SOLID	-	-																														
Aliphatics >C16-21	mg/kg	SOLID	-	-	<1.0000																											<1.0000		
Aliphatics >C16-C35	mg/kg	SOLID	-	-																														
Aliphatics >C21-35	mg/kg	SOLID	-	-	6																											<4.0000		
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000	<1.0000																											<1.0000		
Aliphatics >C5-6	mg/kg	SOLID	3200	95000	<0.0100																											<0.1000		
Aliphatics >C6-8	mg/kg	SOLID	7800	150000	<0.0100																											<0.1000		
Aliphatics >C8-10	mg/kg	SOLID	2000	14000	<0.0100																											<0.1000		
Aliphatics >C8-C44*	mg/kg	SOLID	-	-																														
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																														
Ametryn	mg/kg	SOLID	-	-																														
Aminocarb*	mg/kg	SOLID	-	-																														
Amitraz*	mg/kg	SOLID	-	-																														
Anthracene	mg/kg	SOLID	520000	150000	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	<0.1000	<0.1000
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																														
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																														
Aromatics >C10-12	mg/kg	SOLID	16000	9200	<1.0000																											<1.0000		
Aromatics >C12-16	mg/kg	SOLID	36000	10000	<1.0000																											<1.0000		
Aromatics >C12-44	mg/kg	SOLID	-	-																														
Aromatics >C16-21	mg/kg	SOLID	28000	7600	<1.0000																											<1.0000		
Aromatics >C21-35	mg/kg	SOLID	28000	7800	<1.0000																											<1.0000		
Aromatics >C35-44	mg/kg	SOLID	28000	7800	<1.0000																											<1.0000		
Aromatics >C40-44	mg/kg	SOLID	-	-																														
Aromatics >C5-7	mg/kg	SOLID	26000	76000																														
Aromatics >C6-7	mg/kg	SOLID	-	-	<0.0100																											<0.1000		
Aromatics >C7-8	mg/kg	SOLID	56000	87000	<0.0100																											<0.1000		
Aromatics >C8-10	mg/kg	SOLID	3500	7200	<0.0100																											<0.1000		
Aromatics >C8-C44*	mg/kg	SOLID	-	-																														
Arsenic	mg/kg	SOLID	640	170	3									3	4	3								2	6						6	3	11	12
Asbestos	-	SOLID	-	-											#VALUE!									#VALUE!								#VALUE!	#VALUE!	
Asbestos (Presence of)	N/A	SOLID	-	-																														
Asbestos (Presence of)	---	SOLID	-	-																														
Asbestos Analysts Comments	N/A	SOLID	-	-																														
Asbestos Analysts Comments	---	SOLID	-	-																														
Asbestos fibre count	---	SOLID	-	-																														
Asbestos Gravimetric Quantification	%	SOLID	-	-																														
Asbestos PCOM Quantification	%	SOLID	-	-																														
Asbestos Quantification (Total %)	%	SOLID	-	-																														
Asbestos Quantification Stage 1	N/A	SOLID	-	-																														
Asbestos: Actinolite*	N/A	SOLID	-	-																														
Asbestos: Actinolite*	No units	SOLID	-	-																														
Asbestos: Amosite*	N/A	SOLID	-	-																														
Asbestos: Amosite*	No units	SOLID	-	-																														
Asbestos: Anthophyllite*	N/A	SOLID	-	-																														
Asbestos: Anthophyllite*	No units	SOLID	-	-																														
Asbestos: Chrysotile*	N/A	SOLID	-	-																														
Asbestos: Chrysotile*	No units	SOLID	-	-																														
Asbestos: Crocidolite*	N/A	SOLID	-	-																														
Asbestos: Crocidolite*	No units	SOLID	-	-																														
Asbestos: Tremolite*	N/A	SOLID	-	-																														
Asbestos: Tremolite*	No units	SOLID	-	-																														
Atraton	mg/kg	SOLID	-	-																														
Atrazine	mg/kg	SOLID	9300	2300																														
Azaconazole*	mg/kg	SOLID	-	-																														
Azinphos-ethyl	mg/kg	SOLID	-	-																														
Azinphos-methyl	mg/kg	SOLID	-	-																														
Azobenzene	mg/kg	SOLID	-	-																														
Azoxystrobin*	mg/kg	SOLID	-	-																														
Barium	mg/kg	SOLID	22000	5800	51									46	57	110								18	88						70	31	250	300
Benalaxyl*	mg/kg	SOLID	-	-																														
Bendiocarb*	mg/kg	SOLID	-	-																														
Benfluralin*	mg/kg	SOLID	-	-																														
Benfuracarb*	mg/kg	SOLID	-	-																														
Benzene	mg/kg	SOLID	27	190	<0.0100									<0.0100	<0.0100	<0.0100								<0.0100	<0.0100						<0.0100	<0.0100	<0.0100	<0.0100
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	0.3	0.1
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																														
Benzo(a)anthracene	mg/kg	SOLID	170	49	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	0.4	0.2
Benzo(a)pyrene	mg/kg	SOLID	76	21	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	0.4	0.2
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	0.6	0.2
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																														
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	0.2	0.1
Benzoic Acid	mg/kg	SOLID	-	-																														
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																														
Benzyl Alcohol	mg/kg	SOLID	-	-																														

Max of Normalised Results																											
					ML155-TP041	ML155-WS001	ML155-WS002	ML155-WS024	ML155-WS042	ML155-WS044	ML155-WS044	ML156-CP008	ML156-CP008	ML156-CP023	ML156-CP028	ML156-CP028	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR014	ML156-CR014	ML156-CR020	ML156-CR021	ML156-CR023	ML156-CR025
					Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station
					0	1.67	0.4	0.3	2	0	0.3	0.35	2.35	0.5	1	6	1.5	3	5.5	6.9	9.4	0.5	12.2	0.2	2.25	0.1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	TILMP	TILMP	ALV	TOP	ALV	MGR	MGR	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MMG	GFDUD	MMG	MGR	MMG	TOP	MGR
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500																							
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000																							
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800																							
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100																							
1,1-Biphenyl	mg/kg	SOLID	18000	17000																							
1,1-Dichloroethane	mg/kg	SOLID	260	20000																							
1,1-Dichloroethene	mg/kg	SOLID	24	3500																							
1,1-Dichloropropene	mg/kg	SOLID	-	-																							
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770																							
1,2,3-Trichloropropane	mg/kg	SOLID	-	-																							
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700																							
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310																							
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-																							
1,2-Dibromoethane	mg/kg	SOLID	-	-																							
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000																							
1,2-Dichloroethane	mg/kg	SOLID	0.67	21																							
1,2-Dichloropropane	mg/kg	SOLID	3.1	160																							
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380																							
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																							
1,3-Dichlorobenzene	mg/kg	SOLID	30	390																							
1,3-Dichloropropane	mg/kg	SOLID	-	-																							
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000																							
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																							
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																							
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																							
2,2-Dichloropropane	mg/kg	SOLID	-	-																							
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																							
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-																							
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																							
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-																							
2,4-Dichlorophenol	mg/kg	SOLID	-	-																							
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																							
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200																							
2,4-Dinitrophenol	mg/kg	SOLID	-	-																							
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930																							
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																							
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470																							
2-Chloronaphthalene	mg/kg	SOLID	370	1200																							
2-Chlorophenol	mg/kg	SOLID	-	-																							
2-Chlorotoluene	mg/kg	SOLID	-	-																							
2-isopropylphenol	mg/kg	SOLID	-	-																							
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-																							
2-Methylnaphthalene	mg/kg	SOLID	-	-																							
2-Methylphenol	mg/kg	SOLID	-	-																							
2-Nitroaniline	mg/kg	SOLID	-	-																							
2-Nitrophenol	mg/kg	SOLID	-	-																							
2-Phenylphenol*	mg/kg	SOLID	-	-																							
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																							
3/4 Methylphenol	mg/kg	SOLID	-	-																							
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																							
3-Nitroaniline	mg/kg	SOLID	-	-																							
4,4-DDE	mg/kg	SOLID	-	-																							
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																							
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-																							
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																							
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-																							
4-Chloroaniline	mg/kg	SOLID	-	-																							
4-Chlorophenol	mg/kg	SOLID	-	-																							
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																							
4-Chlorotoluene	mg/kg	SOLID	-	-																							
4-Isopropyltoluene	mg/kg	SOLID	-	-																							
4-Methylphenol	mg/kg	SOLID	-	-																							
4-Nitroaniline	mg/kg	SOLID	-	-																							
4-Nitrophenol	mg/kg	SOLID	-	-																							
6-Benzyladenine*	mg/kg	SOLID	-	-																							
9,10-Anthraquinone*	mg/kg	SOLID	-	-																							
Abamectin*	mg/kg	SOLID	-	-																							
Acenaphthene	mg/kg	SOLID	84000	29000	<0.1000		<0.1000			<0.1000	<0.1000	<0.1400	0.41	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	<0.0300
Acenaphthene-d10	%	SOLID	-	-																							
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.1000		<0.1000			<0.1000	<0.1000	<0.1400	0.36	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	<0.0300
Acephate	mg/kg	SOLID	-	-																							
Acetamiprid*	mg/kg	SOLID	-	-																							
Acetochlor*	mg/kg	SOLID	-	-																							
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																							
Aclonifen*	mg/kg	SOLID	-	-																							
Acrinathrin*	mg/kg	SOLID	-	-																							
Additional Asbestos Components*	N/A	SOLID	-	-																							
Alachlor	mg/kg	SOLID	-	-																							
Aldicarb Sulfone	mg/kg	SOLID	-	-																							
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																							
Aldicarb*	mg/kg	SOLID	-	-																							
Aldrin	mg/kg	SOLID	170	30																							
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-	14		27			<1.0000	<1.0000								<1.0000								
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																							
Aliphatics >C10-12	mg/kg	SOLID	9700	21000																							
Aliphatics >C12-16	mg/kg	SOLID	59000	25000																							
Aliphatics >C12-44	mg/kg	SOLID	-	-																							
Aliphatics >C16-21	mg/kg	SOLID	-	-																							
Aliphatics >C16-C35	mg/kg	SOLID	-	-																							
Aliphatics >C21-35	mg/kg	SOLID	-	-																							
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000																							
Aliphatics >C5-6	mg/kg	SOLID	3200	95000																							
Aliphatics >C6-8	mg/kg	SOLID	7800	150000																							
Aliphatics >C8-10	mg/kg	SOLID	2000	14000																							
Aliphatics >C8-C44*	mg/kg	SOLID	-	-																							
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																							
Ametryn	mg/kg	SOLID	-	-																							
Aminocarb*	mg/kg	SOLID	-	-																							
Amitraz*	mg/kg	SOLID	-	-																							
Anthracene	mg/kg	SOLID	520000	150000	<0.1000		<0.1000			<0.1000	<0.1000	<0.1400	2.19	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	0.12
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																							
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																							
Aromatics >C10-12	mg/kg	SOLID	16000	9200																							
Aromatics >C12-16	mg/kg	SOLID	36000	10000																							
Aromatics >C12-44	mg/kg	SOLID	-	-																							
Aromatics >C16-21	mg/kg	SOLID	28000	7600																							
Aromatics >C21-35	mg/kg	SOLID	28000	7800																							
Aromatics >C35-44	mg/kg	SOLID	28000	7800																							
Aromatics >C40-44	mg/kg	SOLID	-	-																							
Aromatics >C5-7	mg/kg	SOLID	26000	76000																							
Aromatics >C6-7	mg/kg	SOLID	-	-																							
Aromatics >C7-8	mg/kg	SOLID	56000	87000																							
Aromatics >C8-10	mg/kg	SOLID	3500	7200																							
Aromatics >C8-C44*	mg/kg	SOLID	-	-																							
Arsenic	mg/kg	SOLID	640	170	5		8			4	<2.0000	45.7	42	2.34	2.8				3			2.9	3.3	8.2		5.2	3.4
Asbestos	-	SOLID	-	-	#VALUE!																						
Asbestos (Presence of)	N/A	SOLID	-	-								#VALUE!	#VALUE!														
Asbestos (Presence of)	---	SOLID	-	-																				#VALUE!		#VALUE!	#VALUE!
Asbestos Analysts Comments	N/A	SOLID	-	-																							
Asbestos Analysts Comments	---	SOLID	-	-																				#VALUE!		#VALUE!	#VALUE!
Asbestos fibre count	---	SOLID	-	-																				#VALUE!		#VALUE!	#VALUE!
Asbestos Gravimetric Quantification	%	SOLID	-	-																							
Asbestos PCOM Quantification	%	SOLID	-	-																							
Asbestos Quantification (Total %)	%	SOLID	-	-								#VALUE!	#VALUE!														
Asbestos Quantification Stage 1	N/A	SOLID	-	-																							
Asbestos: Actinolite*	N/A	SOLID	-	-																							
Asbestos: Actinolite*	No units	SOLID	-	-																							
Asbestos: Amosite*	N/A	SOLID	-	-																							
Asbestos: Amosite*	No units	SOLID	-	-																							
Asbestos: Anthophyllite*	N/A	SOLID	-	-																							
Asbestos: Anthophyllite*	No units	SOLID	-	-																							
Asbestos: Chrysotile*	N/A	SOLID	-	-																							
Asbestos: Chrysotile*	No units	SOLID	-	-																							
Asbestos: Crocidolite*	N/A	SOLID	-	-																							
Asbestos: Crocidolite*	No units	SOLID	-	-																							
Asbestos: Tremolite*	N/A	SOLID	-	-																							
Asbestos: Tremolite*	No units	SOLID	-	-																							
Atraton	mg/kg	SOLID	-	-																							
Atrazine	mg/kg	SOLID	9300	2300																							
Azaconazole*	mg/kg	SOLID	-	-																							
Azinphos-ethyl	mg/kg	SOLID	-	-																							
Azinphos-methyl	mg/kg	SOLID	-	-																							
Azobenzene	mg/kg	SOLID	-	-																							
Azoxystrobin*	mg/kg	SOLID	-	-																							
Barium	mg/kg	SOLID	22000	5800	43		83			47	9	981	895	22.14	28.3				72			37.3	77.2	130		73	70
Benalaxyl*	mg/kg	SOLID	-	-																							
Bendiocarb*	mg/kg	SOLID	-	-																							
Benfluralin*	mg/kg	SOLID	-	-																							
Benfuracarb*	mg/kg	SOLID	-	-																							
Benzene	mg/kg	SOLID	27	190	<0.0100		<0.0100			<0.0100	<0.0100	0.003	0.007	<0.0010	<0.0010				<0.0100			<0.0010	<0.0010	<0.0100		<0.0100	<0.0100
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	<0.1000		<0.1000			<0.1000	<0.1000	<0.1400	1.31	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	0.32
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																							
Benzo(a)anthracene	mg/kg	SOLID	170	49	<0.1000		0.1			<0.1000	<0.1000	<0.1400	3.46	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	0.34
Benzo(a)pyrene	mg/kg	SOLID	76	21	<0.1000		0.1			<0.1000	<0.1000	<0.1400	2.33	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	0.86
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	<0.1000		0.2			<0.1000	<0.1000	<0.1400	3.07	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	1.1
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																							
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	<0.1000		0.1			<0.1000	<0.1000	<0.1400	1.3	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	0.34
Benzoic Acid	mg/kg	SOLID	-	-																							
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																							
Benzyl Alcohol	mg/kg	SOLID	-	-																							

Max of Normalised Results																																
					ML156-CR025	ML156-CR027	ML156-CR035	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-TP006	ML156-TP008	ML156-TP027	ML156-TP036	ML156-TP036	ML156-TP100	ML156-TP101	ML156-WS025	ML157-CP001	ML157-CP024	ML157-CR010	ML157-CR012	ML157-CR012	ML157-CR012	ML157-CR012	ML157-CR013
					Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting
					0.3	0.2	0.3	0.3	1	3.87	5.06	9.2	10.4	12.7	15.89	19.3	0.3	1.5	1	2.5	4	0.6	0.3	0.3	0.5	1	0.75	0.05	0.1	0.4	1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	GFDMP	GFDMP	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	TOP	MMG	GFDUD	MGR	MGR	GFDUD	TOP	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MMG	MGR
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500																												
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000																												
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800																												
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100																												
1,1-Biphenyl	mg/kg	SOLID	18000	17000																												
1,1-Dichloroethane	mg/kg	SOLID	260	20000																												
1,1-Dichloroethene	mg/kg	SOLID	24	3500																												
1,1-Dichloropropene	mg/kg	SOLID	-	-																												
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770																												
1,2,3-Trichloropropane	mg/kg	SOLID	-	-																												
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700																												
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310																												
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-																												
1,2-Dibromoethane	mg/kg	SOLID	-	-																												
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000																												
1,2-Dichloroethane	mg/kg	SOLID	0.67	21																												
1,2-Dichloropropane	mg/kg	SOLID	3.1	160																												
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380																												
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																												
1,3-Dichlorobenzene	mg/kg	SOLID	30	390																												
1,3-Dichloropropane	mg/kg	SOLID	-	-																												
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000																												
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																												
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																												
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																												
2,2-Dichloropropane	mg/kg	SOLID	-	-																												
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																							<0.0100				
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-																												
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																												
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-																												
2,4-Dichlorophenol	mg/kg	SOLID	-	-																												
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																												
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200																												
2,4-Dinitrophenol	mg/kg	SOLID	-	-																												
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930																												
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																												
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470																												
2-Chloronaphthalene	mg/kg	SOLID	370	1200																												
2-Chlorophenol	mg/kg	SOLID	-	-																												
2-Chlorotoluene	mg/kg	SOLID	-	-																												
2-isopropylphenol	mg/kg	SOLID	-	-																							<0.0150				
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-																												
2-Methylnaphthalene	mg/kg	SOLID	-	-																												
2-Methylphenol	mg/kg	SOLID	-	-																												
2-Nitroaniline	mg/kg	SOLID	-	-																												
2-Nitrophenol	mg/kg	SOLID	-	-																												
2-Phenylphenol*	mg/kg	SOLID	-	-																												
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																												
3/4 Methylphenol	mg/kg	SOLID	-	-																					<0.0040							
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																												
3-Nitroaniline	mg/kg	SOLID	-	-																												
4,4-DDE	mg/kg	SOLID	-	-																												
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																												
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-																												
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																												
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-																												
4-Chloroaniline	mg/kg	SOLID	-	-																												
4-Chlorophenol	mg/kg	SOLID	-	-																												
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																												
4-Chlorotoluene	mg/kg	SOLID	-	-																												
4-Isopropyltoluene	mg/kg	SOLID	-	-																												
4-Methylphenol	mg/kg	SOLID	-	-																												
4-Nitroaniline	mg/kg	SOLID	-	-																												
4-Nitrophenol	mg/kg	SOLID	-	-																												
6-Benzyladenine*	mg/kg	SOLID	-	-																												
9,10-Anthraquinone*	mg/kg	SOLID	-	-																												
Abamectin*	mg/kg	SOLID	-	-																												
Acenaphthene	mg/kg	SOLID	84000	29000	<0.0300	<0.0300	0.16	<0.1000	<0.1000								<0.0900		<0.0800	<0.1300	0.4	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0300	0.221	<0.0080	<0.0080	<0.0080	1.1
Acenaphthene-d10	%	SOLID	-	-																								88.5	99.6	98.6	91.8	94.1
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.0300	<0.0300	<0.0300	<0.1000	<0.1000								<0.0900		<0.0800	<0.1300	<0.1500	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0300	0.195	<0.0120	<0.0120	<0.0120	0.36
Acephate	mg/kg	SOLID	-	-																												
Acetamiprid*	mg/kg	SOLID	-	-																												
Acetochlor*	mg/kg	SOLID	-	-																												
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																												
Aclonifen*	mg/kg	SOLID	-	-																												
Acrinathrin*	mg/kg	SOLID	-	-																												
Additional Asbestos Components*	N/A	SOLID	-	-																												
Alachlor	mg/kg	SOLID	-	-																												
Aldicarb Sulfone	mg/kg	SOLID	-	-																												
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																												
Aldicarb*	mg/kg	SOLID	-	-																												
Aldrin	mg/kg	SOLID	170	30																												
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-				9	3																							
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																												
Aliphatics >C10-12	mg/kg	SOLID	9700	21000																												
Aliphatics >C12-16	mg/kg	SOLID	59000	25000																												
Aliphatics >C12-44	mg/kg	SOLID	-	-																												
Aliphatics >C16-21	mg/kg	SOLID	-	-																												
Aliphatics >C16-C35	mg/kg	SOLID	-	-																												
Aliphatics >C21-35	mg/kg	SOLID	-	-																												
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000																												
Aliphatics >C5-6	mg/kg	SOLID	3200	95000																												
Aliphatics >C6-8	mg/kg	SOLID	7800	150000																												
Aliphatics >C8-10	mg/kg	SOLID	2000	14000																												
Aliphatics >C8-C44*	mg/kg	SOLID	-	-																												
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																												
Ametryn	mg/kg	SOLID	-	-																												
Aminocarb*	mg/kg	SOLID	-	-																												
Amitraz*	mg/kg	SOLID	-	-																												
Anthracene	mg/kg	SOLID	520000	150000	<0.0300	0.05	0.25	<0.1000	<0.1000								<0.0900		<0.0800	0.15	0.17	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0300	0.239	<0.0160	<0.0160	<0.0160	7.98
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																												
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																												
Aromatics >C10-12	mg/kg	SOLID	16000	9200																												
Aromatics >C12-16	mg/kg	SOLID	36000	10000																												
Aromatics >C12-44	mg/kg	SOLID	-	-																												
Aromatics >C16-21	mg/kg	SOLID	28000	7600																												
Aromatics >C21-35	mg/kg	SOLID	28000	7800																												
Aromatics >C35-44	mg/kg	SOLID	28000	7800																												
Aromatics >C40-44	mg/kg	SOLID	-	-																												
Aromatics >C5-7	mg/kg	SOLID	26000	76000																												
Aromatics >C6-7	mg/kg	SOLID	-	-																												
Aromatics >C7-8	mg/kg	SOLID	56000	87000																												
Aromatics >C8-10	mg/kg	SOLID	3500	7200																												
Aromatics >C8-C44*	mg/kg	SOLID	-	-																												
Arsenic	mg/kg	SOLID	640	170	8	7.8	8.3	6	2								4.3		7	49.8	52.9	3.2	4.6	4.9	2.5	1.3	7.6		7.23	6.55	2.77	5.21
Asbestos	-	SOLID	-	-				#VALUE!																								
Asbestos (Presence of)	N/A	SOLID	-	-															#VALUE!	#VALUE!	#VALUE!											
Asbestos (Presence of)	---	SOLID	-	-		#VALUE!	#VALUE!																				#VALUE!					
Asbestos Analysts Comments	N/A	SOLID	-	-																												
Asbestos Analysts Comments	---	SOLID	-	-		#VALUE!	#VALUE!																				#VALUE!					
Asbestos fibre count	---	SOLID	-	-		#VALUE!	#VALUE!																				#VALUE!					
Asbestos Gravimetric Quantification	%	SOLID	-	-																												
Asbestos PCOM Quantification	%	SOLID	-	-																												
Asbestos Quantification (Total %)	%	SOLID	-	-																0.002												
Asbestos Quantification Stage 1	N/A	SOLID	-	-																												
Asbestos: Actinolite*	N/A	SOLID	-	-																												
Asbestos: Actinolite*	No units	SOLID	-	-																									#VALUE!	#VALUE!		#VALUE!
Asbestos: Amosite*	N/A	SOLID	-	-																												
Asbestos: Amosite*	No units	SOLID	-	-																									#VALUE!	#VALUE!		#VALUE!
Asbestos: Anthophyllite*	N/A	SOLID	-	-																												
Asbestos: Anthophyllite*	No units	SOLID	-	-																									#VALUE!	#VALUE!		#VALUE!
Asbestos: Chrysotile*	N/A	SOLID	-	-																												
Asbestos: Chrysotile*	No units	SOLID	-	-																									#VALUE!	#VALUE!		#VALUE!
Asbestos: Crocidolite*	N/A	SOLID	-	-																												
Asbestos: Crocidolite*	No units	SOLID	-	-																									#VALUE!	#VALUE!		#VALUE!
Asbestos: Tremolite*	N/A	SOLID	-	-																												
Asbestos: Tremolite*	No units	SOLID	-	-																									#VALUE!	#VALUE!		#VALUE!
Atraton	mg/kg	SOLID	-	-																												
Atrazine	mg/kg	SOLID	9300	2300																												
Azaconazole*	mg/kg	SOLID	-	-																												
Azinphos-ethyl	mg/kg	SOLID	-	-																												
Azinphos-methyl	mg/kg	SOLID	-	-																												
Azobenzene	mg/kg	SOLID	-	-																												
Azoxystrobin*	mg/kg	SOLID	-	-																												
Barium	mg/kg	SOLID	22000	5800	200	190	160	110	57								68.2		51.3	632	603	39.9	52	28.7	27	24.9	29		113	64.4	38.6	245
Benalaxyl*	mg/kg	SOLID	-	-																												
Bendiocarb*	mg/kg	SOLID	-	-																												
Benfluralin*	mg/kg	SOLID	-	-																												
Benfuracarb*	mg/kg	SOLID	-	-																												
Benzene	mg/kg	SOLID	27	190	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100								<0.0010		<0.0010	<0.0020	0.007	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	<0.0300	<0.0300	0.06	<0.1000	<0.1000								<0.0900		<0.0800	0.18	0.22	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.04	0.47	<0.0240	0.0387	<0.0240	26.2
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																												
Benzo(a)anthracene	mg/kg	SOLID	170	49	0.08	0.07	0.21	<0.1000	<0.1000								<0.0900		<0.0800	0.24	0.42	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0300	0.241	<0.0140	0.0339	<0.0140	58.8
Benzo(a)pyrene	mg/kg	SOLID	76	21	0.08	0.08	0.13	<0.1000	<0.1000								<0.0900		<0.0800	0.23	0.33	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0300	0.288	0.0196	0.0383	<0.0150	50
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	0.15	0.1	0.16	<0.1000	<0.1000								0.13		<0.0800	0.41	0.46	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.05	0.318	0.0209	0.0558	<0.0150	57.9
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																												
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	0.13	<0.0300	0.05	<0.1000	<0.1000								<0.0900		<0.0800	0.2	<0.1500	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0300	0.248	<0.0140	0.0226	<0.0140	26.7
Benzoic Acid	mg/kg	SOLID	-	-																												
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																												
Benzyl Alcohol	mg/kg	SOLID	-	-																												

Max of Normalised Results					ML157-CR013	ML157-CR014	ML157-CR014	ML157-CR014	ML157-CR015	ML157-CR015	ML157-CR021	ML157-CR021	ML157-CR022	ML157-CR027	ML157-CR027	ML157-CR027	ML157-CT011	ML157-CT013	ML157-CT014	ML157-CT015	ML157-CT017	ML157-CT018	ML157-CT018	ML157-CT019	ML157-CT019	ML157-CT027	ML157-CT027	ML157-CT039	ML157-CT039	ML157-CT039	ML157-TP001	ML157-TP063	ML157-WS036	ML157-WS067	ML157-WS067
					Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment	Packington Embankment	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting
					0.9	0.05	0.6	2.2	0.5	1	0.05	9.5	1	0.05	0.5	0.9	0.3	1	0.7	0.5	0.4	0.1	0.5	0.05	1	0.05	1	0.05	0.2	0.9	1	0.7	0.7	0.05	2.8
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GFSG	MGR	MGR	MMG	MGR	MMG	TOP	MMG	MGR	MGR	MGR	MMG	MMG	MGR	SUPDC	SUPDC	SUPDC	MGR	SUPDC	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	GFDUD	TOP	GFDUD
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500																											<0.0010				
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000																											<0.0010				
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800																											<0.0010				
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100																											<0.0010				
1,1-Biphenyl	mg/kg	SOLID	18000	17000																											<0.1000				
1,1-Dichloroethane	mg/kg	SOLID	260	20000																											<0.0010				
1,1-Dichloroethene	mg/kg	SOLID	24	3500																															
1,1-Dichloropropene	mg/kg	SOLID	-	-																											<0.0010				
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770																											<0.0030				
1,2,3-Trichloropropane	mg/kg	SOLID	-	-																											<0.0010				
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700																											<0.0030				
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310																											<0.0010				
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-																											<0.0010				
1,2-Dibromoethane	mg/kg	SOLID	-	-																											<0.0010				
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000																											<0.0010				
1,2-Dichloroethane	mg/kg	SOLID	0.67	21																											<0.0010				
1,2-Dichloropropane	mg/kg	SOLID	3.1	160																											<0.0010				
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380																											<0.0010				
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																															
1,3-Dichlorobenzene	mg/kg	SOLID	30	390																											<0.0010				
1,3-Dichloropropane	mg/kg	SOLID	-	-																											<0.0010				
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000																											<0.0010				
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																															
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																															
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																															
2,2-Dichloropropane	mg/kg	SOLID	-	-																											<0.0010				
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-										<0.0100										<0.0100				<0.0100							
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-																											<0.1000				
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																															
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-																											<0.1000				
2,4-Dichlorophenol	mg/kg	SOLID	-	-																											<0.1000				
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																															
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200																											<0.1000				
2,4-Dinitrophenol	mg/kg	SOLID	-	-																											<0.6000				
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930																											<0.2000				
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																															
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470																											<0.6000				
2-Chloronaphthalene	mg/kg	SOLID	370	1200																											<0.1000				
2-Chlorophenol	mg/kg	SOLID	-	-																											<0.1000				
2-Chlorotoluene	mg/kg	SOLID	-	-																											<0.0010				
2-isopropylphenol	mg/kg	SOLID	-	-										<0.0150										<0.0150				<0.0150							
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-																											<0.2000				
2-Methylnaphthalene	mg/kg	SOLID	-	-																											<0.1000				
2-Methylphenol	mg/kg	SOLID	-	-																											<0.1000				
2-Nitroaniline	mg/kg	SOLID	-	-																											<0.6000				
2-Nitrophenol	mg/kg	SOLID	-	-																											<0.1000				
2-Phenylphenol*	mg/kg	SOLID	-	-																															
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																											<0.6000				
3/4 Methylphenol	mg/kg	SOLID	-	-																											<0.0050				
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																															
3-Nitroaniline	mg/kg	SOLID	-	-																											<16.7000				
4,4-DDE	mg/kg	SOLID	-	-																															
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																															
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-																											<0.1000				
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																											<0.1000				
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-																											<0.1000				
4-Chloroaniline	mg/kg	SOLID	-	-																											<0.6000				
4-Chlorophenol	mg/kg	SOLID	-	-																											<0.6000				
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																															
4-Chlorotoluene	mg/kg	SOLID	-	-																											<0.0010				
4-Isopropyltoluene	mg/kg	SOLID	-	-																											<0.0010				
4-Methylphenol	mg/kg	SOLID	-	-																															
4-Nitroaniline	mg/kg	SOLID	-	-																											<0.7000				
4-Nitrophenol	mg/kg	SOLID	-	-																											<0.6000				
6-Benzyladenine*	mg/kg	SOLID	-	-																															
9,10-Anthraquinone*	mg/kg	SOLID	-	-																															
Abamectin*	mg/kg	SOLID	-	-																															
Acenaphthene	mg/kg	SOLID	84000	29000	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.1000	<0.1000	<0.0300	<0.0800	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	0.0228	<0.0080	<0.0080	<0.0800	<0.0080	0.173	<0.0080	<0.0800	<0.0800	<0.0080	0.8	<0.0900	<0.0900	<0.1000	<0.0800
Acenaphthene-d10	%	SOLID	-	-	95.3	94.1	94	123	101	96.2				99.6	91.2	108	96.3	96.2	92.1	90.6	92.4	89.6	93.7	89.6	97	97.2	90	98.4	91.2	92.9					
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.0120	<0.0120	<0.0120	<0.0120	<0.0120	<0.0120	<0.1000	<0.1000	<0.0300	<0.1200	<0.0120	<0.0120	<0.0120	<0.0120	<0.0120	<0.0120	<0.0120	<0.0120	<0.0120	<0.1200	<0.0120	0.112	0.0153	<0.1200	<0.1200	<0.0120	<0.0900	<0.0900	<0.0900	<0.1000	<0.0800
Acephate	mg/kg	SOLID	-	-																															
Acetamiprid*	mg/kg	SOLID	-	-																															
Acetochlor*	mg/kg	SOLID	-	-																															
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																															
Aclonifen*	mg/kg	SOLID	-	-																															
Acrinathrin*	mg/kg	SOLID	-	-																															
Additional Asbestos Components*	N/A	SOLID	-	-																															
Alachlor	mg/kg	SOLID	-	-																															
Aldicarb Sulfone	mg/kg	SOLID	-	-																															
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																															
Aldicarb*	mg/kg	SOLID	-	-																															
Aldrin	mg/kg	SOLID	170	30																															
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-																															
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																															
Aliphatics >C10-12	mg/kg	SOLID	9700	21000																											<5.0000				
Aliphatics >C12-16	mg/kg	SOLID	59000	25000																											<5.0000				
Aliphatics >C12-44	mg/kg	SOLID	-	-																															
Aliphatics >C16-21	mg/kg	SOLID	-	-																															
Aliphatics >C16-C35	mg/kg	SOLID	-	-																											16.4				
Aliphatics >C21-35	mg/kg	SOLID	-	-																															
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000																											<6.4900				
Aliphatics >C5-6	mg/kg	SOLID	3200	95000																											<0.2000				
Aliphatics >C6-8	mg/kg	SOLID	7800	150000																															
Aliphatics >C8-10	mg/kg	SOLID	2000	14000																											<5.0000				
Aliphatics >C8-C44*	mg/kg	SOLID	-	-																															
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																															
Ametryn	mg/kg	SOLID	-	-																															
Aminocarb*	mg/kg	SOLID	-	-																															
Amitraz*	mg/kg	SOLID	-	-																															
Anthracene	mg/kg	SOLID	520000	150000	<0.0160	0.0211	<0.0160	<0.0160	<0.0160	<0.0160	<0.1000	<0.1000	<0.0300	<0.1600	<0.0160	<0.0160	<0.0160	<0.0160	<0.0160	<0.0160	<0.0160	<0.0160	<0.0160	<0.1600	<0.0160	0.59	0.0246	<0.1600	<0.1600	<0.0160	2.4	<0.0900	<0.0900	<0.1000	<0.0800
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																															
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																															
Aromatics >C10-12	mg/kg	SOLID	16000	9200																											<5.0000				
Aromatics >C12-16	mg/kg	SOLID	36000	10000																											<5.0000				
Aromatics >C12-44	mg/kg	SOLID	-	-																															
Aromatics >C16-21	mg/kg	SOLID	28000	7600																											<5.0000				
Aromatics >C21-35	mg/kg	SOLID	28000	7800																											<10.1200				
Aromatics >C35-44	mg/kg	SOLID	28000	7800																											<6.4900				
Aromatics >C40-44	mg/kg	SOLID	-	-																															
Aromatics >C5-7	mg/kg	SOLID	26000	76000																											<0.0100				
Aromatics >C6-7	mg/kg	SOLID	-	-																															
Aromatics >C7-8	mg/kg	SOLID	56000	87000																															
Aromatics >C8-10	mg/kg	SOLID	3500	7200																											<5.0000				
Aromatics >C8-C44*	mg/kg	SOLID	-	-																															
Arsenic	mg/kg	SOLID	640	170	4.56	8.01	4.03	4.06	4.11	3.78	2.4	5	4.7		1.85	2	3.05	3.45	1.43	2.38	2.53	4.53	1.73		6.73	11.4	2.36		2.26	3.67	4.9	2.3	1.1	3.8	0.6
Asbestos	-	SOLID	-	-																															
Asbestos (Presence of)	N/A	SOLID	-	-																															
Asbestos (Presence of)	---	SOLID	-	-																															
Asbestos Analysts Comments	N/A	SOLID	-	-																															
Asbestos Analysts Comments	---	SOLID	-	-																															
Asbestos fibre count	---	SOLID	-	-																															
Asbestos Gravimetric Quantification	%	SOLID	-	-																															
Asbestos PCOM Quantification	%	SOLID	-	-																															
Asbestos Quantification (Total %)	%	SOLID	-	-																															
Asbestos Quantification Stage 1	N/A	SOLID	-	-																															
Asbestos: Actinolite*	N/A	SOLID	-	-																															
Asbestos: Actinolite*	No units	SOLID	-	-			#VALUE!		#VALUE!					#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!		#VALUE!	#VALUE!	#VALUE!						
Asbestos: Amosite*	N/A	SOLID	-	-																															
Asbestos: Amosite*	No units	SOLID	-	-			#VALUE!		#VALUE!					#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!		#VALUE!	#VALUE!	#VALUE!						
Asbestos: Anthophyllite*	N/A	SOLID	-	-																															
Asbestos: Anthophyllite*	No units	SOLID	-	-			#VALUE!		#VALUE!					#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!		#VALUE!	#VALUE!	#VALUE!						
Asbestos: Chrysotile*	N/A	SOLID	-	-																															
Asbestos: Chrysotile*	No units	SOLID	-	-			#VALUE!		#VALUE!					#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!		#VALUE!	#VALUE!	#VALUE!						
Asbestos: Crocidolite*	N/A	SOLID	-	-																															
Asbestos: Crocidolite*	No units	SOLID	-	-			#VALUE!		#VALUE!					#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!		#VALUE!	#VALUE!	#VALUE!						
Asbestos: Tremolite*	N/A	SOLID	-	-																															
Asbestos: Tremolite*	No units	SOLID	-	-			#VALUE!		#VALUE!					#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!		#VALUE!	#VALUE!	#VALUE!						
Atraton	mg/kg	SOLID	-	-																															
Atrazine	mg/kg	SOLID	9300	2300																															
Azaconazole*	mg/kg	SOLID	-	-																															
Azinphos-ethyl	mg/kg	SOLID	-	-																															
Azinphos-methyl	mg/kg	SOLID	-	-																															
Azobenzene	mg/kg	SOLID	-	-																															
Azoxystrobin*	mg/kg	SOLID	-	-																															
Barium	mg/kg	SOLID	22000	5800	79.7	138	45.2	64.8	135	56.2	28	81	90		62.3	65.7	69.2	59.3	109	58.3	39.2	131	58.2		54.9	193	126		61.6	33.7	34.1	20.4	19.5	46.1	20.7
Benalaxyl*	mg/kg	SOLID	-	-																															
Bendiocarb*	mg/kg	SOLID	-	-																															
Benfluralin*	mg/kg	SOLID	-	-																															
Benfuracarb*	mg/kg	SOLID	-	-																															
Benzene	mg/kg	SOLID	27	190	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100		<0.0100	<0.0100	<0.0100		<0.0100	<0.0100	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	<0.0240	0.0898	<0.0240	<0.0240	<0.0240	<0.0240	<0.1000	<0.1000	<0.0300	<0.2400	<0.0240	<0.0240	0.0328	0.0668	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	0.384	0.0355	1.24	0.104	0.259	<0.2400	<0.0240	1.3	<0.0900	<0.0900	<0.1000	<0.0800
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																															
Benzo(a)anthracene	mg/kg	SOLID	170	49	<0.0140	0.118	<0.0140	<0.0140	<0.0140	<0.0140	<0.1000	<0.1000	<0.0300	<0.1400	<0.0140	<0.0140	0.0346	0.0468	<0.0140	<0.0140	<0.0140	<0.0140	<0.0140	<0.1400	0.041	2.17	0.0993	<0.1400	<0.1400	<0.0140	2.8	<0.0900	<0.0900	<0.1000	<0.0800
Benzo(a)pyrene	mg/kg	SOLID	76	21	0.0257	0.103	<0.0150	<0.0150	<0.0150	<0.0150	<0.1000	<0.1000	<0.0300	<0.1500	<0.0150	<0.0150	0.0402	0.0739	<0.0150	<0.0150	0.0208	0.0237	<0.0150	0.222	0.0365	2.06	0.131	0.201	0.179	<0.0150	2.4	<0.0900	<0.0900	<0.1000	<0.0800
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	0.0224	0.135	<0.0150	<0.0150	<0.0150	<0.0150	<0.1000	<0.1000	<0.0300	<0.1500	<0.0150	<0.0150	0.0465	0.0996	<0.0150	<0.0150	0.0242	0.0264	<0.0150	0.263	0.0433	2.7	0.131	0.276	0.174	<0.0150	2.8	<0.0900	<0.0900	<0.1000	<0.0800
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																															
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	<0.0140	0.0624	<0.0140	<0.0140	<0.0140	<0.0140	<0.1000	<0.1000	<0.0300	<0.1400	<0.0140	<0.0140	0.0198	0.0399	<0.0140	<0.0140	<0.0140	<0.0140	<0.0140	<0.1400	0.0185	1.06	0.067	<0.1400	<0.1400	<0.0140	1	<0.0900	<0.0900	<0.1000	<0.0800
Benzoic Acid	mg/kg	SOLID	-	-																											<0.6000				
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																															
Benzyl Alcohol	mg/kg	SOLID	-	-																											<0.6000				

Max of Normalised Results																										
					ML158-CP002	ML158-CP002	ML158-CP002	ML158-CP005	ML158-CP005	ML158-CP005	ML158-CP007	ML158-CP007	ML158-CP007	ML158-CP021	ML158-CP021	ML158-CP402	ML158-CP402	ML158-CR003	ML158-CR003	ML158-CR007	ML158-CR007	ML158-TP008	ML158-TP008	ML158-TP008	ML158-WS012	ML158-WS012
					Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Packington Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure
					1.05	3.05	3.65	0.5	1	1.3	1.05	3.05	3.85	0.05	0.4	0.3	0.5	0.05	1.05	0.05	5.05	1.05	2.05	3.05	0.4	1.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	GFDUD	MGR	MGR	GFDUD	MGR	MGR	GFDUD	MGR	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	MGR	GFDUD
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000					<0.0700			<0.0070				<0.0500	<0.0500						<0.0070			
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
1,1-Biphenyl	mg/kg	SOLID	18000	17000																						
1,1-Dichloroethane	mg/kg	SOLID	260	20000					<0.0800			<0.0080				<0.0500	<0.0500						<0.0080			
1,1-Dichloroethene	mg/kg	SOLID	24	3500					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
1,1-Dichloropropene	mg/kg	SOLID	-	-					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770					<0.2000			<0.0200											<0.0200			
1,2,3-Trichloropropane	mg/kg	SOLID	-	-					<0.1600			<0.0160				<0.0500	<0.0500						<0.0160			
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700					<0.1000			<0.0200				<0.1000	<0.1000						<0.0200			
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310					<0.0900			<0.0090				<0.0500	<0.0500						<0.0090			
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-					<0.1400			<0.0140											<0.0140			
1,2-Dibromoethane	mg/kg	SOLID	-	-					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
1,2-Dichloroethane	mg/kg	SOLID	0.67	21					<0.0500			<0.0050				<0.0500	<0.0500						<0.0050			
1,2-Dichloropropane	mg/kg	SOLID	3.1	160					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380																						
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-					<0.0800			<0.0080				<0.0500	<0.0500						<0.0080			
1,3-Dichlorobenzene	mg/kg	SOLID	30	390					<0.0800			<0.0080				<0.0500	<0.0500						<0.0080			
1,3-Dichloropropane	mg/kg	SOLID	-	-					<0.0700			<0.0070				<0.0500	<0.0500						<0.0070			
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000					<0.0500			<0.0050				<0.0500	<0.0500						<0.0050			
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																						
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																						
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																						
2,2-Dichloropropane	mg/kg	SOLID	-	-					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																						
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																						
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
2,4-Dichlorophenol	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																						
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
2,4-Dinitrophenol	mg/kg	SOLID	-	-																						
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																						
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
2-Chloronaphthalene	mg/kg	SOLID	370	1200					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
2-Chlorophenol	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
2-Chlorotoluene	mg/kg	SOLID	-	-					<0.0900			<0.0090				<0.0500	<0.0500						<0.0090			
2-isopropylphenol	mg/kg	SOLID	-	-																						
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-																						
2-Methylnaphthalene	mg/kg	SOLID	-	-					0.182			<0.1000				<0.1000	<0.1000						<0.1000			
2-Methylphenol	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
2-Nitroaniline	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
2-Nitrophenol	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
2-Phenylphenol*	mg/kg	SOLID	-	-																						
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																						
3/4 Methylphenol	mg/kg	SOLID	-	-												<0.1000	<0.1000									
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																						
3-Nitroaniline	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
4,4-DDE	mg/kg	SOLID	-	-																						
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-					94.3			72.2											77.8			
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-					<0.1000			<0.1000											<0.1000			
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
4-Chloroaniline	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
4-Chlorophenol	mg/kg	SOLID	-	-																						
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-												<0.1000	<0.1000									
4-Chlorotoluene	mg/kg	SOLID	-	-					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
4-Isopropyltoluene	mg/kg	SOLID	-	-					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
4-Methylphenol	mg/kg	SOLID	-	-					<0.1000			<0.1000											<0.1000			
4-Nitroaniline	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
4-Nitrophenol	mg/kg	SOLID	-	-					<0.1000			<0.1000											<0.1000			
6-Benzyladenine*	mg/kg	SOLID	-	-																						
9,10-Anthraquinone*	mg/kg	SOLID	-	-																						
Abamectin*	mg/kg	SOLID	-	-																						
Acenaphthene	mg/kg	SOLID	84000	29000	0.856	2.92	0.388	5.65	0.527	0.077	0.0096	0.0433	<0.0080	<0.0080	<0.0080	<0.1000	<0.1000	0.0142	<0.0080	<0.0080	0.298	0.0147	<0.0800	0.0103	<0.0080	<0.0080
Acenaphthene-d10	%	SOLID	-	-	95.7	95.9	94.1	99.6	110	109	104	100	96.6	97.5	112			90.3	102	103	102	101	104	103	112	100
Acenaphthylene	mg/kg	SOLID	83000	29000	0.504	1.36	0.303	0.854	0.306	0.0363	0.0438	0.0207	<0.0120	<0.0120	<0.0120	<0.1000	<0.1000	0.0191	<0.0120	<0.0120	0.0176	<0.0120	<0.1000	<0.0120	<0.0120	<0.0120
Acephate	mg/kg	SOLID	-	-																						
Acetamiprid*	mg/kg	SOLID	-	-																						
Acetochlor*	mg/kg	SOLID	-	-																						
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																						
Aclonifen*	mg/kg	SOLID	-	-																						
Acrinathrin*	mg/kg	SOLID	-	-																						
Additional Asbestos Components*	N/A	SOLID	-	-																		#VALUE!				
Alachlor	mg/kg	SOLID	-	-																						
Aldicarb Sulfone	mg/kg	SOLID	-	-																						
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																						
Aldicarb*	mg/kg	SOLID	-	-																						
Aldrin	mg/kg	SOLID	170	30																						
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-												80	25									
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-	1170	5240	268		1740		61.7			25.6					54		130		442			
Aliphatics >C10-12	mg/kg	SOLID	9700	21000	0.678	3.51	1.71		0.29		<0.0100			<0.0100					<0.0100		0.138		<0.0100			
Aliphatics >C12-16	mg/kg	SOLID	59000	25000	54.6	253	7.96		21.3		<0.1000			<0.1000					0.478		<0.1000		<0.1000			
Aliphatics >C12-44	mg/kg	SOLID	-	-	709	3120	141		635		16.8			5.12					26.7		50.7		170			
Aliphatics >C16-21	mg/kg	SOLID	-	-	126	529	25.5		67.1		0.753			<0.1000					4.12		2.41		6.36			
Aliphatics >C16-C35	mg/kg	SOLID	-	-																						
Aliphatics >C21-35	mg/kg	SOLID	-	-	471	2010	95.8		350		15.3			5.12					17.6		27.6		108			
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000	57.1	327	11.9		196		0.771			<0.1000					4.46		20.6		55.3			
Aliphatics >C5-6	mg/kg	SOLID	3200	95000	<0.0100	0.0329	0.022		0.018		<0.0100			<0.0100					<0.0100		<0.0100		<0.0100			
Aliphatics >C6-8	mg/kg	SOLID	7800	150000	0.0242	0.221	0.116		0.0504		<0.0100			<0.0100					<0.0100		0.0172		<0.0100			
Aliphatics >C8-10	mg/kg	SOLID	2000	14000	0.352	2.14	0.918		0.164		0.0104			<0.0100					<0.0100		0.0558		<0.0100			
Aliphatics >C8-C44*	mg/kg	SOLID	-	-																						
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																						
Ametryn	mg/kg	SOLID	-	-																						
Aminocarb*	mg/kg	SOLID	-	-																						
Amitraz*	mg/kg	SOLID	-	-																						
Anthracene	mg/kg	SOLID	520000	150000	1.37	3.26	0.434	10.5	0.968	0.141	0.028	0.0586	<0.0160	<0.0160	<0.0160	<0.1000	<0.1000	0.0472	<0.0160	<0.0160	0.207	0.0185	<0.1000	0.0213	<0.0160	<0.0160
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																						
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																						
Aromatics >C10-12	mg/kg	SOLID	16000	9200	0.453	2.34	1.14		0.194		<0.0100			<0.0100					<0.0100		0.0923		<0.0100			
Aromatics >C12-16	mg/kg	SOLID	36000	10000	31.8	95.2	3.56		10		<0.1000			<0.1000					<0.1000		<0.1000		0.896			
Aromatics >C12-44	mg/kg	SOLID	-	-	462	2110	122		1100		44.9			20.5					27.4		79.4		272			
Aromatics >C16-21	mg/kg	SOLID	28000	7600	94.5	346	18.7		88.4		1.95			1.28					1.12		4.86		6.9			
Aromatics >C21-35	mg/kg	SOLID	28000	7800	282	1400	79.6		606		29			12.7					15.4		40.5		150			
Aromatics >C35-44	mg/kg	SOLID	28000	7800	54.1	267	20.4		397		14			6.52					10.9		34		114			
Aromatics >C40-44	mg/kg	SOLID	-	-	18.6	90.6	7.79		172		4.08			3.02					4.83		15.5		48.8			
Aromatics >C5-7	mg/kg	SOLID	26000	76000																						
Aromatics >C6-7	mg/kg	SOLID	-	-	<0.0100	<0.0100	<0.0100		<0.0100		<0.0100			<0.0100					<0.0100		<0.0100		<0.0100			
Aromatics >C7-8	mg/kg	SOLID	56000	87000	<0.0100	0.0151	0.0116		<0.0100		<0.0100			<0.0100					<0.0100		<0.0100		<0.0100			
Aromatics >C8-10	mg/kg	SOLID	3500	7200	0.266	1.55	0.694		0.115		<0.0100			<0.0100					<0.0100		0.0397		<0.0100			
Aromatics >C8-C44*	mg/kg	SOLID	-	-																						
Arsenic	mg/kg	SOLID	640	170												5	3									
Asbestos	-	SOLID	-	-												#VALUE!	#VALUE!									
Asbestos (Presence of)	N/A	SOLID	-	-																						
Asbestos (Presence of)	---	SOLID	-	-																						
Asbestos Analysts Comments	N/A	SOLID	-	-																		#VALUE!				
Asbestos Analysts Comments	---	SOLID	-	-																						
Asbestos fibre count	---	SOLID	-	-																						
Asbestos Gravimetric Quantification	%	SOLID	-	-																		0.0021				
Asbestos PCOM Quantification	%	SOLID	-	-																		<0.0010				
Asbestos Quantification (Total %)	%	SOLID	-	-																		0.0023				
Asbestos Quantification Stage 1	N/A	SOLID	-	-																						
Asbestos: Actinolite*	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!			#VALUE!					#VALUE!		#VALUE!	#VALUE!			#VALUE!	
Asbestos: Actinolite*	No units	SOLID	-	-																						
Asbestos: Amosite*	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!			#VALUE!					#VALUE!		#VALUE!	#VALUE!			#VALUE!	
Asbestos: Amosite*	No units	SOLID	-	-																						
Asbestos: Anthophyllite*	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!			#VALUE!					#VALUE!		#VALUE!	#VALUE!			#VALUE!	
Asbestos: Anthophyllite*	No units	SOLID	-	-																						
Asbestos: Chrysotile*	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!			#VALUE!					#VALUE!		#VALUE!	#VALUE!			#VALUE!	
Asbestos: Chrysotile*	No units	SOLID	-	-																						
Asbestos: Crocidolite*	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!			#VALUE!					#VALUE!		#VALUE!	#VALUE!			#VALUE!	
Asbestos: Crocidolite*	No units	SOLID	-	-																						
Asbestos: Tremolite*	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!			#VALUE!					#VALUE!		#VALUE!	#VALUE!			#VALUE!	
Asbestos: Tremolite*	No units	SOLID	-	-																						
Atraton	mg/kg	SOLID	-	-																						
Atrazine	mg/kg	SOLID	9300	2300																						
Azaconazole*	mg/kg	SOLID	-	-																						
Azinphos-ethyl	mg/kg	SOLID	-	-																						
Azinphos-methyl	mg/kg	SOLID	-	-																						
Azobenzene	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Azoxystrobin*	mg/kg	SOLID	-	-																						
Barium	mg/kg	SOLID	22000	5800	112	498	119	147	176	41.4	24.4	76.9	65.8	58.4	32.2	41	17	96.5	66.2	86.6	93.6	86.9	2730	46.5	90.1	45.7
Benalaxyl*	mg/kg	SOLID	-	-																						
Bendiocarb*	mg/kg	SOLID	-	-																						
Benfluralin*	mg/kg	SOLID	-	-																						
Benfuracarb*	mg/kg	SOLID	-	-																						
Benzene	mg/kg	SOLID	27	190	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0090	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0090	<0.0100	<0.0100	<0.0100
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	1.46	3.83	0.799	16.7	2.53	0.347	0.122	0.0812	<0.0240	0.1	0.0414	<0.1000	<0.1000	<0.0240	<0.0240	0.0675	0.197	0.0284	1.59	0.0516	0.0653	<0.0240
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-					1.47																	
Benzo(a)anthracene	mg/kg	SOLID	170	49	1.54	3.92	0.545	25.2	2.35	0.328	0.0675	0.0953	<0.0140	0.105	0.055	<0.1000	<0.1000	0.0366	<0.0140	0.0403	0.297	0.0452	0.547	0.0532	0.0407	0.0238
Benzo(a)pyrene	mg/kg	SOLID	76	21	1.93	5.59	1.01	31.3	3.83	0.466	0.0998	0.0994	<0.0150	0.111	0.0442	<0.1000	<0.1000	0.0488	0.0196	0.082	0.292	0.0349	1.64	0.0656	0.0592	<0.0150
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	2.12	5.4	0.945	34.4	4.38	0.609	0.143	0.152	<0.0150	0.169	0.077	<0.1000	<0.1000	0.0713	<0.0150	0.132	0.403	0.0477	1.65	0.0706	0.0523	<0.0150
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-												0.2	<0.1000									
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	0.811	1.88	0.38	14.6	1.53	0.178	0.0494	0.0512	<0.0140	0.0653	0.0233	<0.1000	<0.1000	0.045	<0.0140	0.0461	0.155	0.0158	0.525	0.0301	0.0224	<0.0140
Benzoic Acid	mg/kg	SOLID	-	-																						
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-					2.11																	
Benzyl Alcohol	mg/kg	SOLID	-	-																						

Max of Normalised Results																										
					ML158-WS013	ML158-WS014	ML158-WS015	ML158-WS016	ML158-WS016	ML159-CP003	ML159-CP003	ML159-CP003	ML159-CP018	ML159-CR003	ML159-CR003	ML159-CR008a	ML159-CR018	ML159-CR018	ML159-CR408	ML159-CR408	ML159-CR408	ML159-CR408	ML159-CR410	ML159-CR410	ML159-TP004	ML159-TP015
					Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	M6 Motorway South Viaduct	M6 Motorway Box Structure	M6 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	M6 Motorway Box Structure	M6 Motorway Box Structure	Pool Wood Embankment	M6 Motorway Box Structure
					1	0.5	0.2	1	3	0.05	1.05	1.2	0	0.05	0.6	1.2	1.6	3.6	0.3	0.5	1	1.5	0.3	1	0.05	0.15
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	TOP	MGR	GFDUD	MGR	MGR	MGR	GFDUD	GFDUD	GFDUD	GFDUD	GFDUD	GFDUD	TOP	MGR
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500														<0.0010								
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000														<0.0010								
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800														<0.0010								
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100														<0.0010								
1,1-Biphenyl	mg/kg	SOLID	18000	17000														<0.1000								
1,1-Dichloroethane	mg/kg	SOLID	260	20000														<0.0010								
1,1-Dichloroethene	mg/kg	SOLID	24	3500														<0.0010								
1,1-Dichloropropene	mg/kg	SOLID	-	-														<0.0010								
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770														<0.0030								
1,2,3-Trichloropropane	mg/kg	SOLID	-	-														<0.0010								
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700														<0.0030								
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310														<0.0010								
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-														<0.0010								
1,2-Dibromoethane	mg/kg	SOLID	-	-														<0.0010								
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000														<0.0010								
1,2-Dichloroethane	mg/kg	SOLID	0.67	21														<0.0010								
1,2-Dichloropropane	mg/kg	SOLID	3.1	160														<0.0010								
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380														<0.0010								
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																						
1,3-Dichlorobenzene	mg/kg	SOLID	30	390														<0.0010								
1,3-Dichloropropane	mg/kg	SOLID	-	-														<0.0010								
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000														<0.0010								
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																						
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																						
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																						
2,2-Dichloropropane	mg/kg	SOLID	-	-														<0.0010								
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																						
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-														<0.1000								
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																						
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-														<0.1000								
2,4-Dichlorophenol	mg/kg	SOLID	-	-														<0.1000								
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																						
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200														<0.1000								
2,4-Dinitrophenol	mg/kg	SOLID	-	-														<0.6000								
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930														<0.2000								
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																						
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470														<0.6000								
2-Chloronaphthalene	mg/kg	SOLID	370	1200														<0.1000								
2-Chlorophenol	mg/kg	SOLID	-	-														<0.1000								
2-Chlorotoluene	mg/kg	SOLID	-	-														<0.0010								
2-isopropylphenol	mg/kg	SOLID	-	-																						
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-														<0.2000								
2-Methylnaphthalene	mg/kg	SOLID	-	-														<0.1000								
2-Methylphenol	mg/kg	SOLID	-	-														<0.1000								
2-Nitroaniline	mg/kg	SOLID	-	-														<0.6000								
2-Nitrophenol	mg/kg	SOLID	-	-														<0.1000								
2-Phenylphenol*	mg/kg	SOLID	-	-																						
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-														#VALUE!								
3/4 Methylphenol	mg/kg	SOLID	-	-														<0.1000								
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																						
3-Nitroaniline	mg/kg	SOLID	-	-														<16.2000								
4,4-DDE	mg/kg	SOLID	-	-																						
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																						
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-														<0.1000								
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-														<0.1000								
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-														<0.1000								
4-Chloroaniline	mg/kg	SOLID	-	-														<0.6000								
4-Chlorophenol	mg/kg	SOLID	-	-														<0.6000								
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																						
4-Chlorotoluene	mg/kg	SOLID	-	-														<0.0010								
4-Isopropyltoluene	mg/kg	SOLID	-	-														<0.0010								
4-Methylphenol	mg/kg	SOLID	-	-																						
4-Nitroaniline	mg/kg	SOLID	-	-														<0.7000								
4-Nitrophenol	mg/kg	SOLID	-	-														<0.6000								
6-Benzyladenine*	mg/kg	SOLID	-	-																						
9,10-Anthraquinone*	mg/kg	SOLID	-	-																						
Abamectin*	mg/kg	SOLID	-	-																						
Acenaphthene	mg/kg	SOLID	84000	29000	<0.0080	0.0102	0.0229	<0.0080	0.0617	0.0498	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.0900	<0.0900	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.0080	<0.0900
Acenaphthene-d10	%	SOLID	-	-	92.2	104	108	92.8	99.1	97.4	99.1	93.2	90.8	101	98.1										99.5	
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.0120	0.0291	0.0265	<0.0120	<0.0120	0.0358	0.0202	<0.0120	<0.0120	<0.0120	<0.0120	<0.0900	<0.0900	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.0120	<0.0900
Acephate	mg/kg	SOLID	-	-																						
Acetamiprid*	mg/kg	SOLID	-	-																						
Acetochlor*	mg/kg	SOLID	-	-																						
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																						
Aclonifen*	mg/kg	SOLID	-	-																						
Acrinathrin*	mg/kg	SOLID	-	-																						
Additional Asbestos Components*	N/A	SOLID	-	-					#VALUE!																	
Alachlor	mg/kg	SOLID	-	-																						
Aldicarb Sulfone	mg/kg	SOLID	-	-																						
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																						
Aldicarb*	mg/kg	SOLID	-	-																						
Aldrin	mg/kg	SOLID	170	30																						
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-															39		10	<1.0000	28	<1.0000		
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-			160																			
Aliphatics >C10-12	mg/kg	SOLID	9700	21000			0.0162												<1.0000		<1.0000	<1.0000	<1.0000	<1.0000		
Aliphatics >C12-16	mg/kg	SOLID	59000	25000			<0.1000												<2.0000		<2.0000	<2.0000	2	<2.0000		
Aliphatics >C12-44	mg/kg	SOLID	-	-			56.5																			
Aliphatics >C16-21	mg/kg	SOLID	-	-			<0.1000												2		1	2	3	1		
Aliphatics >C16-C35	mg/kg	SOLID	-	-																						
Aliphatics >C21-35	mg/kg	SOLID	-	-			30												<4.0000		<4.0000	<4.0000	11	<4.0000		
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000			26.4												1		<1.0000	<1.0000	1	2		
Aliphatics >C5-6	mg/kg	SOLID	3200	95000			<0.0100												<0.1000		<0.1000	<0.1000	<0.1000	<0.1000		
Aliphatics >C6-8	mg/kg	SOLID	7800	150000			0.0104												<0.1000		<0.1000	<0.1000	<0.1000	<0.1000		
Aliphatics >C8-10	mg/kg	SOLID	2000	14000			0.0336												<0.1000		<0.1000	<0.1000	<0.1000	<0.1000		
Aliphatics >C8-C44*	mg/kg	SOLID	-	-																						
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																						
Ametryn	mg/kg	SOLID	-	-																						
Aminocarb*	mg/kg	SOLID	-	-																						
Amitraz*	mg/kg	SOLID	-	-																						
Anthracene	mg/kg	SOLID	520000	150000	0.0296	0.0193	0.161	<0.0160	0.0249	0.194	0.0248	<0.0160	<0.0160	<0.0160	0.0194	<0.0900	<0.0900	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.0160	<0.0900
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																						
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																						
Aromatics >C10-12	mg/kg	SOLID	16000	9200			0.0104												<1.0000		<1.0000	<1.0000	<1.0000	<1.0000		
Aromatics >C12-16	mg/kg	SOLID	36000	10000			<0.1000												<1.0000		<1.0000	<1.0000	<1.0000	<1.0000		
Aromatics >C12-44	mg/kg	SOLID	-	-			103																			
Aromatics >C16-21	mg/kg	SOLID	28000	7600			2.56												1		<1.0000	<1.0000	2	<1.0000		
Aromatics >C21-35	mg/kg	SOLID	28000	7800			42.6												<1.0000		<1.0000	<1.0000	7	2		
Aromatics >C35-44	mg/kg	SOLID	28000	7800			57.8												<1.0000		<1.0000	<1.0000	<1.0000	<1.0000		
Aromatics >C40-44	mg/kg	SOLID	-	-			26.7																			
Aromatics >C5-7	mg/kg	SOLID	26000	76000																						
Aromatics >C6-7	mg/kg	SOLID	-	-			<0.0100												<0.1000		<0.1000	<0.1000	<0.1000	<0.1000		
Aromatics >C7-8	mg/kg	SOLID	56000	87000			<0.0100												<0.1000		<0.1000	<0.1000	<0.1000	<0.1000		
Aromatics >C8-10	mg/kg	SOLID	3500	7200			0.0232												<0.1000		<0.1000	<0.1000	<0.1000	<0.1000		
Aromatics >C8-C44*	mg/kg	SOLID	-	-																						
Arsenic	mg/kg	SOLID	640	170												3.4	6.7	5	6		5	2	7	3		7
Asbestos	-	SOLID	-	-															#VALUE!	#VALUE!			#VALUE!			
Asbestos (Presence of)	N/A	SOLID	-	-																						
Asbestos (Presence of)	---	SOLID	-	-																						
Asbestos Analysts Comments	N/A	SOLID	-	-					#VALUE!																	
Asbestos Analysts Comments	---	SOLID	-	-																						
Asbestos fibre count	---	SOLID	-	-																						
Asbestos Gravimetric Quantification	%	SOLID	-	-					<0.0010																	
Asbestos PCOM Quantification	%	SOLID	-	-					<0.0010																	
Asbestos Quantification (Total %)	%	SOLID	-	-					0.0011							#VALUE!	#VALUE!									
Asbestos Quantification Stage 1	N/A	SOLID	-	-																						
Asbestos: Actinolite*	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!				#VALUE!											#VALUE!	
Asbestos: Actinolite*	No units	SOLID	-	-																						
Asbestos: Amosite*	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!				#VALUE!											#VALUE!	
Asbestos: Amosite*	No units	SOLID	-	-																						
Asbestos: Anthophyllite*	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!				#VALUE!											#VALUE!	
Asbestos: Anthophyllite*	No units	SOLID	-	-																						
Asbestos: Chrysotile*	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!				#VALUE!											#VALUE!	
Asbestos: Chrysotile*	No units	SOLID	-	-																						
Asbestos: Crocidolite*	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!				#VALUE!											#VALUE!	
Asbestos: Crocidolite*	No units	SOLID	-	-																						
Asbestos: Tremolite*	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!				#VALUE!											#VALUE!	
Asbestos: Tremolite*	No units	SOLID	-	-																						
Atraton	mg/kg	SOLID	-	-																						
Atrazine	mg/kg	SOLID	9300	2300																						
Azaconazole*	mg/kg	SOLID	-	-																						
Azinphos-ethyl	mg/kg	SOLID	-	-																						
Azinphos-methyl	mg/kg	SOLID	-	-																						
Azobenzene	mg/kg	SOLID	-	-																						
Azoxystrobin*	mg/kg	SOLID	-	-																						
Barium	mg/kg	SOLID	22000	5800	36.8	49.7	51	126	523	807	204	46.8	55.5	158	52	38	55.7	29.2	110		48	14	33	23	145	67.4
Benalaxyl*	mg/kg	SOLID	-	-																						
Bendiocarb*	mg/kg	SOLID	-	-																						
Benfluralin*	mg/kg	SOLID	-	-																						
Benfuracarb*	mg/kg	SOLID	-	-																						
Benzene	mg/kg	SOLID	27	190	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0010	<0.0010	<0.0010	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0010
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	0.107	0.0794	0.459	0.0313	0.0367	0.758	0.101	<0.0240	0.0692	0.101	0.0505	<0.0900	0.09	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.0240	<0.0900
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																						
Benzo(a)anthracene	mg/kg	SOLID	170	49	0.151	0.0478	0.51	0.0296	0.0544	1.02	0.0562	0.0367	0.063	0.0813	0.0478	<0.0900	0.19	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.0472	<0.0900
Benzo(a)pyrene	mg/kg	SOLID	76	21	0.119	0.0451	0.556	0.0329	0.0387	1.12	0.0645	0.0226	0.0668	0.0959	0.0534	<0.0900	0.15	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.0298	<0.0900
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	0.211	0.0319	0.518	0.0398	0.0619	1.6	0.0885	0.035	0.137	0.173	0.0807	<0.0900	0.19	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.0569	<0.0900
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																						
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	0.0549	0.0182	0.262	0.0171	0.0225	0.508	0.0285	0.0174	0.045	0.0485	0.0304	<0.0900	<0.0900	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.0198	<0.0900
Benzoic Acid	mg/kg	SOLID	-	-														<0.6000								
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																						
Benzyl Alcohol	mg/kg	SOLID	-	-														<0.6000								

Max of Normalised Results																									
					ML159-TP015	ML159-WS002	ML159-WS002a	ML160-CP010	ML160-CP041	ML160-CP041	ML160-CR030	ML160-CR033	ML160-CR035	ML160-CR035	ML160-WS003	ML160-WS003	ML161-CP032	ML161-CP032	ML161-CR009	ML161-CR009	ML161-CR021	ML161-TP405	ML161-TP405	ML161-WS002	ML162-CR004
					M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway North Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	Coleshill West Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill West Viaduct	M42 Coleshill Box Structure
					0.45	0.5	1.1	0.5	0.2	0.6	1.5	1.5	0.75	1.1	0.3	1	0.9	1.2	0.2	0.5	0.5	0.05	0.5	0.5	0.6
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GFDUD	MGR	MGR	RTD1	MGR	HEAD	MGR	ALV	MGR	HEAD	MGR	MGR	MGR	MMG	MGR	MGR	MGR	TOP	RTD1	MGR	HEAD
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500																					
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000																					
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800																					
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100																					
1,1-Biphenyl	mg/kg	SOLID	18000	17000																					
1,1-Dichloroethane	mg/kg	SOLID	260	20000																					
1,1-Dichloroethene	mg/kg	SOLID	24	3500																					
1,1-Dichloropropene	mg/kg	SOLID	-	-																					
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770																					
1,2,3-Trichloropropane	mg/kg	SOLID	-	-																					
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700																					
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310																					
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-																					
1,2-Dibromoethane	mg/kg	SOLID	-	-																					
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000																					
1,2-Dichloroethane	mg/kg	SOLID	0.67	21																					
1,2-Dichloropropane	mg/kg	SOLID	3.1	160																					
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380																					
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																					
1,3-Dichlorobenzene	mg/kg	SOLID	30	390																					
1,3-Dichloropropane	mg/kg	SOLID	-	-																					
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000																					
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																					
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																					
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																					
2,2-Dichloropropane	mg/kg	SOLID	-	-																					
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																					
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-																					
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																					
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-																					
2,4-Dichlorophenol	mg/kg	SOLID	-	-																					
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																					
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200																					
2,4-Dinitrophenol	mg/kg	SOLID	-	-																					
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930																					
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																					
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470																					
2-Chloronaphthalene	mg/kg	SOLID	370	1200																					
2-Chlorophenol	mg/kg	SOLID	-	-																					
2-Chlorotoluene	mg/kg	SOLID	-	-																					
2-isopropylphenol	mg/kg	SOLID	-	-																					
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-																					
2-Methylnaphthalene	mg/kg	SOLID	-	-																					
2-Methylphenol	mg/kg	SOLID	-	-																					
2-Nitroaniline	mg/kg	SOLID	-	-																					
2-Nitrophenol	mg/kg	SOLID	-	-																					
2-Phenylphenol*	mg/kg	SOLID	-	-																					
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																					
3/4 Methylphenol	mg/kg	SOLID	-	-																					
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																					
3-Nitroaniline	mg/kg	SOLID	-	-																					
4,4-DDE	mg/kg	SOLID	-	-																					
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																					
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-																					
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																					
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-																					
4-Chloroaniline	mg/kg	SOLID	-	-																					
4-Chlorophenol	mg/kg	SOLID	-	-																					
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																					
4-Chlorotoluene	mg/kg	SOLID	-	-																					
4-Isopropyltoluene	mg/kg	SOLID	-	-																					
4-Methylphenol	mg/kg	SOLID	-	-																					
4-Nitroaniline	mg/kg	SOLID	-	-																					
4-Nitrophenol	mg/kg	SOLID	-	-																					
6-Benzyladenine*	mg/kg	SOLID	-	-																					
9,10-Anthraquinone*	mg/kg	SOLID	-	-																					
Abamectin*	mg/kg	SOLID	-	-																					
Acenaphthene	mg/kg	SOLID	84000	29000	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Acenaphthene-d10	%	SOLID	-	-																					
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Acephate	mg/kg	SOLID	-	-																					
Acetamiprid*	mg/kg	SOLID	-	-																					
Acetochlor*	mg/kg	SOLID	-	-																					
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																					
Aclonifen*	mg/kg	SOLID	-	-																					
Acrinathrin*	mg/kg	SOLID	-	-																					
Additional Asbestos Components*	N/A	SOLID	-	-																					
Alachlor	mg/kg	SOLID	-	-																					
Aldicarb Sulfone	mg/kg	SOLID	-	-																					
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																					
Aldicarb*	mg/kg	SOLID	-	-																					
Aldrin	mg/kg	SOLID	170	30																					
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-																		6	<1.0000		
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																					
Aliphatics >C10-12	mg/kg	SOLID	9700	21000													<5.0000								
Aliphatics >C12-16	mg/kg	SOLID	59000	25000													<5.0000								
Aliphatics >C12-44	mg/kg	SOLID	-	-																					
Aliphatics >C16-21	mg/kg	SOLID	-	-																					
Aliphatics >C16-C35	mg/kg	SOLID	-	-													<15.8000								
Aliphatics >C21-35	mg/kg	SOLID	-	-																					
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000													<7.4400								
Aliphatics >C5-6	mg/kg	SOLID	3200	95000													<0.3000								
Aliphatics >C6-8	mg/kg	SOLID	7800	150000																					
Aliphatics >C8-10	mg/kg	SOLID	2000	14000													<5.0000								
Aliphatics >C8-C44*	mg/kg	SOLID	-	-													<26.0000								
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																					
Ametryn	mg/kg	SOLID	-	-																					
Aminocarb*	mg/kg	SOLID	-	-																					
Amitraz*	mg/kg	SOLID	-	-																					
Anthracene	mg/kg	SOLID	520000	150000	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																					
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																					
Aromatics >C10-12	mg/kg	SOLID	16000	9200													<5.0000								
Aromatics >C12-16	mg/kg	SOLID	36000	10000													<5.0000								
Aromatics >C12-44	mg/kg	SOLID	-	-																					
Aromatics >C16-21	mg/kg	SOLID	28000	7600													<5.0000								
Aromatics >C21-35	mg/kg	SOLID	28000	7800													<11.6000								
Aromatics >C35-44	mg/kg	SOLID	28000	7800													<7.4400								
Aromatics >C40-44	mg/kg	SOLID	-	-																					
Aromatics >C5-7	mg/kg	SOLID	26000	76000													<0.0100								
Aromatics >C6-7	mg/kg	SOLID	-	-																					
Aromatics >C7-8	mg/kg	SOLID	56000	87000																					
Aromatics >C8-10	mg/kg	SOLID	3500	7200													<5.0000								
Aromatics >C8-C44*	mg/kg	SOLID	-	-													<26.0000								
Arsenic	mg/kg	SOLID	640	170	5	4.4	4.8		6.6	6.1	4.5		4.4	5.3	12.5	3	4.8	2	4.9	5.8	3.8	6	5	4	4.7
Asbestos	-	SOLID	-	-																		#VALUE!	#VALUE!		
Asbestos (Presence of)	N/A	SOLID	-	-																					
Asbestos (Presence of)	---	SOLID	-	-																					
Asbestos Analysts Comments	N/A	SOLID	-	-																					
Asbestos Analysts Comments	---	SOLID	-	-																					
Asbestos fibre count	---	SOLID	-	-																					
Asbestos Gravimetric Quantification	%	SOLID	-	-																					
Asbestos PCOM Quantification	%	SOLID	-	-																					
Asbestos Quantification (Total %)	%	SOLID	-	-		#VALUE!			#VALUE!		#VALUE!		#VALUE!		0.002		#VALUE!		#VALUE!		#VALUE!			#VALUE!	#VALUE!
Asbestos Quantification Stage 1	N/A	SOLID	-	-																					
Asbestos: Actinolite*	N/A	SOLID	-	-																					
Asbestos: Actinolite*	No units	SOLID	-	-																					
Asbestos: Amosite*	N/A	SOLID	-	-																					
Asbestos: Amosite*	No units	SOLID	-	-																					
Asbestos: Anthophyllite*	N/A	SOLID	-	-																					
Asbestos: Anthophyllite*	No units	SOLID	-	-																					
Asbestos: Chrysotile*	N/A	SOLID	-	-																					
Asbestos: Chrysotile*	No units	SOLID	-	-																					
Asbestos: Crocidolite*	N/A	SOLID	-	-																					
Asbestos: Crocidolite*	No units	SOLID	-	-																					
Asbestos: Tremolite*	N/A	SOLID	-	-																					
Asbestos: Tremolite*	No units	SOLID	-	-																					
Atraton	mg/kg	SOLID	-	-																					
Atrazine	mg/kg	SOLID	9300	2300																					
Azaconazole*	mg/kg	SOLID	-	-																					
Azinphos-ethyl	mg/kg	SOLID	-	-																					
Azinphos-methyl	mg/kg	SOLID	-	-																					
Azobenzene	mg/kg	SOLID	-	-																					
Azoxystrobin*	mg/kg	SOLID	-	-																					
Barium	mg/kg	SOLID	22000	5800	31	36.2	44.4		100.7	67.6	124		67.8	46.9	168	80	102.2	90	77.4	124	70.5	210	150	159	64.4
Benalaxyl*	mg/kg	SOLID	-	-																					
Bendiocarb*	mg/kg	SOLID	-	-																					
Benfluralin*	mg/kg	SOLID	-	-																					
Benfuracarb*	mg/kg	SOLID	-	-																					
Benzene	mg/kg	SOLID	27	190	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																					
Benzo(a)anthracene	mg/kg	SOLID	170	49	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Benzo(a)pyrene	mg/kg	SOLID	76	21	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	0.11		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	0.1	0.09	<0.1000	<0.1000	<0.1000	<0.0900
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																					
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Benzoic Acid	mg/kg	SOLID	-	-																					
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																					
Benzyl Alcohol	mg/kg	SOLID	-	-																					

Max of Normalised Results																												
					ML162-CR024	ML162-CR024	ML162-CR024	ML162-CR026	ML162-CR026	ML162-CR026	ML162-CR028	ML162-CR401	ML162-CR401	ML162-CR402	ML162-CR402	ML162-CR402	ML162-CR403	ML162-CR403	ML162-CR404	ML162-CR404	ML162-TP402	ML162-TP402	ML163-CP035	ML163-CP038	ML163-CP401	ML163-CP401	ML163-CP401	ML163-CR007
					M42 Coleshill North Viaduct	M42 Coleshill North Viaduct	M42 Coleshill North Viaduct	Gilson Embankment	Gilson Embankment	Gilson Embankment	M42 Coleshill North Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Gilson Embankment	Gilson Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Gilson Cutting	Gilson Cutting	Gilson Cutting	Gilson Embankment
					0.05	0.5	2.1	21.8	22.3	24.8	2.3	0.3	1	0.3	1	3	0.3	1	0.3	1	0.3	1	1	0.5	0.05	0.5	2	0.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	ALV	MMG	MMG	MMG	ALV	ALV	ALV	MGR	MGR	MGR	GFDMP	GFDMP	RTD2	RTD2	TOP	ALV	ALV	RTD1	TOP	GFDUD	GFDUD	GFDUD
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500																				<0.0010		<0.0500		
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000																				<0.0010		<0.0500		
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800																				<0.0010		<0.0500		
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100																				<0.0010		<0.0500		
1,1-Biphenyl	mg/kg	SOLID	18000	17000															<0.0100									
1,1-Dichloroethane	mg/kg	SOLID	260	20000																				<0.0010		<0.0500		
1,1-Dichloroethene	mg/kg	SOLID	24	3500																				<0.0010		<0.0500		
1,1-Dichloropropene	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770																				<0.0030				
1,2,3-Trichloropropane	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700																				<0.0030		<0.1000		
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310																				<0.0010		<0.0500		
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-																				<0.0010				
1,2-Dibromoethane	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000																				<0.0010		<0.0500		
1,2-Dichloroethane	mg/kg	SOLID	0.67	21																				<0.0010		<0.0500		
1,2-Dichloropropane	mg/kg	SOLID	3.1	160																				<0.0010		<0.0500		
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380																				<0.0010				
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																						<0.0500		
1,3-Dichlorobenzene	mg/kg	SOLID	30	390																				<0.0010		<0.0500		
1,3-Dichloropropane	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000																				<0.0010		<0.0500		
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-															<0.0100									
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-															<0.0100									
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-															<0.0100									
2,2-Dichloropropane	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																								
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-																						<0.1000		
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-															<0.0100									
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-															<0.0100							<0.1000		
2,4-Dichlorophenol	mg/kg	SOLID	-	-																						<0.1000		
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-															<0.0100									
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200																						<0.1000		
2,4-Dinitrophenol	mg/kg	SOLID	-	-																								
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930																						<0.1000		
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-															<0.0100									
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470																						<0.1000		
2-Chloronaphthalene	mg/kg	SOLID	370	1200																						<0.1000		
2-Chlorophenol	mg/kg	SOLID	-	-																						<0.1000		
2-Chlorotoluene	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
2-isopropylphenol	mg/kg	SOLID	-	-																								
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-															<0.0100									
2-Methylnaphthalene	mg/kg	SOLID	-	-																						<0.1000		
2-Methylphenol	mg/kg	SOLID	-	-																						<0.1000		
2-Nitroaniline	mg/kg	SOLID	-	-																						<0.1000		
2-Nitrophenol	mg/kg	SOLID	-	-																						<0.1000		
2-Phenylphenol*	mg/kg	SOLID	-	-															<0.0100									
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																								
3/4 Methylphenol	mg/kg	SOLID	-	-																						<0.1000		
3-hydroxycarbofuran*	mg/kg	SOLID	-	-															<0.0100									
3-Nitroaniline	mg/kg	SOLID	-	-																						<0.1000		
4,4-DDE	mg/kg	SOLID	-	-															<0.0100									
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																								
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-																						<0.1000		
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																								
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-																						<0.1000		
4-Chloroaniline	mg/kg	SOLID	-	-																						<0.1000		
4-Chlorophenol	mg/kg	SOLID	-	-																								
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																						<0.1000		
4-Chlorotoluene	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
4-Isopropyltoluene	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
4-Methylphenol	mg/kg	SOLID	-	-																								
4-Nitroaniline	mg/kg	SOLID	-	-																						<0.1000		
4-Nitrophenol	mg/kg	SOLID	-	-																								
6-Benzyladenine*	mg/kg	SOLID	-	-															<0.0100									
9,10-Anthraquinone*	mg/kg	SOLID	-	-															<0.0100									
Abamectin*	mg/kg	SOLID	-	-															<0.0100									
Acenaphthene	mg/kg	SOLID	84000	29000	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Acenaphthene-d10	%	SOLID	-	-																								
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	0.2	<0.1000	<0.1000	<0.1000
Acephate	mg/kg	SOLID	-	-															<0.0100									
Acetamiprid*	mg/kg	SOLID	-	-															<0.0100									
Acetochlor*	mg/kg	SOLID	-	-															<0.0100									
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-															<0.0100									
Aclonifen*	mg/kg	SOLID	-	-															<0.0100									
Acrinathrin*	mg/kg	SOLID	-	-															<0.0100									
Additional Asbestos Components*	N/A	SOLID	-	-																								
Alachlor	mg/kg	SOLID	-	-															<0.0100									
Aldicarb Sulfone	mg/kg	SOLID	-	-															<0.0100									
Aldicarb sulphoxide*	mg/kg	SOLID	-	-															<0.0100									
Aldicarb*	mg/kg	SOLID	-	-															<0.0100									
Aldrin	mg/kg	SOLID	170	30															<0.0100									
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-	16	1	<1.0000					10	3	1000	780	570	14	16	18	<1.0000	1	1			94	34	1	18
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																								
Aliphatics >C10-12	mg/kg	SOLID	9700	21000										<10.0000	<10.0000	<10.0000					<1.0000	<1.0000						
Aliphatics >C12-16	mg/kg	SOLID	59000	25000										<10.0000	<10.0000	<10.0000					<2.0000	<2.0000						
Aliphatics >C12-44	mg/kg	SOLID	-	-																								
Aliphatics >C16-21	mg/kg	SOLID	-	-										<10.0000	<10.0000	<10.0000					1	2						
Aliphatics >C16-C35	mg/kg	SOLID	-	-																								
Aliphatics >C21-35	mg/kg	SOLID	-	-										47	<10.0000	17					5	<4.0000						
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000										85	50	13					1	<1.0000						
Aliphatics >C5-6	mg/kg	SOLID	3200	95000										<0.2000	<0.2000	<0.2000					<0.1000	<0.1000						
Aliphatics >C6-8	mg/kg	SOLID	7800	150000										<0.2000	<0.2000	<0.2000					<0.1000	<0.1000						
Aliphatics >C8-10	mg/kg	SOLID	2000	14000										<0.2000	<0.2000	<0.2000					<0.1000	<0.1000						
Aliphatics >C8-C44*	mg/kg	SOLID	-	-																								
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47															<0.0100									
Ametryn	mg/kg	SOLID	-	-															<0.0100									
Aminocarb*	mg/kg	SOLID	-	-															<0.0100									
Amitraz*	mg/kg	SOLID	-	-															<0.0100									
Anthracene	mg/kg	SOLID	520000	150000	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	0.4	<0.1000	<0.1000	<0.1000
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																								
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																								
Aromatics >C10-12	mg/kg	SOLID	16000	9200										<10.0000	<10.0000	<10.0000					<1.0000	<1.0000						
Aromatics >C12-16	mg/kg	SOLID	36000	10000										<10.0000	<10.0000	<10.0000					<1.0000	<1.0000						
Aromatics >C12-44	mg/kg	SOLID	-	-																								
Aromatics >C16-21	mg/kg	SOLID	28000	7600										18	<10.0000	<10.0000					<1.0000	<1.0000						
Aromatics >C21-35	mg/kg	SOLID	28000	7800										29	36	22					<1.0000	<1.0000						
Aromatics >C35-44	mg/kg	SOLID	28000	7800										<10.0000	<10.0000	<10.0000					<1.0000	<1.0000						
Aromatics >C40-44	mg/kg	SOLID	-	-																								
Aromatics >C5-7	mg/kg	SOLID	26000	76000																								
Aromatics >C6-7	mg/kg	SOLID	-	-										<0.2000	<0.2000	<0.2000					<0.1000	<0.1000						
Aromatics >C7-8	mg/kg	SOLID	56000	87000										<0.2000	<0.2000	<0.2000					<0.1000	<0.1000						
Aromatics >C8-10	mg/kg	SOLID	3500	7200										<0.2000	<0.2000	<0.2000					<0.1000	<0.1000						
Aromatics >C8-C44*	mg/kg	SOLID	-	-																								
Arsenic	mg/kg	SOLID	640	170	6	4	4					4	28	5	4	30	8	5	23	15	5	3	4.1	6	11	7	4	4
Asbestos	-	SOLID	-	-	#VALUE!							#VALUE!		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!		#VALUE!				#VALUE!	#VALUE!		#VALUE!
Asbestos (Presence of)	N/A	SOLID	-	-																								
Asbestos (Presence of)	---	SOLID	-	-																								
Asbestos Analysts Comments	N/A	SOLID	-	-																								
Asbestos Analysts Comments	---	SOLID	-	-																								
Asbestos fibre count	---	SOLID	-	-																								
Asbestos Gravimetric Quantification	%	SOLID	-	-																								
Asbestos PCOM Quantification	%	SOLID	-	-																								
Asbestos Quantification (Total %)	%	SOLID	-	-																								
Asbestos Quantification Stage 1	N/A	SOLID	-	-																								
Asbestos: Actinolite*	N/A	SOLID	-	-																								
Asbestos: Actinolite*	No units	SOLID	-	-																								
Asbestos: Amosite*	N/A	SOLID	-	-																								
Asbestos: Amosite*	No units	SOLID	-	-																								
Asbestos: Anthophyllite*	N/A	SOLID	-	-																								
Asbestos: Anthophyllite*	No units	SOLID	-	-																								
Asbestos: Chrysotile*	N/A	SOLID	-	-																								
Asbestos: Chrysotile*	No units	SOLID	-	-																								
Asbestos: Crocidolite*	N/A	SOLID	-	-																								
Asbestos: Crocidolite*	No units	SOLID	-	-																								
Asbestos: Tremolite*	N/A	SOLID	-	-																								
Asbestos: Tremolite*	No units	SOLID	-	-																								
Atraton	mg/kg	SOLID	-	-															<0.0100									
Atrazine	mg/kg	SOLID	9300	2300															<0.0100									
Azaconazole*	mg/kg	SOLID	-	-															<0.0100									
Azinphos-ethyl	mg/kg	SOLID	-	-															<0.0100									
Azinphos-methyl	mg/kg	SOLID	-	-															<0.0100									
Azobenzene	mg/kg	SOLID	-	-															<0.0100							<0.1000		
Azoxystrobin*	mg/kg	SOLID	-	-															<0.0100									
Barium	mg/kg	SOLID	22000	5800	60	210	110					70	330	510	420	240	69	44	110	69	90	50	97.9	96.6	94	500	70	51
Benalaxyl*	mg/kg	SOLID	-	-															<0.0100									
Bendiocarb*	mg/kg	SOLID	-	-															<0.0100									
Benfluralin*	mg/kg	SOLID	-	-															<0.0100									
Benfuracarb*	mg/kg	SOLID	-	-															<0.0100									
Benzene	mg/kg	SOLID	27	190	<0.0100	<0.0100	<0.0100					<0.0100	<0.0100	<0.0200	<0.0200	<0.0200	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0010	<0.0010	<0.0100	<0.0100	<0.0100	<0.0100
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	0.5	0.2	<0.1000	<0.1000
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																								
Benzo(a)anthracene	mg/kg	SOLID	170	49	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	0.9	0.1	<0.1000	<0.1000
Benzo(a)pyrene	mg/kg	SOLID	76	21	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	1	0.2	<0.1000	<0.1000
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	0.7	0.2	<0.1000	<0.1000
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																						0.4		
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	0.9	0.2	<0.1000	<0.1000
Benzoic Acid	mg/kg	SOLID	-	-																								
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																								
Benzyl Alcohol	mg/kg	SOLID	-	-																								

Max of Normalised Results																											
					ML163-CR007	ML163-CR007	ML163-CR008	ML163-CR008	ML163-CR008	ML163-CR008	ML163-CR010	ML163-CR010	ML163-CR010	ML163-CR016	ML163-CR016	ML163-CR020	ML163-CR020	ML163-CR020	ML163-CR021a	ML163-CR021a	ML163-CR021a	ML163-CR401	ML163-CR401	ML163-CR401	ML163-TP009	ML163-TP020	ML163-TP021
					Gilson Embankment	Gilson Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Gilson Embankment	Gilson Embankment	Gilson Embankment	Gilson Cutting	Lichfield Road Embankment	Lichfield Road Embankment
					1	2	0.05	0.6	1.2	1.5	0.4	1.5	2	0.5	1	0.3	0.5	0.9	0.4	0.9	1.5	0.05	0.5	1	3.5	1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GLLD	GLLD	MGR	MGR	MGR	RTD1	MGR	RTD1	RTD1	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	ALV	TOP	ALV	ALV	MMG	GLLD	MGR
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500													<0.0010									<0.0010	<0.0010
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000													<0.0010									<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800													<0.0010									<0.0010	<0.0010
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100													<0.0010									<0.0010	<0.0010
1,1-Biphenyl	mg/kg	SOLID	18000	17000													<2.0000										
1,1-Dichloroethane	mg/kg	SOLID	260	20000													<0.0010									<0.0010	<0.0010
1,1-Dichloroethene	mg/kg	SOLID	24	3500													<0.0010									<0.0010	<0.0010
1,1-Dichloropropene	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770													<0.0030									<0.0030	<0.0040
1,2,3-Trichloropropane	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700													<0.0030									<0.0030	<0.0040
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310													0.004									<0.0010	<0.0010
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
1,2-Dibromoethane	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000													<0.0010									<0.0010	<0.0010
1,2-Dichloroethane	mg/kg	SOLID	0.67	21													<0.0010									<0.0010	<0.0010
1,2-Dichloropropane	mg/kg	SOLID	3.1	160													<0.0010									<0.0010	<0.0010
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380													0.002									<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																							
1,3-Dichlorobenzene	mg/kg	SOLID	30	390													<0.0010									<0.0010	<0.0010
1,3-Dichloropropane	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000													<0.0010									<0.0010	<0.0010
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																							
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																							
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																							
2,2-Dichloropropane	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																							
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-													<2.0000										
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																							
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-													<2.0000										
2,4-Dichlorophenol	mg/kg	SOLID	-	-													<2.0000										
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																							
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200													<2.0000										
2,4-Dinitrophenol	mg/kg	SOLID	-	-													<11.0000										
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930													<4.0000										
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																							
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470													<11.0000										
2-Chloronaphthalene	mg/kg	SOLID	370	1200													<2.0000										
2-Chlorophenol	mg/kg	SOLID	-	-													<2.0000										
2-Chlorotoluene	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
2-isopropylphenol	mg/kg	SOLID	-	-																							
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-													<4.0000										
2-Methylnaphthalene	mg/kg	SOLID	-	-													<2.0000										
2-Methylphenol	mg/kg	SOLID	-	-													<2.0000										
2-Nitroaniline	mg/kg	SOLID	-	-													<11.0000										
2-Nitrophenol	mg/kg	SOLID	-	-													<2.0000										
2-Phenylphenol*	mg/kg	SOLID	-	-																							
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-													#VALUE!										
3/4 Methylphenol	mg/kg	SOLID	-	-													<2.0000										
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																							
3-Nitroaniline	mg/kg	SOLID	-	-													<324.0000										
4,4-DDE	mg/kg	SOLID	-	-																							
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																							
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-													<2.0000										
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-													<2.0000										
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-													<2.0000										
4-Chloroaniline	mg/kg	SOLID	-	-													<11.0000										
4-Chlorophenol	mg/kg	SOLID	-	-													<11.0000										
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																							
4-Chlorotoluene	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
4-Isopropyltoluene	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
4-Methylphenol	mg/kg	SOLID	-	-																							
4-Nitroaniline	mg/kg	SOLID	-	-													<13.0000										
4-Nitrophenol	mg/kg	SOLID	-	-													<11.0000										
6-Benzyladenine*	mg/kg	SOLID	-	-																							
9,10-Anthraquinone*	mg/kg	SOLID	-	-																							
Abamectin*	mg/kg	SOLID	-	-																							
Acenaphthene	mg/kg	SOLID	84000	29000	<0.1000	<0.1000	<0.0900	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	<0.0900		0.65	<0.0900	<0.0900	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	<0.0900
Acenaphthene-d10	%	SOLID	-	-																							
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.1000	<0.1000	<0.0900	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	0.15		0.1	<0.0900	<0.0900	<0.1000	0.12	<0.1000	<0.1000	<0.1000		<0.0900	<0.0900
Acephate	mg/kg	SOLID	-	-																							
Acetamiprid*	mg/kg	SOLID	-	-																							
Acetochlor*	mg/kg	SOLID	-	-																							
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																							
Aclonifen*	mg/kg	SOLID	-	-																							
Acrinathrin*	mg/kg	SOLID	-	-																							
Additional Asbestos Components*	N/A	SOLID	-	-																							
Alachlor	mg/kg	SOLID	-	-																							
Aldicarb Sulfone	mg/kg	SOLID	-	-																							
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																							
Aldicarb*	mg/kg	SOLID	-	-																							
Aldrin	mg/kg	SOLID	170	30																							
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-	<1.0000	<1.0000																13	<1.0000	<1.0000			
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																							
Aliphatics >C10-12	mg/kg	SOLID	9700	21000			<5.0000	<4.0000	<5.0000	<5.0000							<4.0000					<1.0000	<1.0000	<1.0000			
Aliphatics >C12-16	mg/kg	SOLID	59000	25000			<5.0000	<4.0000	<5.0000	<5.0000							9.13					<2.0000	<2.0000	<2.0000			
Aliphatics >C12-44	mg/kg	SOLID	-	-																							
Aliphatics >C16-21	mg/kg	SOLID	-	-																		<1.0000	<1.0000	<1.0000			
Aliphatics >C16-C35	mg/kg	SOLID	-	-			<14.0000	<13.2000	<13.9000	<13.7000							465										
Aliphatics >C21-35	mg/kg	SOLID	-	-																		<4.0000	<4.0000	<4.0000			
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000			<6.5900	<6.2500	<6.5500	<6.4700							277					<1.0000	<1.0000	<1.0000			
Aliphatics >C5-6	mg/kg	SOLID	3200	95000			<0.2000	<0.2000	<0.2000	<0.2000							<0.2000					<0.0100	<0.0100	<0.0100			
Aliphatics >C6-8	mg/kg	SOLID	7800	150000																		<0.0100	<0.0100	<0.0100			
Aliphatics >C8-10	mg/kg	SOLID	2000	14000			<5.0000	<4.0000	<5.0000	<5.0000							<4.0000					<0.0100	<0.0100	<0.0100			
Aliphatics >C8-C44*	mg/kg	SOLID	-	-			<23.0000	<22.0000	<23.0000	<23.0000							752										
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																							
Ametryn	mg/kg	SOLID	-	-																							
Aminocarb*	mg/kg	SOLID	-	-																							
Amitraz*	mg/kg	SOLID	-	-																							
Anthracene	mg/kg	SOLID	520000	150000	<0.1000	<0.1000	0.14	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	0.29		0.8	<0.0900	<0.0900	0.19	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	<0.0900
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																							
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																							
Aromatics >C10-12	mg/kg	SOLID	16000	9200			<5.0000	<4.0000	<5.0000	<5.0000							<4.0000					<1.0000	<1.0000	<1.0000			
Aromatics >C12-16	mg/kg	SOLID	36000	10000			<5.0000	<4.0000	<5.0000	<5.0000							7.28					<1.0000	<1.0000	<1.0000			
Aromatics >C12-44	mg/kg	SOLID	-	-																							
Aromatics >C16-21	mg/kg	SOLID	28000	7600			<5.0000	<4.0000	<5.0000	<5.0000							50.5					<1.0000	<1.0000	<1.0000			
Aromatics >C21-35	mg/kg	SOLID	28000	7800			21.6	<9.7400	<10.2100	<10.0800							615					4	<1.0000	<1.0000			
Aromatics >C35-44	mg/kg	SOLID	28000	7800			<6.5900	<6.2500	<6.5500	<6.4700							503					<1.0000	<1.0000	<1.0000			
Aromatics >C40-44	mg/kg	SOLID	-	-																							
Aromatics >C5-7	mg/kg	SOLID	26000	76000			<0.0100	<0.0100	<0.0100	<0.0100							<0.0100										
Aromatics >C6-7	mg/kg	SOLID	-	-																		<0.0100	<0.0100	<0.0100			
Aromatics >C7-8	mg/kg	SOLID	56000	87000																		<0.0100	<0.0100	<0.0100			
Aromatics >C8-10	mg/kg	SOLID	3500	7200			<5.0000	<4.0000	<5.0000	<5.0000							<4.0000					<0.0100	<0.0100	<0.0100			
Aromatics >C8-C44*	mg/kg	SOLID	-	-			27.9	<22.0000	<23.0000	<23.0000							1180										
Arsenic	mg/kg	SOLID	640	170	4	3	7	4.6	6.6	2.4	6.4		4.5	7.3	5		6.2	1	6.6	8.4	5.5	5	3	5		4.3	5.5
Asbestos	-	SOLID	-	-																		#VALUE!	#VALUE!				
Asbestos (Presence of)	N/A	SOLID	-	-																							
Asbestos (Presence of)	---	SOLID	-	-																							
Asbestos Analysts Comments	N/A	SOLID	-	-																							
Asbestos Analysts Comments	---	SOLID	-	-																							
Asbestos fibre count	---	SOLID	-	-																							
Asbestos Gravimetric Quantification	%	SOLID	-	-																							
Asbestos PCOM Quantification	%	SOLID	-	-																							
Asbestos Quantification (Total %)	%	SOLID	-	-			#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!		#VALUE!				0.003							#VALUE!
Asbestos Quantification Stage 1	N/A	SOLID	-	-																							
Asbestos: Actinolite*	N/A	SOLID	-	-																							
Asbestos: Actinolite*	No units	SOLID	-	-																							
Asbestos: Amosite*	N/A	SOLID	-	-																							
Asbestos: Amosite*	No units	SOLID	-	-																							
Asbestos: Anthophyllite*	N/A	SOLID	-	-																							
Asbestos: Anthophyllite*	No units	SOLID	-	-																							
Asbestos: Chrysotile*	N/A	SOLID	-	-																							
Asbestos: Chrysotile*	No units	SOLID	-	-																							
Asbestos: Crocidolite*	N/A	SOLID	-	-																							
Asbestos: Crocidolite*	No units	SOLID	-	-																							
Asbestos: Tremolite*	N/A	SOLID	-	-																							
Asbestos: Tremolite*	No units	SOLID	-	-																							
Atraton	mg/kg	SOLID	-	-																							
Atrazine	mg/kg	SOLID	9300	2300																							
Azaconazole*	mg/kg	SOLID	-	-																							
Azinphos-ethyl	mg/kg	SOLID	-	-																							
Azinphos-methyl	mg/kg	SOLID	-	-																							
Azobenzene	mg/kg	SOLID	-	-																							
Azoxystrobin*	mg/kg	SOLID	-	-																							
Barium	mg/kg	SOLID	22000	5800	67	40	109	67.4	129	99.2	141		176	101	64.6		193	66.1	326	151	103	58	40	110		36.4	81.3
Benalaxyl*	mg/kg	SOLID	-	-																							
Bendiocarb*	mg/kg	SOLID	-	-																							
Benfluralin*	mg/kg	SOLID	-	-																							
Benfuracarb*	mg/kg	SOLID	-	-																							
Benzene	mg/kg	SOLID	27	190	<0.0100	<0.0100	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100	<0.0100		<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	<0.1000	<0.1000	0.21	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	1.15		740	<0.0900	<0.0900	0.13	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	<0.0900
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																							
Benzo(a)anthracene	mg/kg	SOLID	170	49	<0.1000	<0.1000	0.28	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	1.59		1.17	<0.0900	<0.0900	0.31	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	0.09
Benzo(a)pyrene	mg/kg	SOLID	76	21	<0.1000	<0.1000	0.29	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	1.93		1	<0.0900	<0.0900	0.26	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	0.09
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	<0.1000	<0.1000	0.38	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	2.49		1.5	<0.0900	<0.0900	0.32	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	0.14
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																							
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	<0.1000	<0.1000	0.15	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	0.93		0.49	<0.0900	<0.0900	0.16	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	<0.0900
Benzoic Acid	mg/kg	SOLID	-	-													<11.0000										
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																							
Benzyl Alcohol	mg/kg	SOLID	-	-													<11.0000										

Max of Normalised Results																									
					ML163-TP021	ML164-CP003	ML164-CP003	ML164-CP003	ML164-CP004	ML164-CP004	ML164-CP004	ML164-CP010	ML164-CP010	ML164-CP021	ML164-CP021	ML164-CP021	ML164-CP023	ML164-CP023	ML164-CP036	ML164-CP036	ML164-CP036	ML164-CR009	ML164-CR009	ML164-CR009	ML164-CR011
					Lichfield Road Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watton House Embankment	Watton House Embankment	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct
					0.5	0.9	2	3.5	1	3	4	0.5	1	0.5	1	3	0.05	1.5	1	3	5	0.05	0.4	1.5	0.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	MGR	TILMP	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	ALV	MGR	MGR	MGR	MGR
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500	<0.0010		<0.0010			<0.0010										<0.0010					
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000	<0.0010		<0.0010			<0.0010										<0.0010					
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800	<0.0010		<0.0010			<0.0010										<0.0010					
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100	<0.0010		<0.0010			<0.0010										<0.0010					
1,1-Biphenyl	mg/kg	SOLID	18000	17000			0.1			<0.1000										<0.1000					
1,1-Dichloroethane	mg/kg	SOLID	260	20000	<0.0010		<0.0010			<0.0010										<0.0010					
1,1-Dichloroethene	mg/kg	SOLID	24	3500	<0.0010		<0.0010			<0.0010										<0.0010					
1,1-Dichloropropene	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770	<0.0030		<0.0040			<0.0040										<0.0030					
1,2,3-Trichloropropane	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700	<0.0030		<0.0040			<0.0040										<0.0030					
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310	<0.0010		<0.0010			0.001										<0.0010					
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
1,2-Dibromoethane	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000	<0.0010		<0.0010			<0.0010										<0.0010					
1,2-Dichloroethane	mg/kg	SOLID	0.67	21	<0.0010		<0.0010			<0.0010										<0.0010					
1,2-Dichloropropane	mg/kg	SOLID	3.1	160	<0.0010		<0.0010			<0.0010										<0.0010					
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380	<0.0010		<0.0010			<0.0010										<0.0010					
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																					
1,3-Dichlorobenzene	mg/kg	SOLID	30	390	<0.0010		<0.0010			<0.0010										<0.0010					
1,3-Dichloropropane	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000	<0.0010		<0.0010			<0.0010										<0.0010					
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																					
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																					
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																					
2,2-Dichloropropane	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																					
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																					
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
2,4-Dichlorophenol	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																					
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200			<0.1000			<0.1000										<0.1000					
2,4-Dinitrophenol	mg/kg	SOLID	-	-			<0.6000			<0.6000										<0.6000					
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930			<0.2000			<0.2000										<0.2000					
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																					
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470			<0.6000			<0.6000										<0.6000					
2-Chloronaphthalene	mg/kg	SOLID	370	1200			<0.1000			<0.1000										<0.1000					
2-Chlorophenol	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
2-Chlorotoluene	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
2-isopropylphenol	mg/kg	SOLID	-	-																					
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-			<0.2000			<0.2000										<0.2000					
2-Methylnaphthalene	mg/kg	SOLID	-	-			0.5			<0.1000										<0.1000					
2-Methylphenol	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
2-Nitroaniline	mg/kg	SOLID	-	-			<0.6000			<0.6000										<0.6000					
2-Nitrophenol	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
2-Phenylphenol*	mg/kg	SOLID	-	-																					
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-			#VALUE!			#VALUE!										#VALUE!					
3/4 Methylphenol	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																					
3-Nitroaniline	mg/kg	SOLID	-	-			<17.8000			<17.8000										<16.1000					
4,4-DDE	mg/kg	SOLID	-	-																					
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																					
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
4-Chloroaniline	mg/kg	SOLID	-	-			<0.6000			<0.6000										<0.6000					
4-Chlorophenol	mg/kg	SOLID	-	-			<0.6000			<0.6000										<0.6000					
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																					
4-Chlorotoluene	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
4-Isopropyltoluene	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
4-Methylphenol	mg/kg	SOLID	-	-																					
4-Nitroaniline	mg/kg	SOLID	-	-			<0.7000			<0.7000										<0.7000					
4-Nitrophenol	mg/kg	SOLID	-	-			<0.6000			<0.6000										<0.6000					
6-Benzyladenine*	mg/kg	SOLID	-	-																					
9,10-Anthraquinone*	mg/kg	SOLID	-	-																					
Abamectin*	mg/kg	SOLID	-	-																					
Acenaphthene	mg/kg	SOLID	84000	29000	<0.0900	<0.0900	5.9	<0.0900	0.1	0.2	0.11	<0.0900	<0.0900	<0.0900		<0.0900		<0.0900	0.09	<0.0900	<0.1000	<0.1000	<0.0900	<0.0900	<0.0900
Acenaphthene-d10	%	SOLID	-	-																					
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.0900	<0.0900	<0.1000	<0.0900	0.1	<0.1000	<0.1000	<0.0900	<0.0900	<0.0900		<0.0900		<0.0900	0.1	<0.0900	<0.1000	<0.1000	<0.0900	<0.0900	<0.0900
Acephate	mg/kg	SOLID	-	-																					
Acetamiprid*	mg/kg	SOLID	-	-																					
Acetochlor*	mg/kg	SOLID	-	-																					
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																					
Aclonifen*	mg/kg	SOLID	-	-																					
Acrinathrin*	mg/kg	SOLID	-	-																					
Additional Asbestos Components*	N/A	SOLID	-	-																					
Alachlor	mg/kg	SOLID	-	-																					
Aldicarb Sulfone	mg/kg	SOLID	-	-																					
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																					
Aldicarb*	mg/kg	SOLID	-	-																					
Aldrin	mg/kg	SOLID	170	30																					
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-																					
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																					
Aliphatics >C10-12	mg/kg	SOLID	9700	21000		<5.0000			<5.0000																
Aliphatics >C12-16	mg/kg	SOLID	59000	25000		10.34			<5.0000																
Aliphatics >C12-44	mg/kg	SOLID	-	-																					
Aliphatics >C16-21	mg/kg	SOLID	-	-																					
Aliphatics >C16-C35	mg/kg	SOLID	-	-		184			42.3																
Aliphatics >C21-35	mg/kg	SOLID	-	-																					
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000		<6.5000			<6.4400																
Aliphatics >C5-6	mg/kg	SOLID	3200	95000		<0.2000			<0.2000																
Aliphatics >C6-8	mg/kg	SOLID	7800	150000																					
Aliphatics >C8-10	mg/kg	SOLID	2000	14000		<5.0000			<5.0000																
Aliphatics >C8-C44*	mg/kg	SOLID	-	-		197			47.7																
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																					
Ametryn	mg/kg	SOLID	-	-																					
Aminocarb*	mg/kg	SOLID	-	-																					
Amitraz*	mg/kg	SOLID	-	-																					
Anthracene	mg/kg	SOLID	520000	150000	<0.0900	0.32	8.8	<0.0900	0.37	0.66	0.2	<0.0900	<0.0900	<0.0900		<0.0900		<0.0900	0.31	0.09	<0.1000	0.1	<0.0900	0.13	0.09
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-					#VALUE!			#VALUE!													
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																					
Aromatics >C10-12	mg/kg	SOLID	16000	9200		<5.0000			<5.0000																
Aromatics >C12-16	mg/kg	SOLID	36000	10000		5.35			5.14																
Aromatics >C12-44	mg/kg	SOLID	-	-																					
Aromatics >C16-21	mg/kg	SOLID	28000	7600		23			15.8																
Aromatics >C21-35	mg/kg	SOLID	28000	7800		77.3			88.6																
Aromatics >C35-44	mg/kg	SOLID	28000	7800		<6.5000			24.9																
Aromatics >C40-44	mg/kg	SOLID	-	-																					
Aromatics >C5-7	mg/kg	SOLID	26000	76000		<0.0100			<0.0100																
Aromatics >C6-7	mg/kg	SOLID	-	-																					
Aromatics >C7-8	mg/kg	SOLID	56000	87000																					
Aromatics >C8-10	mg/kg	SOLID	3500	7200		<5.0000			<5.0000																
Aromatics >C8-C44*	mg/kg	SOLID	-	-		114.2			136																
Arsenic	mg/kg	SOLID	640	170	4.4	6	6.8	4.2	6.1	8	5.4	13.7	7.24	5.3		4	8.3	7	15.7	9.7	17.9	28.5	15.8	15.4	9.2
Asbestos	-	SOLID	-	-																					
Asbestos (Presence of)	N/A	SOLID	-	-																					
Asbestos (Presence of)	---	SOLID	-	-																					
Asbestos Analysts Comments	N/A	SOLID	-	-																					
Asbestos Analysts Comments	---	SOLID	-	-																					
Asbestos fibre count	---	SOLID	-	-																					
Asbestos Gravimetric Quantification	%	SOLID	-	-																					
Asbestos PCOM Quantification	%	SOLID	-	-																					
Asbestos Quantification (Total %)	%	SOLID	-	-		#VALUE!			#VALUE!					#VALUE!			#VALUE!						#VALUE!		#VALUE!
Asbestos Quantification Stage 1	N/A	SOLID	-	-																					
Asbestos: Actinolite*	N/A	SOLID	-	-																					
Asbestos: Actinolite*	No units	SOLID	-	-																					
Asbestos: Amosite*	N/A	SOLID	-	-																					
Asbestos: Amosite*	No units	SOLID	-	-																					
Asbestos: Anthophyllite*	N/A	SOLID	-	-																					
Asbestos: Anthophyllite*	No units	SOLID	-	-																					
Asbestos: Chrysotile*	N/A	SOLID	-	-																					
Asbestos: Chrysotile*	No units	SOLID	-	-																					
Asbestos: Crocidolite*	N/A	SOLID	-	-																					
Asbestos: Crocidolite*	No units	SOLID	-	-																					
Asbestos: Tremolite*	N/A	SOLID	-	-																					
Asbestos: Tremolite*	No units	SOLID	-	-																					
Atraton	mg/kg	SOLID	-	-																					
Atrazine	mg/kg	SOLID	9300	2300																					
Azaconazole*	mg/kg	SOLID	-	-																					
Azinphos-ethyl	mg/kg	SOLID	-	-																					
Azinphos-methyl	mg/kg	SOLID	-	-																					
Azobenzene	mg/kg	SOLID	-	-																					
Azoxystrobin*	mg/kg	SOLID	-	-																					
Barium	mg/kg	SOLID	22000	5800	36.4	120	136	99.3	274	176	117	151	107	74		71	115	64.5	361	115	390	278	193	217	158
Benalaxyl*	mg/kg	SOLID	-	-																					
Bendiocarb*	mg/kg	SOLID	-	-																					
Benfluralin*	mg/kg	SOLID	-	-																					
Benfuracarb*	mg/kg	SOLID	-	-																					
Benzene	mg/kg	SOLID	27	190	<0.0010	<0.0010	<0.0010	<0.0010	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	<0.0900	0.43	3.4	<0.0900	720	700	0.39	0.14	0.1	<0.0900		<0.0900		<0.0900	0.43	0.12	<0.1000	0.57	0.3	1.01	0.38
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																					
Benzo(a)anthracene	mg/kg	SOLID	170	49	<0.0900	0.91	12	<0.0900	1.31	1.07	0.62	0.15	0.14	0.1		<0.0900		<0.0900	700	0.17	0.1	0.56	0.29	730	0.45
Benzo(a)pyrene	mg/kg	SOLID	76	21	<0.0900	750	9.1	<0.0900	1.5	1.03	0.57	0.15	0.16	0.1		<0.0900		<0.0900	0.8	0.25	0.18	0.8	0.43	1.28	0.54
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	<0.0900	0.95	11.5	<0.0900	1.39	1.41	0.86	0.21	0.19	0.16		<0.0900		<0.0900	0.89	0.25	0.16	0.91	0.49	1.63	700
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																					
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	<0.0900	0.42	4.3	<0.0900	0.49	0.51	0.3	<0.0900	<0.0900	<0.0900		<0.0900		<0.0900	0.3	0.1	<0.1000	0.31	0.18	0.53	0.25
Benzoic Acid	mg/kg	SOLID	-	-			<0.6000			<0.6000										<0.6000					
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																					
Benzyl Alcohol	mg/kg	SOLID	-	-			<0.6000			<0.6000										<0.6000					

Max of Normalised Results																									
					ML164-CR011	ML164-CR011	ML164-CR013	ML164-CR013	ML164-CR013	ML164-CR029	ML164-CR029	ML164-CR029	ML164-CR030	ML164-CR032	ML164-CR032	ML164-CR044	ML164-CR044	ML164-CR044	ML164-CR044	ML164-CR045	ML164-CR045	ML164-CR045	ML164-CR046a	ML164-CR046a	ML164-CR046a
					Watten House West Viaduct	Watten House West Viaduct	Watton House Embankment	Watton House Embankment	Watton House Embankment	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct
					0.75	1.1	0.2	1	4	0.35	3.2	4	0.9	0.5	1.2	0.5	1	2	2.5	0.8	1.2	3	0.8	1.2	2.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	RTD1	MGR	MGR	ALV	MGR	MGR	TILMP	RTD1	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	MGR
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500																					
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000																					
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800																					
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100																					
1,1-Biphenyl	mg/kg	SOLID	18000	17000																					
1,1-Dichloroethane	mg/kg	SOLID	260	20000																					
1,1-Dichloroethene	mg/kg	SOLID	24	3500																					
1,1-Dichloropropene	mg/kg	SOLID	-	-																					
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770																					
1,2,3-Trichloropropane	mg/kg	SOLID	-	-																					
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700																					
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310																					
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-																					
1,2-Dibromoethane	mg/kg	SOLID	-	-																					
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000																					
1,2-Dichloroethane	mg/kg	SOLID	0.67	21																					
1,2-Dichloropropane	mg/kg	SOLID	3.1	160																					
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380																					
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																					
1,3-Dichlorobenzene	mg/kg	SOLID	30	390																					
1,3-Dichloropropane	mg/kg	SOLID	-	-																					
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000																					
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																					
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																					
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																					
2,2-Dichloropropane	mg/kg	SOLID	-	-																					
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																					
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-																					
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																					
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-																					
2,4-Dichlorophenol	mg/kg	SOLID	-	-																					
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																					
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200																					
2,4-Dinitrophenol	mg/kg	SOLID	-	-																					
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930																					
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																					
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470																					
2-Chloronaphthalene	mg/kg	SOLID	370	1200																					
2-Chlorophenol	mg/kg	SOLID	-	-																					
2-Chlorotoluene	mg/kg	SOLID	-	-																					
2-isopropylphenol	mg/kg	SOLID	-	-																					
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-																					
2-Methylnaphthalene	mg/kg	SOLID	-	-																					
2-Methylphenol	mg/kg	SOLID	-	-																					
2-Nitroaniline	mg/kg	SOLID	-	-																					
2-Nitrophenol	mg/kg	SOLID	-	-																					
2-Phenylphenol*	mg/kg	SOLID	-	-																					
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																					
3/4 Methylphenol	mg/kg	SOLID	-	-																					
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																					
3-Nitroaniline	mg/kg	SOLID	-	-																					
4,4-DDE	mg/kg	SOLID	-	-																					
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																					
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-																					
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																					
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-																					
4-Chloroaniline	mg/kg	SOLID	-	-																					
4-Chlorophenol	mg/kg	SOLID	-	-																					
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																					
4-Chlorotoluene	mg/kg	SOLID	-	-																					
4-Isopropyltoluene	mg/kg	SOLID	-	-																					
4-Methylphenol	mg/kg	SOLID	-	-																					
4-Nitroaniline	mg/kg	SOLID	-	-																					
4-Nitrophenol	mg/kg	SOLID	-	-																					
6-Benzyladenine*	mg/kg	SOLID	-	-																					
9,10-Anthraquinone*	mg/kg	SOLID	-	-																					
Abamectin*	mg/kg	SOLID	-	-																					
Acenaphthene	mg/kg	SOLID	84000	29000	<0.0900	<0.0900	<0.0900	0.27	<0.1100	0.43	0.13	<0.1000	<0.0800	<0.0900	<0.0900	<0.0900		<0.1100		<0.0900	<0.0900	<0.0900	0.1	<0.1000	<0.1000
Acenaphthene-d10	%	SOLID	-	-																					
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.0900	<0.0900	0.1	0.29	<0.1100	0.31	<0.1000	<0.1000	<0.0800	0.21	<0.0900	<0.0900		<0.1100		<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000
Acephate	mg/kg	SOLID	-	-																					
Acetamiprid*	mg/kg	SOLID	-	-																					
Acetochlor*	mg/kg	SOLID	-	-																					
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																					
Aclonifen*	mg/kg	SOLID	-	-																					
Acrinathrin*	mg/kg	SOLID	-	-																					
Additional Asbestos Components*	N/A	SOLID	-	-																					
Alachlor	mg/kg	SOLID	-	-																					
Aldicarb Sulfone	mg/kg	SOLID	-	-																					
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																					
Aldicarb*	mg/kg	SOLID	-	-																					
Aldrin	mg/kg	SOLID	170	30																					
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-																					
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																					
Aliphatics >C10-12	mg/kg	SOLID	9700	21000							<5.0000				<5.0000										
Aliphatics >C12-16	mg/kg	SOLID	59000	25000							<5.0000				<5.0000										
Aliphatics >C12-44	mg/kg	SOLID	-	-																					
Aliphatics >C16-21	mg/kg	SOLID	-	-																					
Aliphatics >C16-C35	mg/kg	SOLID	-	-							92				<13.8000										
Aliphatics >C21-35	mg/kg	SOLID	-	-																					
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000							6.98				<6.5300										
Aliphatics >C5-6	mg/kg	SOLID	3200	95000							3.82				<0.2000										
Aliphatics >C6-8	mg/kg	SOLID	7800	150000																					
Aliphatics >C8-10	mg/kg	SOLID	2000	14000							<5.0000				<5.0000										
Aliphatics >C8-C44*	mg/kg	SOLID	-	-							107.7				<23.0000										
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																					
Ametryn	mg/kg	SOLID	-	-																					
Aminocarb*	mg/kg	SOLID	-	-																					
Amitraz*	mg/kg	SOLID	-	-																					
Anthracene	mg/kg	SOLID	520000	150000	<0.0900	<0.0900	0.21	0.19	<0.1100	1.29	<0.1000	<0.1000	<0.0800	0.29	<0.0900	<0.0900		<0.1100		<0.0900	<0.0900	<0.0900	0.21	0.11	0.11
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-														#VALUE!							
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																					
Aromatics >C10-12	mg/kg	SOLID	16000	9200							<5.0000				<5.0000										
Aromatics >C12-16	mg/kg	SOLID	36000	10000							22.7				<5.0000										
Aromatics >C12-44	mg/kg	SOLID	-	-																					
Aromatics >C16-21	mg/kg	SOLID	28000	7600							13.5				<5.0000										
Aromatics >C21-35	mg/kg	SOLID	28000	7800							337				<10.1700										
Aromatics >C35-44	mg/kg	SOLID	28000	7800							100.7				<6.5300										
Aromatics >C40-44	mg/kg	SOLID	-	-																					
Aromatics >C5-7	mg/kg	SOLID	26000	76000							<0.0100				<0.0100										
Aromatics >C6-7	mg/kg	SOLID	-	-																					
Aromatics >C7-8	mg/kg	SOLID	56000	87000																					
Aromatics >C8-10	mg/kg	SOLID	3500	7200							5.28				<5.0000										
Aromatics >C8-C44*	mg/kg	SOLID	-	-							484				<23.0000										
Arsenic	mg/kg	SOLID	640	170	6.8	4.8	17.1	11.7	36.9	6.8	5.65	4	3.8	7.6	5.5	15.1		19.7		11.5	6	7.8	7.4	8.5	4.6
Asbestos	-	SOLID	-	-																					
Asbestos (Presence of)	N/A	SOLID	-	-																					
Asbestos (Presence of)	---	SOLID	-	-																					
Asbestos Analysts Comments	N/A	SOLID	-	-																					
Asbestos Analysts Comments	---	SOLID	-	-																					
Asbestos fibre count	---	SOLID	-	-																					
Asbestos Gravimetric Quantification	%	SOLID	-	-																					
Asbestos PCOM Quantification	%	SOLID	-	-																					
Asbestos Quantification (Total %)	%	SOLID	-	-			#VALUE!			#VALUE!					#VALUE!	#VALUE!				#VALUE!			#VALUE!		
Asbestos Quantification Stage 1	N/A	SOLID	-	-																					
Asbestos: Actinolite*	N/A	SOLID	-	-																					
Asbestos: Actinolite*	No units	SOLID	-	-																					
Asbestos: Amosite*	N/A	SOLID	-	-																					
Asbestos: Amosite*	No units	SOLID	-	-																					
Asbestos: Anthophyllite*	N/A	SOLID	-	-																					
Asbestos: Anthophyllite*	No units	SOLID	-	-																					
Asbestos: Chrysotile*	N/A	SOLID	-	-																					
Asbestos: Chrysotile*	No units	SOLID	-	-																					
Asbestos: Crocidolite*	N/A	SOLID	-	-																					
Asbestos: Crocidolite*	No units	SOLID	-	-																					
Asbestos: Tremolite*	N/A	SOLID	-	-																					
Asbestos: Tremolite*	No units	SOLID	-	-																					
Atraton	mg/kg	SOLID	-	-																					
Atrazine	mg/kg	SOLID	9300	2300																					
Azaconazole*	mg/kg	SOLID	-	-																					
Azinphos-ethyl	mg/kg	SOLID	-	-																					
Azinphos-methyl	mg/kg	SOLID	-	-																					
Azobenzene	mg/kg	SOLID	-	-																					
Azoxystrobin*	mg/kg	SOLID	-	-																					
Barium	mg/kg	SOLID	22000	5800	77	42.8	273	150	438	145	157	78.1	58.3	326	109	203		373		173	174	123	168	104.6	124
Benalaxyl*	mg/kg	SOLID	-	-																					
Bendiocarb*	mg/kg	SOLID	-	-																					
Benfluralin*	mg/kg	SOLID	-	-																					
Benfuracarb*	mg/kg	SOLID	-	-																					
Benzene	mg/kg	SOLID	27	190	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	0.1	<0.0900	0.81	<0.1000	<0.1100	2.77	<0.1000	<0.1000	<0.0800	1.67	<0.0900	0.18		<0.1100		<0.0900	<0.0900	<0.0900	0.45	0.19	0.18
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																					
Benzo(a)anthracene	mg/kg	SOLID	170	49	0.12	<0.0900	1.29	<0.1000	<0.1100	4.48	<0.1000	<0.1000	<0.0800	1.47	<0.0900	0.19		<0.1100		<0.0900	<0.0900	<0.0900	700	0.36	0.35
Benzo(a)pyrene	mg/kg	SOLID	76	21	0.14	<0.0900	1.44	<0.1000	<0.1100	4.07	<0.1000	<0.1000	<0.0800	1.71	<0.0900	0.29		<0.1100		<0.0900	<0.0900	<0.0900	0.66	0.31	0.3
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	0.2	<0.0900	1.61	<0.1000	0.16	5.1	<0.1000	<0.1000	<0.0800	2.22	<0.0900	0.3		<0.1100		<0.0900	<0.0900	<0.0900	0.88	0.48	0.44
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																					
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	<0.0900	<0.0900	0.61	<0.1000	<0.1100	2.06	<0.1000	<0.1000	<0.0800	0.78	<0.0900	0.13		<0.1100		<0.0900	<0.0900	<0.0900	0.34	0.14	0.22
Benzoic Acid	mg/kg	SOLID	-	-																					
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																					
Benzyl Alcohol	mg/kg	SOLID	-	-																					

Max of Normalised Results																						
					ML164-CR404	ML164-CR404	ML164-CR404	ML164-TP011	ML164-TP011	ML164-TP015	ML164-TP015	ML164-TP015	ML164-TP015	NC120-CR401	NC120-CR401	NC137-CT401	NC137-CT401	NC145-CR401	NC145-CR401	ND000-CR001	ND000-CR001	ND000-CR020
					Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)
					0.05	0.5	7.2	0.7	2.5	0.05	0.35	1.1	1.7	0.3	1	0.5	1	0.1	0.5	0.5	2	0.4
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	RTD1	MGR	RTD1	GLLD	GLLD	RTD2	RTD2	RTD2	RTD2	TOP	GFDUD	MGR	MGR	MGR
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500																		
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000																		
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800																		
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100																		
1,1-Biphenyl	mg/kg	SOLID	18000	17000																		
1,1-Dichloroethane	mg/kg	SOLID	260	20000																		
1,1-Dichloroethene	mg/kg	SOLID	24	3500																		
1,1-Dichloropropene	mg/kg	SOLID	-	-																		
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770																		
1,2,3-Trichloropropane	mg/kg	SOLID	-	-																		
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700																		
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310																		
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-																		
1,2-Dibromoethane	mg/kg	SOLID	-	-																		
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000																		
1,2-Dichloroethane	mg/kg	SOLID	0.67	21																		
1,2-Dichloropropane	mg/kg	SOLID	3.1	160																		
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380																		
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																		
1,3-Dichlorobenzene	mg/kg	SOLID	30	390																		
1,3-Dichloropropane	mg/kg	SOLID	-	-																		
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000																		
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																		
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																		
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																		
2,2-Dichloropropane	mg/kg	SOLID	-	-																		
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																		
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-																		
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																		
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-																		
2,4-Dichlorophenol	mg/kg	SOLID	-	-																		
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																		
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200																		
2,4-Dinitrophenol	mg/kg	SOLID	-	-																		
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930																		
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																		
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470																		
2-Chloronaphthalene	mg/kg	SOLID	370	1200																		
2-Chlorophenol	mg/kg	SOLID	-	-																		
2-Chlorotoluene	mg/kg	SOLID	-	-																		
2-isopropylphenol	mg/kg	SOLID	-	-																		
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-																		
2-Methylnaphthalene	mg/kg	SOLID	-	-																		
2-Methylphenol	mg/kg	SOLID	-	-																		
2-Nitroaniline	mg/kg	SOLID	-	-																		
2-Nitrophenol	mg/kg	SOLID	-	-																		
2-Phenylphenol*	mg/kg	SOLID	-	-																		
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																		
3/4 Methylphenol	mg/kg	SOLID	-	-																		
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																		
3-Nitroaniline	mg/kg	SOLID	-	-																		
4,4-DDE	mg/kg	SOLID	-	-																		
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																		
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-																		
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																		
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-																		
4-Chloroaniline	mg/kg	SOLID	-	-																		
4-Chlorophenol	mg/kg	SOLID	-	-																		
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																		
4-Chlorotoluene	mg/kg	SOLID	-	-																		
4-Isopropyltoluene	mg/kg	SOLID	-	-																		
4-Methylphenol	mg/kg	SOLID	-	-																		
4-Nitroaniline	mg/kg	SOLID	-	-																		
4-Nitrophenol	mg/kg	SOLID	-	-																		
6-Benzyladenine*	mg/kg	SOLID	-	-																		
9,10-Anthraquinone*	mg/kg	SOLID	-	-																		
Abamectin*	mg/kg	SOLID	-	-																		
Acenaphthene	mg/kg	SOLID	84000	29000	0.1	<0.1000	<0.1000	<0.1000	<0.1000	5.03	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000
Acenaphthene-d10	%	SOLID	-	-																		
Acenaphthylene	mg/kg	SOLID	83000	29000	0.1	<0.1000	<0.1000	<0.1000	<0.1000	1.75	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	0.11	<0.1000
Acephate	mg/kg	SOLID	-	-																		
Acetamiprid*	mg/kg	SOLID	-	-																		
Acetochlor*	mg/kg	SOLID	-	-																		
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																		
Aclonifen*	mg/kg	SOLID	-	-																		
Acrinathrin*	mg/kg	SOLID	-	-																		
Additional Asbestos Components*	N/A	SOLID	-	-																		
Alachlor	mg/kg	SOLID	-	-																		
Aldicarb Sulfone	mg/kg	SOLID	-	-																		
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																		
Aldicarb*	mg/kg	SOLID	-	-																		
Aldrin	mg/kg	SOLID	170	30																		
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-	160	71	32							100	17	9	3	16	3			
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																		
Aliphatics >C10-12	mg/kg	SOLID	9700	21000	<1.0000	4				<4.0000	<4.0000	<4.0000	<5.0000	<1.0000	<1.0000							
Aliphatics >C12-16	mg/kg	SOLID	59000	25000	<2.0000	<10.0000				28.8	<4.0000	<4.0000	<5.0000	<2.0000	<2.0000							
Aliphatics >C12-44	mg/kg	SOLID	-	-																		
Aliphatics >C16-21	mg/kg	SOLID	-	-	4	<10.0000								<1.0000	<1.0000							
Aliphatics >C16-C35	mg/kg	SOLID	-	-						263	<12.7000	<13.3000	<14.1000									
Aliphatics >C21-35	mg/kg	SOLID	-	-	30	49								7	10							
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000	8	<10.0000				19.6	<6.0000	<6.2900	<6.6400	1	1							
Aliphatics >C5-6	mg/kg	SOLID	3200	95000	<0.1000	<0.1000				<0.2000	<0.2000	<0.2000	<0.2000	<0.1000	<0.1000							
Aliphatics >C6-8	mg/kg	SOLID	7800	150000	<0.1000	<0.1000								<0.1000	<0.1000							
Aliphatics >C8-10	mg/kg	SOLID	2000	14000	<0.1000	<0.1000				<4.0000	<4.0000	<4.0000	<5.0000	<0.1000	<0.1000							
Aliphatics >C8-C44*	mg/kg	SOLID	-	-						314	<21.0000	<22.0000	<24.0000									
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																		
Ametryn	mg/kg	SOLID	-	-																		
Aminocarb*	mg/kg	SOLID	-	-																		
Amitraz*	mg/kg	SOLID	-	-																		
Anthracene	mg/kg	SOLID	520000	150000	0.4	<0.1000	<0.1000	<0.1000	<0.1000	13.4	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	0.13	<0.1000
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																		
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-											#VALUE!							
Aromatics >C10-12	mg/kg	SOLID	16000	9200	<1.0000	<10.0000				<4.0000	<4.0000	<4.0000	<5.0000	<1.0000	<1.0000							
Aromatics >C12-16	mg/kg	SOLID	36000	10000	3	<10.0000				61.4	<4.0000	<4.0000	<5.0000	<1.0000	2							
Aromatics >C12-44	mg/kg	SOLID	-	-																		
Aromatics >C16-21	mg/kg	SOLID	28000	7600	37	<10.0000				557	35.9	<4.0000	<5.0000	<1.0000	1							
Aromatics >C21-35	mg/kg	SOLID	28000	7800	150	<10.0000				1920	149	<9.8000	<10.3500	2	3							
Aromatics >C35-44	mg/kg	SOLID	28000	7800	<1.0000	<10.0000				209	16	<6.2900	<6.6400	<1.0000	<1.0000							
Aromatics >C40-44	mg/kg	SOLID	-	-																		
Aromatics >C5-7	mg/kg	SOLID	26000	76000						<0.0100	<0.0100	<0.0100	<0.0100									
Aromatics >C6-7	mg/kg	SOLID	-	-	<0.1000	<0.1000								<0.1000	<0.1000							
Aromatics >C7-8	mg/kg	SOLID	56000	87000	<0.1000	<0.1000								<0.1000	<0.1000							
Aromatics >C8-10	mg/kg	SOLID	3500	7200	<0.1000	<0.1000				<4.0000	<4.0000	<4.0000	<5.0000	<0.1000	<0.1000							
Aromatics >C8-C44*	mg/kg	SOLID	-	-						2750	204	<22.0000	<24.0000									
Arsenic	mg/kg	SOLID	640	170	22	20	8	31.3	11.7	7.5	4.8	1.2	3.1	14	10	5	10	9	7	8.2	14.4	20.5
Asbestos	-	SOLID	-	-	#VALUE!									#VALUE!					#VALUE!			
Asbestos (Presence of)	N/A	SOLID	-	-																		
Asbestos (Presence of)	---	SOLID	-	-																		
Asbestos Analysts Comments	N/A	SOLID	-	-																		
Asbestos Analysts Comments	---	SOLID	-	-																		
Asbestos fibre count	---	SOLID	-	-																		
Asbestos Gravimetric Quantification	%	SOLID	-	-																		
Asbestos PCOM Quantification	%	SOLID	-	-																		
Asbestos Quantification (Total %)	%	SOLID	-	-						#VALUE!										#VALUE!		
Asbestos Quantification Stage 1	N/A	SOLID	-	-																		
Asbestos: Actinolite*	N/A	SOLID	-	-																		
Asbestos: Actinolite*	No units	SOLID	-	-																		
Asbestos: Amosite*	N/A	SOLID	-	-																		
Asbestos: Amosite*	No units	SOLID	-	-																		
Asbestos: Anthophyllite*	N/A	SOLID	-	-																		
Asbestos: Anthophyllite*	No units	SOLID	-	-																		
Asbestos: Chrysotile*	N/A	SOLID	-	-																		
Asbestos: Chrysotile*	No units	SOLID	-	-																		
Asbestos: Crocidolite*	N/A	SOLID	-	-																		
Asbestos: Crocidolite*	No units	SOLID	-	-																		
Asbestos: Tremolite*	N/A	SOLID	-	-																		
Asbestos: Tremolite*	No units	SOLID	-	-																		
Atraton	mg/kg	SOLID	-	-																		
Atrazine	mg/kg	SOLID	9300	2300																		
Azaconazole*	mg/kg	SOLID	-	-																		
Azinphos-ethyl	mg/kg	SOLID	-	-																		
Azinphos-methyl	mg/kg	SOLID	-	-																		
Azobenzene	mg/kg	SOLID	-	-																		
Azoxystrobin*	mg/kg	SOLID	-	-																		
Barium	mg/kg	SOLID	22000	5800	300	300	210	499	168	102.3	57	58.4	89.3	200	230	69	75	83	58	138	188	220
Benalaxyl*	mg/kg	SOLID	-	-																		
Bendiocarb*	mg/kg	SOLID	-	-																		
Benfluralin*	mg/kg	SOLID	-	-																		
Benfuracarb*	mg/kg	SOLID	-	-																		
Benzene	mg/kg	SOLID	27	190	<0.0100	<0.0100	<0.0100	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0010	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	1.4	0.1	<0.1000	0.2	<0.1000	16.5	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	0.77	0.2
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																		
Benzo(a)anthracene	mg/kg	SOLID	170	49	1.8	0.1	<0.1000	0.27	<0.1000	32.4	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	0.89	0.22
Benzo(a)pyrene	mg/kg	SOLID	76	21	2.3	0.2	<0.1000	0.23	<0.1000	31.2	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	1.18	0.2
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	2.3	0.2	<0.1000	0.4	<0.1000	37	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	0.1	1.46	0.35
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																		
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	1.3	<0.1000	<0.1000	0.15	<0.1000	14	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	0.46	0.1
Benzoic Acid	mg/kg	SOLID	-	-																		
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																		
Benzyl Alcohol	mg/kg	SOLID	-	-																		

Max of Normalised Results																	
					ND000-CR020	ND000-CR020	ND000-CR020	ND000-TP035	ND000-TP035	ND001-CP002	ND001-CP002	ND001-CP043	ND001-CP043	ND001-CP049	ND001-CP049	ND001-CR001	ND001-CR002
					Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Chattle Hill Box Structure	Chattle Hill Box Structure	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton No. 3 Viaduct
					1	4	5	0.4	0.8	0.5	1	0.5	2	0.4	0.6	0.5	0.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	RTD1	MGR	ALV	RTD1	RTD1	MGR	MGR	MGR	MGR
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500													<0.0010
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000													<0.0010
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800													<0.0010
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100													<0.0010
1,1-Biphenyl	mg/kg	SOLID	18000	17000													
1,1-Dichloroethane	mg/kg	SOLID	260	20000													<0.0010
1,1-Dichloroethene	mg/kg	SOLID	24	3500													<0.0010
1,1-Dichloropropene	mg/kg	SOLID	-	-													<0.0010
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770													<0.0030
1,2,3-Trichloropropane	mg/kg	SOLID	-	-													<0.0010
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700													<0.0030
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310													<0.0010
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-													<0.0010
1,2-Dibromoethane	mg/kg	SOLID	-	-													<0.0010
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000													<0.0010
1,2-Dichloroethane	mg/kg	SOLID	0.67	21													<0.0010
1,2-Dichloropropane	mg/kg	SOLID	3.1	160													<0.0010
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380													<0.0010
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-													
1,3-Dichlorobenzene	mg/kg	SOLID	30	390													<0.0010
1,3-Dichloropropane	mg/kg	SOLID	-	-													<0.0010
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000													<0.0010
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-													
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-													
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-													
2,2-Dichloropropane	mg/kg	SOLID	-	-													<0.0010
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-													
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-													
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-													
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-													
2,4-Dichlorophenol	mg/kg	SOLID	-	-													
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-													
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200													
2,4-Dinitrophenol	mg/kg	SOLID	-	-													
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930													
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-													
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470													
2-Chloronaphthalene	mg/kg	SOLID	370	1200													
2-Chlorophenol	mg/kg	SOLID	-	-													
2-Chlorotoluene	mg/kg	SOLID	-	-													<0.0010
2-isopropylphenol	mg/kg	SOLID	-	-													
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-													
2-Methylnaphthalene	mg/kg	SOLID	-	-													
2-Methylphenol	mg/kg	SOLID	-	-													
2-Nitroaniline	mg/kg	SOLID	-	-													
2-Nitrophenol	mg/kg	SOLID	-	-													
2-Phenylphenol*	mg/kg	SOLID	-	-													
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-													
3/4 Methylphenol	mg/kg	SOLID	-	-													
3-hydroxycarbofuran*	mg/kg	SOLID	-	-													
3-Nitroaniline	mg/kg	SOLID	-	-													
4,4-DDE	mg/kg	SOLID	-	-													
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-													
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-													
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-													
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-													
4-Chloroaniline	mg/kg	SOLID	-	-													
4-Chlorophenol	mg/kg	SOLID	-	-													
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-													
4-Chlorotoluene	mg/kg	SOLID	-	-													<0.0010
4-Isopropyltoluene	mg/kg	SOLID	-	-													<0.0010
4-Methylphenol	mg/kg	SOLID	-	-													
4-Nitroaniline	mg/kg	SOLID	-	-													
4-Nitrophenol	mg/kg	SOLID	-	-													
6-Benzyladenine*	mg/kg	SOLID	-	-													
9,10-Anthraquinone*	mg/kg	SOLID	-	-													
Abamectin*	mg/kg	SOLID	-	-													
Acenaphthene	mg/kg	SOLID	84000	29000	<0.0900	<0.0900	<0.0900	<0.0800	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0800	750	<0.0900	<0.0900
Acenaphthene-d10	%	SOLID	-	-													
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.0900	<0.0900	<0.0900	<0.0800	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.26	0.2	<0.0900	<0.0900
Acephate	mg/kg	SOLID	-	-													
Acetamiprid*	mg/kg	SOLID	-	-													
Acetochlor*	mg/kg	SOLID	-	-													
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-													
Aclonifen*	mg/kg	SOLID	-	-													
Acrinathrin*	mg/kg	SOLID	-	-													
Additional Asbestos Components*	N/A	SOLID	-	-													
Alachlor	mg/kg	SOLID	-	-													
Aldicarb Sulfone	mg/kg	SOLID	-	-													
Aldicarb sulphoxide*	mg/kg	SOLID	-	-													
Aldicarb*	mg/kg	SOLID	-	-													
Aldrin	mg/kg	SOLID	170	30													
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-													
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-													
Aliphatics >C10-12	mg/kg	SOLID	9700	21000											<4.0000		
Aliphatics >C12-16	mg/kg	SOLID	59000	25000											5.13		
Aliphatics >C12-44	mg/kg	SOLID	-	-													
Aliphatics >C16-21	mg/kg	SOLID	-	-													
Aliphatics >C16-C35	mg/kg	SOLID	-	-											127		
Aliphatics >C21-35	mg/kg	SOLID	-	-													
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000											27.8		
Aliphatics >C5-6	mg/kg	SOLID	3200	95000											<0.2000		
Aliphatics >C6-8	mg/kg	SOLID	7800	150000													
Aliphatics >C8-10	mg/kg	SOLID	2000	14000											<4.0000		
Aliphatics >C8-C44*	mg/kg	SOLID	-	-											161		
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47													
Ametryn	mg/kg	SOLID	-	-													
Aminocarb*	mg/kg	SOLID	-	-													
Amitraz*	mg/kg	SOLID	-	-													
Anthracene	mg/kg	SOLID	520000	150000	0.17	<0.0900	<0.0900	<0.0800	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.43	2.2	<0.0900	0.09
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-													
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-													
Aromatics >C10-12	mg/kg	SOLID	16000	9200											<4.0000		
Aromatics >C12-16	mg/kg	SOLID	36000	10000											10		
Aromatics >C12-44	mg/kg	SOLID	-	-													
Aromatics >C16-21	mg/kg	SOLID	28000	7600											58		
Aromatics >C21-35	mg/kg	SOLID	28000	7800											280		
Aromatics >C35-44	mg/kg	SOLID	28000	7800											57		
Aromatics >C40-44	mg/kg	SOLID	-	-													
Aromatics >C5-7	mg/kg	SOLID	26000	76000											<0.0100		
Aromatics >C6-7	mg/kg	SOLID	-	-													
Aromatics >C7-8	mg/kg	SOLID	56000	87000													
Aromatics >C8-10	mg/kg	SOLID	3500	7200											<4.0000		
Aromatics >C8-C44*	mg/kg	SOLID	-	-											409		
Arsenic	mg/kg	SOLID	640	170	12.3	8.16	8.3	6.6	10.5	19.6	14.3	6.4	5	6	8	36	5.5
Asbestos	-	SOLID	-	-													
Asbestos (Presence of)	N/A	SOLID	-	-													
Asbestos (Presence of)	---	SOLID	-	-													
Asbestos Analysts Comments	N/A	SOLID	-	-													
Asbestos Analysts Comments	---	SOLID	-	-													
Asbestos fibre count	---	SOLID	-	-													
Asbestos Gravimetric Quantification	%	SOLID	-	-													
Asbestos PCOM Quantification	%	SOLID	-	-													
Asbestos Quantification (Total %)	%	SOLID	-	-		0.001		#VALUE!		#VALUE!		#VALUE!		#VALUE!	#VALUE!		
Asbestos Quantification Stage 1	N/A	SOLID	-	-													
Asbestos: Actinolite*	N/A	SOLID	-	-													
Asbestos: Actinolite*	No units	SOLID	-	-													
Asbestos: Amosite*	N/A	SOLID	-	-													
Asbestos: Amosite*	No units	SOLID	-	-													
Asbestos: Anthophyllite*	N/A	SOLID	-	-													
Asbestos: Anthophyllite*	No units	SOLID	-	-													
Asbestos: Chrysotile*	N/A	SOLID	-	-													
Asbestos: Chrysotile*	No units	SOLID	-	-													
Asbestos: Crocidolite*	N/A	SOLID	-	-													
Asbestos: Crocidolite*	No units	SOLID	-	-													
Asbestos: Tremolite*	N/A	SOLID	-	-													
Asbestos: Tremolite*	No units	SOLID	-	-													
Atraton	mg/kg	SOLID	-	-													
Atrazine	mg/kg	SOLID	9300	2300													
Azaconazole*	mg/kg	SOLID	-	-													
Azinphos-ethyl	mg/kg	SOLID	-	-													
Azinphos-methyl	mg/kg	SOLID	-	-													
Azobenzene	mg/kg	SOLID	-	-													
Azoxystrobin*	mg/kg	SOLID	-	-													
Barium	mg/kg	SOLID	22000	5800	181	131	111	118	57.1	272	160	51.5	46.1	168	526	388	99
Benalaxyl*	mg/kg	SOLID	-	-													
Bendiocarb*	mg/kg	SOLID	-	-													
Benfluralin*	mg/kg	SOLID	-	-													
Benfuracarb*	mg/kg	SOLID	-	-													
Benzene	mg/kg	SOLID	27	190	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	0.6	<0.0900	<0.0900	0.14	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	2.75	2.64	0.14	<0.0900
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-													
Benzo(a)anthracene	mg/kg	SOLID	170	49	700	0.09	<0.0900	0.15	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	1.18	4.08	0.14	<0.0900
Benzo(a)pyrene	mg/kg	SOLID	76	21	0.76	<0.0900	<0.0900	0.18	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	2.33	3.87	0.21	<0.0900
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	1.11	<0.0900	<0.0900	0.23	<0.0900	0.1	<0.0900	<0.0900	<0.0900	2.71	4.98	0.28	0.12
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-													
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	0.36	<0.0900	<0.0900	0.08	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.6	1.8	0.1	<0.0900
Benzoic Acid	mg/kg	SOLID	-	-													
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-													
Benzyl Alcohol	mg/kg	SOLID	-	-													

Max of Normalised Results																									
					ND001-CR002	ND001-CR005	ND001-CR011	ND001-CR011	ND001-CR013	ND001-CR013	ND001-CR014	ND001-CR014	ND001-CR014	ND001-CR017	ND001-CR017	ND001-CR022	ND001-CR031	ND001-CR040	ND001-CR041	ND001-CR042	ND001-CR043	ND001-TP002	ND001-TP002	ND001-WS002	ND001-WS003
					Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct
					1.5	0.6	0.05	1.2	0.5	2	0.05	1.1	1.7	0.7	1.2	0.1	0.05	1.4	0.2	0.5	1	0.05	0.3	0.1	0.1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	TOP	RTD1	MGR	GFDUD	MGR	MGR	RTD1	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	MGR	MGR
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500	<0.0010																			<0.0010	<0.0010
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000	<0.0010																			<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800	<0.0010																			<0.0010	<0.0010
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100	<0.0010																			<0.0010	<0.0010
1,1-Biphenyl	mg/kg	SOLID	18000	17000																					
1,1-Dichloroethane	mg/kg	SOLID	260	20000	<0.0010																			<0.0010	<0.0010
1,1-Dichloroethene	mg/kg	SOLID	24	3500	<0.0010																			<0.0010	<0.0010
1,1-Dichloropropene	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770	<0.0030																			<0.0040	<0.0040
1,2,3-Trichloropropane	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700	<0.0030																			<0.0040	<0.0040
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310	<0.0010																			<0.0010	<0.0010
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
1,2-Dibromoethane	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000	<0.0010																			<0.0010	<0.0010
1,2-Dichloroethane	mg/kg	SOLID	0.67	21	<0.0010																			<0.0010	<0.0010
1,2-Dichloropropane	mg/kg	SOLID	3.1	160	<0.0010																			<0.0010	<0.0010
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380	<0.0010																			<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-																					
1,3-Dichlorobenzene	mg/kg	SOLID	30	390	<0.0010																			<0.0010	<0.0010
1,3-Dichloropropane	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000	<0.0010																			<0.0010	<0.0010
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-																					
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-																					
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-																					
2,2-Dichloropropane	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-																					
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-																					
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-																					
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-																					
2,4-Dichlorophenol	mg/kg	SOLID	-	-																					
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-																					
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200																					
2,4-Dinitrophenol	mg/kg	SOLID	-	-																					
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930																					
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-																					
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470																					
2-Chloronaphthalene	mg/kg	SOLID	370	1200																					
2-Chlorophenol	mg/kg	SOLID	-	-																					
2-Chlorotoluene	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
2-isopropylphenol	mg/kg	SOLID	-	-																					
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-																					
2-Methylnaphthalene	mg/kg	SOLID	-	-																					
2-Methylphenol	mg/kg	SOLID	-	-																					
2-Nitroaniline	mg/kg	SOLID	-	-																					
2-Nitrophenol	mg/kg	SOLID	-	-																					
2-Phenylphenol*	mg/kg	SOLID	-	-																					
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-																					
3/4 Methylphenol	mg/kg	SOLID	-	-																					
3-hydroxycarbofuran*	mg/kg	SOLID	-	-																					
3-Nitroaniline	mg/kg	SOLID	-	-																					
4,4-DDE	mg/kg	SOLID	-	-																					
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-																					
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-																					
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-																					
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-																					
4-Chloroaniline	mg/kg	SOLID	-	-																					
4-Chlorophenol	mg/kg	SOLID	-	-																					
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-																					
4-Chlorotoluene	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
4-Isopropyltoluene	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
4-Methylphenol	mg/kg	SOLID	-	-																					
4-Nitroaniline	mg/kg	SOLID	-	-																					
4-Nitrophenol	mg/kg	SOLID	-	-																					
6-Benzyladenine*	mg/kg	SOLID	-	-																					
9,10-Anthraquinone*	mg/kg	SOLID	-	-																					
Abamectin*	mg/kg	SOLID	-	-																					
Acenaphthene	mg/kg	SOLID	84000	29000	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.1	<0.0900	<0.1000	<0.0900	<0.0900	<0.0900
Acenaphthene-d10	%	SOLID	-	-																					
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.1000	<0.0900	<0.0900	<0.0900
Acephate	mg/kg	SOLID	-	-																					
Acetamiprid*	mg/kg	SOLID	-	-																					
Acetochlor*	mg/kg	SOLID	-	-																					
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-																					
Aclonifen*	mg/kg	SOLID	-	-																					
Acrinathrin*	mg/kg	SOLID	-	-																					
Additional Asbestos Components*	N/A	SOLID	-	-																					
Alachlor	mg/kg	SOLID	-	-																					
Aldicarb Sulfone	mg/kg	SOLID	-	-																					
Aldicarb sulphoxide*	mg/kg	SOLID	-	-																					
Aldicarb*	mg/kg	SOLID	-	-																					
Aldrin	mg/kg	SOLID	170	30																					
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-																					
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-																					
Aliphatics >C10-12	mg/kg	SOLID	9700	21000																					
Aliphatics >C12-16	mg/kg	SOLID	59000	25000																					
Aliphatics >C12-44	mg/kg	SOLID	-	-																					
Aliphatics >C16-21	mg/kg	SOLID	-	-																					
Aliphatics >C16-C35	mg/kg	SOLID	-	-																					
Aliphatics >C21-35	mg/kg	SOLID	-	-																					
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000																					
Aliphatics >C5-6	mg/kg	SOLID	3200	95000																					
Aliphatics >C6-8	mg/kg	SOLID	7800	150000																					
Aliphatics >C8-10	mg/kg	SOLID	2000	14000																					
Aliphatics >C8-C44*	mg/kg	SOLID	-	-																					
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47																					
Ametryn	mg/kg	SOLID	-	-																					
Aminocarb*	mg/kg	SOLID	-	-																					
Amitraz*	mg/kg	SOLID	-	-																					
Anthracene	mg/kg	SOLID	520000	150000	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.39	<0.0900	<0.1000	<0.0900	<0.0900	<0.0900
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-																					
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-																					
Aromatics >C10-12	mg/kg	SOLID	16000	9200																					
Aromatics >C12-16	mg/kg	SOLID	36000	10000																					
Aromatics >C12-44	mg/kg	SOLID	-	-																					
Aromatics >C16-21	mg/kg	SOLID	28000	7600																					
Aromatics >C21-35	mg/kg	SOLID	28000	7800																					
Aromatics >C35-44	mg/kg	SOLID	28000	7800																					
Aromatics >C40-44	mg/kg	SOLID	-	-																					
Aromatics >C5-7	mg/kg	SOLID	26000	76000																					
Aromatics >C6-7	mg/kg	SOLID	-	-																					
Aromatics >C7-8	mg/kg	SOLID	56000	87000																					
Aromatics >C8-10	mg/kg	SOLID	3500	7200																					
Aromatics >C8-C44*	mg/kg	SOLID	-	-																					
Arsenic	mg/kg	SOLID	640	170	4.5		8	3.2	6	3.3	4.8	2.2	2.9	15	55	6	8.7	8.4	4.6	6.1	5.8	16.6	14.9	8.7	5.5
Asbestos	-	SOLID	-	-																					
Asbestos (Presence of)	N/A	SOLID	-	-																					
Asbestos (Presence of)	---	SOLID	-	-																					
Asbestos Analysts Comments	N/A	SOLID	-	-																					
Asbestos Analysts Comments	---	SOLID	-	-																					
Asbestos fibre count	---	SOLID	-	-																					
Asbestos Gravimetric Quantification	%	SOLID	-	-																					
Asbestos PCOM Quantification	%	SOLID	-	-																					
Asbestos Quantification (Total %)	%	SOLID	-	-	#VALUE!		#VALUE!					#VALUE!		#VALUE!		#VALUE!	#VALUE!					#VALUE!			#VALUE!
Asbestos Quantification Stage 1	N/A	SOLID	-	-		#VALUE!																			
Asbestos: Actinolite*	N/A	SOLID	-	-																					
Asbestos: Actinolite*	No units	SOLID	-	-																					
Asbestos: Amosite*	N/A	SOLID	-	-																					
Asbestos: Amosite*	No units	SOLID	-	-																					
Asbestos: Anthophyllite*	N/A	SOLID	-	-																					
Asbestos: Anthophyllite*	No units	SOLID	-	-																					
Asbestos: Chrysotile*	N/A	SOLID	-	-																					
Asbestos: Chrysotile*	No units	SOLID	-	-																					
Asbestos: Crocidolite*	N/A	SOLID	-	-																					
Asbestos: Crocidolite*	No units	SOLID	-	-																					
Asbestos: Tremolite*	N/A	SOLID	-	-																					
Asbestos: Tremolite*	No units	SOLID	-	-																					
Atraton	mg/kg	SOLID	-	-																					
Atrazine	mg/kg	SOLID	9300	2300																					
Azaconazole*	mg/kg	SOLID	-	-																					
Azinphos-ethyl	mg/kg	SOLID	-	-																					
Azinphos-methyl	mg/kg	SOLID	-	-																					
Azobenzene	mg/kg	SOLID	-	-																					
Azoxystrobin*	mg/kg	SOLID	-	-																					
Barium	mg/kg	SOLID	22000	5800	82.1		142	54.7	140	44	45.1	106	70.5	57.8	91.2	114	79.2	70.5	27.1	176	60.5	229	164	153	58.7
Benalaxyl*	mg/kg	SOLID	-	-																					
Bendiocarb*	mg/kg	SOLID	-	-																					
Benfluralin*	mg/kg	SOLID	-	-																					
Benfuracarb*	mg/kg	SOLID	-	-																					
Benzene	mg/kg	SOLID	27	190	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.28	<0.0900	<0.0900	<0.0900	<0.0900	0.16	<0.0900	<0.0900	700	<0.0900	<0.1000	<0.0900	<0.0900	<0.0900
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-																					
Benzo(a)anthracene	mg/kg	SOLID	170	49	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.2	<0.0900	<0.0900	<0.0900	<0.0900	0.2	<0.0900	<0.0900	1.52	<0.0900	<0.1000	<0.0900	<0.0900	<0.0900
Benzo(a)pyrene	mg/kg	SOLID	76	21	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.35	<0.0900	<0.0900	<0.0900	<0.0900	0.17	<0.0900	<0.0900	1.3	<0.0900	0.11	<0.0900	<0.0900	<0.0900
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	<0.0900		<0.0900	<0.0900	0.13	<0.0900	<0.0900	0.42	<0.0900	<0.0900	<0.0900	0.1	0.2	<0.0900	<0.0900	1.82	<0.0900	0.17	<0.0900	0.09	<0.0900
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-																					
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.35	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	750	<0.0900	<0.1000	<0.0900	<0.0900	<0.0900
Benzoic Acid	mg/kg	SOLID	-	-																					
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-																					
Benzyl Alcohol	mg/kg	SOLID	-	-																					

Max of Normalised Results								
					ND001-WS003	ND002-CP019	ND002-CR013	ND003-CR004
					Water Orton No. 3 Viaduct	Marsh Lane Embankment	Marsh Lane Embankment	Marsh Lane Embankment
					1.1	1.5	0.2	0.6
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	MGR	MGR
1,1,1,2-Tetrachloroethane	mg/kg	SOLID	110	1500	<0.0010			
1,1,1-Trichloroethane	mg/kg	SOLID	660	57000	<0.0010			
1,1,2,2-Tetrachloroethane	mg/kg	SOLID	270	1800	<0.0010			
1,1,2-Trichloroethane	mg/kg	SOLID	89	1100	<0.0010			
1,1-Biphenyl	mg/kg	SOLID	18000	17000				
1,1-Dichloroethane	mg/kg	SOLID	260	20000	<0.0010			
1,1-Dichloroethene	mg/kg	SOLID	24	3500	<0.0010			
1,1-Dichloropropene	mg/kg	SOLID	-	-	<0.0010			
1,2,3 Trichlorobenzene	mg/kg	SOLID	102	770	<0.0030			
1,2,3-Trichloropropane	mg/kg	SOLID	-	-	<0.0010			
1,2,4-Trichlorobenzene	mg/kg	SOLID	220	1700	<0.0030			
1,2,4-Trimethylbenzene	mg/kg	SOLID	39	310	<0.0010			
1,2-Dibromo-3-Chloropropane	mg/kg	SOLID	-	-	<0.0010			
1,2-Dibromoethane	mg/kg	SOLID	-	-	<0.0010			
1,2-Dichlorobenzene	mg/kg	SOLID	2000	24000	<0.0010			
1,2-Dichloroethane	mg/kg	SOLID	0.67	21	<0.0010			
1,2-Dichloropropane	mg/kg	SOLID	3.1	160	<0.0010			
1,3,5 Trichlorobenzene	mg/kg	SOLID	23	380	<0.0010			
1,3,5-Trimethylbenzene	mg/kg	SOLID	-	-				
1,3-Dichlorobenzene	mg/kg	SOLID	30	390	<0.0010			
1,3-Dichloropropane	mg/kg	SOLID	-	-	<0.0010			
1,4-Dichlorobenzene	mg/kg	SOLID	4400	36000	<0.0010			
1-Methyl-2-(3-Pyridyl) Pyrrolidine	mg/kg	SOLID	-	-				
2-(1-Naphthyl)acetamide*	mg/kg	SOLID	-	-				
2-(2,4-Dichlorophenoxy)propionic Acid	mg/kg	SOLID	-	-				
2,2-Dichloropropane	mg/kg	SOLID	-	-	<0.0010			
2,3,5-Trimethylphenol	mg/kg	SOLID	-	-				
2,4,5-Trichlorophenol	mg/kg	SOLID	-	-				
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/kg	SOLID	-	-				
2,4,6-Trichlorophenol	mg/kg	SOLID	-	-				
2,4-Dichlorophenol	mg/kg	SOLID	-	-				
2,4-Dichlorophenoxy Acetic Acid (D)	mg/kg	SOLID	-	-				
2,4-Dimethylphenol	mg/kg	SOLID	16000	9200				
2,4-Dinitrophenol	mg/kg	SOLID	-	-				
2,4-Dinitrotoluene	mg/kg	SOLID	3700	930				
2,6-Dichloro-4-Nitroaniline	mg/kg	SOLID	-	-				
2,6-Dinitrotoluene	mg/kg	SOLID	1900	470				
2-Chloronaphthalene	mg/kg	SOLID	370	1200				
2-Chlorophenol	mg/kg	SOLID	-	-				
2-Chlorotoluene	mg/kg	SOLID	-	-	<0.0010			
2-isopropylphenol	mg/kg	SOLID	-	-				
2-Methyl-4,6-Dinitrophenol	mg/kg	SOLID	-	-				
2-Methylnaphthalene	mg/kg	SOLID	-	-				
2-Methylphenol	mg/kg	SOLID	-	-				
2-Nitroaniline	mg/kg	SOLID	-	-				
2-Nitrophenol	mg/kg	SOLID	-	-				
2-Phenylphenol*	mg/kg	SOLID	-	-				
3,3'-Dichlorobenzidine	mg/kg	SOLID	-	-				
3/4 Methylphenol	mg/kg	SOLID	-	-				
3-hydroxycarbofuran*	mg/kg	SOLID	-	-				
3-Nitroaniline	mg/kg	SOLID	-	-				
4,4-DDE	mg/kg	SOLID	-	-				
4-Bromofluorobenzene Surrogate*	%	SOLID	-	-				
4-Bromophenyl Phenyl Ether	mg/kg	SOLID	-	-				
4-Chloro Phenyl Ether	mg/kg	SOLID	-	-				
4-Chloro-3-Methylphenol	mg/kg	SOLID	-	-				
4-Chloroaniline	mg/kg	SOLID	-	-				
4-Chlorophenol	mg/kg	SOLID	-	-				
4-Chlorophenyl Phenyl Ether	mg/kg	SOLID	-	-				
4-Chlorotoluene	mg/kg	SOLID	-	-	<0.0010			
4-Isopropyltoluene	mg/kg	SOLID	-	-	<0.0010			
4-Methylphenol	mg/kg	SOLID	-	-				
4-Nitroaniline	mg/kg	SOLID	-	-				
4-Nitrophenol	mg/kg	SOLID	-	-				
6-Benzyladenine*	mg/kg	SOLID	-	-				
9,10-Anthraquinone*	mg/kg	SOLID	-	-				
Abamectin*	mg/kg	SOLID	-	-				
Acenaphthene	mg/kg	SOLID	84000	29000	<0.0900	<0.1300	<0.1100	<0.1000
Acenaphthene-d10	%	SOLID	-	-				
Acenaphthylene	mg/kg	SOLID	83000	29000	<0.0900	<0.1300	<0.1100	<0.1000
Acephate	mg/kg	SOLID	-	-				
Acetamiprid*	mg/kg	SOLID	-	-				
Acetochlor*	mg/kg	SOLID	-	-				
Acibenzolar-S-methyl*	mg/kg	SOLID	-	-				
Aclonifen*	mg/kg	SOLID	-	-				
Acrinathrin*	mg/kg	SOLID	-	-				
Additional Asbestos Components*	N/A	SOLID	-	-				
Alachlor	mg/kg	SOLID	-	-				
Aldicarb Sulfone	mg/kg	SOLID	-	-				
Aldicarb sulphoxide*	mg/kg	SOLID	-	-				
Aldicarb*	mg/kg	SOLID	-	-				
Aldrin	mg/kg	SOLID	170	30				
Aliphatics & Aromatics >C5-40	mg/kg	SOLID	-	-				
Aliphatics & Aromatics >C5-44	mg/kg	SOLID	-	-				
Aliphatics >C10-12	mg/kg	SOLID	9700	21000				
Aliphatics >C12-16	mg/kg	SOLID	59000	25000				
Aliphatics >C12-44	mg/kg	SOLID	-	-				
Aliphatics >C16-21	mg/kg	SOLID	-	-				
Aliphatics >C16-C35	mg/kg	SOLID	-	-				
Aliphatics >C21-35	mg/kg	SOLID	-	-				
Aliphatics >C35-44	mg/kg	SOLID	1600000	450000				
Aliphatics >C5-6	mg/kg	SOLID	3200	95000				
Aliphatics >C6-8	mg/kg	SOLID	7800	150000				
Aliphatics >C8-10	mg/kg	SOLID	2000	14000				
Aliphatics >C8-C44*	mg/kg	SOLID	-	-				
alpha-Hexachlorocyclohexane	mg/kg	SOLID	170	47				
Ametryn	mg/kg	SOLID	-	-				
Aminocarb*	mg/kg	SOLID	-	-				
Amitraz*	mg/kg	SOLID	-	-				
Anthracene	mg/kg	SOLID	520000	150000	<0.0900	<0.1300	<0.1100	<0.1000
Anthrax (Bacillus Anthracis) (presence of)	N/A	SOLID	-	-				
Anthrax (Bacillus Anthracis) (presence of)	-	SOLID	-	-				
Aromatics >C10-12	mg/kg	SOLID	16000	9200				
Aromatics >C12-16	mg/kg	SOLID	36000	10000				
Aromatics >C12-44	mg/kg	SOLID	-	-				
Aromatics >C16-21	mg/kg	SOLID	28000	7600				
Aromatics >C21-35	mg/kg	SOLID	28000	7800				
Aromatics >C35-44	mg/kg	SOLID	28000	7800				
Aromatics >C40-44	mg/kg	SOLID	-	-				
Aromatics >C5-7	mg/kg	SOLID	26000	76000				
Aromatics >C6-7	mg/kg	SOLID	-	-				
Aromatics >C7-8	mg/kg	SOLID	56000	87000				
Aromatics >C8-10	mg/kg	SOLID	3500	7200				
Aromatics >C8-C44*	mg/kg	SOLID	-	-				
Arsenic	mg/kg	SOLID	640	170	4.6	16.8	7.2	5.6
Asbestos	-	SOLID	-	-				
Asbestos (Presence of)	N/A	SOLID	-	-				
Asbestos (Presence of)	---	SOLID	-	-				
Asbestos Analysts Comments	N/A	SOLID	-	-				
Asbestos Analysts Comments	---	SOLID	-	-				
Asbestos fibre count	---	SOLID	-	-				
Asbestos Gravimetric Quantification	%	SOLID	-	-				
Asbestos PCOM Quantification	%	SOLID	-	-				
Asbestos Quantification (Total %)	%	SOLID	-	-			#VALUE!	#VALUE!
Asbestos Quantification Stage 1	N/A	SOLID	-	-				
Asbestos: Actinolite*	N/A	SOLID	-	-				
Asbestos: Actinolite*	No units	SOLID	-	-				
Asbestos: Amosite*	N/A	SOLID	-	-				
Asbestos: Amosite*	No units	SOLID	-	-				
Asbestos: Anthophyllite*	N/A	SOLID	-	-				
Asbestos: Anthophyllite*	No units	SOLID	-	-				
Asbestos: Chrysotile*	N/A	SOLID	-	-				
Asbestos: Chrysotile*	No units	SOLID	-	-				
Asbestos: Crocidolite*	N/A	SOLID	-	-				
Asbestos: Crocidolite*	No units	SOLID	-	-				
Asbestos: Tremolite*	N/A	SOLID	-	-				
Asbestos: Tremolite*	No units	SOLID	-	-				
Atraton	mg/kg	SOLID	-	-				
Atrazine	mg/kg	SOLID	9300	2300				
Azaconazole*	mg/kg	SOLID	-	-				
Azinphos-ethyl	mg/kg	SOLID	-	-				
Azinphos-methyl	mg/kg	SOLID	-	-				
Azobenzene	mg/kg	SOLID	-	-				
Azoxystrobin*	mg/kg	SOLID	-	-				
Barium	mg/kg	SOLID	22000	5800	44	309	137	97
Benalaxyl*	mg/kg	SOLID	-	-				
Bendiocarb*	mg/kg	SOLID	-	-				
Benfluralin*	mg/kg	SOLID	-	-				
Benfuracarb*	mg/kg	SOLID	-	-				
Benzene	mg/kg	SOLID	27	190	<0.0010	<0.0020	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/kg	SOLID	3900	1400	<0.0900	<0.1300	<0.1100	<0.1000
Benzo fluorene (non-specific isomer)*	mg/kg	SOLID	-	-				
Benzo(a)anthracene	mg/kg	SOLID	170	49	<0.0900	<0.1300	<0.1100	<0.1000
Benzo(a)pyrene	mg/kg	SOLID	76	21	<0.0900	<0.1300	<0.1100	<0.1000
Benzo(b)fluoranthene	mg/kg	SOLID	44	13	<0.0900	<0.1300	<0.1100	<0.1000
benzo(b,k)fluoranthene	mg/kg	SOLID	-	-				
Benzo(k)fluoranthene	mg/kg	SOLID	1200	370	<0.0900	<0.1300	<0.1100	<0.1000
Benzoic Acid	mg/kg	SOLID	-	-				
Benzopyrene (non-specific isomer)*	mg/kg	SOLID	-	-				
Benzyl Alcohol	mg/kg	SOLID	-	-				

Max of Normalised Results					Location ID	Asset	Sample Depth	Geology Code													
					BD161-CP028	BD161-CR008	BD161-CR008	BD161-CR010	BD161-TP002	BD161-TP008	BD161-TP035	BD161-TP036	BD161-WS003	BD161-WS003	BD162-CP044	BD162-CR003	BD162-CR020	BD162-CR020	BD162-TP003	BD163-CP043	BD163-CP043
					Coleshill No. 3 Embankment	Coleshill West Viaduct	Coleshill West Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Green Lane Embankment	Green Lane Embankment	Green Lane Embankment	Green Lane Embankment	Coleshill No. 3 Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment
					1.2	0.5	2	0.5	0.15	0.15	0.1	2	0.2	1.1	0.7	0.5	0.5	1	0.65	1	1.7
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TILMP	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	MGR	TILMP	MGR	TILMP	MGR	MGR	MGR
Beryllium	mg/kg	SOLID	12	63		3.15	0.953	0.43	1	0.577	1.5		0.739	0.907	0.237	0.743	0.734	1.68	0.542	0.878	
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																	
Bifenazate*	mg/kg	SOLID	-	-																	
Bifenox*	mg/kg	SOLID	-	-																	
Bifenthrin*	mg/kg	SOLID	-	-																	
Binapacryl*	mg/kg	SOLID	-	-																	
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-																	
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-																	
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-																	
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000																	
Bitertanol*	mg/kg	SOLID	-	-																	
Boron	mg/kg	SOLID	240000	46000		3.6	2.4	2.5	0.8	0.9	2.1		0.9	0.6	0.5	<0.5000	1.8	1.7	0.6	0.7	
Boron (Water Soluble)*	mg/kg	SOLID	-	-																	
Boron*	mg/kg	SOLID	-	-																	
Boscalid*	mg/kg	SOLID	-	-																	
Bromacil	mg/kg	SOLID	-	-																	
Bromobenzene	mg/kg	SOLID	92	1800					<0.0010		<0.0010										
Bromochloromethane	mg/kg	SOLID	-	-					<0.0010		<0.0010										
Bromodichloromethane	mg/kg	SOLID	2	56					<0.0010		<0.0010										
Bromomethane	mg/kg	SOLID	-	-					<0.0010		<0.0010										
Bromophos*	mg/kg	SOLID	-	-																	
Bromophos-Ethyl*	mg/kg	SOLID	-	-																	
Bromopropylate*	mg/kg	SOLID	-	-																	
Bupirimate*	mg/kg	SOLID	-	-																	
Buprofezine*	mg/kg	SOLID	-	-																	
Butachlor*	mg/kg	SOLID	-	-																	
Butoxycarboxim*	mg/kg	SOLID	-	-																	
Butralin*	mg/kg	SOLID	-	-																	
Butylbenzylphthalate	mg/kg	SOLID	940000	250000																	
Cadmium	mg/kg	SOLID	410	880		1.74	<0.2200	0.4	0.35	0.22	1.4		<0.2200	<0.2200	<0.2000	<0.2000	<0.2000	<0.2400	<0.2100	<0.2000	
Cadusafos*	mg/kg	SOLID	-	-																	
Captan	mg/kg	SOLID	-	-																	
Carbaryl	mg/kg	SOLID	-	-																	
Carbazole	mg/kg	SOLID	-	-																	
Carbendazim	mg/kg	SOLID	-	-																	
Carbetamide	mg/kg	SOLID	-	-																	
Carbofuran	mg/kg	SOLID	-	-																	
Carbon Disulphide	mg/kg	SOLID	11	1300																	
Carbophenothion	mg/kg	SOLID	-	-																	
Carboxin	mg/kg	SOLID	-	-																	
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																	
Carpropamid*	mg/kg	SOLID	-	-																	
Chinomethionat*	mg/kg	SOLID	-	-																	
chlorantraniliprole*	mg/kg	SOLID	-	-																	
Chlorbenzilate*	mg/kg	SOLID	-	-																	
Chlorbromuron*	mg/kg	SOLID	-	-																	
Chlorbufam*	mg/kg	SOLID	-	-																	
Chlordane	mg/kg	SOLID	-	-																	
Chlordimeform	mg/kg	SOLID	-	-																	
Chlorethoxyfos*	mg/kg	SOLID	-	-																	
Chlorfenapyr*	mg/kg	SOLID	-	-																	
Chlorfenson*	mg/kg	SOLID	-	-																	
Chlorfenvinphos	mg/kg	SOLID	-	-																	
Chlorfluazuron*	mg/kg	SOLID	-	-																	
Chloridazon*	mg/kg	SOLID	-	-																	
Chlormephos	mg/kg	SOLID	-	-																	
Chlorobenzene	mg/kg	SOLID	56	1300					<0.0010		<0.0010										
Chloroethane	mg/kg	SOLID	900	154000					<0.0020		<0.0030										
Chloroethene	mg/kg	SOLID	0.059	4.8					<0.0010		<0.0010										
Chloroform	mg/kg	SOLID	99	2600					<0.0010		<0.0010										
Chloromethane	mg/kg	SOLID	1	140					<0.0030		<0.0040										
Chloropropham	mg/kg	SOLID	-	-																	
Chloropropylate*	mg/kg	SOLID	-	-																	
Chlorothalonil	mg/kg	SOLID	-	-																	
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																	
Chlorpyriphos	mg/kg	SOLID	-	-																	
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																	
Chlorthion*	mg/kg	SOLID	-	-																	
Chlorthiophos*	mg/kg	SOLID	-	-																	
Chlortoluron	mg/kg	SOLID	-	-																	
Chlozolinate*	mg/kg	SOLID	-	-																	
Chromium	mg/kg	SOLID	-	-		32	21.6	2330	18.9	15.6	50.8		18.9	18.5	8.2	30	24.9	51.3	132	31.8	
Chromium - Hexavalent	mg/kg	SOLID	49	250		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	0.1	<0.1000	
Chromium (III) Oxide	mg/kg	SOLID	-	-		<31.6000	<21.6000	2330	<18.9000	<15.6000	<50.8000		<18.9000	<18.5000	<8.2000	<30.0000	<24.9000	<51.3000	132	<31.8000	
Chrysene	mg/kg	SOLID	350	93		0.35	<0.1000	<0.0900	0.8	<0.0900	0.5		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Chrysene-d12*	%	SOLID	-	-																	
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																	
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690					<0.0060		<0.0070										
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-					<0.0010		<0.0010										
Clodinafop propargy*	mg/kg	SOLID	-	-																	
Clofentezine*	mg/kg	SOLID	-	-																	
Clomazone*	mg/kg	SOLID	-	-																	
Cloquintocet mexyl*	mg/kg	SOLID	-	-																	
Clothianidin*	mg/kg	SOLID	-	-																	
Copper	mg/kg	SOLID	68000	44000		91.9	18	288.9	23	23.4	85.2		65.9	71	14.6	20.5	15	28.8	32.7	26.8	
Coronene	mg/kg	SOLID	-	-																	
Coumaphos	mg/kg	SOLID	-	-																	
Cresols*	mg/kg	SOLID	-	-																	
Cyanazine	mg/kg	SOLID	-	-																	
Cyanide	mg/kg	SOLID	-	-																	
Cyanide Free	mg/kg	SOLID	-	-																	
Cyanide Free as CN	mg/kg	SOLID	-	-		<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.7000		<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.7000	<0.6000	<0.6000	
Cyazofamid*	mg/kg	SOLID	-	-																	
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																	
Cycluron*	mg/kg	SOLID	-	-																	
Cyflufenamid*	mg/kg	SOLID	-	-																	
Cyfluthrin	mg/kg	SOLID	-	-																	
Cymoxanil*	mg/kg	SOLID	-	-																	
Cypermethrin	mg/kg	SOLID	-	-																	
Cyphenothrin*	mg/kg	SOLID	-	-																	
Cyproconazole*	mg/kg	SOLID	-	-																	
Cyprodinil*	mg/kg	SOLID	-	-																	
Cyromazine*	mg/kg	SOLID	-	-																	
Cythioate*	mg/kg	SOLID	-	-																	
DEET*	mg/kg	SOLID	-	-																	
Deltamethrin	mg/kg	SOLID	-	-																	
Demeton	mg/kg	SOLID	-	-																	
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																	
Desmedipham*	mg/kg	SOLID	-	-																	
Desmetryn*	mg/kg	SOLID	-	-																	
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																	
Diafenthiuron*	mg/kg	SOLID	-	-																	
Dialifos*	mg/kg	SOLID	-	-																	
Diazinon	mg/kg	SOLID	-	-																	
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1		<0.0900	<0.1000	<0.0900	0.19	<0.0900	<0.1100		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Dibenzofuran	mg/kg	SOLID	-	-																	
Dibromochloromethane	mg/kg	SOLID	-	-					<0.0010		<0.0010										
Dibromofluoromethane	%	SOLID	-	-																	
Dibromomethane	mg/kg	SOLID	-	-					<0.0010		<0.0010										
Dichlobenil	mg/kg	SOLID	-	-																	
Dichlofenthion*	mg/kg	SOLID	-	-																	
Dichlorodifluoromethane	mg/kg	SOLID	-	-					<0.0010		<0.0010										
Dichloromethane	mg/kg	SOLID	260	1500																	
Dichlorvos	mg/kg	SOLID	140	26																	
Diclobutrazol*	mg/kg	SOLID	-	-																	
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																	
Dicrotophos*	mg/kg	SOLID	-	-																	
Dieldrin	mg/kg	SOLID	170	30																	
Diethofencarb*	mg/kg	SOLID	-	-																	
Diethylphthalate	mg/kg	SOLID	140000	89000																	
Difenoconazole*	mg/kg	SOLID	-	-																	
Diflubenzuron*	mg/kg	SOLID	-	-																	
Diflufenican*	mg/kg	SOLID	-	-																	
Dimefuron*	mg/kg	SOLID	-	-																	
Dimethenamid*	mg/kg	SOLID	-	-																	
Dimethoate	mg/kg	SOLID	-	-																	
Dimethomorph*	mg/kg	SOLID	-	-																	
Dimethylphthalate	mg/kg	SOLID	-	-																	
Dimoxystrobin*	mg/kg	SOLID	-	-																	
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600																	
Diniconazole*	mg/kg	SOLID	-	-																	
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000																	
Dinotefuran*	mg/kg	SOLID	-	-																	
Dinoterb*	mg/kg	SOLID	-	-																	
Dioxabenzofos*	mg/kg	SOLID	-	-																	
Dioxacarb*	mg/kg	SOLID	-	-																	
Diphenamid	mg/kg	SOLID	-	-																	
Diphenyl ether	mg/kg	SOLID	-	-																	
Diphenylamine	mg/kg	SOLID	-	-																	
Disulfoton	mg/kg	SOLID	-	-																	
Disulfoton sulphone*	mg/kg	SOLID	-	-																	
Ditalimfos*	mg/kg	SOLID	-	-																	
Diuron	mg/kg	SOLID	-	-																	
DMSA*	mg/kg	SOLID	-	-																	
DMST*	mg/kg	SOLID	-	-																	
Dodemorph*	mg/kg	SOLID	-	-																	
Edifenphos*	mg/kg	SOLID	-	-																	
Elemental Sulphur	%	SOLID	-	-																	
Emamectin*	mg/kg	SOLID	-	-																	
Endosulfan I	mg/kg	SOLID	5600	2400																	

Max of Normalised Results																									
					BD163-CP043	BD163-CP043	BD163-CP043	BD163-CR006	BD163-CR014	BD163-CR014	BD163-CR014	BD163-CR022	BD163-CR022	BD163-CR022	BD163-TP013	BD163-TP013a	BD163-TP016	BD163-TP016	BD163-WS001	BD163-WS001	BD164-CR011	BS161-CP401	BS161-CP401	BS161-CP401	BS161-CP401
					Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Green Lane Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Green Lane Embankment	Green Lane Embankment	Water Orton Cutting	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment
					2	3	5	0.8	0.5	2	4	7	9	12.8	0.8	1.5	0.6	2.3	0.2	0.5	0.7	0.05	0.3	0.5	1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	TOP	RTD2	RTD2	RTD2
Beryllium	mg/kg	SOLID	12	63		1.036	0.893	1.39	0.667	0.918	1.097	0.825	0.954	1.045	0.446	0.885	0.963	1.13	0.705	0.571	0.85	<2.0000	<2.0000	<2.0000	<2.0000
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																					
Bifenazate*	mg/kg	SOLID	-	-																					
Bifenox*	mg/kg	SOLID	-	-																					
Bifenthrin*	mg/kg	SOLID	-	-																					
Binapacryl*	mg/kg	SOLID	-	-																					
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000																		<0.1000		<0.1000	
Bitertanol*	mg/kg	SOLID	-	-																					
Boron	mg/kg	SOLID	240000	46000		0.6	0.8	0.7	1	0.8	0.8	1.3	1	0.8	0.8	0.8	0.8	0.6	1	1	0.8	<1.0000	<1.0000	<1.0000	<1.0000
Boron (Water Soluble)*	mg/kg	SOLID	-	-																					
Boron*	mg/kg	SOLID	-	-																					
Boscalid*	mg/kg	SOLID	-	-																					
Bromacil	mg/kg	SOLID	-	-																					
Bromobenzene	mg/kg	SOLID	92	1800																		<0.0500		<0.0500	
Bromochloromethane	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
Bromodichloromethane	mg/kg	SOLID	2	56																		<0.0500		<0.0500	
Bromomethane	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
Bromophos*	mg/kg	SOLID	-	-																					
Bromophos-Ethyl*	mg/kg	SOLID	-	-																					
Bromopropylate*	mg/kg	SOLID	-	-																					
Bupirimate*	mg/kg	SOLID	-	-																					
Buprofezine*	mg/kg	SOLID	-	-																					
Butachlor*	mg/kg	SOLID	-	-																					
Butoxycarboxim*	mg/kg	SOLID	-	-																					
Butralin*	mg/kg	SOLID	-	-																					
Butylbenzylphthalate	mg/kg	SOLID	940000	250000																		<0.1000		<0.1000	
Cadmium	mg/kg	SOLID	410	880		<0.2100	<0.2100	<0.2100	0.2	<0.2000	<0.2000	<0.2100	<0.2000	<0.2000	0.5	<0.2000	<0.2000	<0.2000	<0.2300	<0.2100	<0.2100	<1.0000	<1.0000	<1.0000	<1.0000
Cadusafos*	mg/kg	SOLID	-	-																					
Captan	mg/kg	SOLID	-	-																					
Carbaryl	mg/kg	SOLID	-	-																					
Carbazole	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
Carbendazim	mg/kg	SOLID	-	-																					
Carbetamide	mg/kg	SOLID	-	-																					
Carbofuran	mg/kg	SOLID	-	-																					
Carbon Disulphide	mg/kg	SOLID	11	1300																					
Carbophenothion	mg/kg	SOLID	-	-																					
Carboxin	mg/kg	SOLID	-	-																					
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																					
Carpropamid*	mg/kg	SOLID	-	-																					
Chinomethionat*	mg/kg	SOLID	-	-																					
chlorantraniliprole*	mg/kg	SOLID	-	-																					
Chlorbenzilate*	mg/kg	SOLID	-	-																					
Chlorbromuron*	mg/kg	SOLID	-	-																					
Chlorbufam*	mg/kg	SOLID	-	-																					
Chlordane	mg/kg	SOLID	-	-																					
Chlordimeform	mg/kg	SOLID	-	-																					
Chlorethoxyfos*	mg/kg	SOLID	-	-																					
Chlorfenapyr*	mg/kg	SOLID	-	-																					
Chlorfenson*	mg/kg	SOLID	-	-																					
Chlorfenvinphos	mg/kg	SOLID	-	-																					
Chlorfluazuron*	mg/kg	SOLID	-	-																					
Chloridazon*	mg/kg	SOLID	-	-																					
Chlormephos	mg/kg	SOLID	-	-																					
Chlorobenzene	mg/kg	SOLID	56	1300																		<0.0500		<0.0500	
Chloroethane	mg/kg	SOLID	900	154000																		<0.0500		<0.0500	
Chloroethene	mg/kg	SOLID	0.059	4.8																		<0.0500		<0.0500	
Chloroform	mg/kg	SOLID	99	2600																		<0.0500		<0.0500	
Chloromethane	mg/kg	SOLID	1	140																		<0.0500		<0.0500	
Chloropropham	mg/kg	SOLID	-	-																					
Chloropropylate*	mg/kg	SOLID	-	-																					
Chlorothalonil	mg/kg	SOLID	-	-																					
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																					
Chlorpyriphos	mg/kg	SOLID	-	-																					
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																					
Chlorthion*	mg/kg	SOLID	-	-																					
Chlorthiophos*	mg/kg	SOLID	-	-																					
Chlortoluron	mg/kg	SOLID	-	-																					
Chlozolinate*	mg/kg	SOLID	-	-																					
Chromium	mg/kg	SOLID	-	-		29.8	25.3	44.3	21.7	31.6	38.4	28.2	36.4	32.2	17.9	26	28.2	31	24	23.8	31.3	18	19	22	22
Chromium - Hexavalent	mg/kg	SOLID	49	250		<0.1000	<0.1000	0.3	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<1.0000	<1.0000	<1.0000	<1.0000
Chromium (III) Oxide	mg/kg	SOLID	-	-		<29.8000	<25.3000	44	<21.7000	<31.6000	<38.4000	<28.2000	<36.4000	<32.2000	<17.9000	<25.9000	<28.2000	<31.5000	<23.7000	<23.8000	<31.3000				
Chrysene	mg/kg	SOLID	350	93		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	1.9	0.13	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Chrysene-d12*	%	SOLID	-	-																					
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																					
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690																		<0.0500		<0.0500	
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
Clodinafop propargy*	mg/kg	SOLID	-	-																					
Clofentezine*	mg/kg	SOLID	-	-																					
Clomazone*	mg/kg	SOLID	-	-																					
Cloquintocet mexyl*	mg/kg	SOLID	-	-																					
Clothianidin*	mg/kg	SOLID	-	-																					
Copper	mg/kg	SOLID	68000	44000		25.4	25.2	23.9	22.3	33.8	32.9	32.6	28.3	29.2	19.3	38.7	26.8	32.1	27.5	18	41	25	26	18	21
Coronene	mg/kg	SOLID	-	-																					
Coumaphos	mg/kg	SOLID	-	-																					
Cresols*	mg/kg	SOLID	-	-																					
Cyanazine	mg/kg	SOLID	-	-																					
Cyanide	mg/kg	SOLID	-	-																		<1.0000	<1.0000	<1.0000	<1.0000
Cyanide Free	mg/kg	SOLID	-	-																		<1.0000	<1.0000	<1.0000	<1.0000
Cyanide Free as CN	mg/kg	SOLID	-	-		<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.7000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000				
Cyazofamid*	mg/kg	SOLID	-	-																					
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																					
Cycluron*	mg/kg	SOLID	-	-																					
Cyflufenamid*	mg/kg	SOLID	-	-																					
Cyfluthrin	mg/kg	SOLID	-	-																					
Cymoxanil*	mg/kg	SOLID	-	-																					
Cypermethrin	mg/kg	SOLID	-	-																					
Cyphenothrin*	mg/kg	SOLID	-	-																					
Cyproconazole*	mg/kg	SOLID	-	-																					
Cyprodinil*	mg/kg	SOLID	-	-																					
Cyromazine*	mg/kg	SOLID	-	-																					
Cythioate*	mg/kg	SOLID	-	-																					
DEET*	mg/kg	SOLID	-	-																					
Deltamethrin	mg/kg	SOLID	-	-																					
Demeton	mg/kg	SOLID	-	-																					
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																					
Desmedipham*	mg/kg	SOLID	-	-																					
Desmetryn*	mg/kg	SOLID	-	-																					
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																					
Diafenthiuron*	mg/kg	SOLID	-	-																					
Dialifos*	mg/kg	SOLID	-	-																					
Diazinon	mg/kg	SOLID	-	-																					
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	0.22	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Dibenzofuran	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
Dibromochloromethane	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
Dibromofluoromethane	%	SOLID	-	-																					
Dibromomethane	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
Dichlobenil	mg/kg	SOLID	-	-																					
Dichlofenthion*	mg/kg	SOLID	-	-																					
Dichlorodifluoromethane	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
Dichloromethane	mg/kg	SOLID	260	1500																		<0.0500		<0.0500	
Dichlorvos	mg/kg	SOLID	140	26																					
Diclobutrazol*	mg/kg	SOLID	-	-																					
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																					
Dicrotophos*	mg/kg	SOLID	-	-																					
Dieldrin	mg/kg	SOLID	170	30																					
Diethofencarb*	mg/kg	SOLID	-	-																					
Diethylphthalate	mg/kg	SOLID	140000	89000																		<0.1000		<0.1000	
Difenoconazole*	mg/kg	SOLID	-	-																					
Diflubenzuron*	mg/kg	SOLID	-	-																					
Diflufenican*	mg/kg	SOLID	-	-																					
Dimefuron*	mg/kg	SOLID	-	-																					
Dimethenamid*	mg/kg	SOLID	-	-																					
Dimethoate	mg/kg	SOLID	-	-																					
Dimethomorph*	mg/kg	SOLID	-	-																					
Dimethylphthalate	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
Dimoxystrobin*	mg/kg	SOLID	-	-																					
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600																		<0.1000		<0.1000	
Diniconazole*	mg/kg	SOLID	-	-																					
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000																		<0.1000		<0.1000	
Dinotefuran*	mg/kg	SOLID	-	-																					
Dinoterb*	mg/kg	SOLID	-	-																					
Dioxabenzofos*	mg/kg	SOLID	-	-																					
Dioxacarb*	mg/kg	SOLID	-	-																					
Diphenamid	mg/kg	SOLID	-	-																					
Diphenyl ether	mg/kg	SOLID	-	-																					
Diphenylamine	mg/kg	SOLID	-	-																					
Disulfoton	mg/kg	SOLID	-	-																					
Disulfoton sulphone*	mg/kg	SOLID	-	-																					
Ditalimfos*	mg/kg	SOLID	-	-																					
Diuron	mg/kg	SOLID	-	-																					
DMSA*	mg/kg	SOLID	-	-																					
DMST*	mg/kg	SOLID	-	-																					
Dodemorph*	mg/kg	SOLID	-	-																					
Edifenphos*	mg/kg	SOLID	-	-																					
Elemental Sulphur	%	SOLID	-	-																					
Emamectin*	mg/kg	SOLID	-	-																					
Endosulfan I	mg/kg	SOLID	5600	2400																					

Max of Normalised Results					
					BS161-CP401
					Coleshill No. 3 Embankment
					2.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD2
Beryllium	mg/kg	SOLID	12	63	<2.0000
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15	
Bifenazate*	mg/kg	SOLID	-	-	
Bifenox*	mg/kg	SOLID	-	-	
Bifenthrin*	mg/kg	SOLID	-	-	
Binapacryl*	mg/kg	SOLID	-	-	
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-	<0.1000
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-	<0.1000
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-	<0.1000
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000	<0.1000
Bitertanol*	mg/kg	SOLID	-	-	
Boron	mg/kg	SOLID	240000	46000	<1.0000
Boron (Water Soluble)*	mg/kg	SOLID	-	-	
Boron*	mg/kg	SOLID	-	-	
Boscalid*	mg/kg	SOLID	-	-	
Bromacil	mg/kg	SOLID	-	-	
Bromobenzene	mg/kg	SOLID	92	1800	<0.0500
Bromochloromethane	mg/kg	SOLID	-	-	<0.0500
Bromodichloromethane	mg/kg	SOLID	2	56	<0.0500
Bromomethane	mg/kg	SOLID	-	-	<0.0500
Bromophos*	mg/kg	SOLID	-	-	
Bromophos-Ethyl*	mg/kg	SOLID	-	-	
Bromopropylate*	mg/kg	SOLID	-	-	
Bupirimate*	mg/kg	SOLID	-	-	
Buprofezine*	mg/kg	SOLID	-	-	
Butachlor*	mg/kg	SOLID	-	-	
Butoxycarboxim*	mg/kg	SOLID	-	-	
Butralin*	mg/kg	SOLID	-	-	
Butylbenzylphthalate	mg/kg	SOLID	940000	250000	<0.1000
Cadmium	mg/kg	SOLID	410	880	<1.0000
Cadusafos*	mg/kg	SOLID	-	-	
Captan	mg/kg	SOLID	-	-	
Carbaryl	mg/kg	SOLID	-	-	
Carbazole	mg/kg	SOLID	-	-	<0.1000
Carbendazim	mg/kg	SOLID	-	-	
Carbetamide	mg/kg	SOLID	-	-	
Carbofuran	mg/kg	SOLID	-	-	
Carbon Disulphide	mg/kg	SOLID	11	1300	
Carbophenothion	mg/kg	SOLID	-	-	
Carboxin	mg/kg	SOLID	-	-	
Carfentrazone Ethyl*	mg/kg	SOLID	-	-	
Carpropamid*	mg/kg	SOLID	-	-	
Chinomethionat*	mg/kg	SOLID	-	-	
chlorantraniliprole*	mg/kg	SOLID	-	-	
Chlorbenzilate*	mg/kg	SOLID	-	-	
Chlorbromuron*	mg/kg	SOLID	-	-	
Chlorbufam*	mg/kg	SOLID	-	-	
Chlordane	mg/kg	SOLID	-	-	
Chlordimeform	mg/kg	SOLID	-	-	
Chlorethoxyfos*	mg/kg	SOLID	-	-	
Chlorfenapyr*	mg/kg	SOLID	-	-	
Chlorfenson*	mg/kg	SOLID	-	-	
Chlorfenvinphos	mg/kg	SOLID	-	-	
Chlorfluazuron*	mg/kg	SOLID	-	-	
Chloridazon*	mg/kg	SOLID	-	-	
Chlormephos	mg/kg	SOLID	-	-	
Chlorobenzene	mg/kg	SOLID	56	1300	<0.0500
Chloroethane	mg/kg	SOLID	900	154000	<0.0500
Chloroethene	mg/kg	SOLID	0.059	4.8	<0.0500
Chloroform	mg/kg	SOLID	99	2600	<0.0500
Chloromethane	mg/kg	SOLID	1	140	<0.0500
Chloropropham	mg/kg	SOLID	-	-	
Chloropropylate*	mg/kg	SOLID	-	-	
Chlorothalonil	mg/kg	SOLID	-	-	
Chlorpyrifos methyl*	mg/kg	SOLID	-	-	
Chlorpyriphos	mg/kg	SOLID	-	-	
Chlorthal Dimethyl*	mg/kg	SOLID	-	-	
Chlorthion*	mg/kg	SOLID	-	-	
Chlorthiophos*	mg/kg	SOLID	-	-	
Chlortoluron	mg/kg	SOLID	-	-	
Chlozolinate*	mg/kg	SOLID	-	-	
Chromium	mg/kg	SOLID	-	-	21
Chromium - Hexavalent	mg/kg	SOLID	49	250	<1.0000
Chromium (III) Oxide	mg/kg	SOLID	-	-	
Chrysene	mg/kg	SOLID	350	93	<0.1000
Chrysene-d12*	%	SOLID	-	-	
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-	
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690	<0.0500
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-	<0.0500
Clodinafop propargy*	mg/kg	SOLID	-	-	
Clofentezine*	mg/kg	SOLID	-	-	
Clomazone*	mg/kg	SOLID	-	-	
Cloquintocet mexyl*	mg/kg	SOLID	-	-	
Clothianidin*	mg/kg	SOLID	-	-	
Copper	mg/kg	SOLID	68000	44000	17
Coronene	mg/kg	SOLID	-	-	
Coumaphos	mg/kg	SOLID	-	-	
Cresols*	mg/kg	SOLID	-	-	
Cyanazine	mg/kg	SOLID	-	-	
Cyanide	mg/kg	SOLID	-	-	<1.0000
Cyanide Free	mg/kg	SOLID	-	-	<1.0000
Cyanide Free as CN	mg/kg	SOLID	-	-	
Cyazofamid*	mg/kg	SOLID	-	-	
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-	
Cycluron*	mg/kg	SOLID	-	-	
Cyflufenamid*	mg/kg	SOLID	-	-	
Cyfluthrin	mg/kg	SOLID	-	-	
Cymoxanil*	mg/kg	SOLID	-	-	
Cypermethrin	mg/kg	SOLID	-	-	
Cyphenothrin*	mg/kg	SOLID	-	-	
Cyproconazole*	mg/kg	SOLID	-	-	
Cyprodinil*	mg/kg	SOLID	-	-	
Cyromazine*	mg/kg	SOLID	-	-	
Cythioate*	mg/kg	SOLID	-	-	
DEET*	mg/kg	SOLID	-	-	
Deltamethrin	mg/kg	SOLID	-	-	
Demeton	mg/kg	SOLID	-	-	
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-	
Desmedipham*	mg/kg	SOLID	-	-	
Desmetryn*	mg/kg	SOLID	-	-	
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-	
Diafenthiuron*	mg/kg	SOLID	-	-	
Dialifos*	mg/kg	SOLID	-	-	
Diazinon	mg/kg	SOLID	-	-	
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.1000
Dibenzofuran	mg/kg	SOLID	-	-	<0.1000
Dibromochloromethane	mg/kg	SOLID	-	-	<0.0500
Dibromofluoromethane	%	SOLID	-	-	
Dibromomethane	mg/kg	SOLID	-	-	<0.0500
Dichlobenil	mg/kg	SOLID	-	-	
Dichlofenthion*	mg/kg	SOLID	-	-	
Dichlorodifluoromethane	mg/kg	SOLID	-	-	<0.0500
Dichloromethane	mg/kg	SOLID	260	1500	<0.0500
Dichlorvos	mg/kg	SOLID	140	26	
Diclobutrazol*	mg/kg	SOLID	-	-	
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-	
Dicrotophos*	mg/kg	SOLID	-	-	
Dieldrin	mg/kg	SOLID	170	30	
Diethofencarb*	mg/kg	SOLID	-	-	
Diethylphthalate	mg/kg	SOLID	140000	89000	<0.1000
Difenoconazole*	mg/kg	SOLID	-	-	
Diflubenzuron*	mg/kg	SOLID	-	-	
Diflufenican*	mg/kg	SOLID	-	-	
Dimefuron*	mg/kg	SOLID	-	-	
Dimethenamid*	mg/kg	SOLID	-	-	
Dimethoate	mg/kg	SOLID	-	-	
Dimethomorph*	mg/kg	SOLID	-	-	
Dimethylphthalate	mg/kg	SOLID	-	-	<0.1000
Dimoxystrobin*	mg/kg	SOLID	-	-	
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600	<0.1000
Diniconazole*	mg/kg	SOLID	-	-	
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000	<0.1000
Dinotefuran*	mg/kg	SOLID	-	-	
Dinoterb*	mg/kg	SOLID	-	-	
Dioxabenzofos*	mg/kg	SOLID	-	-	
Dioxacarb*	mg/kg	SOLID	-	-	
Diphenamid	mg/kg	SOLID	-	-	
Diphenyl ether	mg/kg	SOLID	-	-	
Diphenylamine	mg/kg	SOLID	-	-	
Disulfoton	mg/kg	SOLID	-	-	
Disulfoton sulphone*	mg/kg	SOLID	-	-	
Ditalimfos*	mg/kg	SOLID	-	-	
Diuron	mg/kg	SOLID	-	-	
DMSA*	mg/kg	SOLID	-	-	
DMST*	mg/kg	SOLID	-	-	
Dodemorph*	mg/kg	SOLID	-	-	
Edifenphos*	mg/kg	SOLID	-	-	
Elemental Sulphur	%	SOLID	-	-	
Emamectin*	mg/kg	SOLID	-	-	
Endosulfan I	mg/kg	SOLID	5600	2400	

Max of Normalised Results																											
					BS161-CT401	BS162-CR401a	BS162-CR401a	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR413
					Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	Coleshill No. 3 Embankment
					0.1	0.35	1	0.3	1	2	4	6.5	9.5	10.5	13.5	16.5	0.1	0.3	1	2	5.5	7.5	10.5	12	15	18.5	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	RTD1	RTD2	RTD2	RTD2	RTD2	SIM	SIM	SIM	SIM	SIM	TOP	RTD	RTD	RTD	SIM	SIM	SIM	SIM	SIM	SIM	TOP
Beryllium	mg/kg	SOLID	12	63		<2.0000	<2.0000	<2.0000	<2.0000									<2.0000	<2.0000								<2.0000
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15														<0.0100									
Bifenazate*	mg/kg	SOLID	-	-														<0.0100									
Bifenox*	mg/kg	SOLID	-	-														<0.0100									
Bifenthrin*	mg/kg	SOLID	-	-														<0.0100									
Binapacryl*	mg/kg	SOLID	-	-														<0.0100									
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000		<0.1000	<0.1000																				
Bitertanol*	mg/kg	SOLID	-	-														<0.0100									
Boron	mg/kg	SOLID	240000	46000		<1.0000	<1.0000	<1.0000	<1.0000									<1.0000	<1.0000								<1.0000
Boron (Water Soluble)*	mg/kg	SOLID	-	-																							
Boron*	mg/kg	SOLID	-	-																							
Boscalid*	mg/kg	SOLID	-	-														<0.0100									
Bromacil	mg/kg	SOLID	-	-														<0.0100									
Bromobenzene	mg/kg	SOLID	92	1800		<0.0500	<0.0500																				
Bromochloromethane	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
Bromodichloromethane	mg/kg	SOLID	2	56		<0.0500	<0.0500																				
Bromomethane	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
Bromophos*	mg/kg	SOLID	-	-														<0.0100									
Bromophos-Ethyl*	mg/kg	SOLID	-	-														<0.0100									
Bromopropylate*	mg/kg	SOLID	-	-														<0.0100									
Bupirimate*	mg/kg	SOLID	-	-														<0.0100									
Buprofezine*	mg/kg	SOLID	-	-														<0.0100									
Butachlor*	mg/kg	SOLID	-	-														<0.0100									
Butoxycarboxim*	mg/kg	SOLID	-	-														<0.0100									
Butralin*	mg/kg	SOLID	-	-														<0.0100									
Butylbenzylphthalate	mg/kg	SOLID	940000	250000		<0.1000	<0.1000																				
Cadmium	mg/kg	SOLID	410	880		<1.0000	<1.0000	<1.0000	<1.0000									<1.0000	<1.0000								<1.0000
Cadusafos*	mg/kg	SOLID	-	-														<0.0100									
Captan	mg/kg	SOLID	-	-														<0.0100									
Carbaryl	mg/kg	SOLID	-	-														<0.0100									
Carbazole	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
Carbendazim	mg/kg	SOLID	-	-														<0.0100									
Carbetamide	mg/kg	SOLID	-	-														<0.0100									
Carbofuran	mg/kg	SOLID	-	-														<0.0100									
Carbon Disulphide	mg/kg	SOLID	11	1300																							
Carbophenothion	mg/kg	SOLID	-	-														<0.0100									
Carboxin	mg/kg	SOLID	-	-														<0.0100									
Carfentrazone Ethyl*	mg/kg	SOLID	-	-														<0.0100									
Carpropamid*	mg/kg	SOLID	-	-														<0.0100									
Chinomethionat*	mg/kg	SOLID	-	-														<0.0100									
chlorantraniliprole*	mg/kg	SOLID	-	-														<0.0100									
Chlorbenzilate*	mg/kg	SOLID	-	-														<0.0100									
Chlorbromuron*	mg/kg	SOLID	-	-														<0.0100									
Chlorbufam*	mg/kg	SOLID	-	-														<0.0100									
Chlordane	mg/kg	SOLID	-	-														<0.0100									
Chlordimeform	mg/kg	SOLID	-	-														<0.0100									
Chlorethoxyfos*	mg/kg	SOLID	-	-														<0.0100									
Chlorfenapyr*	mg/kg	SOLID	-	-														<0.0100									
Chlorfenson*	mg/kg	SOLID	-	-														<0.0100									
Chlorfenvinphos	mg/kg	SOLID	-	-														<0.0100									
Chlorfluazuron*	mg/kg	SOLID	-	-														<0.0100									
Chloridazon*	mg/kg	SOLID	-	-														<0.0100									
Chlormephos	mg/kg	SOLID	-	-														<0.0100									
Chlorobenzene	mg/kg	SOLID	56	1300		<0.0500	<0.0500																				
Chloroethane	mg/kg	SOLID	900	154000		<0.0500	<0.0500																				
Chloroethene	mg/kg	SOLID	0.059	4.8		<0.0500	<0.0500																				
Chloroform	mg/kg	SOLID	99	2600		<0.0500	<0.0500																				
Chloromethane	mg/kg	SOLID	1	140		<0.0500	<0.0500																				
Chloropropham	mg/kg	SOLID	-	-														<0.0100									
Chloropropylate*	mg/kg	SOLID	-	-														<0.0100									
Chlorothalonil	mg/kg	SOLID	-	-														<0.0100									
Chlorpyrifos methyl*	mg/kg	SOLID	-	-														<0.0100									
Chlorpyriphos	mg/kg	SOLID	-	-														<0.0100									
Chlorthal Dimethyl*	mg/kg	SOLID	-	-														<0.0100									
Chlorthion*	mg/kg	SOLID	-	-														<0.0100									
Chlorthiophos*	mg/kg	SOLID	-	-														<0.0100									
Chlortoluron	mg/kg	SOLID	-	-														<0.0100									
Chlozolinate*	mg/kg	SOLID	-	-														<0.0100									
Chromium	mg/kg	SOLID	-	-		28	18	25	23									22	11								26
Chromium - Hexavalent	mg/kg	SOLID	49	250		<1.0000	<1.0000	<1.0000	<1.0000									<1.0000	<1.0000								<1.0000
Chromium (III) Oxide	mg/kg	SOLID	-	-																							
Chrysene	mg/kg	SOLID	350	93		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Chrysene-d12*	%	SOLID	-	-																							
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-														<0.0100									
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690		<0.0500	<0.0500																				
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
Clodinafop propargy*	mg/kg	SOLID	-	-														<0.0100									
Clofentezine*	mg/kg	SOLID	-	-														<0.0100									
Clomazone*	mg/kg	SOLID	-	-														<0.0100									
Cloquintocet mexyl*	mg/kg	SOLID	-	-														<0.0100									
Clothianidin*	mg/kg	SOLID	-	-														<0.0100									
Copper	mg/kg	SOLID	68000	44000		11	7	18	8									14	6								18
Coronene	mg/kg	SOLID	-	-																							
Coumaphos	mg/kg	SOLID	-	-														<0.0100									
Cresols*	mg/kg	SOLID	-	-																							
Cyanazine	mg/kg	SOLID	-	-														<0.0100									
Cyanide	mg/kg	SOLID	-	-		<1.0000	<1.0000	1	<1.0000									<1.0000	<1.0000								<1.0000
Cyanide Free	mg/kg	SOLID	-	-		<1.0000	<1.0000	<1.0000	<1.0000																		<1.0000
Cyanide Free as CN	mg/kg	SOLID	-	-																							
Cyazofamid*	mg/kg	SOLID	-	-														<0.0100									
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																							
Cycluron*	mg/kg	SOLID	-	-														<0.0100									
Cyflufenamid*	mg/kg	SOLID	-	-														<0.0100									
Cyfluthrin	mg/kg	SOLID	-	-														<0.0100									
Cymoxanil*	mg/kg	SOLID	-	-														<0.0100									
Cypermethrin	mg/kg	SOLID	-	-														<0.0100									
Cyphenothrin*	mg/kg	SOLID	-	-														<0.0100									
Cyproconazole*	mg/kg	SOLID	-	-														0.02									
Cyprodinil*	mg/kg	SOLID	-	-														<0.0100									
Cyromazine*	mg/kg	SOLID	-	-														<0.0100									
Cythioate*	mg/kg	SOLID	-	-														<0.0100									
DEET*	mg/kg	SOLID	-	-														<0.0100									
Deltamethrin	mg/kg	SOLID	-	-														<0.0100									
Demeton	mg/kg	SOLID	-	-														<0.0100									
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-														<0.0100									
Desmedipham*	mg/kg	SOLID	-	-														<0.0100									
Desmetryn*	mg/kg	SOLID	-	-														<0.0100									
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-														<0.0100									
Diafenthiuron*	mg/kg	SOLID	-	-														<0.0100									
Dialifos*	mg/kg	SOLID	-	-														<0.0100									
Diazinon	mg/kg	SOLID	-	-														<0.0100									
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Dibenzofuran	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
Dibromochloromethane	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
Dibromofluoromethane	%	SOLID	-	-																							
Dibromomethane	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
Dichlobenil	mg/kg	SOLID	-	-														<0.0100									
Dichlofenthion*	mg/kg	SOLID	-	-														<0.0100									
Dichlorodifluoromethane	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
Dichloromethane	mg/kg	SOLID	260	1500		<0.0500	<0.0500																				
Dichlorvos	mg/kg	SOLID	140	26														<0.0100									
Diclobutrazol*	mg/kg	SOLID	-	-														<0.0100									
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-														<0.0100									
Dicrotophos*	mg/kg	SOLID	-	-														<0.0100									
Dieldrin	mg/kg	SOLID	170	30														<0.0100									
Diethofencarb*	mg/kg	SOLID	-	-														<0.0100									
Diethylphthalate	mg/kg	SOLID	140000	89000		<0.1000	<0.1000																				
Difenoconazole*	mg/kg	SOLID	-	-														<0.0100									
Diflubenzuron*	mg/kg	SOLID	-	-														<0.0100									
Diflufenican*	mg/kg	SOLID	-	-														0.01									
Dimefuron*	mg/kg	SOLID	-	-														<0.0100									
Dimethenamid*	mg/kg	SOLID	-	-														<0.0100									
Dimethoate	mg/kg	SOLID	-	-														<0.0100									
Dimethomorph*	mg/kg	SOLID	-	-														<0.0100									
Dimethylphthalate	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
Dimoxystrobin*	mg/kg	SOLID	-	-														<0.0100									
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600		<0.1000	<0.1000																				
Diniconazole*	mg/kg	SOLID	-	-														<0.0100									
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000		<0.1000	<0.1000																				
Dinotefuran*	mg/kg	SOLID	-	-														<0.0100									
Dinoterb*	mg/kg	SOLID	-	-														<0.0100									
Dioxabenzofos*	mg/kg	SOLID	-	-														<0.0100									
Dioxacarb*	mg/kg	SOLID	-	-														<0.0100									
Diphenamid	mg/kg	SOLID	-	-														<0.0100									
Diphenyl ether	mg/kg	SOLID	-	-																							
Diphenylamine	mg/kg	SOLID	-	-														<0.0100									
Disulfoton	mg/kg	SOLID	-	-														<0.0100									
Disulfoton sulphone*	mg/kg	SOLID	-	-														<0.0100									
Ditalimfos*	mg/kg	SOLID	-	-														<0.0100									
Diuron	mg/kg	SOLID	-	-														<0.0100									
DMSA*	mg/kg	SOLID	-	-														<0.0100									
DMST*	mg/kg	SOLID	-	-														<0.0100									
Dodemorph*	mg/kg	SOLID	-	-														<0.0100									
Edifenphos*	mg/kg	SOLID	-	-														<0.0100									
Elemental Sulphur	%	SOLID	-	-																							
Emamectin*	mg/kg	SOLID	-	-														<0.0100									
Endosulfan I	mg/kg	SOLID	5600	2400														<0.0100									

Max of Normalised Results																														
					BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	ML154-TP023	ML155-CP019	ML155-CP019	ML155-CP019	ML155-CP024	ML155-CP024	ML155-CP024	ML155-CP044	ML155-CP044	ML155-CP044	ML155-CR001	ML155-CR001	ML155-CR005	ML155-CR022	ML155-CR022	ML155-CR403	ML155-CR403	ML155-CR403
					Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting
					0.1	0.5	1	4	6.5	9.5	10.5	13.5	1	0.1	1	2	0.05	0.6	3	0.05	0.5	1	0.05	1	0	0.5	0.9	0.3	0.5	1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	RTD1	RTD1	RTD1	SIM	SIM	SIM	SIM	TILMP	TOP	TILMP	TILMP	TOP	GFDMP	GFDMP	TOP	TILMP	TILMP	TOP	ALV	MGR	MGR	MGR	MGR	MGR	BCMU
Beryllium	mg/kg	SOLID	12	63		<2.0000	<2.0000						<2.0000	<2.0000	<2.0000		0.38	0.205	1.14	<2.0000		<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																										
Bifenazate*	mg/kg	SOLID	-	-																										
Bifenox*	mg/kg	SOLID	-	-																										
Bifenthrin*	mg/kg	SOLID	-	-																										
Binapacryl*	mg/kg	SOLID	-	-																										
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Bitertanol*	mg/kg	SOLID	-	-																										
Boron	mg/kg	SOLID	240000	46000		<1.0000	<1.0000						<1.0000	<1.0000	<1.0000		0.7	1	0.6	<1.0000		<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	
Boron (Water Soluble)*	mg/kg	SOLID	-	-																										
Boron*	mg/kg	SOLID	-	-																										
Boscalid*	mg/kg	SOLID	-	-																										
Bromacil	mg/kg	SOLID	-	-																										
Bromobenzene	mg/kg	SOLID	92	1800										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Bromochloromethane	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Bromodichloromethane	mg/kg	SOLID	2	56										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Bromomethane	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Bromophos*	mg/kg	SOLID	-	-																										
Bromophos-Ethyl*	mg/kg	SOLID	-	-																										
Bromopropylate*	mg/kg	SOLID	-	-																										
Bupirimate*	mg/kg	SOLID	-	-																										
Buprofezine*	mg/kg	SOLID	-	-																										
Butachlor*	mg/kg	SOLID	-	-																										
Butoxycarboxim*	mg/kg	SOLID	-	-																										
Butralin*	mg/kg	SOLID	-	-																										
Butylbenzylphthalate	mg/kg	SOLID	940000	250000										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Cadmium	mg/kg	SOLID	410	880		<1.0000	<1.0000						<1.0000	<1.0000	<1.0000		0.25	2.4	<0.2000	<1.0000		<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	
Cadusafos*	mg/kg	SOLID	-	-																										
Captan	mg/kg	SOLID	-	-																										
Carbaryl	mg/kg	SOLID	-	-																										
Carbazole	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Carbendazim	mg/kg	SOLID	-	-																										
Carbetamide	mg/kg	SOLID	-	-																										
Carbofuran	mg/kg	SOLID	-	-																										
Carbon Disulphide	mg/kg	SOLID	11	1300																										
Carbophenothion	mg/kg	SOLID	-	-																										
Carboxin	mg/kg	SOLID	-	-																										
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																										
Carpropamid*	mg/kg	SOLID	-	-																										
Chinomethionat*	mg/kg	SOLID	-	-																										
chlorantraniliprole*	mg/kg	SOLID	-	-																										
Chlorbenzilate*	mg/kg	SOLID	-	-																										
Chlorbromuron*	mg/kg	SOLID	-	-																										
Chlorbufam*	mg/kg	SOLID	-	-																										
Chlordane	mg/kg	SOLID	-	-																										
Chlordimeform	mg/kg	SOLID	-	-																										
Chlorethoxyfos*	mg/kg	SOLID	-	-																										
Chlorfenapyr*	mg/kg	SOLID	-	-																										
Chlorfenson*	mg/kg	SOLID	-	-																										
Chlorfenvinphos	mg/kg	SOLID	-	-																										
Chlorfluazuron*	mg/kg	SOLID	-	-																										
Chloridazon*	mg/kg	SOLID	-	-																										
Chlormephos	mg/kg	SOLID	-	-																										
Chlorobenzene	mg/kg	SOLID	56	1300										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Chloroethane	mg/kg	SOLID	900	154000										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Chloroethene	mg/kg	SOLID	0.059	4.8										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Chloroform	mg/kg	SOLID	99	2600										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Chloromethane	mg/kg	SOLID	1	140										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Chloropropham	mg/kg	SOLID	-	-																										
Chloropropylate*	mg/kg	SOLID	-	-																										
Chlorothalonil	mg/kg	SOLID	-	-																										
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																										
Chlorpyriphos	mg/kg	SOLID	-	-																										
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																										
Chlorthion*	mg/kg	SOLID	-	-																										
Chlorthiophos*	mg/kg	SOLID	-	-																										
Chlortoluron	mg/kg	SOLID	-	-																										
Chlozolinate*	mg/kg	SOLID	-	-																										
Chromium	mg/kg	SOLID	-	-		18	11						34	19	26		13.5	11	35.4	18		17	19	23	16	27	23	7	32	
Chromium - Hexavalent	mg/kg	SOLID	49	250		<1.0000	<1.0000						<1.0000	<1.0000	<1.0000		<0.1000	<0.1000	<0.1000	<1.0000		<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	
Chromium (III) Oxide	mg/kg	SOLID	-	-													<13.5000	<11.4000	<35.4000											
Chrysene	mg/kg	SOLID	350	93		<0.1000	<0.1000						<0.1000	0.1	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	0.8	0.6	<0.1000	<0.1000	<0.1000	
Chrysene-d12*	%	SOLID	-	-																										
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																										
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Clodinafop propargy*	mg/kg	SOLID	-	-																										
Clofentezine*	mg/kg	SOLID	-	-																										
Clomazone*	mg/kg	SOLID	-	-																										
Cloquintocet mexyl*	mg/kg	SOLID	-	-																										
Clothianidin*	mg/kg	SOLID	-	-																										
Copper	mg/kg	SOLID	68000	44000		9	5						13	14	18		15.9	81	43.4	13		11	15	18	50	26	12	8	19	
Coronene	mg/kg	SOLID	-	-																										
Coumaphos	mg/kg	SOLID	-	-																										
Cresols*	mg/kg	SOLID	-	-																										
Cyanazine	mg/kg	SOLID	-	-																										
Cyanide	mg/kg	SOLID	-	-		<1.0000	<1.0000						<1.0000	<1.0000	<1.0000		<0.6000	<0.6000	<0.6000	<1.0000		<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	
Cyanide Free	mg/kg	SOLID	-	-		<1.0000	<1.0000																					<1.0000	<1.0000	
Cyanide Free as CN	mg/kg	SOLID	-	-													<0.6000	<0.6000	<0.6000											
Cyazofamid*	mg/kg	SOLID	-	-																										
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																										
Cycluron*	mg/kg	SOLID	-	-																										
Cyflufenamid*	mg/kg	SOLID	-	-																										
Cyfluthrin	mg/kg	SOLID	-	-																										
Cymoxanil*	mg/kg	SOLID	-	-																										
Cypermethrin	mg/kg	SOLID	-	-																										
Cyphenothrin*	mg/kg	SOLID	-	-																										
Cyproconazole*	mg/kg	SOLID	-	-																										
Cyprodinil*	mg/kg	SOLID	-	-																										
Cyromazine*	mg/kg	SOLID	-	-																										
Cythioate*	mg/kg	SOLID	-	-																										
DEET*	mg/kg	SOLID	-	-																										
Deltamethrin	mg/kg	SOLID	-	-																										
Demeton	mg/kg	SOLID	-	-																										
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																										
Desmedipham*	mg/kg	SOLID	-	-																										
Desmetryn*	mg/kg	SOLID	-	-																										
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																										
Diafenthiuron*	mg/kg	SOLID	-	-																										
Dialifos*	mg/kg	SOLID	-	-																										
Diazinon	mg/kg	SOLID	-	-																										
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1		<0.1000	<0.1000						<0.1000	<0.1000	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.1	<0.1000	<0.1000	<0.1000	
Dibenzofuran	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Dibromochloromethane	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Dibromofluoromethane	%	SOLID	-	-																										
Dibromomethane	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Dichlobenil	mg/kg	SOLID	-	-																										
Dichlofenthion*	mg/kg	SOLID	-	-																										
Dichlorodifluoromethane	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Dichloromethane	mg/kg	SOLID	260	1500										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Dichlorvos	mg/kg	SOLID	140	26																										
Diclobutrazol*	mg/kg	SOLID	-	-																										
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																										
Dicrotophos*	mg/kg	SOLID	-	-																										
Dieldrin	mg/kg	SOLID	170	30																										
Diethofencarb*	mg/kg	SOLID	-	-																										
Diethylphthalate	mg/kg	SOLID	140000	89000										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Difenoconazole*	mg/kg	SOLID	-	-																										
Diflubenzuron*	mg/kg	SOLID	-	-																										
Diflufenican*	mg/kg	SOLID	-	-																										
Dimefuron*	mg/kg	SOLID	-	-																										
Dimethenamid*	mg/kg	SOLID	-	-																										
Dimethoate	mg/kg	SOLID	-	-																										
Dimethomorph*	mg/kg	SOLID	-	-																										
Dimethylphthalate	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Dimoxystrobin*	mg/kg	SOLID	-	-																										
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Diniconazole*	mg/kg	SOLID	-	-																										
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Dinotefuran*	mg/kg	SOLID	-	-																										
Dinoterb*	mg/kg	SOLID	-	-																										
Dioxabenzofos*	mg/kg	SOLID	-	-																										
Dioxacarb*	mg/kg	SOLID	-	-																										
Diphenamid	mg/kg	SOLID	-	-																										
Diphenyl ether	mg/kg	SOLID	-	-																										
Diphenylamine	mg/kg	SOLID	-	-																										
Disulfoton	mg/kg	SOLID	-	-																										
Disulfoton sulphone*	mg/kg	SOLID	-	-																										
Ditalimfos*	mg/kg	SOLID	-	-																										
Diuron	mg/kg	SOLID	-	-																										
DMSA*	mg/kg	SOLID	-	-																										
DMST*	mg/kg	SOLID	-	-																										
Dodemorph*	mg/kg	SOLID	-	-																										
Edifenphos*	mg/kg	SOLID	-	-																										
Elemental Sulphur	%	SOLID	-	-																										
Emamectin*	mg/kg	SOLID	-	-																										
Endosulfan I	mg/kg	SOLID	5600	2400																										

Max of Normalised Results																																		
					ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-RC007	ML155-TP018	ML155-TP018	ML155-TP025	ML155-TP025
					Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting
					2	4.11	5.3	6.83	12.09	13.43	15.42	16.7	18.6	0.05	0.3	1	3	5.24	7.2	9.18	10.6	12	14.35	0.3	0.5	2	9.2	16.06	19.5	1.7	0	0.5	0	0.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	MGR	MGR	MGR	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	GFDMP	GFDMP	GFDMP	BCMU	BCMU	BCMU	MMG	MGR	MGR	TOP	TILMP
Beryllium	mg/kg	SOLID	12	63	<2.0000									<2.0000	<2.0000	<2.0000								<2.0000	<2.0000						<2.0000	<2.0000	<2.0000	<2.0000
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																														
Bifenazate*	mg/kg	SOLID	-	-																														
Bifenox*	mg/kg	SOLID	-	-																														
Bifenthrin*	mg/kg	SOLID	-	-																														
Binapacryl*	mg/kg	SOLID	-	-																														
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-																														
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-																														
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-																														
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000																														
Bitertanol*	mg/kg	SOLID	-	-																														
Boron	mg/kg	SOLID	240000	46000	<1.0000									<1.0000	<1.0000	<1.0000								<1.0000	<1.0000						<1.0000	<1.0000	<1.0000	<1.0000
Boron (Water Soluble)*	mg/kg	SOLID	-	-																														
Boron*	mg/kg	SOLID	-	-																														
Boscalid*	mg/kg	SOLID	-	-																														
Bromacil	mg/kg	SOLID	-	-																														
Bromobenzene	mg/kg	SOLID	92	1800																														
Bromochloromethane	mg/kg	SOLID	-	-																														
Bromodichloromethane	mg/kg	SOLID	2	56																														
Bromomethane	mg/kg	SOLID	-	-																														
Bromophos*	mg/kg	SOLID	-	-																														
Bromophos-Ethyl*	mg/kg	SOLID	-	-																														
Bromopropylate*	mg/kg	SOLID	-	-																														
Bupirimate*	mg/kg	SOLID	-	-																														
Buprofezine*	mg/kg	SOLID	-	-																														
Butachlor*	mg/kg	SOLID	-	-																														
Butoxycarboxim*	mg/kg	SOLID	-	-																														
Butralin*	mg/kg	SOLID	-	-																														
Butylbenzylphthalate	mg/kg	SOLID	940000	250000																														
Cadmium	mg/kg	SOLID	410	880	<1.0000									<1.0000	<1.0000	<1.0000								<1.0000	<1.0000						<1.0000	<1.0000	<1.0000	<1.0000
Cadusafos*	mg/kg	SOLID	-	-																														
Captan	mg/kg	SOLID	-	-																														
Carbaryl	mg/kg	SOLID	-	-																														
Carbazole	mg/kg	SOLID	-	-																														
Carbendazim	mg/kg	SOLID	-	-																														
Carbetamide	mg/kg	SOLID	-	-																														
Carbofuran	mg/kg	SOLID	-	-																														
Carbon Disulphide	mg/kg	SOLID	11	1300																														
Carbophenothion	mg/kg	SOLID	-	-																														
Carboxin	mg/kg	SOLID	-	-																														
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																														
Carpropamid*	mg/kg	SOLID	-	-																														
Chinomethionat*	mg/kg	SOLID	-	-																														
chlorantraniliprole*	mg/kg	SOLID	-	-																														
Chlorbenzilate*	mg/kg	SOLID	-	-																														
Chlorbromuron*	mg/kg	SOLID	-	-																														
Chlorbufam*	mg/kg	SOLID	-	-																														
Chlordane	mg/kg	SOLID	-	-																														
Chlordimeform	mg/kg	SOLID	-	-																														
Chlorethoxyfos*	mg/kg	SOLID	-	-																														
Chlorfenapyr*	mg/kg	SOLID	-	-																														
Chlorfenson*	mg/kg	SOLID	-	-																														
Chlorfenvinphos	mg/kg	SOLID	-	-																														
Chlorfluazuron*	mg/kg	SOLID	-	-																														
Chloridazon*	mg/kg	SOLID	-	-																														
Chlormephos	mg/kg	SOLID	-	-																														
Chlorobenzene	mg/kg	SOLID	56	1300																														
Chloroethane	mg/kg	SOLID	900	154000																														
Chloroethene	mg/kg	SOLID	0.059	4.8																														
Chloroform	mg/kg	SOLID	99	2600																														
Chloromethane	mg/kg	SOLID	1	140																														
Chloropropham	mg/kg	SOLID	-	-																														
Chloropropylate*	mg/kg	SOLID	-	-																														
Chlorothalonil	mg/kg	SOLID	-	-																														
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																														
Chlorpyriphos	mg/kg	SOLID	-	-																														
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																														
Chlorthion*	mg/kg	SOLID	-	-																														
Chlorthiophos*	mg/kg	SOLID	-	-																														
Chlortoluron	mg/kg	SOLID	-	-																														
Chlozolinate*	mg/kg	SOLID	-	-																														
Chromium	mg/kg	SOLID	-	-	32									27	27	24								9	35						14	14	15	17
Chromium - Hexavalent	mg/kg	SOLID	49	250	<1.0000									<1.0000	<1.0000	<1.0000								<1.0000	<1.0000						<1.0000	<1.0000	<1.0000	<1.0000
Chromium (III) Oxide	mg/kg	SOLID	-	-																														
Chrysene	mg/kg	SOLID	350	93	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	0.4	0.2
Chrysene-d12*	%	SOLID	-	-																														
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																														
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690																														
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-																														
Clodinafop propargy*	mg/kg	SOLID	-	-																														
Clofentezine*	mg/kg	SOLID	-	-																														
Clomazone*	mg/kg	SOLID	-	-																														
Cloquintocet mexyl*	mg/kg	SOLID	-	-																														
Clothianidin*	mg/kg	SOLID	-	-																														
Copper	mg/kg	SOLID	68000	44000	23									15	15	58								10	23						39	10	140	240
Coronene	mg/kg	SOLID	-	-																														
Coumaphos	mg/kg	SOLID	-	-																														
Cresols*	mg/kg	SOLID	-	-																														
Cyanazine	mg/kg	SOLID	-	-																														
Cyanide	mg/kg	SOLID	-	-	<1.0000									<1.0000	<1.0000	<1.0000								<1.0000	<1.0000						<1.0000	<1.0000	<1.0000	<1.0000
Cyanide Free	mg/kg	SOLID	-	-	<1.0000									<1.0000	<1.0000	<1.0000								<1.0000	<1.0000									
Cyanide Free as CN	mg/kg	SOLID	-	-																														
Cyazofamid*	mg/kg	SOLID	-	-																														
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																														
Cycluron*	mg/kg	SOLID	-	-																														
Cyflufenamid*	mg/kg	SOLID	-	-																														
Cyfluthrin	mg/kg	SOLID	-	-																														
Cymoxanil*	mg/kg	SOLID	-	-																														
Cypermethrin	mg/kg	SOLID	-	-																														
Cyphenothrin*	mg/kg	SOLID	-	-																														
Cyproconazole*	mg/kg	SOLID	-	-																														
Cyprodinil*	mg/kg	SOLID	-	-																														
Cyromazine*	mg/kg	SOLID	-	-																														
Cythioate*	mg/kg	SOLID	-	-																														
DEET*	mg/kg	SOLID	-	-																														
Deltamethrin	mg/kg	SOLID	-	-																														
Demeton	mg/kg	SOLID	-	-																														
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																														
Desmedipham*	mg/kg	SOLID	-	-																														
Desmetryn*	mg/kg	SOLID	-	-																														
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																														
Diafenthiuron*	mg/kg	SOLID	-	-																														
Dialifos*	mg/kg	SOLID	-	-																														
Diazinon	mg/kg	SOLID	-	-																														
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	<0.1000	<0.1000
Dibenzofuran	mg/kg	SOLID	-	-																														
Dibromochloromethane	mg/kg	SOLID	-	-																														
Dibromofluoromethane	%	SOLID	-	-																														
Dibromomethane	mg/kg	SOLID	-	-																														
Dichlobenil	mg/kg	SOLID	-	-																														
Dichlofenthion*	mg/kg	SOLID	-	-																														
Dichlorodifluoromethane	mg/kg	SOLID	-	-																														
Dichloromethane	mg/kg	SOLID	260	1500																														
Dichlorvos	mg/kg	SOLID	140	26																														
Diclobutrazol*	mg/kg	SOLID	-	-																														
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																														
Dicrotophos*	mg/kg	SOLID	-	-																														
Dieldrin	mg/kg	SOLID	170	30																														
Diethofencarb*	mg/kg	SOLID	-	-																														
Diethylphthalate	mg/kg	SOLID	140000	89000																														
Difenoconazole*	mg/kg	SOLID	-	-																														
Diflubenzuron*	mg/kg	SOLID	-	-																														
Diflufenican*	mg/kg	SOLID	-	-																														
Dimefuron*	mg/kg	SOLID	-	-																														
Dimethenamid*	mg/kg	SOLID	-	-																														
Dimethoate	mg/kg	SOLID	-	-																														
Dimethomorph*	mg/kg	SOLID	-	-																														
Dimethylphthalate	mg/kg	SOLID	-	-																														
Dimoxystrobin*	mg/kg	SOLID	-	-																														
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600																														
Diniconazole*	mg/kg	SOLID	-	-																														
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000																														
Dinotefuran*	mg/kg	SOLID	-	-																														
Dinoterb*	mg/kg	SOLID	-	-																														
Dioxabenzofos*	mg/kg	SOLID	-	-																														
Dioxacarb*	mg/kg	SOLID	-	-																														
Diphenamid	mg/kg	SOLID	-	-																														
Diphenyl ether	mg/kg	SOLID	-	-																														
Diphenylamine	mg/kg	SOLID	-	-																														
Disulfoton	mg/kg	SOLID	-	-																														
Disulfoton sulphone*	mg/kg	SOLID	-	-																														
Ditalimfos*	mg/kg	SOLID	-	-																														
Diuron	mg/kg	SOLID	-	-																														
DMSA*	mg/kg	SOLID	-	-																														
DMST*	mg/kg	SOLID	-	-																														
Dodemorph*	mg/kg	SOLID	-	-																														
Edifenphos*	mg/kg	SOLID	-	-																														
Elemental Sulphur	%	SOLID	-	-																														
Emamectin*	mg/kg	SOLID	-	-																														
Endosulfan I	mg/kg	SOLID	5600	2400																														

Max of Normalised Results																											
					ML155-TP041	ML155-WS001	ML155-WS002	ML155-WS024	ML155-WS042	ML155-WS044	ML155-WS044	ML156-CP008	ML156-CP008	ML156-CP023	ML156-CP028	ML156-CP028	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR014	ML156-CR014	ML156-CR020	ML156-CR021	ML156-CR023	ML156-CR025
					Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station
					0	1.67	0.4	0.3	2	0	0.3	0.35	2.35	0.5	1	6	1.5	3	5.5	6.9	9.4	0.5	12.2	0.2	2.25	0.1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	TILMP	TILMP	ALV	TOP	ALV	MGR	MGR	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MMG	GFDUD	MMG	MGR	MMG	TOP	MGR
Beryllium	mg/kg	SOLID	12	63	<2.0000		2			<2.0000	<2.0000	7.7	4.2	0.1869	0.253				<2.0000			0.216	0.961	0.6		0.6	0.3
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																							
Bifenazate*	mg/kg	SOLID	-	-																							
Bifenox*	mg/kg	SOLID	-	-																							
Bifenthrin*	mg/kg	SOLID	-	-																							
Binapacryl*	mg/kg	SOLID	-	-																							
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-																							
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-																							
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-																							
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000																							
Bitertanol*	mg/kg	SOLID	-	-																							
Boron	mg/kg	SOLID	240000	46000	<1.0000		<1.0000			<1.0000	<1.0000	17	8.4	<0.5100	0.5				<1.0000			0.7	0.8				
Boron (Water Soluble)*	mg/kg	SOLID	-	-																				0.8		0.7	
Boron*	mg/kg	SOLID	-	-																							<0.2000
Boscalid*	mg/kg	SOLID	-	-																							
Bromacil	mg/kg	SOLID	-	-																							
Bromobenzene	mg/kg	SOLID	92	1800																							
Bromochloromethane	mg/kg	SOLID	-	-																							
Bromodichloromethane	mg/kg	SOLID	2	56																							
Bromomethane	mg/kg	SOLID	-	-																							
Bromophos*	mg/kg	SOLID	-	-																							
Bromophos-Ethyl*	mg/kg	SOLID	-	-																							
Bromopropylate*	mg/kg	SOLID	-	-																							
Bupirimate*	mg/kg	SOLID	-	-																							
Buprofezine*	mg/kg	SOLID	-	-																							
Butachlor*	mg/kg	SOLID	-	-																							
Butoxycarboxim*	mg/kg	SOLID	-	-																							
Butralin*	mg/kg	SOLID	-	-																							
Butylbenzylphthalate	mg/kg	SOLID	940000	250000																							
Cadmium	mg/kg	SOLID	410	880	<1.0000		1			<1.0000	<1.0000	0.85	0.87	<0.2000	<0.2000				<1.0000			<0.2000	0.24	0.4		0.4	1.3
Cadusafos*	mg/kg	SOLID	-	-																							
Captan	mg/kg	SOLID	-	-																							
Carbaryl	mg/kg	SOLID	-	-																							
Carbazole	mg/kg	SOLID	-	-																							
Carbendazim	mg/kg	SOLID	-	-																							
Carbetamide	mg/kg	SOLID	-	-																							
Carbofuran	mg/kg	SOLID	-	-																							
Carbon Disulphide	mg/kg	SOLID	11	1300																							
Carbophenothion	mg/kg	SOLID	-	-																							
Carboxin	mg/kg	SOLID	-	-																							
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																							
Carpropamid*	mg/kg	SOLID	-	-																							
Chinomethionat*	mg/kg	SOLID	-	-																							
chlorantraniliprole*	mg/kg	SOLID	-	-																							
Chlorbenzilate*	mg/kg	SOLID	-	-																							
Chlorbromuron*	mg/kg	SOLID	-	-																							
Chlorbufam*	mg/kg	SOLID	-	-																							
Chlordane	mg/kg	SOLID	-	-																							
Chlordimeform	mg/kg	SOLID	-	-																							
Chlorethoxyfos*	mg/kg	SOLID	-	-																							
Chlorfenapyr*	mg/kg	SOLID	-	-																							
Chlorfenson*	mg/kg	SOLID	-	-																							
Chlorfenvinphos	mg/kg	SOLID	-	-																							
Chlorfluazuron*	mg/kg	SOLID	-	-																							
Chloridazon*	mg/kg	SOLID	-	-																							
Chlormephos	mg/kg	SOLID	-	-																							
Chlorobenzene	mg/kg	SOLID	56	1300																							
Chloroethane	mg/kg	SOLID	900	154000																							
Chloroethene	mg/kg	SOLID	0.059	4.8																							
Chloroform	mg/kg	SOLID	99	2600																							
Chloromethane	mg/kg	SOLID	1	140																							
Chloropropham	mg/kg	SOLID	-	-																							
Chloropropylate*	mg/kg	SOLID	-	-																							
Chlorothalonil	mg/kg	SOLID	-	-																							
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																							
Chlorpyriphos	mg/kg	SOLID	-	-																							
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																							
Chlorthion*	mg/kg	SOLID	-	-																							
Chlorthiophos*	mg/kg	SOLID	-	-																							
Chlortoluron	mg/kg	SOLID	-	-																							
Chlozolinate*	mg/kg	SOLID	-	-																							
Chromium	mg/kg	SOLID	-	-	4		21			13	4	35.8	52.3	7	9.8				22			12	29.6				
Chromium - Hexavalent	mg/kg	SOLID	49	250	<1.0000		<1.0000			<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000				<1.0000			<0.1000	<0.1000	<1.0000		<1.0000	<1.0000
Chromium (III) Oxide	mg/kg	SOLID	-	-								<35.8000	<52.3000	<7.1000	<9.8000							<12.2000	<29.6000				
Chrysene	mg/kg	SOLID	350	93	<0.1000		0.1			<0.1000	<0.1000	<0.1400	2.61	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	0.55
Chrysene-d12*	%	SOLID	-	-																							
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																							
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690																							
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-																							
Clodinafop propargy*	mg/kg	SOLID	-	-																							
Clofentezine*	mg/kg	SOLID	-	-																							
Clomazone*	mg/kg	SOLID	-	-																							
Cloquintocet mexyl*	mg/kg	SOLID	-	-																							
Clothianidin*	mg/kg	SOLID	-	-																							
Copper	mg/kg	SOLID	68000	44000	14		36			12	3	218.4	171.6	5.99	5.9				16			9.5	9	32		20	38
Coronene	mg/kg	SOLID	-	-																							
Coumaphos	mg/kg	SOLID	-	-																							
Cresols*	mg/kg	SOLID	-	-																							
Cyanazine	mg/kg	SOLID	-	-																							
Cyanide	mg/kg	SOLID	-	-	<1.0000		<1.0000			<1.0000	<1.0000	1.24	1.26	<0.5400	<0.6000				<1.0000			<0.6000	<0.7000				
Cyanide Free	mg/kg	SOLID	-	-																				<0.1000		<0.1000	<0.1000
Cyanide Free as CN	mg/kg	SOLID	-	-								<0.8000	<0.7000	<0.5400	<0.6000							<0.6000	<0.7000				
Cyazofamid*	mg/kg	SOLID	-	-																							
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																							
Cycluron*	mg/kg	SOLID	-	-																							
Cyflufenamid*	mg/kg	SOLID	-	-																							
Cyfluthrin	mg/kg	SOLID	-	-																							
Cymoxanil*	mg/kg	SOLID	-	-																							
Cypermethrin	mg/kg	SOLID	-	-																							
Cyphenothrin*	mg/kg	SOLID	-	-																							
Cyproconazole*	mg/kg	SOLID	-	-																							
Cyprodinil*	mg/kg	SOLID	-	-																							
Cyromazine*	mg/kg	SOLID	-	-																							
Cythioate*	mg/kg	SOLID	-	-																							
DEET*	mg/kg	SOLID	-	-																							
Deltamethrin	mg/kg	SOLID	-	-																							
Demeton	mg/kg	SOLID	-	-																							
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																							
Desmedipham*	mg/kg	SOLID	-	-																							
Desmetryn*	mg/kg	SOLID	-	-																							
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																							
Diafenthiuron*	mg/kg	SOLID	-	-																							
Dialifos*	mg/kg	SOLID	-	-																							
Diazinon	mg/kg	SOLID	-	-																							
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.1000		<0.1000			<0.1000	<0.1000	<0.1400	0.23	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	0.07
Dibenzofuran	mg/kg	SOLID	-	-																							
Dibromochloromethane	mg/kg	SOLID	-	-																							
Dibromofluoromethane	%	SOLID	-	-																							
Dibromomethane	mg/kg	SOLID	-	-																							
Dichlobenil	mg/kg	SOLID	-	-																							
Dichlofenthion*	mg/kg	SOLID	-	-																							
Dichlorodifluoromethane	mg/kg	SOLID	-	-																							
Dichloromethane	mg/kg	SOLID	260	1500																							
Dichlorvos	mg/kg	SOLID	140	26																							
Diclobutrazol*	mg/kg	SOLID	-	-																							
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																							
Dicrotophos*	mg/kg	SOLID	-	-																							
Dieldrin	mg/kg	SOLID	170	30																							
Diethofencarb*	mg/kg	SOLID	-	-																							
Diethylphthalate	mg/kg	SOLID	140000	89000																							
Difenoconazole*	mg/kg	SOLID	-	-																							
Diflubenzuron*	mg/kg	SOLID	-	-																							
Diflufenican*	mg/kg	SOLID	-	-																							
Dimefuron*	mg/kg	SOLID	-	-																							
Dimethenamid*	mg/kg	SOLID	-	-																							
Dimethoate	mg/kg	SOLID	-	-																							
Dimethomorph*	mg/kg	SOLID	-	-																							
Dimethylphthalate	mg/kg	SOLID	-	-																							
Dimoxystrobin*	mg/kg	SOLID	-	-																							
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600																							
Diniconazole*	mg/kg	SOLID	-	-																							
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000																							
Dinotefuran*	mg/kg	SOLID	-	-																							
Dinoterb*	mg/kg	SOLID	-	-																							
Dioxabenzofos*	mg/kg	SOLID	-	-																							
Dioxacarb*	mg/kg	SOLID	-	-																							
Diphenamid	mg/kg	SOLID	-	-																							
Diphenyl ether	mg/kg	SOLID	-	-																							
Diphenylamine	mg/kg	SOLID	-	-																							
Disulfoton	mg/kg	SOLID	-	-																							
Disulfoton sulphone*	mg/kg	SOLID	-	-																							
Ditalimfos*	mg/kg	SOLID	-	-																							
Diuron	mg/kg	SOLID	-	-																							
DMSA*	mg/kg	SOLID	-	-																							
DMST*	mg/kg	SOLID	-	-																							
Dodemorph*	mg/kg	SOLID	-	-																							
Edifenphos*	mg/kg	SOLID	-	-																							
Elemental Sulphur	%	SOLID	-	-												0.019									0.044		
Emamectin*	mg/kg	SOLID	-	-																							
Endosulfan I	mg/kg	SOLID	5600	2400																							

Max of Normalised Results																																
					ML156-CR025	ML156-CR027	ML156-CR035	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-TP006	ML156-TP008	ML156-TP027	ML156-TP036	ML156-TP036	ML156-TP100	ML156-TP101	ML156-WS025	ML157-CP001	ML157-CP024	ML157-CR010	ML157-CR012	ML157-CR012	ML157-CR012	ML157-CR012	ML157-CR013
					Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting
					0.3	0.2	0.3	0.3	1	3.87	5.06	9.2	10.4	12.7	15.89	19.3	0.3	1.5	1	2.5	4	0.6	0.3	0.3	0.5	1	0.75	0.05	0.1	0.4	1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	GFDMP	GFDMP	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	TOP	MMG	GFDUD	MGR	MGR	GFDUD	TOP	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MMG	MGR
Beryllium	mg/kg	SOLID	12	63	0.7	0.5	0.5	2	<2.0000								0.537		0.429	4.89	4.89	0.33	0.28	0.328	0.179	0.157	<0.2000		0.657	0.423	0.531	0.467
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																												
Bifenazate*	mg/kg	SOLID	-	-																												
Bifenox*	mg/kg	SOLID	-	-																												
Bifenthrin*	mg/kg	SOLID	-	-																												
Binapacryl*	mg/kg	SOLID	-	-																												
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-																												
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-																												
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-																												
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000																												
Bitertanol*	mg/kg	SOLID	-	-																												
Boron	mg/kg	SOLID	240000	46000				<1.0000	<1.0000								0.8		1.6	14.3	19.7	0.6	0.7	0.6	<0.5000	<0.5000			9.29	7.5	14.2	7.29
Boron (Water Soluble)*	mg/kg	SOLID	-	-																												
Boron*	mg/kg	SOLID	-	-	0.6	1.3	1.1																				0.6					
Boscalid*	mg/kg	SOLID	-	-																												
Bromacil	mg/kg	SOLID	-	-																												
Bromobenzene	mg/kg	SOLID	92	1800																												
Bromochloromethane	mg/kg	SOLID	-	-																												
Bromodichloromethane	mg/kg	SOLID	2	56																												
Bromomethane	mg/kg	SOLID	-	-																												
Bromophos*	mg/kg	SOLID	-	-																												
Bromophos-Ethyl*	mg/kg	SOLID	-	-																												
Bromopropylate*	mg/kg	SOLID	-	-																												
Bupirimate*	mg/kg	SOLID	-	-																												
Buprofezine*	mg/kg	SOLID	-	-																												
Butachlor*	mg/kg	SOLID	-	-																												
Butoxycarboxim*	mg/kg	SOLID	-	-																												
Butralin*	mg/kg	SOLID	-	-																												
Butylbenzylphthalate	mg/kg	SOLID	940000	250000																												
Cadmium	mg/kg	SOLID	410	880	1	1.6	1.1	<1.0000	<1.0000								<0.2000		<0.2000	11.24	2.33	<0.2000	0.22	<0.2000	<0.2000	<0.2000	0.3		0.227	0.18	<0.0200	0.553
Cadusafos*	mg/kg	SOLID	-	-																												
Captan	mg/kg	SOLID	-	-																												
Carbaryl	mg/kg	SOLID	-	-																												
Carbazole	mg/kg	SOLID	-	-																												
Carbendazim	mg/kg	SOLID	-	-																												
Carbetamide	mg/kg	SOLID	-	-																												
Carbofuran	mg/kg	SOLID	-	-																												
Carbon Disulphide	mg/kg	SOLID	11	1300																												
Carbophenothion	mg/kg	SOLID	-	-																												
Carboxin	mg/kg	SOLID	-	-																												
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																												
Carpropamid*	mg/kg	SOLID	-	-																												
Chinomethionat*	mg/kg	SOLID	-	-																												
chlorantraniliprole*	mg/kg	SOLID	-	-																												
Chlorbenzilate*	mg/kg	SOLID	-	-																												
Chlorbromuron*	mg/kg	SOLID	-	-																												
Chlorbufam*	mg/kg	SOLID	-	-																												
Chlordane	mg/kg	SOLID	-	-																												
Chlordimeform	mg/kg	SOLID	-	-																												
Chlorethoxyfos*	mg/kg	SOLID	-	-																												
Chlorfenapyr*	mg/kg	SOLID	-	-																												
Chlorfenson*	mg/kg	SOLID	-	-																												
Chlorfenvinphos	mg/kg	SOLID	-	-																												
Chlorfluazuron*	mg/kg	SOLID	-	-																												
Chloridazon*	mg/kg	SOLID	-	-																												
Chlormephos	mg/kg	SOLID	-	-																												
Chlorobenzene	mg/kg	SOLID	56	1300																												
Chloroethane	mg/kg	SOLID	900	154000																												
Chloroethene	mg/kg	SOLID	0.059	4.8																												
Chloroform	mg/kg	SOLID	99	2600																												
Chloromethane	mg/kg	SOLID	1	140																												
Chloropropham	mg/kg	SOLID	-	-																												
Chloropropylate*	mg/kg	SOLID	-	-																												
Chlorothalonil	mg/kg	SOLID	-	-																												
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																												
Chlorpyriphos	mg/kg	SOLID	-	-																												
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																												
Chlorthion*	mg/kg	SOLID	-	-																												
Chlorthiophos*	mg/kg	SOLID	-	-																												
Chlortoluron	mg/kg	SOLID	-	-																												
Chlozolinate*	mg/kg	SOLID	-	-																												
Chromium	mg/kg	SOLID	-	-				35	23								17.7		11.9	99	57.5	9.4	9	11.5	10.8	6.7						
Chromium - Hexavalent	mg/kg	SOLID	49	250	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000								<0.1000		<0.1000	<0.1000	<0.1000	0.2	<0.1000	<0.1000	<0.1000	<0.1000	<1.0000		<0.6000	<0.6000	<0.6000	<0.6000
Chromium (III) Oxide	mg/kg	SOLID	-	-													<17.7000		<11.9000	<99.1000	<57.5000	9.2	<9.1000	<11.5000	<10.8000	<6.7000						
Chrysene	mg/kg	SOLID	350	93	0.07	0.09	0.2	<0.1000	<0.1000								0.1		<0.0800	0.3	0.62	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.03	0.364	<0.0100	0.0246	<0.0100	44.3
Chrysene-d12*	%	SOLID	-	-																								82	92.8	91.4	88.3	109
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																												
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690																												
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-																												
Clodinafop propargy*	mg/kg	SOLID	-	-																												
Clofentezine*	mg/kg	SOLID	-	-																												
Clomazone*	mg/kg	SOLID	-	-																												
Cloquintocet mexyl*	mg/kg	SOLID	-	-																												
Clothianidin*	mg/kg	SOLID	-	-																												
Copper	mg/kg	SOLID	68000	44000	47	210	19	22	10								13.9		15.3	1110	230.3	8.8	14.7	9.2	6.4	6.4	11		16.9	17.2	8.62	18.7
Coronene	mg/kg	SOLID	-	-																								<0.2000				
Coumaphos	mg/kg	SOLID	-	-																												
Cresols*	mg/kg	SOLID	-	-																								<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Cyanazine	mg/kg	SOLID	-	-																												
Cyanide	mg/kg	SOLID	-	-				<1.0000	<1.0000								<0.6000		<0.5000	3.16	7.06	<0.6000	<0.6000	<0.5000	<0.6000	<0.5000			<1.0000	<1.0000	<1.0000	<1.0000
Cyanide Free	mg/kg	SOLID	-	-	<0.1000	<0.1000	<0.1000	<1.0000	<1.0000																		<0.1000		<1.0000	<1.0000	<1.0000	<1.0000
Cyanide Free as CN	mg/kg	SOLID	-	-													<0.6000		<0.5000	<0.8000	<0.9000	<0.6000	<0.6000	<0.5000	<0.6000	<0.5000						
Cyazofamid*	mg/kg	SOLID	-	-																												
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																												
Cycluron*	mg/kg	SOLID	-	-																												
Cyflufenamid*	mg/kg	SOLID	-	-																												
Cyfluthrin	mg/kg	SOLID	-	-																												
Cymoxanil*	mg/kg	SOLID	-	-																												
Cypermethrin	mg/kg	SOLID	-	-																												
Cyphenothrin*	mg/kg	SOLID	-	-																												
Cyproconazole*	mg/kg	SOLID	-	-																												
Cyprodinil*	mg/kg	SOLID	-	-																												
Cyromazine*	mg/kg	SOLID	-	-																												
Cythioate*	mg/kg	SOLID	-	-																												
DEET*	mg/kg	SOLID	-	-																												
Deltamethrin	mg/kg	SOLID	-	-																												
Demeton	mg/kg	SOLID	-	-																												
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																												
Desmedipham*	mg/kg	SOLID	-	-																												
Desmetryn*	mg/kg	SOLID	-	-																												
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																												
Diafenthiuron*	mg/kg	SOLID	-	-																												
Dialifos*	mg/kg	SOLID	-	-																												
Diazinon	mg/kg	SOLID	-	-																												
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.0300	<0.0300	<0.0300	<0.1000	<0.1000								<0.0900		<0.0800	<0.1300	<0.1500	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0300	0.338	<0.0230	<0.0230	<0.0230	7.69
Dibenzofuran	mg/kg	SOLID	-	-																												
Dibromochloromethane	mg/kg	SOLID	-	-																												
Dibromofluoromethane	%	SOLID	-	-																												
Dibromomethane	mg/kg	SOLID	-	-																												
Dichlobenil	mg/kg	SOLID	-	-																												
Dichlofenthion*	mg/kg	SOLID	-	-																												
Dichlorodifluoromethane	mg/kg	SOLID	-	-																												
Dichloromethane	mg/kg	SOLID	260	1500																												
Dichlorvos	mg/kg	SOLID	140	26																												
Diclobutrazol*	mg/kg	SOLID	-	-																												
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																												
Dicrotophos*	mg/kg	SOLID	-	-																												
Dieldrin	mg/kg	SOLID	170	30																												
Diethofencarb*	mg/kg	SOLID	-	-																												
Diethylphthalate	mg/kg	SOLID	140000	89000																												
Difenoconazole*	mg/kg	SOLID	-	-																												
Diflubenzuron*	mg/kg	SOLID	-	-																												
Diflufenican*	mg/kg	SOLID	-	-																												
Dimefuron*	mg/kg	SOLID	-	-																												
Dimethenamid*	mg/kg	SOLID	-	-																												
Dimethoate	mg/kg	SOLID	-	-																												
Dimethomorph*	mg/kg	SOLID	-	-																												
Dimethylphthalate	mg/kg	SOLID	-	-																												
Dimoxystrobin*	mg/kg	SOLID	-	-																												
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600																												
Diniconazole*	mg/kg	SOLID	-	-																												
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000																												
Dinotefuran*	mg/kg	SOLID	-	-																												
Dinoterb*	mg/kg	SOLID	-	-																												
Dioxabenzofos*	mg/kg	SOLID	-	-																												
Dioxacarb*	mg/kg	SOLID	-	-																												
Diphenamid	mg/kg	SOLID	-	-																												
Diphenyl ether	mg/kg	SOLID	-	-																												
Diphenylamine	mg/kg	SOLID	-	-																												
Disulfoton	mg/kg	SOLID	-	-																												
Disulfoton sulphone*	mg/kg	SOLID	-	-																												
Ditalimfos*	mg/kg	SOLID	-	-																												
Diuron	mg/kg	SOLID	-	-																												
DMSA*	mg/kg	SOLID	-	-																												
DMST*	mg/kg	SOLID	-	-																												
Dodemorph*	mg/kg	SOLID	-	-																												
Edifenphos*	mg/kg	SOLID	-	-																												
Elemental Sulphur	%	SOLID	-	-																												
Emamectin*	mg/kg	SOLID	-	-																												
Endosulfan I	mg/kg	SOLID	5600	2400																												

Max of Normalised Results																																			
					ML157-CR013	ML157-CR014	ML157-CR014	ML157-CR014	ML157-CR015	ML157-CR015	ML157-CR021	ML157-CR021	ML157-CR022	ML157-CR027	ML157-CR027	ML157-CR027	ML157-CT011	ML157-CT013	ML157-CT014	ML157-CT015	ML157-CT017	ML157-CT018	ML157-CT018	ML157-CT019	ML157-CT019	ML157-CT027	ML157-CT027	ML157-CT039	ML157-CT039	ML157-CT039	ML157-TP001	ML157-TP063	ML157-WS036	ML157-WS067	ML157-WS067
					Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment	Packington Embankment	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting
					0.9	0.05	0.6	2.2	0.5	1	0.05	9.5	1	0.05	0.5	0.9	0.3	1	0.7	0.5	0.4	0.1	0.5	0.05	1	0.05	1	0.05	0.2	0.9	1	0.7	0.7	0.05	2.8
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GFSG	MGR	MGR	MMG	MGR	MMG	TOP	MMG	MGR	MGR	MGR	MMG	MMG	MGR	SUPDC	SUPDC	SUPDC	MGR	SUPDC	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	GFDUD	TOP	GFDUD
Beryllium	mg/kg	SOLID	12	63	2.49	0.402	0.545	1.14	0.968	0.802	<0.2000	0.8	1		1.08	1.41	1.48	0.569	2.15	0.76	0.474	1.04	0.895		0.441	1.05	0.921		0.816	0.646	0.231	0.163	0.14	0.258	0.103
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																															
Bifenazate*	mg/kg	SOLID	-	-																															
Bifenox*	mg/kg	SOLID	-	-																															
Bifenthrin*	mg/kg	SOLID	-	-																															
Binapacryl*	mg/kg	SOLID	-	-																															
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-																											<0.1000				
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-																											<0.1000				
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-																											<0.6000				
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000																											<0.2000				
Bitertanol*	mg/kg	SOLID	-	-																															
Boron	mg/kg	SOLID	240000	46000	24.1	9.45	10.1	21.8	17.8	22.5					20.6	27.2	26.9	9.29	20	11	9.1	15.3	11.7		5.33	10.5	16.7		2.96	14.7	0.8	<0.5000	<0.5000	0.7	<0.5000
Boron (Water Soluble)*	mg/kg	SOLID	-	-									<0.2000																						
Boron*	mg/kg	SOLID	-	-																															
Boscalid*	mg/kg	SOLID	-	-																															
Bromacil	mg/kg	SOLID	-	-																															
Bromobenzene	mg/kg	SOLID	92	1800																											<0.0010				
Bromochloromethane	mg/kg	SOLID	-	-																											<0.0010				
Bromodichloromethane	mg/kg	SOLID	2	56																											<0.0010				
Bromomethane	mg/kg	SOLID	-	-																											<0.0010				
Bromophos*	mg/kg	SOLID	-	-																															
Bromophos-Ethyl*	mg/kg	SOLID	-	-																															
Bromopropylate*	mg/kg	SOLID	-	-																															
Bupirimate*	mg/kg	SOLID	-	-																															
Buprofezine*	mg/kg	SOLID	-	-																															
Butachlor*	mg/kg	SOLID	-	-																															
Butoxycarboxim*	mg/kg	SOLID	-	-																															
Butralin*	mg/kg	SOLID	-	-																															
Butylbenzylphthalate	mg/kg	SOLID	940000	250000																											<0.2000				
Cadmium	mg/kg	SOLID	410	880	<0.0200	0.0805	0.0519	<0.0200	<0.0200	<0.0200	<0.1000	0.2	0.1		0.261	0.281	0.34	0.362	0.292	0.217	0.224	0.15	<0.0200		0.122	1.52	0.245		0.448	0.264	<0.2100	<0.2000	<0.2000	0.25	<0.2000
Cadusafos*	mg/kg	SOLID	-	-																															
Captan	mg/kg	SOLID	-	-																															
Carbaryl	mg/kg	SOLID	-	-																															
Carbazole	mg/kg	SOLID	-	-																															
Carbendazim	mg/kg	SOLID	-	-																															
Carbetamide	mg/kg	SOLID	-	-																															
Carbofuran	mg/kg	SOLID	-	-																															
Carbon Disulphide	mg/kg	SOLID	11	1300																															
Carbophenothion	mg/kg	SOLID	-	-																															
Carboxin	mg/kg	SOLID	-	-																															
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																															
Carpropamid*	mg/kg	SOLID	-	-																															
Chinomethionat*	mg/kg	SOLID	-	-																															
chlorantraniliprole*	mg/kg	SOLID	-	-																															
Chlorbenzilate*	mg/kg	SOLID	-	-																															
Chlorbromuron*	mg/kg	SOLID	-	-																															
Chlorbufam*	mg/kg	SOLID	-	-																															
Chlordane	mg/kg	SOLID	-	-																															
Chlordimeform	mg/kg	SOLID	-	-																															
Chlorethoxyfos*	mg/kg	SOLID	-	-																															
Chlorfenapyr*	mg/kg	SOLID	-	-																															
Chlorfenson*	mg/kg	SOLID	-	-																															
Chlorfenvinphos	mg/kg	SOLID	-	-																															
Chlorfluazuron*	mg/kg	SOLID	-	-																															
Chloridazon*	mg/kg	SOLID	-	-																															
Chlormephos	mg/kg	SOLID	-	-																															
Chlorobenzene	mg/kg	SOLID	56	1300																											<0.0010				
Chloroethane	mg/kg	SOLID	900	154000																											<0.0020				
Chloroethene	mg/kg	SOLID	0.059	4.8																											<0.0010				
Chloroform	mg/kg	SOLID	99	2600																											<0.0010				
Chloromethane	mg/kg	SOLID	1	140																											<0.0030				
Chloropropham	mg/kg	SOLID	-	-																															
Chloropropylate*	mg/kg	SOLID	-	-																															
Chlorothalonil	mg/kg	SOLID	-	-																															
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																															
Chlorpyriphos	mg/kg	SOLID	-	-																															
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																															
Chlorthion*	mg/kg	SOLID	-	-																															
Chlorthiophos*	mg/kg	SOLID	-	-																															
Chlortoluron	mg/kg	SOLID	-	-																															
Chlozolinate*	mg/kg	SOLID	-	-																															
Chromium	mg/kg	SOLID	-	-																											8.2	6.6	5.9	7.8	4.5
Chromium - Hexavalent	mg/kg	SOLID	49	250	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<1.0000	<1.0000	<1.0000		<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000		<0.6000	<0.6000	<0.6000		<0.6000	<0.6000	<0.1000	<0.1000	<0.1000	0.7	<0.1000
Chromium (III) Oxide	mg/kg	SOLID	-	-																											<8.2000	<6.6000	<5.9000	7.1	<4.5000
Chrysene	mg/kg	SOLID	350	93	0.0175	0.105	<0.0100	<0.0100	0.0137	<0.0100	<0.1000	<0.1000	<0.0300	<0.1000	<0.0100	<0.0100	0.023	0.0553	<0.0100	<0.0100	0.0151	<0.0100	<0.0100	0.214	0.0344	1.73	0.0725	0.263	<0.1000	<0.0100	2.5	<0.0900	<0.0900	<0.1000	<0.0800
Chrysene-d12*	%	SOLID	-	-	85.1	88.1	89	111	84.8	84.5				95.9	77.3	92.5	89.4	98.6	82.4	88.5	78.4	85.8	83.7	91	87.6	102	85.3	97.3	99.8	95.4					
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																															
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690																											<0.0060				
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-																											<0.0010				
Clodinafop propargy*	mg/kg	SOLID	-	-																															
Clofentezine*	mg/kg	SOLID	-	-																															
Clomazone*	mg/kg	SOLID	-	-																															
Cloquintocet mexyl*	mg/kg	SOLID	-	-																															
Clothianidin*	mg/kg	SOLID	-	-																															
Copper	mg/kg	SOLID	68000	44000	17.8	16.4	13	8.95	12.7	7.98	5	17	18		11.4	13	13.6	29.3	14.4	13.7	11.2	15.2	10.6		14.4	136	57.1		<14.0000	8.46	11.5	5.1	3.3	10.5	2.9
Coronene	mg/kg	SOLID	-	-										<0.2000										<0.2000				<0.2000			<0.3000				
Coumaphos	mg/kg	SOLID	-	-																															
Cresols*	mg/kg	SOLID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.0114	<0.0100	<0.0100	<0.0100	<0.0100					
Cyanazine	mg/kg	SOLID	-	-																															
Cyanide	mg/kg	SOLID	-	-	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<0.1000	0.1			<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000		<1.0000	<1.0000	<1.0000		<1.0000	<1.0000	<0.6000	<0.5000	<0.5000	<0.6000	<0.5000
Cyanide Free	mg/kg	SOLID	-	-	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000		<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000		<1.0000	<1.0000	<1.0000		<1.0000	<1.0000					
Cyanide Free as CN	mg/kg	SOLID	-	-																											<0.6000	<0.5000	<0.5000	<0.6000	<0.5000
Cyazofamid*	mg/kg	SOLID	-	-																															
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																															
Cycluron*	mg/kg	SOLID	-	-																															
Cyflufenamid*	mg/kg	SOLID	-	-																															
Cyfluthrin	mg/kg	SOLID	-	-																															
Cymoxanil*	mg/kg	SOLID	-	-																															
Cypermethrin	mg/kg	SOLID	-	-																															
Cyphenothrin*	mg/kg	SOLID	-	-																															
Cyproconazole*	mg/kg	SOLID	-	-																															
Cyprodinil*	mg/kg	SOLID	-	-																															
Cyromazine*	mg/kg	SOLID	-	-																															
Cythioate*	mg/kg	SOLID	-	-																															
DEET*	mg/kg	SOLID	-	-																															
Deltamethrin	mg/kg	SOLID	-	-																															
Demeton	mg/kg	SOLID	-	-																															
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																															
Desmedipham*	mg/kg	SOLID	-	-																															
Desmetryn*	mg/kg	SOLID	-	-																															
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																															
Diafenthiuron*	mg/kg	SOLID	-	-																															
Dialifos*	mg/kg	SOLID	-	-																															
Diazinon	mg/kg	SOLID	-	-																															
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.0230	<0.0230	<0.0230	<0.0230	<0.0230	<0.0230	<0.1000	<0.1000	<0.0300	<0.2300	<0.0230	<0.0230	<0.0230	<0.0230	<0.0230	<0.0230	<0.0230	<0.0230	<0.0230	<0.2300	<0.0230	0.315	0.0379	<0.2300	<0.2300	<0.0230	<0.0900	<0.0900	<0.0900	<0.1000	<0.0800
Dibenzofuran	mg/kg	SOLID	-	-																											0.2				
Dibromochloromethane	mg/kg	SOLID	-	-																											<0.0010				
Dibromofluoromethane	%	SOLID	-	-																															
Dibromomethane	mg/kg	SOLID	-	-																											<0.0010				
Dichlobenil	mg/kg	SOLID	-	-																															
Dichlofenthion*	mg/kg	SOLID	-	-																															
Dichlorodifluoromethane	mg/kg	SOLID	-	-																											<0.0010				
Dichloromethane	mg/kg	SOLID	260	1500																															
Dichlorvos	mg/kg	SOLID	140	26																															
Diclobutrazol*	mg/kg	SOLID	-	-																															
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																															
Dicrotophos*	mg/kg	SOLID	-	-																															
Dieldrin	mg/kg	SOLID	170	30																															
Diethofencarb*	mg/kg	SOLID	-	-																															
Diethylphthalate	mg/kg	SOLID	140000	89000																											<0.1000				
Difenoconazole*	mg/kg	SOLID	-	-																															
Diflubenzuron*	mg/kg	SOLID	-	-																															
Diflufenican*	mg/kg	SOLID	-	-																															
Dimefuron*	mg/kg	SOLID	-	-																															
Dimethenamid*	mg/kg	SOLID	-	-																															
Dimethoate	mg/kg	SOLID	-	-																															
Dimethomorph*	mg/kg	SOLID	-	-																															
Dimethylphthalate	mg/kg	SOLID	-	-																											<0.1000				
Dimoxystrobin*	mg/kg	SOLID	-	-																															
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600																											<0.1000				
Diniconazole*	mg/kg	SOLID	-	-																															
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000																											<0.2000				
Dinotefuran*	mg/kg	SOLID	-	-																															
Dinoterb*	mg/kg	SOLID	-	-																															
Dioxabenzofos*	mg/kg	SOLID	-	-																															
Dioxacarb*	mg/kg	SOLID	-	-																															
Diphenamid	mg/kg	SOLID	-	-																															
Diphenyl ether	mg/kg	SOLID	-	-																											<0.1000				
Diphenylamine	mg/kg	SOLID	-	-																															
Disulfoton	mg/kg	SOLID	-	-																															
Disulfoton sulphone*	mg/kg	SOLID	-	-																															
Ditalimfos*	mg/kg	SOLID	-	-																															
Diuron	mg/kg	SOLID	-	-																															
DMSA*	mg/kg	SOLID	-	-																															
DMST*	mg/kg	SOLID	-	-																															
Dodemorph*	mg/kg	SOLID	-	-																															
Edifenphos*	mg/kg	SOLID	-	-																															
Elemental Sulphur	%	SOLID	-	-																															
Emamectin*	mg/kg	SOLID	-	-																															
Endosulfan I	mg/kg	SOLID	5600	2400																															

Max of Normalised Results																										
					ML158-CP002	ML158-CP002	ML158-CP002	ML158-CP005	ML158-CP005	ML158-CP005	ML158-CP007	ML158-CP007	ML158-CP007	ML158-CP021	ML158-CP021	ML158-CP402	ML158-CP402	ML158-CR003	ML158-CR003	ML158-CR007	ML158-CR007	ML158-TP008	ML158-TP008	ML158-TP008	ML158-WS012	ML158-WS012
					Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Packington Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure
					1.05	3.05	3.65	0.5	1	1.3	1.05	3.05	3.85	0.05	0.4	0.3	0.5	0.05	1.05	0.05	5.05	1.05	2.05	3.05	0.4	1.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	GFDUD	MGR	MGR	GFDUD	MGR	MGR	GFDUD	MGR	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	MGR	GFDUD
Beryllium	mg/kg	SOLID	12	63	0.5	1.62	0.658	1.01	1.42	0.45	0.266	0.313	0.553	0.639	0.346	<2.0000	<2.0000	0.809	0.713	0.74	1.75	0.942	0.229	0.491	0.444	0.426
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																						
Bifenazate*	mg/kg	SOLID	-	-																						
Bifenox*	mg/kg	SOLID	-	-																						
Bifenthrin*	mg/kg	SOLID	-	-																						
Binapacryl*	mg/kg	SOLID	-	-																						
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Bitertanol*	mg/kg	SOLID	-	-																						
Boron	mg/kg	SOLID	240000	46000	6.73	22	10.6	7.12	17.7	3.82	3.32	9.14	8.02	3.27	3	<1.0000	<1.0000	14.4	13.8	14.4	10.5	10.9	2.59	5.36	4.57	7.48
Boron (Water Soluble)*	mg/kg	SOLID	-	-																						
Boron*	mg/kg	SOLID	-	-																						
Boscalid*	mg/kg	SOLID	-	-																						
Bromacil	mg/kg	SOLID	-	-																						
Bromobenzene	mg/kg	SOLID	92	1800					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Bromochloromethane	mg/kg	SOLID	-	-					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Bromodichloromethane	mg/kg	SOLID	2	56					<0.0700			<0.0070				<0.0500	<0.0500						<0.0070			
Bromomethane	mg/kg	SOLID	-	-					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Bromophos*	mg/kg	SOLID	-	-																						
Bromophos-Ethyl*	mg/kg	SOLID	-	-																						
Bromopropylate*	mg/kg	SOLID	-	-																						
Bupirimate*	mg/kg	SOLID	-	-																						
Buprofezine*	mg/kg	SOLID	-	-																						
Butachlor*	mg/kg	SOLID	-	-																						
Butoxycarboxim*	mg/kg	SOLID	-	-																						
Butralin*	mg/kg	SOLID	-	-																						
Butylbenzylphthalate	mg/kg	SOLID	940000	250000					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Cadmium	mg/kg	SOLID	410	880	2.43	10.2	2.44	0.548	0.949	0.228	0.303	0.34	0.0804	0.0868	0.0813	<1.0000	<1.0000	0.279	0.224	0.289	<0.0200	0.241	0.788	<0.0200	0.119	0.0483
Cadusafos*	mg/kg	SOLID	-	-																						
Captan	mg/kg	SOLID	-	-																						
Carbaryl	mg/kg	SOLID	-	-																						
Carbazole	mg/kg	SOLID	-	-					0.208			<0.1000				<0.1000	<0.1000						<0.1000			
Carbendazim	mg/kg	SOLID	-	-																						
Carbetamide	mg/kg	SOLID	-	-																						
Carbofuran	mg/kg	SOLID	-	-																						
Carbon Disulphide	mg/kg	SOLID	11	1300					<0.0700			<0.0070											<0.0070			
Carbophenothion	mg/kg	SOLID	-	-																						
Carboxin	mg/kg	SOLID	-	-																						
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																						
Carpropamid*	mg/kg	SOLID	-	-																						
Chinomethionat*	mg/kg	SOLID	-	-																						
chlorantraniliprole*	mg/kg	SOLID	-	-																						
Chlorbenzilate*	mg/kg	SOLID	-	-																						
Chlorbromuron*	mg/kg	SOLID	-	-																						
Chlorbufam*	mg/kg	SOLID	-	-																						
Chlordane	mg/kg	SOLID	-	-																						
Chlordimeform	mg/kg	SOLID	-	-																						
Chlorethoxyfos*	mg/kg	SOLID	-	-																						
Chlorfenapyr*	mg/kg	SOLID	-	-																						
Chlorfenson*	mg/kg	SOLID	-	-																						
Chlorfenvinphos	mg/kg	SOLID	-	-																						
Chlorfluazuron*	mg/kg	SOLID	-	-																						
Chloridazon*	mg/kg	SOLID	-	-																						
Chlormephos	mg/kg	SOLID	-	-																						
Chlorobenzene	mg/kg	SOLID	56	1300					<0.0500			<0.0050				<0.0500	<0.0500						<0.0050			
Chloroethane	mg/kg	SOLID	900	154000					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Chloroethene	mg/kg	SOLID	0.059	4.8					<0.0600			<0.0060				<0.0500	<0.0500						<0.0060			
Chloroform	mg/kg	SOLID	99	2600					<0.0800			<0.0080				<0.0500	<0.0500						<0.0080			
Chloromethane	mg/kg	SOLID	1	140					<0.0700			<0.0070				<0.0500	<0.0500						<0.0070			
Chloropropham	mg/kg	SOLID	-	-																						
Chloropropylate*	mg/kg	SOLID	-	-																						
Chlorothalonil	mg/kg	SOLID	-	-																						
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																						
Chlorpyriphos	mg/kg	SOLID	-	-																						
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																						
Chlorthion*	mg/kg	SOLID	-	-																						
Chlorthiophos*	mg/kg	SOLID	-	-																						
Chlortoluron	mg/kg	SOLID	-	-																						
Chlozolinate*	mg/kg	SOLID	-	-																						
Chromium	mg/kg	SOLID	-	-												11	10									
Chromium - Hexavalent	mg/kg	SOLID	49	250												<1.0000	<1.0000									
Chromium (III) Oxide	mg/kg	SOLID	-	-																						
Chrysene	mg/kg	SOLID	350	93	1.27	2.92	0.532	22.8	1.73	0.248	0.0515	0.0843	<0.0100	0.0857	0.0378	<0.1000	<0.1000	0.0622	<0.0100	0.0577	0.259	0.0236	0.492	0.0317	0.0259	<0.0100
Chrysene-d12*	%	SOLID	-	-	106	108	103	107	107	104	99.7	90.5	86.5	91.9	106			78.8	95.3	101	94.3	97.2	95.4	98.9	109	98.6
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																						
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690					<0.0600			<0.0060				<0.0500	<0.0500						<0.0060			
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Clodinafop propargy*	mg/kg	SOLID	-	-																						
Clofentezine*	mg/kg	SOLID	-	-																						
Clomazone*	mg/kg	SOLID	-	-																						
Cloquintocet mexyl*	mg/kg	SOLID	-	-																						
Clothianidin*	mg/kg	SOLID	-	-																						
Copper	mg/kg	SOLID	68000	44000	330	1950	302	51.6	113	23.8	22.5	24.8	18.1	25.5	9.32	10	4	18.6	23	19.3	9.23	38.5	20.8	13.2	9.57	11.5
Coronene	mg/kg	SOLID	-	-																						
Coumaphos	mg/kg	SOLID	-	-																						
Cresols*	mg/kg	SOLID	-	-																						
Cyanazine	mg/kg	SOLID	-	-																						
Cyanide	mg/kg	SOLID	-	-	20	18.3	12.4	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000
Cyanide Free	mg/kg	SOLID	-	-	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000
Cyanide Free as CN	mg/kg	SOLID	-	-																						
Cyazofamid*	mg/kg	SOLID	-	-																						
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-					1.77																	
Cycluron*	mg/kg	SOLID	-	-																						
Cyflufenamid*	mg/kg	SOLID	-	-																						
Cyfluthrin	mg/kg	SOLID	-	-																						
Cymoxanil*	mg/kg	SOLID	-	-																						
Cypermethrin	mg/kg	SOLID	-	-																						
Cyphenothrin*	mg/kg	SOLID	-	-																						
Cyproconazole*	mg/kg	SOLID	-	-																						
Cyprodinil*	mg/kg	SOLID	-	-																						
Cyromazine*	mg/kg	SOLID	-	-																						
Cythioate*	mg/kg	SOLID	-	-																						
DEET*	mg/kg	SOLID	-	-																						
Deltamethrin	mg/kg	SOLID	-	-																						
Demeton	mg/kg	SOLID	-	-																						
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																						
Desmedipham*	mg/kg	SOLID	-	-																						
Desmetryn*	mg/kg	SOLID	-	-																						
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																						
Diafenthiuron*	mg/kg	SOLID	-	-																						
Dialifos*	mg/kg	SOLID	-	-																						
Diazinon	mg/kg	SOLID	-	-																						
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	0.278	0.826	0.15	4.44	0.529	0.0751	<0.0230	<0.0230	<0.0230	<0.0230	<0.0230	<0.1000	<0.1000	<0.0230	<0.0230	<0.0230	0.0458	<0.0230	0.285	<0.0230	<0.0230	<0.0230
Dibenzofuran	mg/kg	SOLID	-	-					0.189			<0.1000				<0.1000	<0.1000						<0.1000			
Dibromochloromethane	mg/kg	SOLID	-	-					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Dibromofluoromethane	%	SOLID	-	-					100			99.8											102			
Dibromomethane	mg/kg	SOLID	-	-					<0.0900			<0.0090				<0.0500	<0.0500						<0.0090			
Dichlobenil	mg/kg	SOLID	-	-																						
Dichlofenthion*	mg/kg	SOLID	-	-																						
Dichlorodifluoromethane	mg/kg	SOLID	-	-					<0.0600			<0.0060				<0.0500	<0.0500						<0.0060			
Dichloromethane	mg/kg	SOLID	260	1500					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Dichlorvos	mg/kg	SOLID	140	26																						
Diclobutrazol*	mg/kg	SOLID	-	-																						
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																						
Dicrotophos*	mg/kg	SOLID	-	-																						
Dieldrin	mg/kg	SOLID	170	30																						
Diethofencarb*	mg/kg	SOLID	-	-																						
Diethylphthalate	mg/kg	SOLID	140000	89000					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Difenoconazole*	mg/kg	SOLID	-	-																						
Diflubenzuron*	mg/kg	SOLID	-	-																						
Diflufenican*	mg/kg	SOLID	-	-																						
Dimefuron*	mg/kg	SOLID	-	-																						
Dimethenamid*	mg/kg	SOLID	-	-																						
Dimethoate	mg/kg	SOLID	-	-																						
Dimethomorph*	mg/kg	SOLID	-	-																						
Dimethylphthalate	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Dimoxystrobin*	mg/kg	SOLID	-	-																						
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Diniconazole*	mg/kg	SOLID	-	-																						
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Dinotefuran*	mg/kg	SOLID	-	-																						
Dinoterb*	mg/kg	SOLID	-	-																						
Dioxabenzofos*	mg/kg	SOLID	-	-																						
Dioxacarb*	mg/kg	SOLID	-	-																						
Diphenamid	mg/kg	SOLID	-	-																						
Diphenyl ether	mg/kg	SOLID	-	-																						
Diphenylamine	mg/kg	SOLID	-	-																						
Disulfoton	mg/kg	SOLID	-	-																						
Disulfoton sulphone*	mg/kg	SOLID	-	-																						
Ditalimfos*	mg/kg	SOLID	-	-																						
Diuron	mg/kg	SOLID	-	-																						
DMSA*	mg/kg	SOLID	-	-																						
DMST*	mg/kg	SOLID	-	-																						
Dodemorph*	mg/kg	SOLID	-	-																						
Edifenphos*	mg/kg	SOLID	-	-																						
Elemental Sulphur	%	SOLID	-	-																						
Emamectin*	mg/kg	SOLID	-	-																						
Endosulfan I	mg/kg	SOLID	5600	2400																						

Max of Normalised Results																										
					ML158-WS013	ML158-WS014	ML158-WS015	ML158-WS016	ML158-WS016	ML159-CP003	ML159-CP003	ML159-CP003	ML159-CP018	ML159-CR003	ML159-CR003	ML159-CR008a	ML159-CR018	ML159-CR018	ML159-CR408	ML159-CR408	ML159-CR408	ML159-CR408	ML159-CR410	ML159-CR410	ML159-TP004	ML159-TP015
					Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	M6 Motorway South Viaduct	M6 Motorway Box Structure	M6 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	M6 Motorway Box Structure	M6 Motorway Box Structure	Pool Wood Embankment	M6 Motorway Box Structure
					1	0.5	0.2	1	3	0.05	1.05	1.2	0	0.05	0.6	1.2	1.6	3.6	0.3	0.5	1	1.5	0.3	1	0.05	0.15
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	TOP	MGR	GFDUD	MGR	MGR	MGR	GFDUD	GFDUD	GFDUD	GFDUD	GFDUD	GFDUD	TOP	MGR
Beryllium	mg/kg	SOLID	12	63	0.376	0.483	0.566	0.702	1.5	3.55	1.71	0.535	0.392	0.692	0.626	0.365	0.268	0.404	<2.0000		<2.0000	<2.0000	<2.0000	<2.0000	0.926	0.459
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																						
Bifenazate*	mg/kg	SOLID	-	-																						
Bifenox*	mg/kg	SOLID	-	-																						
Bifenthrin*	mg/kg	SOLID	-	-																						
Binapacryl*	mg/kg	SOLID	-	-																						
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-														<0.1000								
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-														<0.1000								
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-														<0.6000								
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000														<0.2000								
Bitertanol*	mg/kg	SOLID	-	-																						
Boron	mg/kg	SOLID	240000	46000	3.97	8.65	5.31	13.1	34.5	38.1	19.7	9.19	4.87	9.47	9.03	<0.5000	0.7	<0.5000	<1.0000		<1.0000	<1.0000	<1.0000	<1.0000	11.9	0.5
Boron (Water Soluble)*	mg/kg	SOLID	-	-																						
Boron*	mg/kg	SOLID	-	-																						
Boscalid*	mg/kg	SOLID	-	-																						
Bromacil	mg/kg	SOLID	-	-																						
Bromobenzene	mg/kg	SOLID	92	1800														<0.0010								
Bromochloromethane	mg/kg	SOLID	-	-														<0.0010								
Bromodichloromethane	mg/kg	SOLID	2	56														<0.0010								
Bromomethane	mg/kg	SOLID	-	-														<0.0010								
Bromophos*	mg/kg	SOLID	-	-																						
Bromophos-Ethyl*	mg/kg	SOLID	-	-																						
Bromopropylate*	mg/kg	SOLID	-	-																						
Bupirimate*	mg/kg	SOLID	-	-																						
Buprofezine*	mg/kg	SOLID	-	-																						
Butachlor*	mg/kg	SOLID	-	-																						
Butoxycarboxim*	mg/kg	SOLID	-	-																						
Butralin*	mg/kg	SOLID	-	-																						
Butylbenzylphthalate	mg/kg	SOLID	940000	250000														<0.2000								
Cadmium	mg/kg	SOLID	410	880	0.137	0.253	0.455	0.186	1.17	2.76	1.37	0.125	0.86	0.315	0.337	<0.2000	<0.2000	<0.2000	<1.0000		<1.0000	<1.0000	<1.0000	<1.0000	0.225	0.26
Cadusafos*	mg/kg	SOLID	-	-																						
Captan	mg/kg	SOLID	-	-																						
Carbaryl	mg/kg	SOLID	-	-																						
Carbazole	mg/kg	SOLID	-	-																						
Carbendazim	mg/kg	SOLID	-	-																						
Carbetamide	mg/kg	SOLID	-	-																						
Carbofuran	mg/kg	SOLID	-	-																						
Carbon Disulphide	mg/kg	SOLID	11	1300																						
Carbophenothion	mg/kg	SOLID	-	-																						
Carboxin	mg/kg	SOLID	-	-																						
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																						
Carpropamid*	mg/kg	SOLID	-	-																						
Chinomethionat*	mg/kg	SOLID	-	-																						
chlorantraniliprole*	mg/kg	SOLID	-	-																						
Chlorbenzilate*	mg/kg	SOLID	-	-																						
Chlorbromuron*	mg/kg	SOLID	-	-																						
Chlorbufam*	mg/kg	SOLID	-	-																						
Chlordane	mg/kg	SOLID	-	-																						
Chlordimeform	mg/kg	SOLID	-	-																						
Chlorethoxyfos*	mg/kg	SOLID	-	-																						
Chlorfenapyr*	mg/kg	SOLID	-	-																						
Chlorfenson*	mg/kg	SOLID	-	-																						
Chlorfenvinphos	mg/kg	SOLID	-	-																						
Chlorfluazuron*	mg/kg	SOLID	-	-																						
Chloridazon*	mg/kg	SOLID	-	-																						
Chlormephos	mg/kg	SOLID	-	-																						
Chlorobenzene	mg/kg	SOLID	56	1300														<0.0010								
Chloroethane	mg/kg	SOLID	900	154000														<0.0020								
Chloroethene	mg/kg	SOLID	0.059	4.8														<0.0010								
Chloroform	mg/kg	SOLID	99	2600														<0.0010								
Chloromethane	mg/kg	SOLID	1	140														<0.0030								
Chloropropham	mg/kg	SOLID	-	-																						
Chloropropylate*	mg/kg	SOLID	-	-																						
Chlorothalonil	mg/kg	SOLID	-	-																						
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																						
Chlorpyriphos	mg/kg	SOLID	-	-																						
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																						
Chlorthion*	mg/kg	SOLID	-	-																						
Chlorthiophos*	mg/kg	SOLID	-	-																						
Chlortoluron	mg/kg	SOLID	-	-																						
Chlozolinate*	mg/kg	SOLID	-	-																						
Chromium	mg/kg	SOLID	-	-												11.3	22.6	17	16		12	6	9	9		13.4
Chromium - Hexavalent	mg/kg	SOLID	49	250												<0.1000	<0.1000	<0.1000	<1.0000		<1.0000	<1.0000	<1.0000	<1.0000		<0.1000
Chromium (III) Oxide	mg/kg	SOLID	-	-												<11.3000	<22.6000	<17.0000								<13.4000
Chrysene	mg/kg	SOLID	350	93	0.15	0.0345	0.45	0.0269	0.0448	1.08	0.0566	0.0293	0.063	0.0889	0.0431	<0.0900	0.17	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.0278	<0.0900
Chrysene-d12*	%	SOLID	-	-	91	93.4	99.6	92.1	89.9	101	86.4	90.1	84	100	80.5										97.5	
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																						
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690														<0.0060								
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-														<0.0010								
Clodinafop propargy*	mg/kg	SOLID	-	-																						
Clofentezine*	mg/kg	SOLID	-	-																						
Clomazone*	mg/kg	SOLID	-	-																						
Cloquintocet mexyl*	mg/kg	SOLID	-	-																						
Clothianidin*	mg/kg	SOLID	-	-																						
Copper	mg/kg	SOLID	68000	44000	10.1	34.7	27.3	18.3	29.1	1100	514	34.6	44.1	21.4	17.3	6.9	12.8	12.8	21		17	4	12	8	16.8	18.8
Coronene	mg/kg	SOLID	-	-														<0.3000								
Coumaphos	mg/kg	SOLID	-	-																						
Cresols*	mg/kg	SOLID	-	-																						
Cyanazine	mg/kg	SOLID	-	-																						
Cyanide	mg/kg	SOLID	-	-	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	18.3	23.7	<1.0000	<1.0000	<1.0000	<1.0000				<1.0000		<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	
Cyanide Free	mg/kg	SOLID	-	-	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000				<1.0000		<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	
Cyanide Free as CN	mg/kg	SOLID	-	-												<0.5000	<0.5000	<0.6000								<0.6000
Cyazofamid*	mg/kg	SOLID	-	-																						
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																						
Cycluron*	mg/kg	SOLID	-	-																						
Cyflufenamid*	mg/kg	SOLID	-	-																						
Cyfluthrin	mg/kg	SOLID	-	-																						
Cymoxanil*	mg/kg	SOLID	-	-																						
Cypermethrin	mg/kg	SOLID	-	-																						
Cyphenothrin*	mg/kg	SOLID	-	-																						
Cyproconazole*	mg/kg	SOLID	-	-																						
Cyprodinil*	mg/kg	SOLID	-	-																						
Cyromazine*	mg/kg	SOLID	-	-																						
Cythioate*	mg/kg	SOLID	-	-																						
DEET*	mg/kg	SOLID	-	-																						
Deltamethrin	mg/kg	SOLID	-	-																						
Demeton	mg/kg	SOLID	-	-																						
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																						
Desmedipham*	mg/kg	SOLID	-	-																						
Desmetryn*	mg/kg	SOLID	-	-																						
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																						
Diafenthiuron*	mg/kg	SOLID	-	-																						
Dialifos*	mg/kg	SOLID	-	-																						
Diazinon	mg/kg	SOLID	-	-																						
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.0230	<0.0230	0.0868	<0.0230	<0.0230	0.169	<0.0230	<0.0230	<0.0230	<0.0230	<0.0230	<0.0900	<0.0900	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.0230	<0.0900
Dibenzofuran	mg/kg	SOLID	-	-														<0.1000								
Dibromochloromethane	mg/kg	SOLID	-	-														<0.0010								
Dibromofluoromethane	%	SOLID	-	-																						
Dibromomethane	mg/kg	SOLID	-	-														<0.0010								
Dichlobenil	mg/kg	SOLID	-	-																						
Dichlofenthion*	mg/kg	SOLID	-	-																						
Dichlorodifluoromethane	mg/kg	SOLID	-	-														<0.0010								
Dichloromethane	mg/kg	SOLID	260	1500																						
Dichlorvos	mg/kg	SOLID	140	26																						
Diclobutrazol*	mg/kg	SOLID	-	-																						
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																						
Dicrotophos*	mg/kg	SOLID	-	-																						
Dieldrin	mg/kg	SOLID	170	30																						
Diethofencarb*	mg/kg	SOLID	-	-																						
Diethylphthalate	mg/kg	SOLID	140000	89000														<0.1000								
Difenoconazole*	mg/kg	SOLID	-	-																						
Diflubenzuron*	mg/kg	SOLID	-	-																						
Diflufenican*	mg/kg	SOLID	-	-																						
Dimefuron*	mg/kg	SOLID	-	-																						
Dimethenamid*	mg/kg	SOLID	-	-																						
Dimethoate	mg/kg	SOLID	-	-																						
Dimethomorph*	mg/kg	SOLID	-	-																						
Dimethylphthalate	mg/kg	SOLID	-	-														<0.1000								
Dimoxystrobin*	mg/kg	SOLID	-	-																						
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600														<0.1000								
Diniconazole*	mg/kg	SOLID	-	-																						
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000														<0.2000								
Dinotefuran*	mg/kg	SOLID	-	-																						
Dinoterb*	mg/kg	SOLID	-	-																						
Dioxabenzofos*	mg/kg	SOLID	-	-																						
Dioxacarb*	mg/kg	SOLID	-	-																						
Diphenamid	mg/kg	SOLID	-	-																						
Diphenyl ether	mg/kg	SOLID	-	-														<0.1000								
Diphenylamine	mg/kg	SOLID	-	-																						
Disulfoton	mg/kg	SOLID	-	-																						
Disulfoton sulphone*	mg/kg	SOLID	-	-																						
Ditalimfos*	mg/kg	SOLID	-	-																						
Diuron	mg/kg	SOLID	-	-																						
DMSA*	mg/kg	SOLID	-	-																						
DMST*	mg/kg	SOLID	-	-																						
Dodemorph*	mg/kg	SOLID	-	-																						
Edifenphos*	mg/kg	SOLID	-	-																						
Elemental Sulphur	%	SOLID	-	-																						
Emamectin*	mg/kg	SOLID	-	-																						
Endosulfan I	mg/kg	SOLID	5600	2400																						

Max of Normalised Results																									
					ML159-TP015	ML159-WS002	ML159-WS002a	ML160-CP010	ML160-CP041	ML160-CP041	ML160-CR030	ML160-CR033	ML160-CR035	ML160-CR035	ML160-WS003	ML160-WS003	ML161-CP032	ML161-CP032	ML161-CR009	ML161-CR009	ML161-CR021	ML161-TP405	ML161-TP405	ML161-WS002	ML162-CR004
					M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway North Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	Coleshill West Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill West Viaduct	M42 Coleshill Box Structure
					0.45	0.5	1.1	0.5	0.2	0.6	1.5	1.5	0.75	1.1	0.3	1	0.9	1.2	0.2	0.5	0.5	0.05	0.5	0.5	0.6
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GFDUD	MGR	MGR	RTD1	MGR	HEAD	MGR	ALV	MGR	HEAD	MGR	MGR	MGR	MMG	MGR	MGR	MGR	TOP	RTD1	MGR	HEAD
Beryllium	mg/kg	SOLID	12	63	0.333	0.3	0.361		0.507	0.437	1.03		0.383	0.412	0.41	0.915	1.28	1.16	0.556	0.561	0.337	<2.0000	<2.0000	0.755	0.598
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																					
Bifenazate*	mg/kg	SOLID	-	-																					
Bifenox*	mg/kg	SOLID	-	-																					
Bifenthrin*	mg/kg	SOLID	-	-																					
Binapacryl*	mg/kg	SOLID	-	-																					
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-																					
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-																					
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-																					
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000																					
Bitertanol*	mg/kg	SOLID	-	-																					
Boron	mg/kg	SOLID	240000	46000	<0.5000	<0.5000	0.5		0.7	<0.5000	0.7		<0.5000	<0.5000	<0.5000	0.7	0.7	0.5	0.6	0.6	0.9	<1.0000	<1.0000	0.9	0.6
Boron (Water Soluble)*	mg/kg	SOLID	-	-																					
Boron*	mg/kg	SOLID	-	-																					
Boscalid*	mg/kg	SOLID	-	-																					
Bromacil	mg/kg	SOLID	-	-																					
Bromobenzene	mg/kg	SOLID	92	1800																					
Bromochloromethane	mg/kg	SOLID	-	-																					
Bromodichloromethane	mg/kg	SOLID	2	56																					
Bromomethane	mg/kg	SOLID	-	-																					
Bromophos*	mg/kg	SOLID	-	-																					
Bromophos-Ethyl*	mg/kg	SOLID	-	-																					
Bromopropylate*	mg/kg	SOLID	-	-																					
Bupirimate*	mg/kg	SOLID	-	-																					
Buprofezine*	mg/kg	SOLID	-	-																					
Butachlor*	mg/kg	SOLID	-	-																					
Butoxycarboxim*	mg/kg	SOLID	-	-																					
Butralin*	mg/kg	SOLID	-	-																					
Butylbenzylphthalate	mg/kg	SOLID	940000	250000																					
Cadmium	mg/kg	SOLID	410	880	<0.2000	<0.2000	<0.2000		0.3	0.23	<0.2000		<0.2100	<0.2000	<0.2000	<0.2200	<0.2200	<0.2000	0.22	0.27	<0.2000	<1.0000	<1.0000	<0.2000	<0.2000
Cadusafos*	mg/kg	SOLID	-	-																					
Captan	mg/kg	SOLID	-	-																					
Carbaryl	mg/kg	SOLID	-	-																					
Carbazole	mg/kg	SOLID	-	-																					
Carbendazim	mg/kg	SOLID	-	-																					
Carbetamide	mg/kg	SOLID	-	-																					
Carbofuran	mg/kg	SOLID	-	-																					
Carbon Disulphide	mg/kg	SOLID	11	1300																					
Carbophenothion	mg/kg	SOLID	-	-																					
Carboxin	mg/kg	SOLID	-	-																					
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																					
Carpropamid*	mg/kg	SOLID	-	-																					
Chinomethionat*	mg/kg	SOLID	-	-																					
chlorantraniliprole*	mg/kg	SOLID	-	-																					
Chlorbenzilate*	mg/kg	SOLID	-	-																					
Chlorbromuron*	mg/kg	SOLID	-	-																					
Chlorbufam*	mg/kg	SOLID	-	-																					
Chlordane	mg/kg	SOLID	-	-																					
Chlordimeform	mg/kg	SOLID	-	-																					
Chlorethoxyfos*	mg/kg	SOLID	-	-																					
Chlorfenapyr*	mg/kg	SOLID	-	-																					
Chlorfenson*	mg/kg	SOLID	-	-																					
Chlorfenvinphos	mg/kg	SOLID	-	-																					
Chlorfluazuron*	mg/kg	SOLID	-	-																					
Chloridazon*	mg/kg	SOLID	-	-																					
Chlormephos	mg/kg	SOLID	-	-																					
Chlorobenzene	mg/kg	SOLID	56	1300																					
Chloroethane	mg/kg	SOLID	900	154000																					
Chloroethene	mg/kg	SOLID	0.059	4.8																					
Chloroform	mg/kg	SOLID	99	2600																					
Chloromethane	mg/kg	SOLID	1	140																					
Chloropropham	mg/kg	SOLID	-	-																					
Chloropropylate*	mg/kg	SOLID	-	-																					
Chlorothalonil	mg/kg	SOLID	-	-																					
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																					
Chlorpyriphos	mg/kg	SOLID	-	-																					
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																					
Chlorthion*	mg/kg	SOLID	-	-																					
Chlorthiophos*	mg/kg	SOLID	-	-																					
Chlortoluron	mg/kg	SOLID	-	-																					
Chlozolinate*	mg/kg	SOLID	-	-																					
Chromium	mg/kg	SOLID	-	-	8.8	8.5	10.6		16.2	18	34.4		14.7	12.7	11.2	23.9	32.2	28	15.9	14.5	15.8	18	20	18.1	21.5
Chromium - Hexavalent	mg/kg	SOLID	49	250	<0.1000	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000
Chromium (III) Oxide	mg/kg	SOLID	-	-	<8.8000	<8.5000	<10.6000		<16.2000	<18.0000	<34.4000		<14.7000	<12.7000	<11.2000	<23.9000	<32.2000	<28.0000	<15.9000	<14.5000	<15.8000			<18.1000	<21.5000
Chrysene	mg/kg	SOLID	350	93	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Chrysene-d12*	%	SOLID	-	-																					
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																					
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690																					
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-																					
Clodinafop propargy*	mg/kg	SOLID	-	-																					
Clofentezine*	mg/kg	SOLID	-	-																					
Clomazone*	mg/kg	SOLID	-	-																					
Cloquintocet mexyl*	mg/kg	SOLID	-	-																					
Clothianidin*	mg/kg	SOLID	-	-																					
Copper	mg/kg	SOLID	68000	44000	14.8	9.8	15.6		17.1	16.1	16.5		11.9	10	27.7	67.3	16.2	13.6	20.2	22.3	14.7	52	38	41.7	17.5
Coronene	mg/kg	SOLID	-	-																					
Coumaphos	mg/kg	SOLID	-	-																					
Cresols*	mg/kg	SOLID	-	-																					
Cyanazine	mg/kg	SOLID	-	-																					
Cyanide	mg/kg	SOLID	-	-																		<1.0000	<1.0000		
Cyanide Free	mg/kg	SOLID	-	-																		<1.0000	<1.0000		
Cyanide Free as CN	mg/kg	SOLID	-	-	<0.5000	<0.5000	<0.6000		<0.0700	<0.0600	<0.6000		<0.0600	<0.0600	<0.5000	<0.6000	<0.7000	<0.6000	<0.6000	<0.6000	<0.5000			<0.6000	<0.6000
Cyazofamid*	mg/kg	SOLID	-	-																					
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																					
Cycluron*	mg/kg	SOLID	-	-																					
Cyflufenamid*	mg/kg	SOLID	-	-																					
Cyfluthrin	mg/kg	SOLID	-	-																					
Cymoxanil*	mg/kg	SOLID	-	-																					
Cypermethrin	mg/kg	SOLID	-	-																					
Cyphenothrin*	mg/kg	SOLID	-	-																					
Cyproconazole*	mg/kg	SOLID	-	-																					
Cyprodinil*	mg/kg	SOLID	-	-																					
Cyromazine*	mg/kg	SOLID	-	-																					
Cythioate*	mg/kg	SOLID	-	-																					
DEET*	mg/kg	SOLID	-	-																					
Deltamethrin	mg/kg	SOLID	-	-																					
Demeton	mg/kg	SOLID	-	-																					
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																					
Desmedipham*	mg/kg	SOLID	-	-																					
Desmetryn*	mg/kg	SOLID	-	-																					
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																					
Diafenthiuron*	mg/kg	SOLID	-	-																					
Dialifos*	mg/kg	SOLID	-	-																					
Diazinon	mg/kg	SOLID	-	-																					
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Dibenzofuran	mg/kg	SOLID	-	-																					
Dibromochloromethane	mg/kg	SOLID	-	-																					
Dibromofluoromethane	%	SOLID	-	-																					
Dibromomethane	mg/kg	SOLID	-	-																					
Dichlobenil	mg/kg	SOLID	-	-																					
Dichlofenthion*	mg/kg	SOLID	-	-																					
Dichlorodifluoromethane	mg/kg	SOLID	-	-																					
Dichloromethane	mg/kg	SOLID	260	1500																					
Dichlorvos	mg/kg	SOLID	140	26																					
Diclobutrazol*	mg/kg	SOLID	-	-																					
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																					
Dicrotophos*	mg/kg	SOLID	-	-																					
Dieldrin	mg/kg	SOLID	170	30																					
Diethofencarb*	mg/kg	SOLID	-	-																					
Diethylphthalate	mg/kg	SOLID	140000	89000																					
Difenoconazole*	mg/kg	SOLID	-	-																					
Diflubenzuron*	mg/kg	SOLID	-	-																					
Diflufenican*	mg/kg	SOLID	-	-																					
Dimefuron*	mg/kg	SOLID	-	-																					
Dimethenamid*	mg/kg	SOLID	-	-																					
Dimethoate	mg/kg	SOLID	-	-																					
Dimethomorph*	mg/kg	SOLID	-	-																					
Dimethylphthalate	mg/kg	SOLID	-	-																					
Dimoxystrobin*	mg/kg	SOLID	-	-																					
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600																					
Diniconazole*	mg/kg	SOLID	-	-																					
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000																					
Dinotefuran*	mg/kg	SOLID	-	-																					
Dinoterb*	mg/kg	SOLID	-	-																					
Dioxabenzofos*	mg/kg	SOLID	-	-																					
Dioxacarb*	mg/kg	SOLID	-	-																					
Diphenamid	mg/kg	SOLID	-	-																					
Diphenyl ether	mg/kg	SOLID	-	-																					
Diphenylamine	mg/kg	SOLID	-	-																					
Disulfoton	mg/kg	SOLID	-	-																					
Disulfoton sulphone*	mg/kg	SOLID	-	-																					
Ditalimfos*	mg/kg	SOLID	-	-																					
Diuron	mg/kg	SOLID	-	-																					
DMSA*	mg/kg	SOLID	-	-																					
DMST*	mg/kg	SOLID	-	-																					
Dodemorph*	mg/kg	SOLID	-	-																					
Edifenphos*	mg/kg	SOLID	-	-																					
Elemental Sulphur	%	SOLID	-	-																					
Emamectin*	mg/kg	SOLID	-	-																					
Endosulfan I	mg/kg	SOLID	5600	2400																					

Max of Normalised Results																												
					ML162-CR024	ML162-CR024	ML162-CR024	ML162-CR026	ML162-CR026	ML162-CR026	ML162-CR028	ML162-CR401	ML162-CR401	ML162-CR402	ML162-CR402	ML162-CR402	ML162-CR403	ML162-CR403	ML162-CR404	ML162-CR404	ML162-TP402	ML162-TP402	ML163-CP035	ML163-CP038	ML163-CP401	ML163-CP401	ML163-CP401	ML163-CR007
					M42 Coleshill North Viaduct	M42 Coleshill North Viaduct	M42 Coleshill North Viaduct	Gilson Embankment	Gilson Embankment	Gilson Embankment	M42 Coleshill North Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Gilson Embankment	Gilson Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Gilson Cutting	Gilson Cutting	Gilson Cutting	Gilson Embankment
					0.05	0.5	2.1	21.8	22.3	24.8	2.3	0.3	1	0.3	1	3	0.3	1	0.3	1	0.3	1	1	0.5	0.05	0.5	2	0.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	ALV	MMG	MMG	MMG	ALV	ALV	ALV	MGR	MGR	MGR	GFDMP	GFDMP	RTD2	RTD2	TOP	ALV	ALV	RTD1	TOP	GFDUD	GFDUD	GFDUD
Beryllium	mg/kg	SOLID	12	63	<2.0000	<2.0000	<2.0000					<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	0.565	0.377	<2.0000	<2.0000	<2.0000	<2.0000
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15															<0.0100									
Bifenazate*	mg/kg	SOLID	-	-															<0.0100									
Bifenox*	mg/kg	SOLID	-	-															<0.0100									
Bifenthrin*	mg/kg	SOLID	-	-															<0.0100									
Binapacryl*	mg/kg	SOLID	-	-															<0.0100									
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-																						<0.1000		
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-																						<0.1000		
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-																						<0.1000		
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000																						<0.1000		
Bitertanol*	mg/kg	SOLID	-	-															<0.0100									
Boron	mg/kg	SOLID	240000	46000	<1.0000	<1.0000	<1.0000					<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	0.7	<0.5000	<1.0000	<1.0000	<1.0000	<1.0000
Boron (Water Soluble)*	mg/kg	SOLID	-	-																								
Boron*	mg/kg	SOLID	-	-																								
Boscalid*	mg/kg	SOLID	-	-															<0.0100									
Bromacil	mg/kg	SOLID	-	-															<0.0100									
Bromobenzene	mg/kg	SOLID	92	1800																				<0.0010		<0.0500		
Bromochloromethane	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
Bromodichloromethane	mg/kg	SOLID	2	56																				<0.0010		<0.0500		
Bromomethane	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
Bromophos*	mg/kg	SOLID	-	-															<0.0100									
Bromophos-Ethyl*	mg/kg	SOLID	-	-															<0.0100									
Bromopropylate*	mg/kg	SOLID	-	-															<0.0100									
Bupirimate*	mg/kg	SOLID	-	-															<0.0100									
Buprofezine*	mg/kg	SOLID	-	-															<0.0100									
Butachlor*	mg/kg	SOLID	-	-															<0.0100									
Butoxycarboxim*	mg/kg	SOLID	-	-															<0.0100									
Butralin*	mg/kg	SOLID	-	-															<0.0100									
Butylbenzylphthalate	mg/kg	SOLID	940000	250000																						<0.1000		
Cadmium	mg/kg	SOLID	410	880	<1.0000	<1.0000	<1.0000					<1.0000	<1.0000	<1.0000	<1.0000	4	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<0.2000	<0.2000	<1.0000	<1.0000	<1.0000	<1.0000
Cadusafos*	mg/kg	SOLID	-	-															<0.0100									
Captan	mg/kg	SOLID	-	-															<0.0100									
Carbaryl	mg/kg	SOLID	-	-															<0.0100									
Carbazole	mg/kg	SOLID	-	-																						<0.1000		
Carbendazim	mg/kg	SOLID	-	-															<0.0100									
Carbetamide	mg/kg	SOLID	-	-															<0.0100									
Carbofuran	mg/kg	SOLID	-	-															<0.0100									
Carbon Disulphide	mg/kg	SOLID	11	1300																								
Carbophenothion	mg/kg	SOLID	-	-															<0.0100									
Carboxin	mg/kg	SOLID	-	-															<0.0100									
Carfentrazone Ethyl*	mg/kg	SOLID	-	-															<0.0100									
Carpropamid*	mg/kg	SOLID	-	-															<0.0100									
Chinomethionat*	mg/kg	SOLID	-	-															<0.0100									
chlorantraniliprole*	mg/kg	SOLID	-	-															<0.0100									
Chlorbenzilate*	mg/kg	SOLID	-	-															<0.0100									
Chlorbromuron*	mg/kg	SOLID	-	-															<0.0100									
Chlorbufam*	mg/kg	SOLID	-	-															<0.0100									
Chlordane	mg/kg	SOLID	-	-															<0.0100									
Chlordimeform	mg/kg	SOLID	-	-															<0.0100									
Chlorethoxyfos*	mg/kg	SOLID	-	-															<0.0100									
Chlorfenapyr*	mg/kg	SOLID	-	-															<0.0100									
Chlorfenson*	mg/kg	SOLID	-	-															<0.0100									
Chlorfenvinphos	mg/kg	SOLID	-	-															<0.0100									
Chlorfluazuron*	mg/kg	SOLID	-	-															<0.0100									
Chloridazon*	mg/kg	SOLID	-	-															<0.0100									
Chlormephos	mg/kg	SOLID	-	-															<0.0100									
Chlorobenzene	mg/kg	SOLID	56	1300																				<0.0010		<0.0500		
Chloroethane	mg/kg	SOLID	900	154000																				<0.0020		<0.0500		
Chloroethene	mg/kg	SOLID	0.059	4.8																				<0.0010		<0.0500		
Chloroform	mg/kg	SOLID	99	2600																				<0.0010		<0.0500		
Chloromethane	mg/kg	SOLID	1	140																				<0.0030		<0.0500		
Chloropropham	mg/kg	SOLID	-	-															<0.0100									
Chloropropylate*	mg/kg	SOLID	-	-															<0.0100									
Chlorothalonil	mg/kg	SOLID	-	-															<0.0100									
Chlorpyrifos methyl*	mg/kg	SOLID	-	-															<0.0100									
Chlorpyriphos	mg/kg	SOLID	-	-															<0.0100									
Chlorthal Dimethyl*	mg/kg	SOLID	-	-															<0.0100									
Chlorthion*	mg/kg	SOLID	-	-															<0.0100									
Chlorthiophos*	mg/kg	SOLID	-	-															<0.0100									
Chlortoluron	mg/kg	SOLID	-	-															<0.0100									
Chlozolinate*	mg/kg	SOLID	-	-															<0.0100									
Chromium	mg/kg	SOLID	-	-	19	27	42					25	38	10	15	98	26	19	25	16	16	15	13.7	9.5	15	13	18	14
Chromium - Hexavalent	mg/kg	SOLID	49	250	<1.0000	<1.0000	<1.0000					<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<0.1000	<0.1000	<1.0000	<1.0000	<1.0000	<1.0000
Chromium (III) Oxide	mg/kg	SOLID	-	-																			<13.7000	<9.5000				
Chrysene	mg/kg	SOLID	350	93	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	1	0.2	<0.1000	<0.1000
Chrysene-d12*	%	SOLID	-	-																								
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-															<0.0100									
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690																				<0.0070		<0.0500		
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
Clodinafop propargy*	mg/kg	SOLID	-	-															<0.0100									
Clofentezine*	mg/kg	SOLID	-	-															<0.0100									
Clomazone*	mg/kg	SOLID	-	-															<0.0100									
Cloquintocet mexyl*	mg/kg	SOLID	-	-															<0.0100									
Clothianidin*	mg/kg	SOLID	-	-															<0.0100									
Copper	mg/kg	SOLID	68000	44000	16	17	22					11	18	21	27	170	19	12	14	8	15	11	15.2	13	28	21	19	17
Coronene	mg/kg	SOLID	-	-																								
Coumaphos	mg/kg	SOLID	-	-															<0.0100									
Cresols*	mg/kg	SOLID	-	-																								
Cyanazine	mg/kg	SOLID	-	-															<0.0100									
Cyanide	mg/kg	SOLID	-	-	<1.0000	<1.0000	<1.0000					<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000			<1.0000	<1.0000	<1.0000	<1.0000
Cyanide Free	mg/kg	SOLID	-	-								<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000			<1.0000	<1.0000	<1.0000	
Cyanide Free as CN	mg/kg	SOLID	-	-																			<0.5000	<0.5000				
Cyazofamid*	mg/kg	SOLID	-	-															<0.0100									
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																								
Cycluron*	mg/kg	SOLID	-	-															<0.0100									
Cyflufenamid*	mg/kg	SOLID	-	-															<0.0100									
Cyfluthrin	mg/kg	SOLID	-	-															<0.0100									
Cymoxanil*	mg/kg	SOLID	-	-															<0.0100									
Cypermethrin	mg/kg	SOLID	-	-															<0.0100									
Cyphenothrin*	mg/kg	SOLID	-	-															<0.0100									
Cyproconazole*	mg/kg	SOLID	-	-															<0.0100									
Cyprodinil*	mg/kg	SOLID	-	-															<0.0100									
Cyromazine*	mg/kg	SOLID	-	-															<0.0100									
Cythioate*	mg/kg	SOLID	-	-															<0.0100									
DEET*	mg/kg	SOLID	-	-															<0.0100									
Deltamethrin	mg/kg	SOLID	-	-															<0.0100									
Demeton	mg/kg	SOLID	-	-															<0.0100									
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-															<0.0100									
Desmedipham*	mg/kg	SOLID	-	-															<0.0100									
Desmetryn*	mg/kg	SOLID	-	-															<0.0100									
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-															<0.0100									
Diafenthiuron*	mg/kg	SOLID	-	-															<0.0100									
Dialifos*	mg/kg	SOLID	-	-															<0.0100									
Diazinon	mg/kg	SOLID	-	-															<0.0100									
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	0.2	<0.1000	<0.1000	<0.1000
Dibenzofuran	mg/kg	SOLID	-	-																						<0.1000		
Dibromochloromethane	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
Dibromofluoromethane	%	SOLID	-	-																								
Dibromomethane	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
Dichlobenil	mg/kg	SOLID	-	-															<0.0100									
Dichlofenthion*	mg/kg	SOLID	-	-															<0.0100									
Dichlorodifluoromethane	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
Dichloromethane	mg/kg	SOLID	260	1500																						<0.0500		
Dichlorvos	mg/kg	SOLID	140	26															<0.0100									
Diclobutrazol*	mg/kg	SOLID	-	-															<0.0100									
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-															<0.0100									
Dicrotophos*	mg/kg	SOLID	-	-															<0.0100									
Dieldrin	mg/kg	SOLID	170	30															<0.0100									
Diethofencarb*	mg/kg	SOLID	-	-															<0.0100									
Diethylphthalate	mg/kg	SOLID	140000	89000																						<0.1000		
Difenoconazole*	mg/kg	SOLID	-	-															<0.0100									
Diflubenzuron*	mg/kg	SOLID	-	-															<0.0100									
Diflufenican*	mg/kg	SOLID	-	-															<0.0100									
Dimefuron*	mg/kg	SOLID	-	-															<0.0100									
Dimethenamid*	mg/kg	SOLID	-	-															<0.0100									
Dimethoate	mg/kg	SOLID	-	-															<0.0100									
Dimethomorph*	mg/kg	SOLID	-	-															<0.0100									
Dimethylphthalate	mg/kg	SOLID	-	-																						<0.1000		
Dimoxystrobin*	mg/kg	SOLID	-	-															<0.0100									
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600																						<0.1000		
Diniconazole*	mg/kg	SOLID	-	-															<0.0100									
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000																						<0.1000		
Dinotefuran*	mg/kg	SOLID	-	-															<0.0100									
Dinoterb*	mg/kg	SOLID	-	-															<0.0100									
Dioxabenzofos*	mg/kg	SOLID	-	-															<0.0100									
Dioxacarb*	mg/kg	SOLID	-	-															<0.0100									
Diphenamid	mg/kg	SOLID	-	-															<0.0100									
Diphenyl ether	mg/kg	SOLID	-	-																								
Diphenylamine	mg/kg	SOLID	-	-															<0.0100									
Disulfoton	mg/kg	SOLID	-	-															<0.0100									
Disulfoton sulphone*	mg/kg	SOLID	-	-															<0.0100									
Ditalimfos*	mg/kg	SOLID	-	-															<0.0100									
Diuron	mg/kg	SOLID	-	-															<0.0100									
DMSA*	mg/kg	SOLID	-	-															<0.0100									
DMST*	mg/kg	SOLID	-	-															<0.0100									
Dodemorph*	mg/kg	SOLID	-	-															<0.0100									
Edifenphos*	mg/kg	SOLID	-	-															<0.0100									
Elemental Sulphur	%	SOLID	-	-																								
Emamectin*	mg/kg	SOLID	-	-															<0.0100									
Endosulfan I	mg/kg	SOLID	5600	2400															<0.0100									

Max of Normalised Results																											
					ML163-CR007	ML163-CR007	ML163-CR008	ML163-CR008	ML163-CR008	ML163-CR008	ML163-CR010	ML163-CR010	ML163-CR010	ML163-CR016	ML163-CR016	ML163-CR020	ML163-CR020	ML163-CR020	ML163-CR021a	ML163-CR021a	ML163-CR021a	ML163-CR401	ML163-CR401	ML163-CR401	ML163-TP009	ML163-TP020	ML163-TP021
					Gilson Embankment	Gilson Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Gilson Embankment	Gilson Embankment	Gilson Embankment	Gilson Cutting	Lichfield Road Embankment	Lichfield Road Embankment
					1	2	0.05	0.6	1.2	1.5	0.4	1.5	2	0.5	1	0.3	0.5	0.9	0.4	0.9	1.5	0.05	0.5	1	3.5	1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GLLD	GLLD	MGR	MGR	MGR	RTD1	MGR	RTD1	RTD1	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	ALV	TOP	ALV	ALV	MMG	GLLD	MGR
Beryllium	mg/kg	SOLID	12	63	<2.0000	<2.0000	0.526	0.359	0.532	0.423	0.54		0.463	0.427	0.294		0.553	0.295	0.7	0.54	0.401	<2.0000	<2.0000	<2.0000		0.394	0.45
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																							
Bifenazate*	mg/kg	SOLID	-	-																							
Bifenox*	mg/kg	SOLID	-	-																							
Bifenthrin*	mg/kg	SOLID	-	-																							
Binapacryl*	mg/kg	SOLID	-	-																							
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-													<2.0000										
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-													<2.0000										
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-													<11.0000										
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000													<4.0000										
Bitertanol*	mg/kg	SOLID	-	-																							
Boron	mg/kg	SOLID	240000	46000	<1.0000	<1.0000	0.9	0.5	0.8	0.8	0.8		0.7	0.6	<0.5000		1.1	<0.5000	0.6	1	<0.5000	<1.0000	<1.0000	<1.0000		<0.5000	0.6
Boron (Water Soluble)*	mg/kg	SOLID	-	-																							
Boron*	mg/kg	SOLID	-	-																							
Boscalid*	mg/kg	SOLID	-	-																							
Bromacil	mg/kg	SOLID	-	-																							
Bromobenzene	mg/kg	SOLID	92	1800													<0.0010									<0.0010	<0.0010
Bromochloromethane	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
Bromodichloromethane	mg/kg	SOLID	2	56													<0.0010									<0.0010	<0.0010
Bromomethane	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
Bromophos*	mg/kg	SOLID	-	-																							
Bromophos-Ethyl*	mg/kg	SOLID	-	-																							
Bromopropylate*	mg/kg	SOLID	-	-																							
Bupirimate*	mg/kg	SOLID	-	-																							
Buprofezine*	mg/kg	SOLID	-	-																							
Butachlor*	mg/kg	SOLID	-	-																							
Butoxycarboxim*	mg/kg	SOLID	-	-																							
Butralin*	mg/kg	SOLID	-	-																							
Butylbenzylphthalate	mg/kg	SOLID	940000	250000													<4.0000										
Cadmium	mg/kg	SOLID	410	880	<1.0000	<1.0000	0.36	<0.2000	<0.2000	<0.2000	<0.2100		<0.2000	<0.2000	<0.2000		0.38	<0.2000	0.24	0.3	<0.2000	<1.0000	<1.0000	<1.0000		<0.2000	0.27
Cadusafos*	mg/kg	SOLID	-	-																							
Captan	mg/kg	SOLID	-	-																							
Carbaryl	mg/kg	SOLID	-	-																							
Carbazole	mg/kg	SOLID	-	-																							
Carbendazim	mg/kg	SOLID	-	-																							
Carbetamide	mg/kg	SOLID	-	-																							
Carbofuran	mg/kg	SOLID	-	-																							
Carbon Disulphide	mg/kg	SOLID	11	1300																							
Carbophenothion	mg/kg	SOLID	-	-																							
Carboxin	mg/kg	SOLID	-	-																							
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																							
Carpropamid*	mg/kg	SOLID	-	-																							
Chinomethionat*	mg/kg	SOLID	-	-																							
chlorantraniliprole*	mg/kg	SOLID	-	-																							
Chlorbenzilate*	mg/kg	SOLID	-	-																							
Chlorbromuron*	mg/kg	SOLID	-	-																							
Chlorbufam*	mg/kg	SOLID	-	-																							
Chlordane	mg/kg	SOLID	-	-																							
Chlordimeform	mg/kg	SOLID	-	-																							
Chlorethoxyfos*	mg/kg	SOLID	-	-																							
Chlorfenapyr*	mg/kg	SOLID	-	-																							
Chlorfenson*	mg/kg	SOLID	-	-																							
Chlorfenvinphos	mg/kg	SOLID	-	-																							
Chlorfluazuron*	mg/kg	SOLID	-	-																							
Chloridazon*	mg/kg	SOLID	-	-																							
Chlormephos	mg/kg	SOLID	-	-																							
Chlorobenzene	mg/kg	SOLID	56	1300													<0.0010									<0.0010	<0.0010
Chloroethane	mg/kg	SOLID	900	154000													<0.0020									<0.0020	<0.0020
Chloroethene	mg/kg	SOLID	0.059	4.8													<0.0010									<0.0010	<0.0010
Chloroform	mg/kg	SOLID	99	2600													<0.0010									<0.0010	<0.0010
Chloromethane	mg/kg	SOLID	1	140													<0.0030									<0.0030	<0.0040
Chloropropham	mg/kg	SOLID	-	-																							
Chloropropylate*	mg/kg	SOLID	-	-																							
Chlorothalonil	mg/kg	SOLID	-	-																							
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																							
Chlorpyriphos	mg/kg	SOLID	-	-																							
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																							
Chlorthion*	mg/kg	SOLID	-	-																							
Chlorthiophos*	mg/kg	SOLID	-	-																							
Chlortoluron	mg/kg	SOLID	-	-																							
Chlozolinate*	mg/kg	SOLID	-	-																							
Chromium	mg/kg	SOLID	-	-	28	19	12.7	10.4	12.3	12	15.3		16.7	10.4	6.7		22	12.6	26	14.6	13	16	13	40		8.4	14.2
Chromium - Hexavalent	mg/kg	SOLID	49	250	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<1.0000	<1.0000	<1.0000		<0.1000	<0.1000
Chromium (III) Oxide	mg/kg	SOLID	-	-			<12.7000	<10.4000	<12.3000	<12.0000	<15.3000		<16.7000	<10.4000	<6.7000		<22.0000	<12.6000	<25.8000	<14.6000	<13.2000					<8.4000	<14.2000
Chrysene	mg/kg	SOLID	350	93	<0.1000	<0.1000	0.27	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	1.7		1.26	<0.0900	<0.0900	0.3	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	0.11
Chrysene-d12*	%	SOLID	-	-																							
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																							
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690													<0.0060									<0.0060	<0.0060
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
Clodinafop propargy*	mg/kg	SOLID	-	-																							
Clofentezine*	mg/kg	SOLID	-	-																							
Clomazone*	mg/kg	SOLID	-	-																							
Cloquintocet mexyl*	mg/kg	SOLID	-	-																							
Clothianidin*	mg/kg	SOLID	-	-																							
Copper	mg/kg	SOLID	68000	44000	25	15	29	12.7	16	14	18.1		10.4	28.2	11.4		29.2	10.8	33.7	21.4	7.6	24	12	27		11.4	22
Coronene	mg/kg	SOLID	-	-													<7.0000										
Coumaphos	mg/kg	SOLID	-	-																							
Cresols*	mg/kg	SOLID	-	-																							
Cyanazine	mg/kg	SOLID	-	-																							
Cyanide	mg/kg	SOLID	-	-	<1.0000	<1.0000																<1.0000	<1.0000	<1.0000			
Cyanide Free	mg/kg	SOLID	-	-																		<1.0000	<1.0000	<1.0000			
Cyanide Free as CN	mg/kg	SOLID	-	-			<0.6000	<0.6000	<0.6000	<0.6000	<0.6000		<0.6000	<0.6000	<0.6000		<0.6000	<0.6000	<0.6000	<0.6000	<0.5000					<0.6000	<0.6000
Cyazofamid*	mg/kg	SOLID	-	-																							
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																							
Cycluron*	mg/kg	SOLID	-	-																							
Cyflufenamid*	mg/kg	SOLID	-	-																							
Cyfluthrin	mg/kg	SOLID	-	-																							
Cymoxanil*	mg/kg	SOLID	-	-																							
Cypermethrin	mg/kg	SOLID	-	-																							
Cyphenothrin*	mg/kg	SOLID	-	-																							
Cyproconazole*	mg/kg	SOLID	-	-																							
Cyprodinil*	mg/kg	SOLID	-	-																							
Cyromazine*	mg/kg	SOLID	-	-																							
Cythioate*	mg/kg	SOLID	-	-																							
DEET*	mg/kg	SOLID	-	-																							
Deltamethrin	mg/kg	SOLID	-	-																							
Demeton	mg/kg	SOLID	-	-																							
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																							
Desmedipham*	mg/kg	SOLID	-	-																							
Desmetryn*	mg/kg	SOLID	-	-																							
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																							
Diafenthiuron*	mg/kg	SOLID	-	-																							
Dialifos*	mg/kg	SOLID	-	-																							
Diazinon	mg/kg	SOLID	-	-																							
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.1000	<0.1000	<0.0900	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	0.3		0.2	<0.0900	<0.0900	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	<0.0900
Dibenzofuran	mg/kg	SOLID	-	-													<2.0000										
Dibromochloromethane	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
Dibromofluoromethane	%	SOLID	-	-																							
Dibromomethane	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
Dichlobenil	mg/kg	SOLID	-	-																							
Dichlofenthion*	mg/kg	SOLID	-	-																							
Dichlorodifluoromethane	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
Dichloromethane	mg/kg	SOLID	260	1500																							
Dichlorvos	mg/kg	SOLID	140	26																							
Diclobutrazol*	mg/kg	SOLID	-	-																							
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																							
Dicrotophos*	mg/kg	SOLID	-	-																							
Dieldrin	mg/kg	SOLID	170	30																							
Diethofencarb*	mg/kg	SOLID	-	-																							
Diethylphthalate	mg/kg	SOLID	140000	89000													<2.0000										
Difenoconazole*	mg/kg	SOLID	-	-																							
Diflubenzuron*	mg/kg	SOLID	-	-																							
Diflufenican*	mg/kg	SOLID	-	-																							
Dimefuron*	mg/kg	SOLID	-	-																							
Dimethenamid*	mg/kg	SOLID	-	-																							
Dimethoate	mg/kg	SOLID	-	-																							
Dimethomorph*	mg/kg	SOLID	-	-																							
Dimethylphthalate	mg/kg	SOLID	-	-													<2.0000										
Dimoxystrobin*	mg/kg	SOLID	-	-																							
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600													<2.0000										
Diniconazole*	mg/kg	SOLID	-	-																							
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000													<4.0000										
Dinotefuran*	mg/kg	SOLID	-	-																							
Dinoterb*	mg/kg	SOLID	-	-																							
Dioxabenzofos*	mg/kg	SOLID	-	-																							
Dioxacarb*	mg/kg	SOLID	-	-																							
Diphenamid	mg/kg	SOLID	-	-																							
Diphenyl ether	mg/kg	SOLID	-	-													<2.0000										
Diphenylamine	mg/kg	SOLID	-	-																							
Disulfoton	mg/kg	SOLID	-	-																							
Disulfoton sulphone*	mg/kg	SOLID	-	-																							
Ditalimfos*	mg/kg	SOLID	-	-																							
Diuron	mg/kg	SOLID	-	-																							
DMSA*	mg/kg	SOLID	-	-																							
DMST*	mg/kg	SOLID	-	-																							
Dodemorph*	mg/kg	SOLID	-	-																							
Edifenphos*	mg/kg	SOLID	-	-																							
Elemental Sulphur	%	SOLID	-	-																							
Emamectin*	mg/kg	SOLID	-	-																							
Endosulfan I	mg/kg	SOLID	5600	2400																							

Max of Normalised Results																									
					ML163-TP021	ML164-CP003	ML164-CP003	ML164-CP003	ML164-CP004	ML164-CP004	ML164-CP004	ML164-CP010	ML164-CP010	ML164-CP021	ML164-CP021	ML164-CP021	ML164-CP023	ML164-CP023	ML164-CP036	ML164-CP036	ML164-CP036	ML164-CR009	ML164-CR009	ML164-CR009	ML164-CR011
					Lichfield Road Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watton House Embankment	Watton House Embankment	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct
					0.5	0.9	2	3.5	1	3	4	0.5	1	0.5	1	3	0.05	1.5	1	3	5	0.05	0.4	1.5	0.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	MGR	TILMP	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	ALV	MGR	MGR	MGR	MGR
Beryllium	mg/kg	SOLID	12	63	0.302	0.776	0.79	1.015	0.766	0.938	0.615	1.66	0.6179	0.47		0.659	0.504	0.416	1.32	0.79	1.58	1.3	0.92	1.21	0.968
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																					
Bifenazate*	mg/kg	SOLID	-	-																					
Bifenox*	mg/kg	SOLID	-	-																					
Bifenthrin*	mg/kg	SOLID	-	-																					
Binapacryl*	mg/kg	SOLID	-	-																					
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-			<0.6000			<0.6000										<0.6000					
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000			<0.2000			<0.2000										<0.2000					
Bitertanol*	mg/kg	SOLID	-	-																					
Boron	mg/kg	SOLID	240000	46000	<0.5000	1.9	0.7	2	1.9	2.2	1.9	<0.5000	<0.5100	0.7		0.7	0.8	<0.5000	1.1	0.7	1	0.8	0.9	1.4	0.7
Boron (Water Soluble)*	mg/kg	SOLID	-	-																					
Boron*	mg/kg	SOLID	-	-																					
Boscalid*	mg/kg	SOLID	-	-																					
Bromacil	mg/kg	SOLID	-	-																					
Bromobenzene	mg/kg	SOLID	92	1800	<0.0010		<0.0010			<0.0010										<0.0010					
Bromochloromethane	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
Bromodichloromethane	mg/kg	SOLID	2	56	<0.0010		<0.0010			<0.0010										<0.0010					
Bromomethane	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
Bromophos*	mg/kg	SOLID	-	-																					
Bromophos-Ethyl*	mg/kg	SOLID	-	-																					
Bromopropylate*	mg/kg	SOLID	-	-																					
Bupirimate*	mg/kg	SOLID	-	-																					
Buprofezine*	mg/kg	SOLID	-	-																					
Butachlor*	mg/kg	SOLID	-	-																					
Butoxycarboxim*	mg/kg	SOLID	-	-																					
Butralin*	mg/kg	SOLID	-	-																					
Butylbenzylphthalate	mg/kg	SOLID	940000	250000			<0.2000			<0.2000										<0.2000					
Cadmium	mg/kg	SOLID	410	880	<0.2000	<0.2000	0.26	<0.2100	0.43	0.36	<0.2000	1.19	0.438	<0.2000		<0.2000	0.26	<0.2000	0.53	0.3	0.48	1.46	0.4	0.8	0.36
Cadusafos*	mg/kg	SOLID	-	-																					
Captan	mg/kg	SOLID	-	-																					
Carbaryl	mg/kg	SOLID	-	-																					
Carbazole	mg/kg	SOLID	-	-																					
Carbendazim	mg/kg	SOLID	-	-																					
Carbetamide	mg/kg	SOLID	-	-																					
Carbofuran	mg/kg	SOLID	-	-																					
Carbon Disulphide	mg/kg	SOLID	11	1300																					
Carbophenothion	mg/kg	SOLID	-	-																					
Carboxin	mg/kg	SOLID	-	-																					
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																					
Carpropamid*	mg/kg	SOLID	-	-																					
Chinomethionat*	mg/kg	SOLID	-	-																					
chlorantraniliprole*	mg/kg	SOLID	-	-																					
Chlorbenzilate*	mg/kg	SOLID	-	-																					
Chlorbromuron*	mg/kg	SOLID	-	-																					
Chlorbufam*	mg/kg	SOLID	-	-																					
Chlordane	mg/kg	SOLID	-	-																					
Chlordimeform	mg/kg	SOLID	-	-																					
Chlorethoxyfos*	mg/kg	SOLID	-	-																					
Chlorfenapyr*	mg/kg	SOLID	-	-																					
Chlorfenson*	mg/kg	SOLID	-	-																					
Chlorfenvinphos	mg/kg	SOLID	-	-																					
Chlorfluazuron*	mg/kg	SOLID	-	-																					
Chloridazon*	mg/kg	SOLID	-	-																					
Chlormephos	mg/kg	SOLID	-	-																					
Chlorobenzene	mg/kg	SOLID	56	1300	<0.0010		<0.0010			<0.0010										<0.0010					
Chloroethane	mg/kg	SOLID	900	154000	<0.0020		<0.0020			<0.0020										<0.0020					
Chloroethene	mg/kg	SOLID	0.059	4.8	<0.0010		<0.0010			<0.0010										<0.0010					
Chloroform	mg/kg	SOLID	99	2600	<0.0010		<0.0010			<0.0010										<0.0010					
Chloromethane	mg/kg	SOLID	1	140	<0.0030		<0.0040			<0.0040										<0.0030					
Chloropropham	mg/kg	SOLID	-	-																					
Chloropropylate*	mg/kg	SOLID	-	-																					
Chlorothalonil	mg/kg	SOLID	-	-																					
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																					
Chlorpyriphos	mg/kg	SOLID	-	-																					
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																					
Chlorthion*	mg/kg	SOLID	-	-																					
Chlorthiophos*	mg/kg	SOLID	-	-																					
Chlortoluron	mg/kg	SOLID	-	-																					
Chlozolinate*	mg/kg	SOLID	-	-																					
Chromium	mg/kg	SOLID	-	-	9.2	26.7	22	38	23.5	25.5	19.1	33.3	24.57	18		21	14.1	15.5	36	29.1	46.1	44.5	26.7	29.9	30
Chromium - Hexavalent	mg/kg	SOLID	49	250	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000
Chromium (III) Oxide	mg/kg	SOLID	-	-	<9.2000	<26.7000	<22.0000	<38.0000	<23.5000	<25.5000	<19.1000	<33.3000	<24.6000	<18.5000		<20.7000	<14.1000	<15.5000	<36.3000	<29.1000	<46.1000	<44.5000	<26.7000	<29.9000	<29.9000
Chrysene	mg/kg	SOLID	350	93	<0.0900	0.88	10.3	<0.0900	0.94	1.14	670	0.18	0.13	0.13		<0.0900		<0.0900	0.63	0.16	<0.1000	0.6	0.32	0.79	0.5
Chrysene-d12*	%	SOLID	-	-																					
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																					
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690	<0.0070		<0.0060			<0.0060										<0.0060					
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
Clodinafop propargy*	mg/kg	SOLID	-	-																					
Clofentezine*	mg/kg	SOLID	-	-																					
Clomazone*	mg/kg	SOLID	-	-																					
Cloquintocet mexyl*	mg/kg	SOLID	-	-																					
Clothianidin*	mg/kg	SOLID	-	-																					
Copper	mg/kg	SOLID	68000	44000	10.2	39.3	35	22	45.1	34.7	24.9	73.9	44.36	26		19.2	28.6	15.6	95.3	46.2	30.2	229.2	91.2	110.6	54.7
Coronene	mg/kg	SOLID	-	-			0.5			<0.4000										<0.3000					
Coumaphos	mg/kg	SOLID	-	-																					
Cresols*	mg/kg	SOLID	-	-																					
Cyanazine	mg/kg	SOLID	-	-																					
Cyanide	mg/kg	SOLID	-	-																					
Cyanide Free	mg/kg	SOLID	-	-																					
Cyanide Free as CN	mg/kg	SOLID	-	-	<0.5000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.0500	<0.5400	<0.6000		<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000
Cyazofamid*	mg/kg	SOLID	-	-																					
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																					
Cycluron*	mg/kg	SOLID	-	-																					
Cyflufenamid*	mg/kg	SOLID	-	-																					
Cyfluthrin	mg/kg	SOLID	-	-																					
Cymoxanil*	mg/kg	SOLID	-	-																					
Cypermethrin	mg/kg	SOLID	-	-																					
Cyphenothrin*	mg/kg	SOLID	-	-																					
Cyproconazole*	mg/kg	SOLID	-	-																					
Cyprodinil*	mg/kg	SOLID	-	-																					
Cyromazine*	mg/kg	SOLID	-	-																					
Cythioate*	mg/kg	SOLID	-	-																					
DEET*	mg/kg	SOLID	-	-																					
Deltamethrin	mg/kg	SOLID	-	-																					
Demeton	mg/kg	SOLID	-	-																					
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																					
Desmedipham*	mg/kg	SOLID	-	-																					
Desmetryn*	mg/kg	SOLID	-	-																					
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																					
Diafenthiuron*	mg/kg	SOLID	-	-																					
Dialifos*	mg/kg	SOLID	-	-																					
Diazinon	mg/kg	SOLID	-	-																					
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.0900	0.1	1.1	<0.0900	0.19	0.16	<0.1000	<0.0900	<0.0900	<0.0900		<0.0900		<0.0900	0.1	<0.0900	<0.1000	0.1	<0.0900	0.2	0.11
Dibenzofuran	mg/kg	SOLID	-	-			4.2			<0.1000										<0.1000					
Dibromochloromethane	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
Dibromofluoromethane	%	SOLID	-	-																					
Dibromomethane	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
Dichlobenil	mg/kg	SOLID	-	-																					
Dichlofenthion*	mg/kg	SOLID	-	-																					
Dichlorodifluoromethane	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
Dichloromethane	mg/kg	SOLID	260	1500																					
Dichlorvos	mg/kg	SOLID	140	26																					
Diclobutrazol*	mg/kg	SOLID	-	-																					
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																					
Dicrotophos*	mg/kg	SOLID	-	-																					
Dieldrin	mg/kg	SOLID	170	30																					
Diethofencarb*	mg/kg	SOLID	-	-																					
Diethylphthalate	mg/kg	SOLID	140000	89000			<0.1000			<0.1000										<0.1000					
Difenoconazole*	mg/kg	SOLID	-	-																					
Diflubenzuron*	mg/kg	SOLID	-	-																					
Diflufenican*	mg/kg	SOLID	-	-																					
Dimefuron*	mg/kg	SOLID	-	-																					
Dimethenamid*	mg/kg	SOLID	-	-																					
Dimethoate	mg/kg	SOLID	-	-																					
Dimethomorph*	mg/kg	SOLID	-	-																					
Dimethylphthalate	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
Dimoxystrobin*	mg/kg	SOLID	-	-																					
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600			<0.1000			<0.1000										<0.1000					
Diniconazole*	mg/kg	SOLID	-	-																					
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000			<0.2000			<0.2000										<0.2000					
Dinotefuran*	mg/kg	SOLID	-	-																					
Dinoterb*	mg/kg	SOLID	-	-																					
Dioxabenzofos*	mg/kg	SOLID	-	-																					
Dioxacarb*	mg/kg	SOLID	-	-																					
Diphenamid	mg/kg	SOLID	-	-																					
Diphenyl ether	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
Diphenylamine	mg/kg	SOLID	-	-																					
Disulfoton	mg/kg	SOLID	-	-																					
Disulfoton sulphone*	mg/kg	SOLID	-	-																					
Ditalimfos*	mg/kg	SOLID	-	-																					
Diuron	mg/kg	SOLID	-	-																					
DMSA*	mg/kg	SOLID	-	-																					
DMST*	mg/kg	SOLID	-	-																					
Dodemorph*	mg/kg	SOLID	-	-																					
Edifenphos*	mg/kg	SOLID	-	-																					
Elemental Sulphur	%	SOLID	-	-																					
Emamectin*	mg/kg	SOLID	-	-																					
Endosulfan I	mg/kg	SOLID	5600	2400																					

Max of Normalised Results																									
					ML164-CR011	ML164-CR011	ML164-CR013	ML164-CR013	ML164-CR013	ML164-CR029	ML164-CR029	ML164-CR029	ML164-CR030	ML164-CR032	ML164-CR032	ML164-CR044	ML164-CR044	ML164-CR044	ML164-CR044	ML164-CR045	ML164-CR045	ML164-CR045	ML164-CR046a	ML164-CR046a	ML164-CR046a
					Watten House West Viaduct	Watten House West Viaduct	Watton House Embankment	Watton House Embankment	Watton House Embankment	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct
					0.75	1.1	0.2	1	4	0.35	3.2	4	0.9	0.5	1.2	0.5	1	2	2.5	0.8	1.2	3	0.8	1.2	2.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	RTD1	MGR	MGR	ALV	MGR	MGR	TILMP	RTD1	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	MGR
Beryllium	mg/kg	SOLID	12	63	0.466	0.386	1.91	0.809	1.8	0.54	0.6085	0.951	0.324	0.839	0.456	0.973		1.69		0.887	1.06	0.533	0.66	0.911	0.546
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																					
Bifenazate*	mg/kg	SOLID	-	-																					
Bifenox*	mg/kg	SOLID	-	-																					
Bifenthrin*	mg/kg	SOLID	-	-																					
Binapacryl*	mg/kg	SOLID	-	-																					
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-																					
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-																					
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-																					
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000																					
Bitertanol*	mg/kg	SOLID	-	-																					
Boron	mg/kg	SOLID	240000	46000	0.9	0.6	1.6	1.3	1.8	1	1	0.7	0.5	0.9	0.6	1.2		1.8		1	1.1	0.9	2	1.7	1.4
Boron (Water Soluble)*	mg/kg	SOLID	-	-																					
Boron*	mg/kg	SOLID	-	-																					
Boscalid*	mg/kg	SOLID	-	-																					
Bromacil	mg/kg	SOLID	-	-																					
Bromobenzene	mg/kg	SOLID	92	1800																					
Bromochloromethane	mg/kg	SOLID	-	-																					
Bromodichloromethane	mg/kg	SOLID	2	56																					
Bromomethane	mg/kg	SOLID	-	-																					
Bromophos*	mg/kg	SOLID	-	-																					
Bromophos-Ethyl*	mg/kg	SOLID	-	-																					
Bromopropylate*	mg/kg	SOLID	-	-																					
Bupirimate*	mg/kg	SOLID	-	-																					
Buprofezine*	mg/kg	SOLID	-	-																					
Butachlor*	mg/kg	SOLID	-	-																					
Butoxycarboxim*	mg/kg	SOLID	-	-																					
Butralin*	mg/kg	SOLID	-	-																					
Butylbenzylphthalate	mg/kg	SOLID	940000	250000																					
Cadmium	mg/kg	SOLID	410	880	<0.2000	<0.2000	1.1	<0.2100	1.5	0.7	<0.2060	<0.2000	<0.2000	0.46	<0.2000	0.39		0.48		0.23	<0.2000	<0.2000	0.39	<0.2100	<0.2000
Cadusafos*	mg/kg	SOLID	-	-																					
Captan	mg/kg	SOLID	-	-																					
Carbaryl	mg/kg	SOLID	-	-																					
Carbazole	mg/kg	SOLID	-	-																					
Carbendazim	mg/kg	SOLID	-	-																					
Carbetamide	mg/kg	SOLID	-	-																					
Carbofuran	mg/kg	SOLID	-	-																					
Carbon Disulphide	mg/kg	SOLID	11	1300																					
Carbophenothion	mg/kg	SOLID	-	-																					
Carboxin	mg/kg	SOLID	-	-																					
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																					
Carpropamid*	mg/kg	SOLID	-	-																					
Chinomethionat*	mg/kg	SOLID	-	-																					
chlorantraniliprole*	mg/kg	SOLID	-	-																					
Chlorbenzilate*	mg/kg	SOLID	-	-																					
Chlorbromuron*	mg/kg	SOLID	-	-																					
Chlorbufam*	mg/kg	SOLID	-	-																					
Chlordane	mg/kg	SOLID	-	-																					
Chlordimeform	mg/kg	SOLID	-	-																					
Chlorethoxyfos*	mg/kg	SOLID	-	-																					
Chlorfenapyr*	mg/kg	SOLID	-	-																					
Chlorfenson*	mg/kg	SOLID	-	-																					
Chlorfenvinphos	mg/kg	SOLID	-	-																					
Chlorfluazuron*	mg/kg	SOLID	-	-																					
Chloridazon*	mg/kg	SOLID	-	-																					
Chlormephos	mg/kg	SOLID	-	-																					
Chlorobenzene	mg/kg	SOLID	56	1300																					
Chloroethane	mg/kg	SOLID	900	154000																					
Chloroethene	mg/kg	SOLID	0.059	4.8																					
Chloroform	mg/kg	SOLID	99	2600																					
Chloromethane	mg/kg	SOLID	1	140																					
Chloropropham	mg/kg	SOLID	-	-																					
Chloropropylate*	mg/kg	SOLID	-	-																					
Chlorothalonil	mg/kg	SOLID	-	-																					
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																					
Chlorpyriphos	mg/kg	SOLID	-	-																					
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																					
Chlorthion*	mg/kg	SOLID	-	-																					
Chlorthiophos*	mg/kg	SOLID	-	-																					
Chlortoluron	mg/kg	SOLID	-	-																					
Chlozolinate*	mg/kg	SOLID	-	-																					
Chromium	mg/kg	SOLID	-	-	12.1	11.6	62.1	21.8	48.9	23.2	21.69	36.7	10.8	15.6	17	25.8		48.6		29.6	34.5	18.6	56.2	28	22
Chromium - Hexavalent	mg/kg	SOLID	49	250	<0.1000	0.2	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000		<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000
Chromium (III) Oxide	mg/kg	SOLID	-	-	<12.1000	11.4	<62.1000	<21.8000	<48.9000	<23.2000	<21.7000	<36.7000	<10.8000	<15.6000	<17.4000	<25.8000		<48.6000		<29.6000	<34.5000	<18.6000	<56.2000	<28.0000	<22.0000
Chrysene	mg/kg	SOLID	350	93	0.13	<0.0900	1.05	<0.1000	0.13	4.13	<0.1000	<0.1000	<0.0800	1.6	<0.0900	0.19		<0.1100		<0.0900	<0.0900	<0.0900	700	0.4	0.41
Chrysene-d12*	%	SOLID	-	-																					
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																					
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690																					
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-																					
Clodinafop propargy*	mg/kg	SOLID	-	-																					
Clofentezine*	mg/kg	SOLID	-	-																					
Clomazone*	mg/kg	SOLID	-	-																					
Cloquintocet mexyl*	mg/kg	SOLID	-	-																					
Clothianidin*	mg/kg	SOLID	-	-																					
Copper	mg/kg	SOLID	68000	44000	33.5	9.9	137.9	41.7	196.2	38.1	24.36	34.5	5.1	40.7	14	77.2		74		38	15	14.7	93.9	25.9	21.7
Coronene	mg/kg	SOLID	-	-																					
Coumaphos	mg/kg	SOLID	-	-																					
Cresols*	mg/kg	SOLID	-	-																					
Cyanazine	mg/kg	SOLID	-	-																					
Cyanide	mg/kg	SOLID	-	-																					
Cyanide Free	mg/kg	SOLID	-	-																					
Cyanide Free as CN	mg/kg	SOLID	-	-	<0.6000	<0.6000	<0.6000	<0.6000	<0.7000	<0.6000	<0.6000	<0.6000	<0.5000	<0.6000	<0.6000	<0.6000		<0.0700		<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000
Cyazofamid*	mg/kg	SOLID	-	-																					
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																					
Cycluron*	mg/kg	SOLID	-	-																					
Cyflufenamid*	mg/kg	SOLID	-	-																					
Cyfluthrin	mg/kg	SOLID	-	-																					
Cymoxanil*	mg/kg	SOLID	-	-																					
Cypermethrin	mg/kg	SOLID	-	-																					
Cyphenothrin*	mg/kg	SOLID	-	-																					
Cyproconazole*	mg/kg	SOLID	-	-																					
Cyprodinil*	mg/kg	SOLID	-	-																					
Cyromazine*	mg/kg	SOLID	-	-																					
Cythioate*	mg/kg	SOLID	-	-																					
DEET*	mg/kg	SOLID	-	-																					
Deltamethrin	mg/kg	SOLID	-	-																					
Demeton	mg/kg	SOLID	-	-																					
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																					
Desmedipham*	mg/kg	SOLID	-	-																					
Desmetryn*	mg/kg	SOLID	-	-																					
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																					
Diafenthiuron*	mg/kg	SOLID	-	-																					
Dialifos*	mg/kg	SOLID	-	-																					
Diazinon	mg/kg	SOLID	-	-																					
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.0900	<0.0900	0.19	<0.1000	<0.1100	0.5	<0.1000	<0.1000	<0.0800	0.3	<0.0900	<0.0900		<0.1100		<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000
Dibenzofuran	mg/kg	SOLID	-	-																					
Dibromochloromethane	mg/kg	SOLID	-	-																					
Dibromofluoromethane	%	SOLID	-	-																					
Dibromomethane	mg/kg	SOLID	-	-																					
Dichlobenil	mg/kg	SOLID	-	-																					
Dichlofenthion*	mg/kg	SOLID	-	-																					
Dichlorodifluoromethane	mg/kg	SOLID	-	-																					
Dichloromethane	mg/kg	SOLID	260	1500																					
Dichlorvos	mg/kg	SOLID	140	26																					
Diclobutrazol*	mg/kg	SOLID	-	-																					
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																					
Dicrotophos*	mg/kg	SOLID	-	-																					
Dieldrin	mg/kg	SOLID	170	30																					
Diethofencarb*	mg/kg	SOLID	-	-																					
Diethylphthalate	mg/kg	SOLID	140000	89000																					
Difenoconazole*	mg/kg	SOLID	-	-																					
Diflubenzuron*	mg/kg	SOLID	-	-																					
Diflufenican*	mg/kg	SOLID	-	-																					
Dimefuron*	mg/kg	SOLID	-	-																					
Dimethenamid*	mg/kg	SOLID	-	-																					
Dimethoate	mg/kg	SOLID	-	-																					
Dimethomorph*	mg/kg	SOLID	-	-																					
Dimethylphthalate	mg/kg	SOLID	-	-																					
Dimoxystrobin*	mg/kg	SOLID	-	-																					
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600																					
Diniconazole*	mg/kg	SOLID	-	-																					
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000																					
Dinotefuran*	mg/kg	SOLID	-	-																					
Dinoterb*	mg/kg	SOLID	-	-																					
Dioxabenzofos*	mg/kg	SOLID	-	-																					
Dioxacarb*	mg/kg	SOLID	-	-																					
Diphenamid	mg/kg	SOLID	-	-																					
Diphenyl ether	mg/kg	SOLID	-	-																					
Diphenylamine	mg/kg	SOLID	-	-																					
Disulfoton	mg/kg	SOLID	-	-																					
Disulfoton sulphone*	mg/kg	SOLID	-	-																					
Ditalimfos*	mg/kg	SOLID	-	-																					
Diuron	mg/kg	SOLID	-	-																					
DMSA*	mg/kg	SOLID	-	-																					
DMST*	mg/kg	SOLID	-	-																					
Dodemorph*	mg/kg	SOLID	-	-																					
Edifenphos*	mg/kg	SOLID	-	-																					
Elemental Sulphur	%	SOLID	-	-																					
Emamectin*	mg/kg	SOLID	-	-																					
Endosulfan I	mg/kg	SOLID	5600	2400																					

Max of Normalised Results																						
					ML164-CR404	ML164-CR404	ML164-CR404	ML164-TP011	ML164-TP011	ML164-TP015	ML164-TP015	ML164-TP015	ML164-TP015	NC120-CR401	NC120-CR401	NC137-CT401	NC137-CT401	NC145-CR401	NC145-CR401	ND000-CR001	ND000-CR001	ND000-CR020
					Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)
					0.05	0.5	7.2	0.7	2.5	0.05	0.35	1.1	1.7	0.3	1	0.5	1	0.1	0.5	0.5	2	0.4
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	RTD1	MGR	RTD1	GLLD	GLLD	RTD2	RTD2	RTD2	RTD2	TOP	GFDUD	MGR	MGR	MGR
Beryllium	mg/kg	SOLID	12	63	2	<2.0000	<2.0000	3.58	1.81	0.412	0.253	0.344	0.65	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000	0.683	0.949	1.11
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																		
Bifenazate*	mg/kg	SOLID	-	-																		
Bifenox*	mg/kg	SOLID	-	-																		
Bifenthrin*	mg/kg	SOLID	-	-																		
Binapacryl*	mg/kg	SOLID	-	-																		
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-																		
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-																		
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-																		
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000																		
Bitertanol*	mg/kg	SOLID	-	-																		
Boron	mg/kg	SOLID	240000	46000	<1.0000	<1.0000	<1.0000	1.8	1.2	<0.5000	<0.5000	<0.5000	<0.5000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	0.7	0.8	1
Boron (Water Soluble)*	mg/kg	SOLID	-	-																		
Boron*	mg/kg	SOLID	-	-																		
Boscalid*	mg/kg	SOLID	-	-																		
Bromacil	mg/kg	SOLID	-	-																		
Bromobenzene	mg/kg	SOLID	92	1800																		
Bromochloromethane	mg/kg	SOLID	-	-																		
Bromodichloromethane	mg/kg	SOLID	2	56																		
Bromomethane	mg/kg	SOLID	-	-																		
Bromophos*	mg/kg	SOLID	-	-																		
Bromophos-Ethyl*	mg/kg	SOLID	-	-																		
Bromopropylate*	mg/kg	SOLID	-	-																		
Bupirimate*	mg/kg	SOLID	-	-																		
Buprofezine*	mg/kg	SOLID	-	-																		
Butachlor*	mg/kg	SOLID	-	-																		
Butoxycarboxim*	mg/kg	SOLID	-	-																		
Butralin*	mg/kg	SOLID	-	-																		
Butylbenzylphthalate	mg/kg	SOLID	940000	250000																		
Cadmium	mg/kg	SOLID	410	880	1	1	<1.0000	24.31	0.77	0.2	<0.2000	<0.2000	<0.2000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<0.2000	0.25	0.98
Cadusafos*	mg/kg	SOLID	-	-																		
Captan	mg/kg	SOLID	-	-																		
Carbaryl	mg/kg	SOLID	-	-																		
Carbazole	mg/kg	SOLID	-	-																		
Carbendazim	mg/kg	SOLID	-	-																		
Carbetamide	mg/kg	SOLID	-	-																		
Carbofuran	mg/kg	SOLID	-	-																		
Carbon Disulphide	mg/kg	SOLID	11	1300																		
Carbophenothion	mg/kg	SOLID	-	-																		
Carboxin	mg/kg	SOLID	-	-																		
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																		
Carpropamid*	mg/kg	SOLID	-	-																		
Chinomethionat*	mg/kg	SOLID	-	-																		
chlorantraniliprole*	mg/kg	SOLID	-	-																		
Chlorbenzilate*	mg/kg	SOLID	-	-																		
Chlorbromuron*	mg/kg	SOLID	-	-																		
Chlorbufam*	mg/kg	SOLID	-	-																		
Chlordane	mg/kg	SOLID	-	-																		
Chlordimeform	mg/kg	SOLID	-	-																		
Chlorethoxyfos*	mg/kg	SOLID	-	-																		
Chlorfenapyr*	mg/kg	SOLID	-	-																		
Chlorfenson*	mg/kg	SOLID	-	-																		
Chlorfenvinphos	mg/kg	SOLID	-	-																		
Chlorfluazuron*	mg/kg	SOLID	-	-																		
Chloridazon*	mg/kg	SOLID	-	-																		
Chlormephos	mg/kg	SOLID	-	-																		
Chlorobenzene	mg/kg	SOLID	56	1300																		
Chloroethane	mg/kg	SOLID	900	154000																		
Chloroethene	mg/kg	SOLID	0.059	4.8																		
Chloroform	mg/kg	SOLID	99	2600																		
Chloromethane	mg/kg	SOLID	1	140																		
Chloropropham	mg/kg	SOLID	-	-																		
Chloropropylate*	mg/kg	SOLID	-	-																		
Chlorothalonil	mg/kg	SOLID	-	-																		
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																		
Chlorpyriphos	mg/kg	SOLID	-	-																		
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																		
Chlorthion*	mg/kg	SOLID	-	-																		
Chlorthiophos*	mg/kg	SOLID	-	-																		
Chlortoluron	mg/kg	SOLID	-	-																		
Chlozolinate*	mg/kg	SOLID	-	-																		
Chromium	mg/kg	SOLID	-	-	68	43	37	153.9	64.1	8.6	6.8	9.8	20.4	17	18	9	10	16	16	21.5	27.1	24.1
Chromium - Hexavalent	mg/kg	SOLID	49	250	<1.0000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	0.2	<0.1000	<0.1000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000
Chromium (III) Oxide	mg/kg	SOLID	-	-				154	<64.1000	<8.6000	6.6	<9.8000	<20.4000							<21.5000	<27.1000	<24.1000
Chrysene	mg/kg	SOLID	350	93	1.6	0.2	<0.1000	0.31	<0.1000	28.5	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	0.81	0.22
Chrysene-d12*	%	SOLID	-	-																		
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																		
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690																		
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-																		
Clodinafop propargy*	mg/kg	SOLID	-	-																		
Clofentezine*	mg/kg	SOLID	-	-																		
Clomazone*	mg/kg	SOLID	-	-																		
Cloquintocet mexyl*	mg/kg	SOLID	-	-																		
Clothianidin*	mg/kg	SOLID	-	-																		
Copper	mg/kg	SOLID	68000	44000	150	130	20	458.2	33	21	9	10.5	18	31	22	15	7	36	21	28.6	55.3	98.2
Coronene	mg/kg	SOLID	-	-																		
Coumaphos	mg/kg	SOLID	-	-																		
Cresols*	mg/kg	SOLID	-	-																		
Cyanazine	mg/kg	SOLID	-	-																		
Cyanide	mg/kg	SOLID	-	-	<1.0000	<1.0000	<1.0000							<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000			
Cyanide Free	mg/kg	SOLID	-	-	<1.0000	<1.0000	<1.0000							<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000			
Cyanide Free as CN	mg/kg	SOLID	-	-				<0.6000	<0.6000	<0.6000	<0.5000	<0.6000	<0.6000							<0.5000	<0.6000	<0.6000
Cyazofamid*	mg/kg	SOLID	-	-																		
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																		
Cycluron*	mg/kg	SOLID	-	-																		
Cyflufenamid*	mg/kg	SOLID	-	-																		
Cyfluthrin	mg/kg	SOLID	-	-																		
Cymoxanil*	mg/kg	SOLID	-	-																		
Cypermethrin	mg/kg	SOLID	-	-																		
Cyphenothrin*	mg/kg	SOLID	-	-																		
Cyproconazole*	mg/kg	SOLID	-	-																		
Cyprodinil*	mg/kg	SOLID	-	-																		
Cyromazine*	mg/kg	SOLID	-	-																		
Cythioate*	mg/kg	SOLID	-	-																		
DEET*	mg/kg	SOLID	-	-																		
Deltamethrin	mg/kg	SOLID	-	-																		
Demeton	mg/kg	SOLID	-	-																		
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																		
Desmedipham*	mg/kg	SOLID	-	-																		
Desmetryn*	mg/kg	SOLID	-	-																		
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																		
Diafenthiuron*	mg/kg	SOLID	-	-																		
Dialifos*	mg/kg	SOLID	-	-																		
Diazinon	mg/kg	SOLID	-	-																		
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	0.5	<0.1000	<0.1000	<0.1000	<0.1000	4	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	0.14	<0.1000
Dibenzofuran	mg/kg	SOLID	-	-																		
Dibromochloromethane	mg/kg	SOLID	-	-																		
Dibromofluoromethane	%	SOLID	-	-																		
Dibromomethane	mg/kg	SOLID	-	-																		
Dichlobenil	mg/kg	SOLID	-	-																		
Dichlofenthion*	mg/kg	SOLID	-	-																		
Dichlorodifluoromethane	mg/kg	SOLID	-	-																		
Dichloromethane	mg/kg	SOLID	260	1500																		
Dichlorvos	mg/kg	SOLID	140	26																		
Diclobutrazol*	mg/kg	SOLID	-	-																		
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																		
Dicrotophos*	mg/kg	SOLID	-	-																		
Dieldrin	mg/kg	SOLID	170	30																		
Diethofencarb*	mg/kg	SOLID	-	-																		
Diethylphthalate	mg/kg	SOLID	140000	89000																		
Difenoconazole*	mg/kg	SOLID	-	-																		
Diflubenzuron*	mg/kg	SOLID	-	-																		
Diflufenican*	mg/kg	SOLID	-	-																		
Dimefuron*	mg/kg	SOLID	-	-																		
Dimethenamid*	mg/kg	SOLID	-	-																		
Dimethoate	mg/kg	SOLID	-	-																		
Dimethomorph*	mg/kg	SOLID	-	-																		
Dimethylphthalate	mg/kg	SOLID	-	-																		
Dimoxystrobin*	mg/kg	SOLID	-	-																		
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600																		
Diniconazole*	mg/kg	SOLID	-	-																		
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000																		
Dinotefuran*	mg/kg	SOLID	-	-																		
Dinoterb*	mg/kg	SOLID	-	-																		
Dioxabenzofos*	mg/kg	SOLID	-	-																		
Dioxacarb*	mg/kg	SOLID	-	-																		
Diphenamid	mg/kg	SOLID	-	-																		
Diphenyl ether	mg/kg	SOLID	-	-																		
Diphenylamine	mg/kg	SOLID	-	-																		
Disulfoton	mg/kg	SOLID	-	-																		
Disulfoton sulphone*	mg/kg	SOLID	-	-																		
Ditalimfos*	mg/kg	SOLID	-	-																		
Diuron	mg/kg	SOLID	-	-																		
DMSA*	mg/kg	SOLID	-	-																		
DMST*	mg/kg	SOLID	-	-																		
Dodemorph*	mg/kg	SOLID	-	-																		
Edifenphos*	mg/kg	SOLID	-	-																		
Elemental Sulphur	%	SOLID	-	-																		
Emamectin*	mg/kg	SOLID	-	-																		
Endosulfan I	mg/kg	SOLID	5600	2400																		

Max of Normalised Results																		
					ND000-CR020	ND000-CR020	ND000-CR020	ND000-TP035	ND000-TP035	ND001-CP002	ND001-CP002	ND001-CP043	ND001-CP043	ND001-CP049	ND001-CP049	ND001-CR001	ND001-CR002
					Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Chattle Hill Box Structure	Chattle Hill Box Structure	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton No. 3 Viaduct
					1	4	5	0.4	0.8	0.5	1	0.5	2	0.4	0.6	0.5	0.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	RTD1	MGR	ALV	RTD1	RTD1	MGR	MGR	MGR	MGR
Beryllium	mg/kg	SOLID	12	63	1.08	0.5042	0.6	0.61	0.42	0.646	0.45	0.3	0.26	0.929	5.6	1	0.549
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15													
Bifenazate*	mg/kg	SOLID	-	-													
Bifenox*	mg/kg	SOLID	-	-													
Bifenthrin*	mg/kg	SOLID	-	-													
Binapacryl*	mg/kg	SOLID	-	-													
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-													
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-													
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-													
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000													
Bitertanol*	mg/kg	SOLID	-	-													
Boron	mg/kg	SOLID	240000	46000	1.4	0.93	1.3	<0.5000	0.6	0.8	<0.5000	1	0.7	0.9	1.8	1.7	0.7
Boron (Water Soluble)*	mg/kg	SOLID	-	-													
Boron*	mg/kg	SOLID	-	-													
Boscalid*	mg/kg	SOLID	-	-													
Bromacil	mg/kg	SOLID	-	-													
Bromobenzene	mg/kg	SOLID	92	1800													<0.0010
Bromochloromethane	mg/kg	SOLID	-	-													<0.0010
Bromodichloromethane	mg/kg	SOLID	2	56													<0.0010
Bromomethane	mg/kg	SOLID	-	-													<0.0010
Bromophos*	mg/kg	SOLID	-	-													
Bromophos-Ethyl*	mg/kg	SOLID	-	-													
Bromopropylate*	mg/kg	SOLID	-	-													
Bupirimate*	mg/kg	SOLID	-	-													
Buprofezine*	mg/kg	SOLID	-	-													
Butachlor*	mg/kg	SOLID	-	-													
Butoxycarboxim*	mg/kg	SOLID	-	-													
Butralin*	mg/kg	SOLID	-	-													
Butylbenzylphthalate	mg/kg	SOLID	940000	250000													
Cadmium	mg/kg	SOLID	410	880	0.8	0.444	0.45	0.24	0.32	0.57	0.38	<0.2000	<0.2000	0.52	0.93	0.33	<0.2000
Cadusafos*	mg/kg	SOLID	-	-													
Captan	mg/kg	SOLID	-	-													
Carbaryl	mg/kg	SOLID	-	-													
Carbazole	mg/kg	SOLID	-	-													
Carbendazim	mg/kg	SOLID	-	-													
Carbetamide	mg/kg	SOLID	-	-													
Carbofuran	mg/kg	SOLID	-	-													
Carbon Disulphide	mg/kg	SOLID	11	1300													
Carbophenothion	mg/kg	SOLID	-	-													
Carboxin	mg/kg	SOLID	-	-													
Carfentrazone Ethyl*	mg/kg	SOLID	-	-													
Carpropamid*	mg/kg	SOLID	-	-													
Chinomethionat*	mg/kg	SOLID	-	-													
chlorantraniliprole*	mg/kg	SOLID	-	-													
Chlorbenzilate*	mg/kg	SOLID	-	-													
Chlorbromuron*	mg/kg	SOLID	-	-													
Chlorbufam*	mg/kg	SOLID	-	-													
Chlordane	mg/kg	SOLID	-	-													
Chlordimeform	mg/kg	SOLID	-	-													
Chlorethoxyfos*	mg/kg	SOLID	-	-													
Chlorfenapyr*	mg/kg	SOLID	-	-													
Chlorfenson*	mg/kg	SOLID	-	-													
Chlorfenvinphos	mg/kg	SOLID	-	-													
Chlorfluazuron*	mg/kg	SOLID	-	-													
Chloridazon*	mg/kg	SOLID	-	-													
Chlormephos	mg/kg	SOLID	-	-													
Chlorobenzene	mg/kg	SOLID	56	1300													<0.0010
Chloroethane	mg/kg	SOLID	900	154000													<0.0020
Chloroethene	mg/kg	SOLID	0.059	4.8													<0.0010
Chloroform	mg/kg	SOLID	99	2600													<0.0010
Chloromethane	mg/kg	SOLID	1	140													<0.0030
Chloropropham	mg/kg	SOLID	-	-													
Chloropropylate*	mg/kg	SOLID	-	-													
Chlorothalonil	mg/kg	SOLID	-	-													
Chlorpyrifos methyl*	mg/kg	SOLID	-	-													
Chlorpyriphos	mg/kg	SOLID	-	-													
Chlorthal Dimethyl*	mg/kg	SOLID	-	-													
Chlorthion*	mg/kg	SOLID	-	-													
Chlorthiophos*	mg/kg	SOLID	-	-													
Chlortoluron	mg/kg	SOLID	-	-													
Chlozolinate*	mg/kg	SOLID	-	-													
Chromium	mg/kg	SOLID	-	-	12	15.81	15.2	12.2	11.4	11.8	10	11.1	9.2	25	68.2	14.2	15.1
Chromium - Hexavalent	mg/kg	SOLID	49	250	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	0.3	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000
Chromium (III) Oxide	mg/kg	SOLID	-	-	<12.0000	<15.8000	<15.2000	<12.2000	<11.4000	<11.8000	<10.0000	10.8	<9.2000	<24.8000	<68.2000	<14.2000	<15.1000
Chrysene	mg/kg	SOLID	350	93	720	<0.0900	<0.0900	0.15	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	1.39	4.12	0.16	<0.0900
Chrysene-d12*	%	SOLID	-	-													
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-													
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690													<0.0060
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-													<0.0010
Clodinafop propargy*	mg/kg	SOLID	-	-													
Clofentezine*	mg/kg	SOLID	-	-													
Clomazone*	mg/kg	SOLID	-	-													
Cloquintocet mexyl*	mg/kg	SOLID	-	-													
Clothianidin*	mg/kg	SOLID	-	-													
Copper	mg/kg	SOLID	68000	44000	102.4	16.12	19.6	55.3	58.8	33.2	10.4	6.8	10.4	67.3	100.9	31.6	24.7
Coronene	mg/kg	SOLID	-	-													
Coumaphos	mg/kg	SOLID	-	-													
Cresols*	mg/kg	SOLID	-	-													
Cyanazine	mg/kg	SOLID	-	-													
Cyanide	mg/kg	SOLID	-	-													
Cyanide Free	mg/kg	SOLID	-	-													
Cyanide Free as CN	mg/kg	SOLID	-	-	<0.6000	<0.5600	<0.6000	<0.5000	<0.5000	<0.6000	<0.6000	<0.6000	<0.5000	<0.5000	<0.5000	0.6	<0.6000
Cyazofamid*	mg/kg	SOLID	-	-													
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-													
Cycluron*	mg/kg	SOLID	-	-													
Cyflufenamid*	mg/kg	SOLID	-	-													
Cyfluthrin	mg/kg	SOLID	-	-													
Cymoxanil*	mg/kg	SOLID	-	-													
Cypermethrin	mg/kg	SOLID	-	-													
Cyphenothrin*	mg/kg	SOLID	-	-													
Cyproconazole*	mg/kg	SOLID	-	-													
Cyprodinil*	mg/kg	SOLID	-	-													
Cyromazine*	mg/kg	SOLID	-	-													
Cythioate*	mg/kg	SOLID	-	-													
DEET*	mg/kg	SOLID	-	-													
Deltamethrin	mg/kg	SOLID	-	-													
Demeton	mg/kg	SOLID	-	-													
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-													
Desmedipham*	mg/kg	SOLID	-	-													
Desmetryn*	mg/kg	SOLID	-	-													
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-													
Diafenthiuron*	mg/kg	SOLID	-	-													
Dialifos*	mg/kg	SOLID	-	-													
Diazinon	mg/kg	SOLID	-	-													
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	0.1	<0.0900	<0.0900	<0.0800	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.54	0.64	<0.0900	<0.0900
Dibenzofuran	mg/kg	SOLID	-	-													
Dibromochloromethane	mg/kg	SOLID	-	-													<0.0010
Dibromofluoromethane	%	SOLID	-	-													
Dibromomethane	mg/kg	SOLID	-	-													<0.0010
Dichlobenil	mg/kg	SOLID	-	-													
Dichlofenthion*	mg/kg	SOLID	-	-													
Dichlorodifluoromethane	mg/kg	SOLID	-	-													<0.0010
Dichloromethane	mg/kg	SOLID	260	1500													
Dichlorvos	mg/kg	SOLID	140	26													
Diclobutrazol*	mg/kg	SOLID	-	-													
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-													
Dicrotophos*	mg/kg	SOLID	-	-													
Dieldrin	mg/kg	SOLID	170	30													
Diethofencarb*	mg/kg	SOLID	-	-													
Diethylphthalate	mg/kg	SOLID	140000	89000													
Difenoconazole*	mg/kg	SOLID	-	-													
Diflubenzuron*	mg/kg	SOLID	-	-													
Diflufenican*	mg/kg	SOLID	-	-													
Dimefuron*	mg/kg	SOLID	-	-													
Dimethenamid*	mg/kg	SOLID	-	-													
Dimethoate	mg/kg	SOLID	-	-													
Dimethomorph*	mg/kg	SOLID	-	-													
Dimethylphthalate	mg/kg	SOLID	-	-													
Dimoxystrobin*	mg/kg	SOLID	-	-													
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600													
Diniconazole*	mg/kg	SOLID	-	-													
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000													
Dinotefuran*	mg/kg	SOLID	-	-													
Dinoterb*	mg/kg	SOLID	-	-													
Dioxabenzofos*	mg/kg	SOLID	-	-													
Dioxacarb*	mg/kg	SOLID	-	-													
Diphenamid	mg/kg	SOLID	-	-													
Diphenyl ether	mg/kg	SOLID	-	-													
Diphenylamine	mg/kg	SOLID	-	-													
Disulfoton	mg/kg	SOLID	-	-													
Disulfoton sulphone*	mg/kg	SOLID	-	-													
Ditalimfos*	mg/kg	SOLID	-	-													
Diuron	mg/kg	SOLID	-	-													
DMSA*	mg/kg	SOLID	-	-													
DMST*	mg/kg	SOLID	-	-													
Dodemorph*	mg/kg	SOLID	-	-													
Edifenphos*	mg/kg	SOLID	-	-													
Elemental Sulphur	%	SOLID	-	-													
Emamectin*	mg/kg	SOLID	-	-													
Endosulfan I	mg/kg	SOLID	5600	2400													

Max of Normalised Results																									
					ND001-CR002	ND001-CR005	ND001-CR011	ND001-CR011	ND001-CR013	ND001-CR013	ND001-CR014	ND001-CR014	ND001-CR014	ND001-CR017	ND001-CR017	ND001-CR022	ND001-CR031	ND001-CR040	ND001-CR041	ND001-CR042	ND001-CR043	ND001-TP002	ND001-TP002	ND001-WS002	ND001-WS003
					Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct
					1.5	0.6	0.05	1.2	0.5	2	0.05	1.1	1.7	0.7	1.2	0.1	0.05	1.4	0.2	0.5	1	0.05	0.3	0.1	0.1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	TOP	RTD1	MGR	GFDUD	MGR	MGR	RTD1	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	MGR	MGR
Beryllium	mg/kg	SOLID	12	63	0.397		0.381	0.282	0.581	0.304	0.388	0.499	0.346	0.316	0.657	0.612	0.516	0.305	0.329	0.623	0.262	0.82	0.457	0.491	0.382
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15																					
Bifenazate*	mg/kg	SOLID	-	-																					
Bifenox*	mg/kg	SOLID	-	-																					
Bifenthrin*	mg/kg	SOLID	-	-																					
Binapacryl*	mg/kg	SOLID	-	-																					
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-																					
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-																					
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-																					
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000																					
Bitertanol*	mg/kg	SOLID	-	-																					
Boron	mg/kg	SOLID	240000	46000	0.5		1	0.5	1.3	<0.5000	0.6	0.7	<0.5000	<0.5000	<0.5000	1.2	<0.5000	<0.5000	<0.5000	1.6	0.9	1.5	1.1	1.1	0.6
Boron (Water Soluble)*	mg/kg	SOLID	-	-																					
Boron*	mg/kg	SOLID	-	-																					
Boscalid*	mg/kg	SOLID	-	-																					
Bromacil	mg/kg	SOLID	-	-																					
Bromobenzene	mg/kg	SOLID	92	1800	<0.0010																			<0.0010	<0.0010
Bromochloromethane	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
Bromodichloromethane	mg/kg	SOLID	2	56	<0.0010																			<0.0010	<0.0010
Bromomethane	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
Bromophos*	mg/kg	SOLID	-	-																					
Bromophos-Ethyl*	mg/kg	SOLID	-	-																					
Bromopropylate*	mg/kg	SOLID	-	-																					
Bupirimate*	mg/kg	SOLID	-	-																					
Buprofezine*	mg/kg	SOLID	-	-																					
Butachlor*	mg/kg	SOLID	-	-																					
Butoxycarboxim*	mg/kg	SOLID	-	-																					
Butralin*	mg/kg	SOLID	-	-																					
Butylbenzylphthalate	mg/kg	SOLID	940000	250000																					
Cadmium	mg/kg	SOLID	410	880	<0.2000		0.24	<0.2000	0.37	<0.2000	<0.2000	<0.2000	<0.2000	<0.2100	<0.2000	0.27	0.45	<0.2100	<0.2000	0.3	<0.2100	0.33	<0.2000	0.32	<0.2100
Cadusafos*	mg/kg	SOLID	-	-																					
Captan	mg/kg	SOLID	-	-																					
Carbaryl	mg/kg	SOLID	-	-																					
Carbazole	mg/kg	SOLID	-	-																					
Carbendazim	mg/kg	SOLID	-	-																					
Carbetamide	mg/kg	SOLID	-	-																					
Carbofuran	mg/kg	SOLID	-	-																					
Carbon Disulphide	mg/kg	SOLID	11	1300																					
Carbophenothion	mg/kg	SOLID	-	-																					
Carboxin	mg/kg	SOLID	-	-																					
Carfentrazone Ethyl*	mg/kg	SOLID	-	-																					
Carpropamid*	mg/kg	SOLID	-	-																					
Chinomethionat*	mg/kg	SOLID	-	-																					
chlorantraniliprole*	mg/kg	SOLID	-	-																					
Chlorbenzilate*	mg/kg	SOLID	-	-																					
Chlorbromuron*	mg/kg	SOLID	-	-																					
Chlorbufam*	mg/kg	SOLID	-	-																					
Chlordane	mg/kg	SOLID	-	-																					
Chlordimeform	mg/kg	SOLID	-	-																					
Chlorethoxyfos*	mg/kg	SOLID	-	-																					
Chlorfenapyr*	mg/kg	SOLID	-	-																					
Chlorfenson*	mg/kg	SOLID	-	-																					
Chlorfenvinphos	mg/kg	SOLID	-	-																					
Chlorfluazuron*	mg/kg	SOLID	-	-																					
Chloridazon*	mg/kg	SOLID	-	-																					
Chlormephos	mg/kg	SOLID	-	-																					
Chlorobenzene	mg/kg	SOLID	56	1300	<0.0010																			<0.0010	<0.0010
Chloroethane	mg/kg	SOLID	900	154000	<0.0020																			<0.0020	<0.0020
Chloroethene	mg/kg	SOLID	0.059	4.8	<0.0010																			<0.0010	<0.0010
Chloroform	mg/kg	SOLID	99	2600	<0.0010																			<0.0010	<0.0010
Chloromethane	mg/kg	SOLID	1	140	<0.0030																			<0.0040	<0.0040
Chloropropham	mg/kg	SOLID	-	-																					
Chloropropylate*	mg/kg	SOLID	-	-																					
Chlorothalonil	mg/kg	SOLID	-	-																					
Chlorpyrifos methyl*	mg/kg	SOLID	-	-																					
Chlorpyriphos	mg/kg	SOLID	-	-																					
Chlorthal Dimethyl*	mg/kg	SOLID	-	-																					
Chlorthion*	mg/kg	SOLID	-	-																					
Chlorthiophos*	mg/kg	SOLID	-	-																					
Chlortoluron	mg/kg	SOLID	-	-																					
Chlozolinate*	mg/kg	SOLID	-	-																					
Chromium	mg/kg	SOLID	-	-	11.4		10.7	24.7	22.2	17.3	16.8	21.7	16.3	22.3	12.4	17.3	22	22.8	10.3	29.1	11	22.5	12.8	16.4	8.6
Chromium - Hexavalent	mg/kg	SOLID	49	250	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	1.7	<0.1000	<0.1000	<0.1000	<0.1000	0.4	<0.1000	0.1	<0.1000	<0.1000	<0.1000
Chromium (III) Oxide	mg/kg	SOLID	-	-	<11.4000		<10.7000	<24.7000	<22.2000	<17.3000	<16.8000	<21.7000	<16.3000	<22.3000	10.7	<17.3000	<22.0000	<22.8000	<10.3000	28.7	<11.4000	22.3	<12.8000	<16.4000	<8.6000
Chrysene	mg/kg	SOLID	350	93	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.31	<0.0900	<0.0900	<0.0900	<0.0900	0.2	<0.0900	<0.0900	1.39	<0.0900	<0.1000	<0.0900	<0.0900	<0.0900
Chrysene-d12*	%	SOLID	-	-																					
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-																					
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690	<0.0070																			<0.0060	<0.0060
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
Clodinafop propargy*	mg/kg	SOLID	-	-																					
Clofentezine*	mg/kg	SOLID	-	-																					
Clomazone*	mg/kg	SOLID	-	-																					
Cloquintocet mexyl*	mg/kg	SOLID	-	-																					
Clothianidin*	mg/kg	SOLID	-	-																					
Copper	mg/kg	SOLID	68000	44000	16.4		19	9.9	29	9.5	26.5	13.2	10.5	10.9	10	30.4	29.7	11.7	7.1	68.5	11.2	31.3	8.2	23.5	26
Coronene	mg/kg	SOLID	-	-																					
Coumaphos	mg/kg	SOLID	-	-																					
Cresols*	mg/kg	SOLID	-	-																					
Cyanazine	mg/kg	SOLID	-	-																					
Cyanide	mg/kg	SOLID	-	-																					
Cyanide Free	mg/kg	SOLID	-	-																					
Cyanide Free as CN	mg/kg	SOLID	-	-	<0.6000		1.4	<0.5000	<0.6000	<0.5000	<0.5000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.5000	<0.6000	<0.6000	<0.6000	<0.5000	<0.6000	<0.6000
Cyazofamid*	mg/kg	SOLID	-	-																					
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-																					
Cycluron*	mg/kg	SOLID	-	-																					
Cyflufenamid*	mg/kg	SOLID	-	-																					
Cyfluthrin	mg/kg	SOLID	-	-																					
Cymoxanil*	mg/kg	SOLID	-	-																					
Cypermethrin	mg/kg	SOLID	-	-																					
Cyphenothrin*	mg/kg	SOLID	-	-																					
Cyproconazole*	mg/kg	SOLID	-	-																					
Cyprodinil*	mg/kg	SOLID	-	-																					
Cyromazine*	mg/kg	SOLID	-	-																					
Cythioate*	mg/kg	SOLID	-	-																					
DEET*	mg/kg	SOLID	-	-																					
Deltamethrin	mg/kg	SOLID	-	-																					
Demeton	mg/kg	SOLID	-	-																					
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-																					
Desmedipham*	mg/kg	SOLID	-	-																					
Desmetryn*	mg/kg	SOLID	-	-																					
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-																					
Diafenthiuron*	mg/kg	SOLID	-	-																					
Dialifos*	mg/kg	SOLID	-	-																					
Diazinon	mg/kg	SOLID	-	-																					
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.1	<0.0900	<0.1000	<0.0900	<0.0900	<0.0900
Dibenzofuran	mg/kg	SOLID	-	-																					
Dibromochloromethane	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
Dibromofluoromethane	%	SOLID	-	-																					
Dibromomethane	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
Dichlobenil	mg/kg	SOLID	-	-																					
Dichlofenthion*	mg/kg	SOLID	-	-																					
Dichlorodifluoromethane	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
Dichloromethane	mg/kg	SOLID	260	1500																					
Dichlorvos	mg/kg	SOLID	140	26																					
Diclobutrazol*	mg/kg	SOLID	-	-																					
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-																					
Dicrotophos*	mg/kg	SOLID	-	-																					
Dieldrin	mg/kg	SOLID	170	30																					
Diethofencarb*	mg/kg	SOLID	-	-																					
Diethylphthalate	mg/kg	SOLID	140000	89000																					
Difenoconazole*	mg/kg	SOLID	-	-																					
Diflubenzuron*	mg/kg	SOLID	-	-																					
Diflufenican*	mg/kg	SOLID	-	-																					
Dimefuron*	mg/kg	SOLID	-	-																					
Dimethenamid*	mg/kg	SOLID	-	-																					
Dimethoate	mg/kg	SOLID	-	-																					
Dimethomorph*	mg/kg	SOLID	-	-																					
Dimethylphthalate	mg/kg	SOLID	-	-																					
Dimoxystrobin*	mg/kg	SOLID	-	-																					
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600																					
Diniconazole*	mg/kg	SOLID	-	-																					
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000																					
Dinotefuran*	mg/kg	SOLID	-	-																					
Dinoterb*	mg/kg	SOLID	-	-																					
Dioxabenzofos*	mg/kg	SOLID	-	-																					
Dioxacarb*	mg/kg	SOLID	-	-																					
Diphenamid	mg/kg	SOLID	-	-																					
Diphenyl ether	mg/kg	SOLID	-	-																					
Diphenylamine	mg/kg	SOLID	-	-																					
Disulfoton	mg/kg	SOLID	-	-																					
Disulfoton sulphone*	mg/kg	SOLID	-	-																					
Ditalimfos*	mg/kg	SOLID	-	-																					
Diuron	mg/kg	SOLID	-	-																					
DMSA*	mg/kg	SOLID	-	-																					
DMST*	mg/kg	SOLID	-	-																					
Dodemorph*	mg/kg	SOLID	-	-																					
Edifenphos*	mg/kg	SOLID	-	-																					
Elemental Sulphur	%	SOLID	-	-																					
Emamectin*	mg/kg	SOLID	-	-																					
Endosulfan I	mg/kg	SOLID	5600	2400																					

Max of Normalised Results								
					ND001-WS003	ND002-CP019	ND002-CR013	ND003-CR004
					Water Orton No. 3 Viaduct	Marsh Lane Embankment	Marsh Lane Embankment	Marsh Lane Embankment
					1.1	1.5	0.2	0.6
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	MGR	MGR
Beryllium	mg/kg	SOLID	12	63	0.298	1.9	0.836	0.813
beta-Hexachlorocyclohexane	mg/kg	SOLID	65	15				
Bifenazate*	mg/kg	SOLID	-	-				
Bifenox*	mg/kg	SOLID	-	-				
Bifenthrin*	mg/kg	SOLID	-	-				
Binapacryl*	mg/kg	SOLID	-	-				
Bis(2-chloroethoxy)methane	mg/kg	SOLID	-	-				
Bis(2-chloroethyl)ether	mg/kg	SOLID	-	-				
Bis(2-chloroisopropyl)ether	mg/kg	SOLID	-	-				
Bis(2-ethylhexyl)phthalate	mg/kg	SOLID	85000	17000				
Bitertanol*	mg/kg	SOLID	-	-				
Boron	mg/kg	SOLID	240000	46000	<0.5000	12.6	1.2	1
Boron (Water Soluble)*	mg/kg	SOLID	-	-				
Boron*	mg/kg	SOLID	-	-				
Boscalid*	mg/kg	SOLID	-	-				
Bromacil	mg/kg	SOLID	-	-				
Bromobenzene	mg/kg	SOLID	92	1800	<0.0010			
Bromochloromethane	mg/kg	SOLID	-	-	<0.0010			
Bromodichloromethane	mg/kg	SOLID	2	56	<0.0010			
Bromomethane	mg/kg	SOLID	-	-	<0.0010			
Bromophos*	mg/kg	SOLID	-	-				
Bromophos-Ethyl*	mg/kg	SOLID	-	-				
Bromopropylate*	mg/kg	SOLID	-	-				
Bupirimate*	mg/kg	SOLID	-	-				
Buprofezine*	mg/kg	SOLID	-	-				
Butachlor*	mg/kg	SOLID	-	-				
Butoxycarboxim*	mg/kg	SOLID	-	-				
Butralin*	mg/kg	SOLID	-	-				
Butylbenzylphthalate	mg/kg	SOLID	940000	250000				
Cadmium	mg/kg	SOLID	410	880	<0.2000	0.67	0.3	0.29
Cadusafos*	mg/kg	SOLID	-	-				
Captan	mg/kg	SOLID	-	-				
Carbaryl	mg/kg	SOLID	-	-				
Carbazole	mg/kg	SOLID	-	-				
Carbendazim	mg/kg	SOLID	-	-				
Carbetamide	mg/kg	SOLID	-	-				
Carbofuran	mg/kg	SOLID	-	-				
Carbon Disulphide	mg/kg	SOLID	11	1300				
Carbophenothion	mg/kg	SOLID	-	-				
Carboxin	mg/kg	SOLID	-	-				
Carfentrazone Ethyl*	mg/kg	SOLID	-	-				
Carpropamid*	mg/kg	SOLID	-	-				
Chinomethionat*	mg/kg	SOLID	-	-				
chlorantraniliprole*	mg/kg	SOLID	-	-				
Chlorbenzilate*	mg/kg	SOLID	-	-				
Chlorbromuron*	mg/kg	SOLID	-	-				
Chlorbufam*	mg/kg	SOLID	-	-				
Chlordane	mg/kg	SOLID	-	-				
Chlordimeform	mg/kg	SOLID	-	-				
Chlorethoxyfos*	mg/kg	SOLID	-	-				
Chlorfenapyr*	mg/kg	SOLID	-	-				
Chlorfenson*	mg/kg	SOLID	-	-				
Chlorfenvinphos	mg/kg	SOLID	-	-				
Chlorfluazuron*	mg/kg	SOLID	-	-				
Chloridazon*	mg/kg	SOLID	-	-				
Chlormephos	mg/kg	SOLID	-	-				
Chlorobenzene	mg/kg	SOLID	56	1300	<0.0010			
Chloroethane	mg/kg	SOLID	900	154000	<0.0020			
Chloroethene	mg/kg	SOLID	0.059	4.8	<0.0010			
Chloroform	mg/kg	SOLID	99	2600	<0.0010			
Chloromethane	mg/kg	SOLID	1	140	<0.0030			
Chloropropham	mg/kg	SOLID	-	-				
Chloropropylate*	mg/kg	SOLID	-	-				
Chlorothalonil	mg/kg	SOLID	-	-				
Chlorpyrifos methyl*	mg/kg	SOLID	-	-				
Chlorpyriphos	mg/kg	SOLID	-	-				
Chlorthal Dimethyl*	mg/kg	SOLID	-	-				
Chlorthion*	mg/kg	SOLID	-	-				
Chlorthiophos*	mg/kg	SOLID	-	-				
Chlortoluron	mg/kg	SOLID	-	-				
Chlozolinate*	mg/kg	SOLID	-	-				
Chromium	mg/kg	SOLID	-	-	9.4	42	30	27.1
Chromium - Hexavalent	mg/kg	SOLID	49	250	0.2	<0.1000	<0.1000	<0.1000
Chromium (III) Oxide	mg/kg	SOLID	-	-	9.2	<41.6000	<30.4000	<27.1000
Chrysene	mg/kg	SOLID	350	93	<0.0900	<0.1300	<0.1100	<0.1000
Chrysene-d12*	%	SOLID	-	-				
cis-1,2,3,6-Tetrahydrophthalimide*	mg/kg	SOLID	-	-				
cis-1,2-Dichloroethene	mg/kg	SOLID	14	690	<0.0050			
cis-1,3-Dichloropropene	mg/kg	SOLID	-	-	<0.0010			
Clodinafop propargy*	mg/kg	SOLID	-	-				
Clofentezine*	mg/kg	SOLID	-	-				
Clomazone*	mg/kg	SOLID	-	-				
Cloquintocet mexyl*	mg/kg	SOLID	-	-				
Clothianidin*	mg/kg	SOLID	-	-				
Copper	mg/kg	SOLID	68000	44000	11	110	27	25.1
Coronene	mg/kg	SOLID	-	-				
Coumaphos	mg/kg	SOLID	-	-				
Cresols*	mg/kg	SOLID	-	-				
Cyanazine	mg/kg	SOLID	-	-				
Cyanide	mg/kg	SOLID	-	-				
Cyanide Free	mg/kg	SOLID	-	-				
Cyanide Free as CN	mg/kg	SOLID	-	-	<0.5000	<0.8000	<0.7000	<0.6000
Cyazofamid*	mg/kg	SOLID	-	-				
Cyclopenta Phenanthrene (non-specific isomer)	mg/kg	SOLID	-	-				
Cycluron*	mg/kg	SOLID	-	-				
Cyflufenamid*	mg/kg	SOLID	-	-				
Cyfluthrin	mg/kg	SOLID	-	-				
Cymoxanil*	mg/kg	SOLID	-	-				
Cypermethrin	mg/kg	SOLID	-	-				
Cyphenothrin*	mg/kg	SOLID	-	-				
Cyproconazole*	mg/kg	SOLID	-	-				
Cyprodinil*	mg/kg	SOLID	-	-				
Cyromazine*	mg/kg	SOLID	-	-				
Cythioate*	mg/kg	SOLID	-	-				
DEET*	mg/kg	SOLID	-	-				
Deltamethrin	mg/kg	SOLID	-	-				
Demeton	mg/kg	SOLID	-	-				
Demeton-s-methyl sulphone*	mg/kg	SOLID	-	-				
Desmedipham*	mg/kg	SOLID	-	-				
Desmetryn*	mg/kg	SOLID	-	-				
Deta-Hexachlorocyclohexane	mg/kg	SOLID	-	-				
Diafenthiuron*	mg/kg	SOLID	-	-				
Dialifos*	mg/kg	SOLID	-	-				
Diazinon	mg/kg	SOLID	-	-				
Dibenz-a-h-anthracene	mg/kg	SOLID	3.5	1.1	<0.0900	<0.1300	<0.1100	<0.1000
Dibenzofuran	mg/kg	SOLID	-	-				
Dibromochloromethane	mg/kg	SOLID	-	-	<0.0010			
Dibromofluoromethane	%	SOLID	-	-				
Dibromomethane	mg/kg	SOLID	-	-	<0.0010			
Dichlobenil	mg/kg	SOLID	-	-				
Dichlofenthion*	mg/kg	SOLID	-	-				
Dichlorodifluoromethane	mg/kg	SOLID	-	-	<0.0010			
Dichloromethane	mg/kg	SOLID	260	1500				
Dichlorvos	mg/kg	SOLID	140	26				
Diclobutrazol*	mg/kg	SOLID	-	-				
Diclofol (assumed Dicofol)	mg/kg	SOLID	-	-				
Dicrotophos*	mg/kg	SOLID	-	-				
Dieldrin	mg/kg	SOLID	170	30				
Diethofencarb*	mg/kg	SOLID	-	-				
Diethylphthalate	mg/kg	SOLID	140000	89000				
Difenoconazole*	mg/kg	SOLID	-	-				
Diflubenzuron*	mg/kg	SOLID	-	-				
Diflufenican*	mg/kg	SOLID	-	-				
Dimefuron*	mg/kg	SOLID	-	-				
Dimethenamid*	mg/kg	SOLID	-	-				
Dimethoate	mg/kg	SOLID	-	-				
Dimethomorph*	mg/kg	SOLID	-	-				
Dimethylphthalate	mg/kg	SOLID	-	-				
Dimoxystrobin*	mg/kg	SOLID	-	-				
Di-N-Butyl Phthalate	mg/kg	SOLID	15000	2600				
Diniconazole*	mg/kg	SOLID	-	-				
Di-N-Octyl Phthalate	mg/kg	SOLID	89000	20000				
Dinotefuran*	mg/kg	SOLID	-	-				
Dinoterb*	mg/kg	SOLID	-	-				
Dioxabenzofos*	mg/kg	SOLID	-	-				
Dioxacarb*	mg/kg	SOLID	-	-				
Diphenamid	mg/kg	SOLID	-	-				
Diphenyl ether	mg/kg	SOLID	-	-				
Diphenylamine	mg/kg	SOLID	-	-				
Disulfoton	mg/kg	SOLID	-	-				
Disulfoton sulphone*	mg/kg	SOLID	-	-				
Ditalimfos*	mg/kg	SOLID	-	-				
Diuron	mg/kg	SOLID	-	-				
DMSA*	mg/kg	SOLID	-	-				
DMST*	mg/kg	SOLID	-	-				
Dodemorph*	mg/kg	SOLID	-	-				
Edifenphos*	mg/kg	SOLID	-	-				
Elemental Sulphur	%	SOLID	-	-				
Emamectin*	mg/kg	SOLID	-	-				
Endosulfan I	mg/kg	SOLID	5600	2400				

Max of Normalised Results					Location ID	Asset	Sample Depth	Geology Code													
					BD161-CP028	BD161-CR008	BD161-CR008	BD161-CR010	BD161-TP002	BD161-TP008	BD161-TP035	BD161-TP036	BD161-WS003	BD161-WS003	BD162-CP044	BD162-CR003	BD162-CR020	BD162-CR020	BD162-TP003	BD163-CP043	BD163-CP043
					Coleshill No. 3 Embankment	Coleshill West Viaduct	Coleshill West Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Green Lane Embankment	Green Lane Embankment	Green Lane Embankment	Green Lane Embankment	Coleshill No. 3 Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment
					1.2	0.5	2	0.5	0.15	0.15	0.1	2	0.2	1.1	0.7	0.5	0.5	1	0.65	1	1.7
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TILMP	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	MGR	TILMP	MGR	TILMP	MGR	MGR	MGR
Endosulfan II	mg/kg	SOLID	6300	2400																	
Endosulphan sulphate*	mg/kg	SOLID	-	-																	
Endrin	mg/kg	SOLID	-	-																	
Enterococci	CFU/g	SOLID	-	-																	
EPH >C10-12	mg/kg	SOLID	-	-																	
EPH >C10-35	mg/kg	SOLID	-	-																	
EPH >C10-40	mg/kg	SOLID	-	-																	
EPH >C12-16	mg/kg	SOLID	-	-																	
EPH >C16-21	mg/kg	SOLID	-	-																	
EPH >C21-35	mg/kg	SOLID	-	-																	
EPH >C8-40	mg/kg	SOLID	-	-		488	38	16	136	41	186		42	28	75	18	38	30	18	31	
EPH/TPH >C10-12	mg/kg	SOLID	-	-																	
EPH/TPH >C10-25	mg/kg	SOLID	-	-																	
EPH/TPH >C12-16	mg/kg	SOLID	-	-																	
EPH/TPH >C16-21	mg/kg	SOLID	-	-																	
EPH/TPH >C21-40	mg/kg	SOLID	-	-																	
EPH/TPH >C24-40	mg/kg	SOLID	-	-																	
EPH/TPH >C35-40	mg/kg	SOLID	-	-																	
EPH/TPH >C6-8	mg/kg	SOLID	-	-		<0.2000														<0.2000	
EPH/TPH >C8-10	mg/kg	SOLID	-	-																	
Epoxiconazole*	mg/kg	SOLID	-	-																	
EPTC*	mg/kg	SOLID	-	-																	
Escherichia coli (Confirmed)	N/A	SOLID	-	-																	
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																	
Etaconazole*	mg/kg	SOLID	-	-																	
Ethidimuron*	mg/kg	SOLID	-	-																	
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																	
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																	
Ethiofencarb*	mg/kg	SOLID	-	-																	
Ethion	mg/kg	SOLID	-	-																	
Ethiprole*	mg/kg	SOLID	-	-																	
Ethirimol*	mg/kg	SOLID	-	-																	
Ethofumesate	mg/kg	SOLID	-	-																	
Ethoprophos	mg/kg	SOLID	-	-																	
Ethoxyquin*	mg/kg	SOLID	-	-																	
Ethylbenzene	mg/kg	SOLID	5700	17000		0.006	<0.0020	<0.0020	<0.0020	<0.0020	<0.0030		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0030	<0.0020	<0.0020	
Ethylparathion	mg/kg	SOLID	-	-																	
Etofenprox*	mg/kg	SOLID	-	-																	
Etoxazole*	mg/kg	SOLID	-	-																	
Etrimphos	mg/kg	SOLID	-	-																	
Famoxadone*	mg/kg	SOLID	-	-																	
Famphur	mg/kg	SOLID	-	-																	
Fenamidone*	mg/kg	SOLID	-	-																	
Fenamiphos sulfone*	mg/kg	SOLID	-	-																	
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																	
Fenamiphos*	mg/kg	SOLID	-	-																	
Fenarimol	mg/kg	SOLID	-	-																	
Fenazaquin*	mg/kg	SOLID	-	-																	
Fenbuconazole*	mg/kg	SOLID	-	-																	
Fenchlorphos oxon*	mg/kg	SOLID	-	-																	
Fenhexamid*	mg/kg	SOLID	-	-																	
Fenitrothion	mg/kg	SOLID	-	-																	
Fenpiclonil*	mg/kg	SOLID	-	-																	
Fenpropathrin*	mg/kg	SOLID	-	-																	
Fenpropidin*	mg/kg	SOLID	-	-																	
Fenpropimorph*	mg/kg	SOLID	-	-																	
Fenpyroximate*	mg/kg	SOLID	-	-																	
Fenson*	mg/kg	SOLID	-	-																	
Fensulfothion	mg/kg	SOLID	-	-																	
Fenthion	mg/kg	SOLID	-	-																	
Fenthion Sulphone*	mg/kg	SOLID	-	-																	
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																	
Fenuron	mg/kg	SOLID	-	-																	
Fenvalerate	mg/kg	SOLID	-	-																	
Fipronil sulphone*	mg/kg	SOLID	-	-																	
Fipronil*	mg/kg	SOLID	-	-																	
Flamprop-isopropyl	mg/kg	SOLID	-	-																	
Flonicamid*	mg/kg	SOLID	-	-																	
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																	
Fluazinam*	mg/kg	SOLID	-	-																	
Flucythrinate*	mg/kg	SOLID	-	-																	
Fludioxonil*	mg/kg	SOLID	-	-																	
Flufenacet*	mg/kg	SOLID	-	-																	
Flufenoxuron*	mg/kg	SOLID	-	-																	
Flumetralin*	mg/kg	SOLID	-	-																	
Flumioxazin*	mg/kg	SOLID	-	-																	
Flumorph*	mg/kg	SOLID	-	-																	
Fluometuron*	mg/kg	SOLID	-	-																	
Fluopicolide*	mg/kg	SOLID	-	-																	
Fluopyram*	mg/kg	SOLID	-	-																	
Fluoranthene	mg/kg	SOLID	23000	6300		0.52	<0.1000	<0.0900	1.09	<0.0900	730		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Fluorene	mg/kg	SOLID	63000	20000		<0.0900	<0.1000	<0.0900	<0.0900	<0.0900	<0.1100		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Fluorochloridone*	mg/kg	SOLID	-	-																	
Fluoroxypyr	mg/kg	SOLID	-	-																	
Fluquinconazole*	mg/kg	SOLID	-	-																	
Flurtamone*	mg/kg	SOLID	-	-																	
Flusilazole*	mg/kg	SOLID	-	-																	
Flutolanil*	mg/kg	SOLID	-	-																	
Flutriafol*	mg/kg	SOLID	-	-																	
Fluxapyroxad*	mg/kg	SOLID	-	-																	
Folpet	mg/kg	SOLID	-	-																	
Fonophos*	mg/kg	SOLID	-	-																	
Forchlorfenuron*	mg/kg	SOLID	-	-																	
Formetanate*	mg/kg	SOLID	-	-																	
Formothion*	mg/kg	SOLID	-	-																	
Fraction of non-crushable material*	%	SOLID	-	-		0	0	0	0	0	0		0	0	0	0	0	0	0	0	
Fraction of sample above 4mm*	%	SOLID	-	-		30	30	38.8	57	30	0		21	16.4	53	5.5	14	4	38.6	22.9	
Fuberidazole*	mg/kg	SOLID	-	-																	
Furalaxyl*	mg/kg	SOLID	-	-																	
Furathiocarb*	mg/kg	SOLID	-	-																	
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																	
GRO >C5-10	mg/kg	SOLID	-	-		<0.2000														<0.2000	
GRO >C5-12	mg/kg	SOLID	-	-																	
GRO >C7-8	mg/kg	SOLID	-	-		<0.0100														<0.0100	
GRO >C8-10	mg/kg	SOLID	-	-																	
GRO Surrogate % recovery	%	SOLID	-	-																	
Haloxyfop etotyl*	mg/kg	SOLID	-	-																	
Haloxyfop Methyl*	mg/kg	SOLID	-	-																	
Heptachlor	mg/kg	SOLID	-	-																	
Heptachlor Epoxide	mg/kg	SOLID	-	-																	
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																	
Heptanoic Acid	mg/kg	SOLID	-	-																	
Heptenophos	mg/kg	SOLID	-	-																	
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																	
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48					<0.0020		<0.0030										
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-																	
Hexachloroethane	mg/kg	SOLID	21	158																	
Hexaconazole	mg/kg	SOLID	-	-																	
Hexaflumuron*	mg/kg	SOLID	-	-																	
Hexazinone	mg/kg	SOLID	-	-																	
Hexythiazox*	mg/kg	SOLID	-	-																	
Imazalil*	mg/kg	SOLID	-	-																	
Imidacloprid*	mg/kg	SOLID	-	-																	
Imidan	mg/kg	SOLID	-	-																	
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150		0.19	<0.1000	<0.0900	0.87	<0.0900	0.63		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Indoxacarb*	mg/kg	SOLID	-	-																	
Iodofenphos	mg/kg	SOLID	-	-																	
Iprodione*	mg/kg	SOLID	-	-																	
Iprovalicarb*	mg/kg	SOLID	-	-																	
Isazofos*	mg/kg	SOLID	-	-																	
Isocarbophos*	mg/kg	SOLID	-	-																	
Isodrin	mg/kg	SOLID	-	-																	
Isofenphos Methyl*	mg/kg	SOLID	-	-																	
Isofenphos*	mg/kg	SOLID	-	-																	
Isomethiozin*	mg/kg	SOLID	-	-																	
Isophorone	mg/kg	SOLID	-	-																	
Isoprocarb*	mg/kg	SOLID	-	-																	
Isopropylbenzene	mg/kg	SOLID	1300	23000					<0.0010		<0.0010										
Isoprothiolane*	mg/kg	SOLID	-	-																	
Isoproturon	mg/kg	SOLID	-	-																	
Isopyrazam*	mg/kg	SOLID	-	-																	
Isothiazolinone*	mg/kg	SOLID	-	-																	
Isoxaben*	mg/kg	SOLID	-	-																	
Karbutilate*	mg/kg	SOLID	-	-																	
Kresoxim Methyl*	mg/kg	SOLID	-	-																	
Lambda Cyhalothrin	mg/kg	SOLID	-	-																	
Lead	mg/kg	SOLID	2300	1300		327.9	41	34.2	26.1	43.2	130.5		67	92.1	19	11.6	12.3	12.4	12.1	10.1	
Lenacil*	mg/kg	SOLID	-	-																	
Leptophos	mg/kg	SOLID	-	-																	
Linuron	mg/kg	SOLID	-	-																	
Lufenuron*	mg/kg	SOLID	-	-																	
m,p xylenes	mg/kg	SOLID	-	-		0.008	<0.0050	<0.0050	<0.0040	<0.0050	<0.0060		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060	<0.0050	<0.0040	
m,p,o Xylenes	mg/kg	SOLID	-	-																	
Malaoxon*	mg/kg	SOLID	-	-																	
Malathion	mg/kg	SOLID	-	-																	
Mandipropamid*	mg/kg	SOLID	-	-																	
MCPA-thioethyl*	mg/kg	SOLID	-	-																	
Mecarbam*	mg/kg	SOLID	-	-																	
Mecoprop	mg/kg	SOLID	-	-																	
Mefenacet*	mg/kg	SOLID	-	-																	

Max of Normalised Results																									
					BD163-CP043	BD163-CP043	BD163-CP043	BD163-CR006	BD163-CR014	BD163-CR014	BD163-CR014	BD163-CR022	BD163-CR022	BD163-CR022	BD163-TP013	BD163-TP013a	BD163-TP016	BD163-TP016	BD163-WS001	BD163-WS001	BD164-CR011	BS161-CP401	BS161-CP401	BS161-CP401	BS161-CP401
					Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Green Lane Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Green Lane Embankment	Green Lane Embankment	Water Orton Cutting	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment
					2	3	5	0.8	0.5	2	4	7	9	12.8	0.8	1.5	0.6	2.3	0.2	0.5	0.7	0.05	0.3	0.5	1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	TOP	RTD2	RTD2	RTD2
Endosulfan II	mg/kg	SOLID	6300	2400																					
Endosulphan sulphate*	mg/kg	SOLID	-	-																					
Endrin	mg/kg	SOLID	-	-																					
Enterococci	CFU/g	SOLID	-	-																					
EPH >C10-12	mg/kg	SOLID	-	-																					
EPH >C10-35	mg/kg	SOLID	-	-																		9	14	4	4
EPH >C10-40	mg/kg	SOLID	-	-																					
EPH >C12-16	mg/kg	SOLID	-	-																					
EPH >C16-21	mg/kg	SOLID	-	-																					
EPH >C21-35	mg/kg	SOLID	-	-																					
EPH >C8-40	mg/kg	SOLID	-	-		78	45	165	67	35	272	100	53	64	40	89	39	107	34	20	<12.0000				
EPH/TPH >C10-12	mg/kg	SOLID	-	-																					
EPH/TPH >C10-25	mg/kg	SOLID	-	-																					
EPH/TPH >C12-16	mg/kg	SOLID	-	-																					
EPH/TPH >C16-21	mg/kg	SOLID	-	-																					
EPH/TPH >C21-40	mg/kg	SOLID	-	-																					
EPH/TPH >C24-40	mg/kg	SOLID	-	-																					
EPH/TPH >C35-40	mg/kg	SOLID	-	-																		1	2	<1.0000	<1.0000
EPH/TPH >C6-8	mg/kg	SOLID	-	-		<0.2000										<0.2000									
EPH/TPH >C8-10	mg/kg	SOLID	-	-																					
Epoxiconazole*	mg/kg	SOLID	-	-																					
EPTC*	mg/kg	SOLID	-	-																					
Escherichia coli (Confirmed)	N/A	SOLID	-	-																					
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																					
Etaconazole*	mg/kg	SOLID	-	-																					
Ethidimuron*	mg/kg	SOLID	-	-																					
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																					
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																					
Ethiofencarb*	mg/kg	SOLID	-	-																					
Ethion	mg/kg	SOLID	-	-																					
Ethiprole*	mg/kg	SOLID	-	-																					
Ethirimol*	mg/kg	SOLID	-	-																					
Ethofumesate	mg/kg	SOLID	-	-																					
Ethoprophos	mg/kg	SOLID	-	-																					
Ethoxyquin*	mg/kg	SOLID	-	-																					
Ethylbenzene	mg/kg	SOLID	5700	17000		<0.0020	<0.0020	<0.0020	<0.0030	<0.0020	<0.0030	<0.0020	<0.0030	<0.0030	<0.0020	<0.0020	<0.0030	<0.0020	<0.0030	<0.0020	<0.0020	<0.0100	<0.0100	<0.0100	<0.0100
Ethylparathion	mg/kg	SOLID	-	-																					
Etofenprox*	mg/kg	SOLID	-	-																					
Etoxazole*	mg/kg	SOLID	-	-																					
Etrimphos	mg/kg	SOLID	-	-																					
Famoxadone*	mg/kg	SOLID	-	-																					
Famphur	mg/kg	SOLID	-	-																					
Fenamidone*	mg/kg	SOLID	-	-																					
Fenamiphos sulfone*	mg/kg	SOLID	-	-																					
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																					
Fenamiphos*	mg/kg	SOLID	-	-																					
Fenarimol	mg/kg	SOLID	-	-																					
Fenazaquin*	mg/kg	SOLID	-	-																					
Fenbuconazole*	mg/kg	SOLID	-	-																					
Fenchlorphos oxon*	mg/kg	SOLID	-	-																					
Fenhexamid*	mg/kg	SOLID	-	-																					
Fenitrothion	mg/kg	SOLID	-	-																					
Fenpiclonil*	mg/kg	SOLID	-	-																					
Fenpropathrin*	mg/kg	SOLID	-	-																					
Fenpropidin*	mg/kg	SOLID	-	-																					
Fenpropimorph*	mg/kg	SOLID	-	-																					
Fenpyroximate*	mg/kg	SOLID	-	-																					
Fenson*	mg/kg	SOLID	-	-																					
Fensulfothion	mg/kg	SOLID	-	-																					
Fenthion	mg/kg	SOLID	-	-																					
Fenthion Sulphone*	mg/kg	SOLID	-	-																					
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																					
Fenuron	mg/kg	SOLID	-	-																					
Fenvalerate	mg/kg	SOLID	-	-																					
Fipronil sulphone*	mg/kg	SOLID	-	-																					
Fipronil*	mg/kg	SOLID	-	-																					
Flamprop-isopropyl	mg/kg	SOLID	-	-																					
Flonicamid*	mg/kg	SOLID	-	-																					
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																					
Fluazinam*	mg/kg	SOLID	-	-																					
Flucythrinate*	mg/kg	SOLID	-	-																					
Fludioxonil*	mg/kg	SOLID	-	-																					
Flufenacet*	mg/kg	SOLID	-	-																					
Flufenoxuron*	mg/kg	SOLID	-	-																					
Flumetralin*	mg/kg	SOLID	-	-																					
Flumioxazin*	mg/kg	SOLID	-	-																					
Flumorph*	mg/kg	SOLID	-	-																					
Fluometuron*	mg/kg	SOLID	-	-																					
Fluopicolide*	mg/kg	SOLID	-	-																					
Fluopyram*	mg/kg	SOLID	-	-																					
Fluoranthene	mg/kg	SOLID	23000	6300		0.13	0.11	<0.1000	<0.1000	<0.1000	5.21	0.22	0.12	0.14	<0.1000	0.09	<0.1000	<0.1000	<0.1000	<0.0900	0.22	<0.1000	0.1	<0.1000	<0.1000
Fluorene	mg/kg	SOLID	63000	20000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Fluorochloridone*	mg/kg	SOLID	-	-																					
Fluoroxypyr	mg/kg	SOLID	-	-																					
Fluquinconazole*	mg/kg	SOLID	-	-																					
Flurtamone*	mg/kg	SOLID	-	-																					
Flusilazole*	mg/kg	SOLID	-	-																					
Flutolanil*	mg/kg	SOLID	-	-																					
Flutriafol*	mg/kg	SOLID	-	-																					
Fluxapyroxad*	mg/kg	SOLID	-	-																					
Folpet	mg/kg	SOLID	-	-																					
Fonophos*	mg/kg	SOLID	-	-																					
Forchlorfenuron*	mg/kg	SOLID	-	-																					
Formetanate*	mg/kg	SOLID	-	-																					
Formothion*	mg/kg	SOLID	-	-																					
Fraction of non-crushable material*	%	SOLID	-	-		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Fraction of sample above 4mm*	%	SOLID	-	-		22.5	31.2	0	39	40	19	14	13	0	79	9	15	16	30	25	4				
Fuberidazole*	mg/kg	SOLID	-	-																					
Furalaxyl*	mg/kg	SOLID	-	-																					
Furathiocarb*	mg/kg	SOLID	-	-																					
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																					
GRO >C5-10	mg/kg	SOLID	-	-		<0.2000										<0.2000						<0.1000	<0.1000	<0.1000	<0.1000
GRO >C5-12	mg/kg	SOLID	-	-																					
GRO >C7-8	mg/kg	SOLID	-	-		<0.0100										<0.0100									
GRO >C8-10	mg/kg	SOLID	-	-																					
GRO Surrogate % recovery	%	SOLID	-	-																					
Haloxyfop etotyl*	mg/kg	SOLID	-	-																					
Haloxyfop Methyl*	mg/kg	SOLID	-	-																					
Heptachlor	mg/kg	SOLID	-	-																					
Heptachlor Epoxide	mg/kg	SOLID	-	-																					
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																					
Heptanoic Acid	mg/kg	SOLID	-	-																					
Heptenophos	mg/kg	SOLID	-	-																					
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																		<0.1000		<0.1000	
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48																		<0.1000		<0.1000	
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-																		<0.2000		<0.2000	
Hexachloroethane	mg/kg	SOLID	21	158																		<0.1000		<0.1000	
Hexaconazole	mg/kg	SOLID	-	-																					
Hexaflumuron*	mg/kg	SOLID	-	-																					
Hexazinone	mg/kg	SOLID	-	-																					
Hexythiazox*	mg/kg	SOLID	-	-																					
Imazalil*	mg/kg	SOLID	-	-																					
Imidacloprid*	mg/kg	SOLID	-	-																					
Imidan	mg/kg	SOLID	-	-																					
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	1	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Indoxacarb*	mg/kg	SOLID	-	-																					
Iodofenphos	mg/kg	SOLID	-	-																					
Iprodione*	mg/kg	SOLID	-	-																					
Iprovalicarb*	mg/kg	SOLID	-	-																					
Isazofos*	mg/kg	SOLID	-	-																					
Isocarbophos*	mg/kg	SOLID	-	-																					
Isodrin	mg/kg	SOLID	-	-																					
Isofenphos Methyl*	mg/kg	SOLID	-	-																					
Isofenphos*	mg/kg	SOLID	-	-																					
Isomethiozin*	mg/kg	SOLID	-	-																					
Isophorone	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
Isoprocarb*	mg/kg	SOLID	-	-																					
Isopropylbenzene	mg/kg	SOLID	1300	23000																		<0.0500		<0.0500	
Isoprothiolane*	mg/kg	SOLID	-	-																					
Isoproturon	mg/kg	SOLID	-	-																					
Isopyrazam*	mg/kg	SOLID	-	-																					
Isothiazolinone*	mg/kg	SOLID	-	-																					
Isoxaben*	mg/kg	SOLID	-	-																					
Karbutilate*	mg/kg	SOLID	-	-																					
Kresoxim Methyl*	mg/kg	SOLID	-	-																					
Lambda Cyhalothrin	mg/kg	SOLID	-	-																					
Lead	mg/kg	SOLID	2300	1300		11	12.7	10.5	23.3	8.9	8	21	11.4	6.3	15	13.2	7.8	8.9	19.5	18.7	24.5	31	33	9	13
Lenacil*	mg/kg	SOLID	-	-																					
Leptophos	mg/kg	SOLID	-	-																					
Linuron	mg/kg	SOLID	-	-																					
Lufenuron*	mg/kg	SOLID	-	-																					
m,p xylenes	mg/kg	SOLID	-	-		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0100	<0.0100	<0.0100	<0.0100
m,p,o Xylenes	mg/kg	SOLID	-	-																					
Malaoxon*	mg/kg	SOLID	-	-																					
Malathion	mg/kg	SOLID	-	-																					
Mandipropamid*	mg/kg	SOLID	-	-																					
MCPA-thioethyl*	mg/kg	SOLID	-	-																					
Mecarbam*	mg/kg	SOLID	-	-																					
Mecoprop	mg/kg	SOLID	-	-																					
Mefenacet*	mg/kg	SOLID	-	-																					

Max of Normalised Results					
					BS161-CP401
					Coleshill No. 3 Embankment
					2.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD2
Endosulfan II	mg/kg	SOLID	6300	2400	
Endosulphan sulphate*	mg/kg	SOLID	-	-	
Endrin	mg/kg	SOLID	-	-	
Enterococci	CFU/g	SOLID	-	-	
EPH >C10-12	mg/kg	SOLID	-	-	
EPH >C10-35	mg/kg	SOLID	-	-	5
EPH >C10-40	mg/kg	SOLID	-	-	
EPH >C12-16	mg/kg	SOLID	-	-	
EPH >C16-21	mg/kg	SOLID	-	-	
EPH >C21-35	mg/kg	SOLID	-	-	
EPH >C8-40	mg/kg	SOLID	-	-	
EPH/TPH >C10-12	mg/kg	SOLID	-	-	
EPH/TPH >C10-25	mg/kg	SOLID	-	-	
EPH/TPH >C12-16	mg/kg	SOLID	-	-	
EPH/TPH >C16-21	mg/kg	SOLID	-	-	
EPH/TPH >C21-40	mg/kg	SOLID	-	-	
EPH/TPH >C24-40	mg/kg	SOLID	-	-	
EPH/TPH >C35-40	mg/kg	SOLID	-	-	<1.0000
EPH/TPH >C6-8	mg/kg	SOLID	-	-	
EPH/TPH >C8-10	mg/kg	SOLID	-	-	
Epoxiconazole*	mg/kg	SOLID	-	-	
EPTC*	mg/kg	SOLID	-	-	
Escherichia coli (Confirmed)	N/A	SOLID	-	-	
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-	
Etaconazole*	mg/kg	SOLID	-	-	
Ethidimuron*	mg/kg	SOLID	-	-	
Ethiofencarb sulfone*	mg/kg	SOLID	-	-	
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-	
Ethiofencarb*	mg/kg	SOLID	-	-	
Ethion	mg/kg	SOLID	-	-	
Ethiprole*	mg/kg	SOLID	-	-	
Ethirimol*	mg/kg	SOLID	-	-	
Ethofumesate	mg/kg	SOLID	-	-	
Ethoprophos	mg/kg	SOLID	-	-	
Ethoxyquin*	mg/kg	SOLID	-	-	
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0100
Ethylparathion	mg/kg	SOLID	-	-	
Etofenprox*	mg/kg	SOLID	-	-	
Etoxazole*	mg/kg	SOLID	-	-	
Etrimphos	mg/kg	SOLID	-	-	
Famoxadone*	mg/kg	SOLID	-	-	
Famphur	mg/kg	SOLID	-	-	
Fenamidone*	mg/kg	SOLID	-	-	
Fenamiphos sulfone*	mg/kg	SOLID	-	-	
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-	
Fenamiphos*	mg/kg	SOLID	-	-	
Fenarimol	mg/kg	SOLID	-	-	
Fenazaquin*	mg/kg	SOLID	-	-	
Fenbuconazole*	mg/kg	SOLID	-	-	
Fenchlorphos oxon*	mg/kg	SOLID	-	-	
Fenhexamid*	mg/kg	SOLID	-	-	
Fenitrothion	mg/kg	SOLID	-	-	
Fenpiclonil*	mg/kg	SOLID	-	-	
Fenpropathrin*	mg/kg	SOLID	-	-	
Fenpropidin*	mg/kg	SOLID	-	-	
Fenpropimorph*	mg/kg	SOLID	-	-	
Fenpyroximate*	mg/kg	SOLID	-	-	
Fenson*	mg/kg	SOLID	-	-	
Fensulfothion	mg/kg	SOLID	-	-	
Fenthion	mg/kg	SOLID	-	-	
Fenthion Sulphone*	mg/kg	SOLID	-	-	
Fenthion Sulphoxide*	mg/kg	SOLID	-	-	
Fenuron	mg/kg	SOLID	-	-	
Fenvalerate	mg/kg	SOLID	-	-	
Fipronil sulphone*	mg/kg	SOLID	-	-	
Fipronil*	mg/kg	SOLID	-	-	
Flamprop-isopropyl	mg/kg	SOLID	-	-	
Flonicamid*	mg/kg	SOLID	-	-	
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-	
Fluazinam*	mg/kg	SOLID	-	-	
Flucythrinate*	mg/kg	SOLID	-	-	
Fludioxonil*	mg/kg	SOLID	-	-	
Flufenacet*	mg/kg	SOLID	-	-	
Flufenoxuron*	mg/kg	SOLID	-	-	
Flumetralin*	mg/kg	SOLID	-	-	
Flumioxazin*	mg/kg	SOLID	-	-	
Flumorph*	mg/kg	SOLID	-	-	
Fluometuron*	mg/kg	SOLID	-	-	
Fluopicolide*	mg/kg	SOLID	-	-	
Fluopyram*	mg/kg	SOLID	-	-	
Fluoranthene	mg/kg	SOLID	23000	6300	<0.1000
Fluorene	mg/kg	SOLID	63000	20000	<0.1000
Fluorochloridone*	mg/kg	SOLID	-	-	
Fluoroxypyr	mg/kg	SOLID	-	-	
Fluquinconazole*	mg/kg	SOLID	-	-	
Flurtamone*	mg/kg	SOLID	-	-	
Flusilazole*	mg/kg	SOLID	-	-	
Flutolanil*	mg/kg	SOLID	-	-	
Flutriafol*	mg/kg	SOLID	-	-	
Fluxapyroxad*	mg/kg	SOLID	-	-	
Folpet	mg/kg	SOLID	-	-	
Fonophos*	mg/kg	SOLID	-	-	
Forchlorfenuron*	mg/kg	SOLID	-	-	
Formetanate*	mg/kg	SOLID	-	-	
Formothion*	mg/kg	SOLID	-	-	
Fraction of non-crushable material*	%	SOLID	-	-	
Fraction of sample above 4mm*	%	SOLID	-	-	
Fuberidazole*	mg/kg	SOLID	-	-	
Furalaxyl*	mg/kg	SOLID	-	-	
Furathiocarb*	mg/kg	SOLID	-	-	
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14	
GRO >C5-10	mg/kg	SOLID	-	-	<0.1000
GRO >C5-12	mg/kg	SOLID	-	-	
GRO >C7-8	mg/kg	SOLID	-	-	
GRO >C8-10	mg/kg	SOLID	-	-	
GRO Surrogate % recovery	%	SOLID	-	-	
Haloxyfop etotyl*	mg/kg	SOLID	-	-	
Haloxyfop Methyl*	mg/kg	SOLID	-	-	
Heptachlor	mg/kg	SOLID	-	-	
Heptachlor Epoxide	mg/kg	SOLID	-	-	
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-	
Heptanoic Acid	mg/kg	SOLID	-	-	
Heptenophos	mg/kg	SOLID	-	-	
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30	<0.1000
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48	<0.1000
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-	<0.2000
Hexachloroethane	mg/kg	SOLID	21	158	<0.1000
Hexaconazole	mg/kg	SOLID	-	-	
Hexaflumuron*	mg/kg	SOLID	-	-	
Hexazinone	mg/kg	SOLID	-	-	
Hexythiazox*	mg/kg	SOLID	-	-	
Imazalil*	mg/kg	SOLID	-	-	
Imidacloprid*	mg/kg	SOLID	-	-	
Imidan	mg/kg	SOLID	-	-	
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	<0.1000
Indoxacarb*	mg/kg	SOLID	-	-	
Iodofenphos	mg/kg	SOLID	-	-	
Iprodione*	mg/kg	SOLID	-	-	
Iprovalicarb*	mg/kg	SOLID	-	-	
Isazofos*	mg/kg	SOLID	-	-	
Isocarbophos*	mg/kg	SOLID	-	-	
Isodrin	mg/kg	SOLID	-	-	
Isofenphos Methyl*	mg/kg	SOLID	-	-	
Isofenphos*	mg/kg	SOLID	-	-	
Isomethiozin*	mg/kg	SOLID	-	-	
Isophorone	mg/kg	SOLID	-	-	<0.1000
Isoprocarb*	mg/kg	SOLID	-	-	
Isopropylbenzene	mg/kg	SOLID	1300	23000	<0.0500
Isoprothiolane*	mg/kg	SOLID	-	-	
Isoproturon	mg/kg	SOLID	-	-	
Isopyrazam*	mg/kg	SOLID	-	-	
Isothiazolinone*	mg/kg	SOLID	-	-	
Isoxaben*	mg/kg	SOLID	-	-	
Karbutilate*	mg/kg	SOLID	-	-	
Kresoxim Methyl*	mg/kg	SOLID	-	-	
Lambda Cyhalothrin	mg/kg	SOLID	-	-	
Lead	mg/kg	SOLID	2300	1300	6
Lenacil*	mg/kg	SOLID	-	-	
Leptophos	mg/kg	SOLID	-	-	
Linuron	mg/kg	SOLID	-	-	
Lufenuron*	mg/kg	SOLID	-	-	
m,p xylenes	mg/kg	SOLID	-	-	<0.0100
m,p,o Xylenes	mg/kg	SOLID	-	-	
Malaoxon*	mg/kg	SOLID	-	-	
Malathion	mg/kg	SOLID	-	-	
Mandipropamid*	mg/kg	SOLID	-	-	
MCPA-thioethyl*	mg/kg	SOLID	-	-	
Mecarbam*	mg/kg	SOLID	-	-	
Mecoprop	mg/kg	SOLID	-	-	
Mefenacet*	mg/kg	SOLID	-	-	

Max of Normalised Results																											
					BS161-CT401	BS162-CR401a	BS162-CR401a	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR413
					Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	Coleshill No. 3 Embankment
					0.1	0.35	1	0.3	1	2	4	6.5	9.5	10.5	13.5	16.5	0.1	0.3	1	2	5.5	7.5	10.5	12	15	18.5	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	RTD1	RTD2	RTD2	RTD2	RTD2	SIM	SIM	SIM	SIM	SIM	TOP	RTD	RTD	RTD	SIM	SIM	SIM	SIM	SIM	SIM	TOP
Endosulfan II	mg/kg	SOLID	6300	2400														<0.0100									
Endosulphan sulphate*	mg/kg	SOLID	-	-														<0.0100									
Endrin	mg/kg	SOLID	-	-														<0.0100									
Enterococci	CFU/g	SOLID	-	-																							
EPH >C10-12	mg/kg	SOLID	-	-																							
EPH >C10-35	mg/kg	SOLID	-	-		3	2	30	<1.0000									10	<1.0000								32
EPH >C10-40	mg/kg	SOLID	-	-																							
EPH >C12-16	mg/kg	SOLID	-	-																							
EPH >C16-21	mg/kg	SOLID	-	-																							
EPH >C21-35	mg/kg	SOLID	-	-																							
EPH >C8-40	mg/kg	SOLID	-	-																							
EPH/TPH >C10-12	mg/kg	SOLID	-	-																							
EPH/TPH >C10-25	mg/kg	SOLID	-	-																							
EPH/TPH >C12-16	mg/kg	SOLID	-	-																							
EPH/TPH >C16-21	mg/kg	SOLID	-	-																							
EPH/TPH >C21-40	mg/kg	SOLID	-	-																							
EPH/TPH >C24-40	mg/kg	SOLID	-	-																							
EPH/TPH >C35-40	mg/kg	SOLID	-	-		<1.0000	<1.0000	6	<1.0000									<1.0000	<1.0000								4
EPH/TPH >C6-8	mg/kg	SOLID	-	-																							
EPH/TPH >C8-10	mg/kg	SOLID	-	-																							
Epoxiconazole*	mg/kg	SOLID	-	-														0.01									
EPTC*	mg/kg	SOLID	-	-														<0.0100									
Escherichia coli (Confirmed)	N/A	SOLID	-	-																							
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																							
Etaconazole*	mg/kg	SOLID	-	-														<0.0100									
Ethidimuron*	mg/kg	SOLID	-	-														<0.0100									
Ethiofencarb sulfone*	mg/kg	SOLID	-	-														<0.0100									
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-														<0.0100									
Ethiofencarb*	mg/kg	SOLID	-	-														<0.0100									
Ethion	mg/kg	SOLID	-	-														<0.0100									
Ethiprole*	mg/kg	SOLID	-	-														<0.0100									
Ethirimol*	mg/kg	SOLID	-	-														<0.0100									
Ethofumesate	mg/kg	SOLID	-	-														<0.0100									
Ethoprophos	mg/kg	SOLID	-	-														<0.0100									
Ethoxyquin*	mg/kg	SOLID	-	-														<0.0100									
Ethylbenzene	mg/kg	SOLID	5700	17000		<0.0100	<0.0100	<0.0100	<0.0100									<0.0100	<0.0100								<0.0100
Ethylparathion	mg/kg	SOLID	-	-														<0.0100									
Etofenprox*	mg/kg	SOLID	-	-														<0.0100									
Etoxazole*	mg/kg	SOLID	-	-														<0.0100									
Etrimphos	mg/kg	SOLID	-	-														<0.0100									
Famoxadone*	mg/kg	SOLID	-	-														<0.0100									
Famphur	mg/kg	SOLID	-	-														<0.0100									
Fenamidone*	mg/kg	SOLID	-	-														<0.0100									
Fenamiphos sulfone*	mg/kg	SOLID	-	-														<0.0100									
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-														<0.0100									
Fenamiphos*	mg/kg	SOLID	-	-														<0.0100									
Fenarimol	mg/kg	SOLID	-	-														<0.0100									
Fenazaquin*	mg/kg	SOLID	-	-														<0.0100									
Fenbuconazole*	mg/kg	SOLID	-	-														<0.0100									
Fenchlorphos oxon*	mg/kg	SOLID	-	-														<0.0100									
Fenhexamid*	mg/kg	SOLID	-	-														<0.0100									
Fenitrothion	mg/kg	SOLID	-	-														<0.0100									
Fenpiclonil*	mg/kg	SOLID	-	-														<0.0100									
Fenpropathrin*	mg/kg	SOLID	-	-														<0.0100									
Fenpropidin*	mg/kg	SOLID	-	-														<0.0100									
Fenpropimorph*	mg/kg	SOLID	-	-														<0.0100									
Fenpyroximate*	mg/kg	SOLID	-	-														<0.0100									
Fenson*	mg/kg	SOLID	-	-														<0.0100									
Fensulfothion	mg/kg	SOLID	-	-														<0.0100									
Fenthion	mg/kg	SOLID	-	-														<0.0100									
Fenthion Sulphone*	mg/kg	SOLID	-	-														<0.0100									
Fenthion Sulphoxide*	mg/kg	SOLID	-	-														<0.0100									
Fenuron	mg/kg	SOLID	-	-														<0.0100									
Fenvalerate	mg/kg	SOLID	-	-														<0.0100									
Fipronil sulphone*	mg/kg	SOLID	-	-														<0.0100									
Fipronil*	mg/kg	SOLID	-	-														<0.0100									
Flamprop-isopropyl	mg/kg	SOLID	-	-														<0.0100									
Flonicamid*	mg/kg	SOLID	-	-														<0.0100									
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-														<0.0100									
Fluazinam*	mg/kg	SOLID	-	-														<0.0100									
Flucythrinate*	mg/kg	SOLID	-	-														<0.0100									
Fludioxonil*	mg/kg	SOLID	-	-														<0.0100									
Flufenacet*	mg/kg	SOLID	-	-														<0.0100									
Flufenoxuron*	mg/kg	SOLID	-	-														<0.0100									
Flumetralin*	mg/kg	SOLID	-	-														<0.0100									
Flumioxazin*	mg/kg	SOLID	-	-														<0.0100									
Flumorph*	mg/kg	SOLID	-	-														<0.0100									
Fluometuron*	mg/kg	SOLID	-	-														<0.0100									
Fluopicolide*	mg/kg	SOLID	-	-														<0.0100									
Fluopyram*	mg/kg	SOLID	-	-														<0.0100									
Fluoranthene	mg/kg	SOLID	23000	6300		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								0.2
Fluorene	mg/kg	SOLID	63000	20000		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Fluorochloridone*	mg/kg	SOLID	-	-														<0.0100									
Fluoroxypyr	mg/kg	SOLID	-	-														<0.0100									
Fluquinconazole*	mg/kg	SOLID	-	-														<0.0100									
Flurtamone*	mg/kg	SOLID	-	-														<0.0100									
Flusilazole*	mg/kg	SOLID	-	-														<0.0100									
Flutolanil*	mg/kg	SOLID	-	-														<0.0100									
Flutriafol*	mg/kg	SOLID	-	-														<0.0100									
Fluxapyroxad*	mg/kg	SOLID	-	-														0.01									
Folpet	mg/kg	SOLID	-	-														<0.0100									
Fonophos*	mg/kg	SOLID	-	-														<0.0100									
Forchlorfenuron*	mg/kg	SOLID	-	-														<0.0100									
Formetanate*	mg/kg	SOLID	-	-														<0.0100									
Formothion*	mg/kg	SOLID	-	-														<0.0100									
Fraction of non-crushable material*	%	SOLID	-	-																							
Fraction of sample above 4mm*	%	SOLID	-	-																							
Fuberidazole*	mg/kg	SOLID	-	-														<0.0100									
Furalaxyl*	mg/kg	SOLID	-	-														<0.0100									
Furathiocarb*	mg/kg	SOLID	-	-														<0.0100									
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14														<0.0100									
GRO >C5-10	mg/kg	SOLID	-	-		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
GRO >C5-12	mg/kg	SOLID	-	-																							
GRO >C7-8	mg/kg	SOLID	-	-																							
GRO >C8-10	mg/kg	SOLID	-	-																							
GRO Surrogate % recovery	%	SOLID	-	-																							
Haloxyfop etotyl*	mg/kg	SOLID	-	-														<0.0100									
Haloxyfop Methyl*	mg/kg	SOLID	-	-														<0.0100									
Heptachlor	mg/kg	SOLID	-	-														<0.0100									
Heptachlor Epoxide	mg/kg	SOLID	-	-														<0.0100									
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-														<0.0100									
Heptanoic Acid	mg/kg	SOLID	-	-																							
Heptenophos	mg/kg	SOLID	-	-														<0.0100									
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30		<0.1000	<0.1000											<0.0100									
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48		<0.1000	<0.1000																				
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-		<0.2000	<0.2000																				
Hexachloroethane	mg/kg	SOLID	21	158		<0.1000	<0.1000																				
Hexaconazole	mg/kg	SOLID	-	-														<0.0100									
Hexaflumuron*	mg/kg	SOLID	-	-														<0.0100									
Hexazinone	mg/kg	SOLID	-	-														<0.0100									
Hexythiazox*	mg/kg	SOLID	-	-														<0.0100									
Imazalil*	mg/kg	SOLID	-	-														<0.0100									
Imidacloprid*	mg/kg	SOLID	-	-														<0.0100									
Imidan	mg/kg	SOLID	-	-														<0.0100									
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Indoxacarb*	mg/kg	SOLID	-	-														<0.0100									
Iodofenphos	mg/kg	SOLID	-	-														<0.0100									
Iprodione*	mg/kg	SOLID	-	-														<0.0100									
Iprovalicarb*	mg/kg	SOLID	-	-														<0.0100									
Isazofos*	mg/kg	SOLID	-	-														<0.0100									
Isocarbophos*	mg/kg	SOLID	-	-														<0.0100									
Isodrin	mg/kg	SOLID	-	-														<0.0100									
Isofenphos Methyl*	mg/kg	SOLID	-	-														<0.0100									
Isofenphos*	mg/kg	SOLID	-	-														<0.0100									
Isomethiozin*	mg/kg	SOLID	-	-														<0.0100									
Isophorone	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
Isoprocarb*	mg/kg	SOLID	-	-														<0.0100									
Isopropylbenzene	mg/kg	SOLID	1300	23000		<0.0500	<0.0500																				
Isoprothiolane*	mg/kg	SOLID	-	-														<0.0100									
Isoproturon	mg/kg	SOLID	-	-														<0.0100									
Isopyrazam*	mg/kg	SOLID	-	-														<0.0100									
Isothiazolinone*	mg/kg	SOLID	-	-														<0.0100									
Isoxaben*	mg/kg	SOLID	-	-														<0.0100									
Karbutilate*	mg/kg	SOLID	-	-														<0.0100									
Kresoxim Methyl*	mg/kg	SOLID	-	-														<0.0100									
Lambda Cyhalothrin	mg/kg	SOLID	-	-														<0.0100									
Lead	mg/kg	SOLID	2300	1300		13	6	44	9									40	6								37
Lenacil*	mg/kg	SOLID	-	-														<0.0100									
Leptophos	mg/kg	SOLID	-	-														<0.0100									
Linuron	mg/kg	SOLID	-	-														<0.0100									
Lufenuron*	mg/kg	SOLID	-	-														<0.0100									
m,p xylenes	mg/kg	SOLID	-	-		<0.0100	<0.0100	<0.0100	<0.0100									<0.0100	<0.0100								<0.0100
m,p,o Xylenes	mg/kg	SOLID	-	-																							
Malaoxon*	mg/kg	SOLID	-	-														<0.0100									
Malathion	mg/kg	SOLID	-	-														<0.0100									
Mandipropamid*	mg/kg	SOLID	-	-														<0.0100									
MCPA-thioethyl*	mg/kg	SOLID	-	-														<0.0100									
Mecarbam*	mg/kg	SOLID	-	-														<0.0100									
Mecoprop	mg/kg	SOLID	-	-														<0.0100									
Mefenacet*	mg/kg	SOLID	-	-														<0.0100									

Max of Normalised Results																														
					BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	ML154-TP023	ML155-CP019	ML155-CP019	ML155-CP019	ML155-CP024	ML155-CP024	ML155-CP024	ML155-CP044	ML155-CP044	ML155-CP044	ML155-CR001	ML155-CR001	ML155-CR005	ML155-CR022	ML155-CR022	ML155-CR403	ML155-CR403	ML155-CR403
					Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting
					0.1	0.5	1	4	6.5	9.5	10.5	13.5	1	0.1	1	2	0.05	0.6	3	0.05	0.5	1	0.05	1	0	0.5	0.9	0.3	0.5	1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	RTD1	RTD1	RTD1	SIM	SIM	SIM	SIM	TILMP	TOP	TILMP	TILMP	TOP	GFDMP	GFDMP	TOP	TILMP	TILMP	TOP	ALV	MGR	MGR	MGR	MGR	MGR	BCMU
Endosulfan II	mg/kg	SOLID	6300	2400																										
Endosulphan sulphate*	mg/kg	SOLID	-	-																										
Endrin	mg/kg	SOLID	-	-																										
Enterococci	CFU/g	SOLID	-	-																										
EPH >C10-12	mg/kg	SOLID	-	-													<2.0000	<2.0000	<2.0000											
EPH >C10-35	mg/kg	SOLID	-	-		5	3																							
EPH >C10-40	mg/kg	SOLID	-	-																								25	25	
EPH >C12-16	mg/kg	SOLID	-	-													<2.0000	<2.0000	<2.0000											
EPH >C16-21	mg/kg	SOLID	-	-													<2.0000	<2.0000	<2.0000											
EPH >C21-35	mg/kg	SOLID	-	-													31.9	<4.9700	<5.3500											
EPH >C8-40	mg/kg	SOLID	-	-													39	<11.0000	<12.0000											
EPH/TPH >C10-12	mg/kg	SOLID	-	-																										
EPH/TPH >C10-25	mg/kg	SOLID	-	-																										
EPH/TPH >C12-16	mg/kg	SOLID	-	-																										
EPH/TPH >C16-21	mg/kg	SOLID	-	-																										
EPH/TPH >C21-40	mg/kg	SOLID	-	-																										
EPH/TPH >C24-40	mg/kg	SOLID	-	-																										
EPH/TPH >C35-40	mg/kg	SOLID	-	-		<1.0000	<1.0000						<1.0000	<1.0000	<1.0000					<1.0000		<1.0000	<1.0000	<1.0000	11	47	10	<10.0000	<10.0000	
EPH/TPH >C6-8	mg/kg	SOLID	-	-																										
EPH/TPH >C8-10	mg/kg	SOLID	-	-																										
Epoxiconazole*	mg/kg	SOLID	-	-																										
EPTC*	mg/kg	SOLID	-	-																										
Escherichia coli (Confirmed)	N/A	SOLID	-	-																										
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																										
Etaconazole*	mg/kg	SOLID	-	-																										
Ethidimuron*	mg/kg	SOLID	-	-																										
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																										
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																										
Ethiofencarb*	mg/kg	SOLID	-	-																										
Ethion	mg/kg	SOLID	-	-																										
Ethiprole*	mg/kg	SOLID	-	-																										
Ethirimol*	mg/kg	SOLID	-	-																										
Ethofumesate	mg/kg	SOLID	-	-																										
Ethoprophos	mg/kg	SOLID	-	-																										
Ethoxyquin*	mg/kg	SOLID	-	-																										
Ethylbenzene	mg/kg	SOLID	5700	17000		<0.0100	<0.0100						<0.0100	<0.0100	<0.0100		<0.0020	<0.0020	<0.0020	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	
Ethylparathion	mg/kg	SOLID	-	-																										
Etofenprox*	mg/kg	SOLID	-	-																										
Etoxazole*	mg/kg	SOLID	-	-																										
Etrimphos	mg/kg	SOLID	-	-																										
Famoxadone*	mg/kg	SOLID	-	-																										
Famphur	mg/kg	SOLID	-	-																										
Fenamidone*	mg/kg	SOLID	-	-																										
Fenamiphos sulfone*	mg/kg	SOLID	-	-																										
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																										
Fenamiphos*	mg/kg	SOLID	-	-																										
Fenarimol	mg/kg	SOLID	-	-																										
Fenazaquin*	mg/kg	SOLID	-	-																										
Fenbuconazole*	mg/kg	SOLID	-	-																										
Fenchlorphos oxon*	mg/kg	SOLID	-	-																										
Fenhexamid*	mg/kg	SOLID	-	-																										
Fenitrothion	mg/kg	SOLID	-	-																										
Fenpiclonil*	mg/kg	SOLID	-	-																										
Fenpropathrin*	mg/kg	SOLID	-	-																										
Fenpropidin*	mg/kg	SOLID	-	-																										
Fenpropimorph*	mg/kg	SOLID	-	-																										
Fenpyroximate*	mg/kg	SOLID	-	-																										
Fenson*	mg/kg	SOLID	-	-																										
Fensulfothion	mg/kg	SOLID	-	-																										
Fenthion	mg/kg	SOLID	-	-																										
Fenthion Sulphone*	mg/kg	SOLID	-	-																										
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																										
Fenuron	mg/kg	SOLID	-	-																										
Fenvalerate	mg/kg	SOLID	-	-																										
Fipronil sulphone*	mg/kg	SOLID	-	-																										
Fipronil*	mg/kg	SOLID	-	-																										
Flamprop-isopropyl	mg/kg	SOLID	-	-																										
Flonicamid*	mg/kg	SOLID	-	-																										
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																										
Fluazinam*	mg/kg	SOLID	-	-																										
Flucythrinate*	mg/kg	SOLID	-	-																										
Fludioxonil*	mg/kg	SOLID	-	-																										
Flufenacet*	mg/kg	SOLID	-	-																										
Flufenoxuron*	mg/kg	SOLID	-	-																										
Flumetralin*	mg/kg	SOLID	-	-																										
Flumioxazin*	mg/kg	SOLID	-	-																										
Flumorph*	mg/kg	SOLID	-	-																										
Fluometuron*	mg/kg	SOLID	-	-																										
Fluopicolide*	mg/kg	SOLID	-	-																										
Fluopyram*	mg/kg	SOLID	-	-																										
Fluoranthene	mg/kg	SOLID	23000	6300		<0.1000	<0.1000						<0.1000	0.2	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	1.5	1.4	<0.1000	<0.1000	<0.1000	
Fluorene	mg/kg	SOLID	63000	20000		<0.1000	<0.1000						<0.1000	<0.1000	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.1	<0.1000	<0.1000	<0.1000	
Fluorochloridone*	mg/kg	SOLID	-	-																										
Fluoroxypyr	mg/kg	SOLID	-	-																										
Fluquinconazole*	mg/kg	SOLID	-	-																										
Flurtamone*	mg/kg	SOLID	-	-																										
Flusilazole*	mg/kg	SOLID	-	-																										
Flutolanil*	mg/kg	SOLID	-	-																										
Flutriafol*	mg/kg	SOLID	-	-																										
Fluxapyroxad*	mg/kg	SOLID	-	-																										
Folpet	mg/kg	SOLID	-	-																										
Fonophos*	mg/kg	SOLID	-	-																										
Forchlorfenuron*	mg/kg	SOLID	-	-																										
Formetanate*	mg/kg	SOLID	-	-																										
Formothion*	mg/kg	SOLID	-	-																										
Fraction of non-crushable material*	%	SOLID	-	-													0	0	0											
Fraction of sample above 4mm*	%	SOLID	-	-													14	27	0											
Fuberidazole*	mg/kg	SOLID	-	-																										
Furalaxyl*	mg/kg	SOLID	-	-																										
Furathiocarb*	mg/kg	SOLID	-	-																										
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																										
GRO >C5-10	mg/kg	SOLID	-	-		<0.1000	<0.1000						<0.1000	<0.1000	<0.1000					<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	
GRO >C5-12	mg/kg	SOLID	-	-																										
GRO >C7-8	mg/kg	SOLID	-	-																										
GRO >C8-10	mg/kg	SOLID	-	-													<2.0000	<2.0000	<2.0000											
GRO Surrogate % recovery	%	SOLID	-	-																										
Haloxyfop etotyl*	mg/kg	SOLID	-	-																										
Haloxyfop Methyl*	mg/kg	SOLID	-	-																										
Heptachlor	mg/kg	SOLID	-	-																										
Heptachlor Epoxide	mg/kg	SOLID	-	-																										
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																										
Heptanoic Acid	mg/kg	SOLID	-	-																										
Heptenophos	mg/kg	SOLID	-	-																										
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-										<0.5000	<0.5000					<0.5000			<0.5000	<0.5000						
Hexachloroethane	mg/kg	SOLID	21	158										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Hexaconazole	mg/kg	SOLID	-	-																										
Hexaflumuron*	mg/kg	SOLID	-	-																										
Hexazinone	mg/kg	SOLID	-	-																										
Hexythiazox*	mg/kg	SOLID	-	-																										
Imazalil*	mg/kg	SOLID	-	-																										
Imidacloprid*	mg/kg	SOLID	-	-																										
Imidan	mg/kg	SOLID	-	-																										
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150		<0.1000	<0.1000						<0.1000	<0.1000	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	0.5	0.3	<0.1000	<0.1000	<0.1000	
Indoxacarb*	mg/kg	SOLID	-	-																										
Iodofenphos	mg/kg	SOLID	-	-																										
Iprodione*	mg/kg	SOLID	-	-																										
Iprovalicarb*	mg/kg	SOLID	-	-																										
Isazofos*	mg/kg	SOLID	-	-																										
Isocarbophos*	mg/kg	SOLID	-	-																										
Isodrin	mg/kg	SOLID	-	-																										
Isofenphos Methyl*	mg/kg	SOLID	-	-																										
Isofenphos*	mg/kg	SOLID	-	-																										
Isomethiozin*	mg/kg	SOLID	-	-																										
Isophorone	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Isoprocarb*	mg/kg	SOLID	-	-																										
Isopropylbenzene	mg/kg	SOLID	1300	23000										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Isoprothiolane*	mg/kg	SOLID	-	-																										
Isoproturon	mg/kg	SOLID	-	-																										
Isopyrazam*	mg/kg	SOLID	-	-																										
Isothiazolinone*	mg/kg	SOLID	-	-																										
Isoxaben*	mg/kg	SOLID	-	-																										
Karbutilate*	mg/kg	SOLID	-	-																										
Kresoxim Methyl*	mg/kg	SOLID	-	-																										
Lambda Cyhalothrin	mg/kg	SOLID	-	-																										
Lead	mg/kg	SOLID	2300	1300		15	7						13	23	12		25	53.6	17.5	23		7	29	12	120	25	16	4	8	
Lenacil*	mg/kg	SOLID	-	-																										
Leptophos	mg/kg	SOLID	-	-																										
Linuron	mg/kg	SOLID	-	-																										
Lufenuron*	mg/kg	SOLID	-	-																										
m,p xylenes	mg/kg	SOLID	-	-		<0.0100	<0.0100						<0.0100	<0.0100	<0.0100		<0.0050	<0.0050	<0.0050	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	
m,p,o Xylenes	mg/kg	SOLID	-	-																										
Malaoxon*	mg/kg	SOLID	-	-																										
Malathion	mg/kg	SOLID	-	-																										
Mandipropamid*	mg/kg	SOLID	-	-																										
MCPA-thioethyl*	mg/kg	SOLID	-	-																										
Mecarbam*	mg/kg	SOLID	-	-																										
Mecoprop	mg/kg	SOLID	-	-																										
Mefenacet*	mg/kg	SOLID	-	-																										

Max of Normalised Results																																		
					ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-RC007	ML155-TP018	ML155-TP018	ML155-TP025	ML155-TP025
					Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting
					2	4.11	5.3	6.83	12.09	13.43	15.42	16.7	18.6	0.05	0.3	1	3	5.24	7.2	9.18	10.6	12	14.35	0.3	0.5	2	9.2	16.06	19.5	1.7	0	0.5	0	0.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	MGR	MGR	MGR	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	GFDMP	GFDMP	GFDMP	BCMU	BCMU	BCMU	MMG	MGR	MGR	TOP	TILMP
Endosulfan II	mg/kg	SOLID	6300	2400																														
Endosulphan sulphate*	mg/kg	SOLID	-	-																														
Endrin	mg/kg	SOLID	-	-																														
Enterococci	CFU/g	SOLID	-	-																														
EPH >C10-12	mg/kg	SOLID	-	-																														
EPH >C10-35	mg/kg	SOLID	-	-	50									4	2	3								4	6									
EPH >C10-40	mg/kg	SOLID	-	-																														
EPH >C12-16	mg/kg	SOLID	-	-																														
EPH >C16-21	mg/kg	SOLID	-	-																														
EPH >C21-35	mg/kg	SOLID	-	-																														
EPH >C8-40	mg/kg	SOLID	-	-																														
EPH/TPH >C10-12	mg/kg	SOLID	-	-																														
EPH/TPH >C10-25	mg/kg	SOLID	-	-																														
EPH/TPH >C12-16	mg/kg	SOLID	-	-																														
EPH/TPH >C16-21	mg/kg	SOLID	-	-																														
EPH/TPH >C21-40	mg/kg	SOLID	-	-																														
EPH/TPH >C24-40	mg/kg	SOLID	-	-																														
EPH/TPH >C35-40	mg/kg	SOLID	-	-	<10.0000									<1.0000	<1.0000	<1.0000								<1.0000	<1.0000						2	<1.0000	6	8
EPH/TPH >C6-8	mg/kg	SOLID	-	-																														
EPH/TPH >C8-10	mg/kg	SOLID	-	-																														
Epoxiconazole*	mg/kg	SOLID	-	-																														
EPTC*	mg/kg	SOLID	-	-																														
Escherichia coli (Confirmed)	N/A	SOLID	-	-																														
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																														
Etaconazole*	mg/kg	SOLID	-	-																														
Ethidimuron*	mg/kg	SOLID	-	-																														
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																														
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																														
Ethiofencarb*	mg/kg	SOLID	-	-																														
Ethion	mg/kg	SOLID	-	-																														
Ethiprole*	mg/kg	SOLID	-	-																														
Ethirimol*	mg/kg	SOLID	-	-																														
Ethofumesate	mg/kg	SOLID	-	-																														
Ethoprophos	mg/kg	SOLID	-	-																														
Ethoxyquin*	mg/kg	SOLID	-	-																														
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0100									<0.0100	<0.0100	<0.0100								<0.0100	<0.0100						<0.0100	<0.0100	<0.0100	<0.0100
Ethylparathion	mg/kg	SOLID	-	-																														
Etofenprox*	mg/kg	SOLID	-	-																														
Etoxazole*	mg/kg	SOLID	-	-																														
Etrimphos	mg/kg	SOLID	-	-																														
Famoxadone*	mg/kg	SOLID	-	-																														
Famphur	mg/kg	SOLID	-	-																														
Fenamidone*	mg/kg	SOLID	-	-																														
Fenamiphos sulfone*	mg/kg	SOLID	-	-																														
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																														
Fenamiphos*	mg/kg	SOLID	-	-																														
Fenarimol	mg/kg	SOLID	-	-																														
Fenazaquin*	mg/kg	SOLID	-	-																														
Fenbuconazole*	mg/kg	SOLID	-	-																														
Fenchlorphos oxon*	mg/kg	SOLID	-	-																														
Fenhexamid*	mg/kg	SOLID	-	-																														
Fenitrothion	mg/kg	SOLID	-	-																														
Fenpiclonil*	mg/kg	SOLID	-	-																														
Fenpropathrin*	mg/kg	SOLID	-	-																														
Fenpropidin*	mg/kg	SOLID	-	-																														
Fenpropimorph*	mg/kg	SOLID	-	-																														
Fenpyroximate*	mg/kg	SOLID	-	-																														
Fenson*	mg/kg	SOLID	-	-																														
Fensulfothion	mg/kg	SOLID	-	-																														
Fenthion	mg/kg	SOLID	-	-																														
Fenthion Sulphone*	mg/kg	SOLID	-	-																														
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																														
Fenuron	mg/kg	SOLID	-	-																														
Fenvalerate	mg/kg	SOLID	-	-																														
Fipronil sulphone*	mg/kg	SOLID	-	-																														
Fipronil*	mg/kg	SOLID	-	-																														
Flamprop-isopropyl	mg/kg	SOLID	-	-																														
Flonicamid*	mg/kg	SOLID	-	-																														
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																														
Fluazinam*	mg/kg	SOLID	-	-																														
Flucythrinate*	mg/kg	SOLID	-	-																														
Fludioxonil*	mg/kg	SOLID	-	-																														
Flufenacet*	mg/kg	SOLID	-	-																														
Flufenoxuron*	mg/kg	SOLID	-	-																														
Flumetralin*	mg/kg	SOLID	-	-																														
Flumioxazin*	mg/kg	SOLID	-	-																														
Flumorph*	mg/kg	SOLID	-	-																														
Fluometuron*	mg/kg	SOLID	-	-																														
Fluopicolide*	mg/kg	SOLID	-	-																														
Fluopyram*	mg/kg	SOLID	-	-																														
Fluoranthene	mg/kg	SOLID	23000	6300	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	0.6	0.2
Fluorene	mg/kg	SOLID	63000	20000	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	<0.1000	<0.1000
Fluorochloridone*	mg/kg	SOLID	-	-																														
Fluoroxypyr	mg/kg	SOLID	-	-																														
Fluquinconazole*	mg/kg	SOLID	-	-																														
Flurtamone*	mg/kg	SOLID	-	-																														
Flusilazole*	mg/kg	SOLID	-	-																														
Flutolanil*	mg/kg	SOLID	-	-																														
Flutriafol*	mg/kg	SOLID	-	-																														
Fluxapyroxad*	mg/kg	SOLID	-	-																														
Folpet	mg/kg	SOLID	-	-																														
Fonophos*	mg/kg	SOLID	-	-																														
Forchlorfenuron*	mg/kg	SOLID	-	-																														
Formetanate*	mg/kg	SOLID	-	-																														
Formothion*	mg/kg	SOLID	-	-																														
Fraction of non-crushable material*	%	SOLID	-	-																														
Fraction of sample above 4mm*	%	SOLID	-	-																														
Fuberidazole*	mg/kg	SOLID	-	-																														
Furalaxyl*	mg/kg	SOLID	-	-																														
Furathiocarb*	mg/kg	SOLID	-	-																														
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																														
GRO >C5-10	mg/kg	SOLID	-	-	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	<0.1000	<0.1000
GRO >C5-12	mg/kg	SOLID	-	-																														
GRO >C7-8	mg/kg	SOLID	-	-																														
GRO >C8-10	mg/kg	SOLID	-	-																														
GRO Surrogate % recovery	%	SOLID	-	-																														
Haloxyfop etotyl*	mg/kg	SOLID	-	-																														
Haloxyfop Methyl*	mg/kg	SOLID	-	-																														
Heptachlor	mg/kg	SOLID	-	-																														
Heptachlor Epoxide	mg/kg	SOLID	-	-																														
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																														
Heptanoic Acid	mg/kg	SOLID	-	-																														
Heptenophos	mg/kg	SOLID	-	-																														
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																														
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48																														
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-																														
Hexachloroethane	mg/kg	SOLID	21	158																														
Hexaconazole	mg/kg	SOLID	-	-																														
Hexaflumuron*	mg/kg	SOLID	-	-																														
Hexazinone	mg/kg	SOLID	-	-																														
Hexythiazox*	mg/kg	SOLID	-	-																														
Imazalil*	mg/kg	SOLID	-	-																														
Imidacloprid*	mg/kg	SOLID	-	-																														
Imidan	mg/kg	SOLID	-	-																														
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	0.2	<0.1000
Indoxacarb*	mg/kg	SOLID	-	-																														
Iodofenphos	mg/kg	SOLID	-	-																														
Iprodione*	mg/kg	SOLID	-	-																														
Iprovalicarb*	mg/kg	SOLID	-	-																														
Isazofos*	mg/kg	SOLID	-	-																														
Isocarbophos*	mg/kg	SOLID	-	-																														
Isodrin	mg/kg	SOLID	-	-																														
Isofenphos Methyl*	mg/kg	SOLID	-	-																														
Isofenphos*	mg/kg	SOLID	-	-																														
Isomethiozin*	mg/kg	SOLID	-	-																														
Isophorone	mg/kg	SOLID	-	-																														
Isoprocarb*	mg/kg	SOLID	-	-																														
Isopropylbenzene	mg/kg	SOLID	1300	23000																														
Isoprothiolane*	mg/kg	SOLID	-	-																														
Isoproturon	mg/kg	SOLID	-	-																														
Isopyrazam*	mg/kg	SOLID	-	-																														
Isothiazolinone*	mg/kg	SOLID	-	-																														
Isoxaben*	mg/kg	SOLID	-	-																														
Karbutilate*	mg/kg	SOLID	-	-																														
Kresoxim Methyl*	mg/kg	SOLID	-	-																														
Lambda Cyhalothrin	mg/kg	SOLID	-	-																														
Lead	mg/kg	SOLID	2300	1300	5									5	6	4								4	10						85	11	380	630
Lenacil*	mg/kg	SOLID	-	-																														
Leptophos	mg/kg	SOLID	-	-																														
Linuron	mg/kg	SOLID	-	-																														
Lufenuron*	mg/kg	SOLID	-	-																														
m,p xylenes	mg/kg	SOLID	-	-	<0.0100									<0.0100	<0.0100	<0.0100								<0.0100	<0.0100						<0.0100	<0.0100	<0.0100	<0.0100
m,p,o Xylenes	mg/kg	SOLID	-	-																														
Malaoxon*	mg/kg	SOLID	-	-																														
Malathion	mg/kg	SOLID	-	-																														
Mandipropamid*	mg/kg	SOLID	-	-																														
MCPA-thioethyl*	mg/kg	SOLID	-	-																														
Mecarbam*	mg/kg	SOLID	-	-																														
Mecoprop	mg/kg	SOLID	-	-																														
Mefenacet*	mg/kg	SOLID	-	-																														

Max of Normalised Results																											
					ML155-TP041	ML155-WS001	ML155-WS002	ML155-WS024	ML155-WS042	ML155-WS044	ML155-WS044	ML156-CP008	ML156-CP008	ML156-CP023	ML156-CP028	ML156-CP028	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR014	ML156-CR014	ML156-CR020	ML156-CR021	ML156-CR023	ML156-CR025
					Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station
					0	1.67	0.4	0.3	2	0	0.3	0.35	2.35	0.5	1	6	1.5	3	5.5	6.9	9.4	0.5	12.2	0.2	2.25	0.1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	TILMP	TILMP	ALV	TOP	ALV	MGR	MGR	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MMG	GFDUD	MMG	MGR	MMG	TOP	MGR
Endosulfan II	mg/kg	SOLID	6300	2400																							
Endosulphan sulphate*	mg/kg	SOLID	-	-																							
Endrin	mg/kg	SOLID	-	-																							
Enterococci	CFU/g	SOLID	-	-																							
EPH >C10-12	mg/kg	SOLID	-	-								15.4	3.91	<2.0000	<2.0000							<2.0000	<3.0000				
EPH >C10-35	mg/kg	SOLID	-	-																							
EPH >C10-40	mg/kg	SOLID	-	-																				320			1300
EPH >C12-16	mg/kg	SOLID	-	-								<3.0000	26.3	<2.0000	<2.0000							<2.0000	<3.0000				
EPH >C16-21	mg/kg	SOLID	-	-								9.08	181	<2.0000	2.82							<2.0000	<3.0000				
EPH >C21-35	mg/kg	SOLID	-	-								71	606	9.65	10.6							9.94	12.07				
EPH >C8-40	mg/kg	SOLID	-	-								114	866	15	17							13	17				
EPH/TPH >C10-12	mg/kg	SOLID	-	-																							
EPH/TPH >C10-25	mg/kg	SOLID	-	-																						<10.0000	
EPH/TPH >C12-16	mg/kg	SOLID	-	-																							
EPH/TPH >C16-21	mg/kg	SOLID	-	-																							
EPH/TPH >C21-40	mg/kg	SOLID	-	-																							
EPH/TPH >C24-40	mg/kg	SOLID	-	-																						<10.0000	
EPH/TPH >C35-40	mg/kg	SOLID	-	-	2		4			<1.0000	<1.0000								<1.0000								
EPH/TPH >C6-8	mg/kg	SOLID	-	-																							
EPH/TPH >C8-10	mg/kg	SOLID	-	-																							
Epoxiconazole*	mg/kg	SOLID	-	-																							
EPTC*	mg/kg	SOLID	-	-																							
Escherichia coli (Confirmed)	N/A	SOLID	-	-																							
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																							
Etaconazole*	mg/kg	SOLID	-	-																							
Ethidimuron*	mg/kg	SOLID	-	-																							
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																							
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																							
Ethiofencarb*	mg/kg	SOLID	-	-																							
Ethion	mg/kg	SOLID	-	-																							
Ethiprole*	mg/kg	SOLID	-	-																							
Ethirimol*	mg/kg	SOLID	-	-																							
Ethofumesate	mg/kg	SOLID	-	-																							
Ethoprophos	mg/kg	SOLID	-	-																							
Ethoxyquin*	mg/kg	SOLID	-	-																							
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0100		<0.0100			<0.0100	<0.0100	<0.0030	0.003	<0.0020	<0.0020				<0.0100			<0.0020	<0.0030	<0.0100		<0.0100	<0.0100
Ethylparathion	mg/kg	SOLID	-	-																							
Etofenprox*	mg/kg	SOLID	-	-																							
Etoxazole*	mg/kg	SOLID	-	-																							
Etrimphos	mg/kg	SOLID	-	-																							
Famoxadone*	mg/kg	SOLID	-	-																							
Famphur	mg/kg	SOLID	-	-																							
Fenamidone*	mg/kg	SOLID	-	-																							
Fenamiphos sulfone*	mg/kg	SOLID	-	-																							
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																							
Fenamiphos*	mg/kg	SOLID	-	-																							
Fenarimol	mg/kg	SOLID	-	-																							
Fenazaquin*	mg/kg	SOLID	-	-																							
Fenbuconazole*	mg/kg	SOLID	-	-																							
Fenchlorphos oxon*	mg/kg	SOLID	-	-																							
Fenhexamid*	mg/kg	SOLID	-	-																							
Fenitrothion	mg/kg	SOLID	-	-																							
Fenpiclonil*	mg/kg	SOLID	-	-																							
Fenpropathrin*	mg/kg	SOLID	-	-																							
Fenpropidin*	mg/kg	SOLID	-	-																							
Fenpropimorph*	mg/kg	SOLID	-	-																							
Fenpyroximate*	mg/kg	SOLID	-	-																							
Fenson*	mg/kg	SOLID	-	-																							
Fensulfothion	mg/kg	SOLID	-	-																							
Fenthion	mg/kg	SOLID	-	-																							
Fenthion Sulphone*	mg/kg	SOLID	-	-																							
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																							
Fenuron	mg/kg	SOLID	-	-																							
Fenvalerate	mg/kg	SOLID	-	-																							
Fipronil sulphone*	mg/kg	SOLID	-	-																							
Fipronil*	mg/kg	SOLID	-	-																							
Flamprop-isopropyl	mg/kg	SOLID	-	-																							
Flonicamid*	mg/kg	SOLID	-	-																							
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																							
Fluazinam*	mg/kg	SOLID	-	-																							
Flucythrinate*	mg/kg	SOLID	-	-																							
Fludioxonil*	mg/kg	SOLID	-	-																							
Flufenacet*	mg/kg	SOLID	-	-																							
Flufenoxuron*	mg/kg	SOLID	-	-																							
Flumetralin*	mg/kg	SOLID	-	-																							
Flumioxazin*	mg/kg	SOLID	-	-																							
Flumorph*	mg/kg	SOLID	-	-																							
Fluometuron*	mg/kg	SOLID	-	-																							
Fluopicolide*	mg/kg	SOLID	-	-																							
Fluopyram*	mg/kg	SOLID	-	-																							
Fluoranthene	mg/kg	SOLID	23000	6300	<0.1000		0.1			<0.1000	<0.1000	<0.1400	10.4	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	1.5
Fluorene	mg/kg	SOLID	63000	20000	<0.1000		<0.1000			<0.1000	<0.1000	<0.1400	0.44	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	<0.0300
Fluorochloridone*	mg/kg	SOLID	-	-																							
Fluoroxypyr	mg/kg	SOLID	-	-																							
Fluquinconazole*	mg/kg	SOLID	-	-																							
Flurtamone*	mg/kg	SOLID	-	-																							
Flusilazole*	mg/kg	SOLID	-	-																							
Flutolanil*	mg/kg	SOLID	-	-																							
Flutriafol*	mg/kg	SOLID	-	-																							
Fluxapyroxad*	mg/kg	SOLID	-	-																							
Folpet	mg/kg	SOLID	-	-																							
Fonophos*	mg/kg	SOLID	-	-																							
Forchlorfenuron*	mg/kg	SOLID	-	-																							
Formetanate*	mg/kg	SOLID	-	-																							
Formothion*	mg/kg	SOLID	-	-																							
Fraction of non-crushable material*	%	SOLID	-	-								0	0	0	0							0	0				
Fraction of sample above 4mm*	%	SOLID	-	-								43	37	35	17.9							42.1	8.4				
Fuberidazole*	mg/kg	SOLID	-	-																							
Furalaxyl*	mg/kg	SOLID	-	-																							
Furathiocarb*	mg/kg	SOLID	-	-																							
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																							
GRO >C5-10	mg/kg	SOLID	-	-	<0.1000		<0.1000			<0.1000	<0.1000								<0.1000							<0.1000	
GRO >C5-12	mg/kg	SOLID	-	-																							
GRO >C7-8	mg/kg	SOLID	-	-																							
GRO >C8-10	mg/kg	SOLID	-	-								7.44	<3.0000	<2.0000	<2.0000							<2.0000	<3.0000				
GRO Surrogate % recovery	%	SOLID	-	-																							
Haloxyfop etotyl*	mg/kg	SOLID	-	-																							
Haloxyfop Methyl*	mg/kg	SOLID	-	-																							
Heptachlor	mg/kg	SOLID	-	-																							
Heptachlor Epoxide	mg/kg	SOLID	-	-																							
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																							
Heptanoic Acid	mg/kg	SOLID	-	-																							
Heptenophos	mg/kg	SOLID	-	-																							
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																							
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48																							
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-																							
Hexachloroethane	mg/kg	SOLID	21	158																							
Hexaconazole	mg/kg	SOLID	-	-																							
Hexaflumuron*	mg/kg	SOLID	-	-																							
Hexazinone	mg/kg	SOLID	-	-																							
Hexythiazox*	mg/kg	SOLID	-	-																							
Imazalil*	mg/kg	SOLID	-	-																							
Imidacloprid*	mg/kg	SOLID	-	-																							
Imidan	mg/kg	SOLID	-	-																							
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	<0.1000		<0.1000			<0.1000	<0.1000	<0.1400	1.49	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	0.21
Indoxacarb*	mg/kg	SOLID	-	-																							
Iodofenphos	mg/kg	SOLID	-	-																							
Iprodione*	mg/kg	SOLID	-	-																							
Iprovalicarb*	mg/kg	SOLID	-	-																							
Isazofos*	mg/kg	SOLID	-	-																							
Isocarbophos*	mg/kg	SOLID	-	-																							
Isodrin	mg/kg	SOLID	-	-																							
Isofenphos Methyl*	mg/kg	SOLID	-	-																							
Isofenphos*	mg/kg	SOLID	-	-																							
Isomethiozin*	mg/kg	SOLID	-	-																							
Isophorone	mg/kg	SOLID	-	-																							
Isoprocarb*	mg/kg	SOLID	-	-																							
Isopropylbenzene	mg/kg	SOLID	1300	23000																							
Isoprothiolane*	mg/kg	SOLID	-	-																							
Isoproturon	mg/kg	SOLID	-	-																							
Isopyrazam*	mg/kg	SOLID	-	-																							
Isothiazolinone*	mg/kg	SOLID	-	-																							
Isoxaben*	mg/kg	SOLID	-	-																							
Karbutilate*	mg/kg	SOLID	-	-																							
Kresoxim Methyl*	mg/kg	SOLID	-	-																							
Lambda Cyhalothrin	mg/kg	SOLID	-	-																							
Lead	mg/kg	SOLID	2300	1300	53		47			26	3	207.4	155.8	5.99	6.8				12			14.7	8.9	43		23	15
Lenacil*	mg/kg	SOLID	-	-																							
Leptophos	mg/kg	SOLID	-	-																							
Linuron	mg/kg	SOLID	-	-																							
Lufenuron*	mg/kg	SOLID	-	-																							
m,p xylenes	mg/kg	SOLID	-	-	<0.0100		<0.0100			<0.0100	<0.0100	<0.0070	<0.0060	<0.0040	<0.0040				<0.0100			<0.0040	<0.0060				
m,p,o Xylenes	mg/kg	SOLID	-	-																							
Malaoxon*	mg/kg	SOLID	-	-																							
Malathion	mg/kg	SOLID	-	-																							
Mandipropamid*	mg/kg	SOLID	-	-																							
MCPA-thioethyl*	mg/kg	SOLID	-	-																							
Mecarbam*	mg/kg	SOLID	-	-																							
Mecoprop	mg/kg	SOLID	-	-																							
Mefenacet*	mg/kg	SOLID	-	-																							

Max of Normalised Results																																
					ML156-CR025	ML156-CR027	ML156-CR035	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-TP006	ML156-TP008	ML156-TP027	ML156-TP036	ML156-TP036	ML156-TP100	ML156-TP101	ML156-WS025	ML157-CP001	ML157-CP024	ML157-CR010	ML157-CR012	ML157-CR012	ML157-CR012	ML157-CR012	ML157-CR013
					Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting
					0.3	0.2	0.3	0.3	1	3.87	5.06	9.2	10.4	12.7	15.89	19.3	0.3	1.5	1	2.5	4	0.6	0.3	0.3	0.5	1	0.75	0.05	0.1	0.4	1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	GFDMP	GFDMP	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	TOP	MMG	GFDUD	MGR	MGR	GFDUD	TOP	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MMG	MGR
Endosulfan II	mg/kg	SOLID	6300	2400																												
Endosulphan sulphate*	mg/kg	SOLID	-	-																												
Endrin	mg/kg	SOLID	-	-																												
Enterococci	CFU/g	SOLID	-	-																												
EPH >C10-12	mg/kg	SOLID	-	-													<2.0000		<2.0000	16.7	23.5	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000						
EPH >C10-35	mg/kg	SOLID	-	-				9	3																							
EPH >C10-40	mg/kg	SOLID	-	-	190	3400	3100																				<10.0000					
EPH >C12-16	mg/kg	SOLID	-	-													<2.0000		<2.0000	17	79.1	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000						
EPH >C16-21	mg/kg	SOLID	-	-													3.2		<2.0000	117	429	3.08	3.12	<2.0000	<2.0000	<2.0000						
EPH >C21-35	mg/kg	SOLID	-	-													30.8		6.32	1070	3390	13.5	13.8	7.86	8.23	6.81						
EPH >C8-40	mg/kg	SOLID	-	-													16		<11.0000	1390	4180	20	20	11	11	11						
EPH/TPH >C10-12	mg/kg	SOLID	-	-																									<10.0000	<10.0000	<10.0000	<10.0000
EPH/TPH >C10-25	mg/kg	SOLID	-	-																												
EPH/TPH >C12-16	mg/kg	SOLID	-	-																									<10.0000	<10.0000	<10.0000	<10.0000
EPH/TPH >C16-21	mg/kg	SOLID	-	-																									<10.0000	<10.0000	<10.0000	146
EPH/TPH >C21-40	mg/kg	SOLID	-	-																									34	27.2	<10.0000	652
EPH/TPH >C24-40	mg/kg	SOLID	-	-																												
EPH/TPH >C35-40	mg/kg	SOLID	-	-				<1.0000	<1.0000																							
EPH/TPH >C6-8	mg/kg	SOLID	-	-																									<10.0000	<10.0000	<10.0000	<10.0000
EPH/TPH >C8-10	mg/kg	SOLID	-	-																									<10.0000	<10.0000	<10.0000	<10.0000
Epoxiconazole*	mg/kg	SOLID	-	-																												
EPTC*	mg/kg	SOLID	-	-																												
Escherichia coli (Confirmed)	N/A	SOLID	-	-																												
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																												
Etaconazole*	mg/kg	SOLID	-	-																												
Ethidimuron*	mg/kg	SOLID	-	-																												
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																												
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																												
Ethiofencarb*	mg/kg	SOLID	-	-																												
Ethion	mg/kg	SOLID	-	-																												
Ethiprole*	mg/kg	SOLID	-	-																												
Ethirimol*	mg/kg	SOLID	-	-																												
Ethofumesate	mg/kg	SOLID	-	-																												
Ethoprophos	mg/kg	SOLID	-	-																												
Ethoxyquin*	mg/kg	SOLID	-	-																												
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100								<0.0020		<0.0020	<0.0030	0.006	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0100		<0.0030	<0.0030	<0.0030	<0.0030
Ethylparathion	mg/kg	SOLID	-	-																												
Etofenprox*	mg/kg	SOLID	-	-																												
Etoxazole*	mg/kg	SOLID	-	-																												
Etrimphos	mg/kg	SOLID	-	-																												
Famoxadone*	mg/kg	SOLID	-	-																												
Famphur	mg/kg	SOLID	-	-																												
Fenamidone*	mg/kg	SOLID	-	-																												
Fenamiphos sulfone*	mg/kg	SOLID	-	-																												
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																												
Fenamiphos*	mg/kg	SOLID	-	-																												
Fenarimol	mg/kg	SOLID	-	-																												
Fenazaquin*	mg/kg	SOLID	-	-																												
Fenbuconazole*	mg/kg	SOLID	-	-																												
Fenchlorphos oxon*	mg/kg	SOLID	-	-																												
Fenhexamid*	mg/kg	SOLID	-	-																												
Fenitrothion	mg/kg	SOLID	-	-																												
Fenpiclonil*	mg/kg	SOLID	-	-																												
Fenpropathrin*	mg/kg	SOLID	-	-																												
Fenpropidin*	mg/kg	SOLID	-	-																												
Fenpropimorph*	mg/kg	SOLID	-	-																												
Fenpyroximate*	mg/kg	SOLID	-	-																												
Fenson*	mg/kg	SOLID	-	-																												
Fensulfothion	mg/kg	SOLID	-	-																												
Fenthion	mg/kg	SOLID	-	-																												
Fenthion Sulphone*	mg/kg	SOLID	-	-																												
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																												
Fenuron	mg/kg	SOLID	-	-																												
Fenvalerate	mg/kg	SOLID	-	-																												
Fipronil sulphone*	mg/kg	SOLID	-	-																												
Fipronil*	mg/kg	SOLID	-	-																												
Flamprop-isopropyl	mg/kg	SOLID	-	-																												
Flonicamid*	mg/kg	SOLID	-	-																												
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																												
Fluazinam*	mg/kg	SOLID	-	-																												
Flucythrinate*	mg/kg	SOLID	-	-																												
Fludioxonil*	mg/kg	SOLID	-	-																												
Flufenacet*	mg/kg	SOLID	-	-																												
Flufenoxuron*	mg/kg	SOLID	-	-																												
Flumetralin*	mg/kg	SOLID	-	-																												
Flumioxazin*	mg/kg	SOLID	-	-																												
Flumorph*	mg/kg	SOLID	-	-																												
Fluometuron*	mg/kg	SOLID	-	-																												
Fluopicolide*	mg/kg	SOLID	-	-																												
Fluopyram*	mg/kg	SOLID	-	-																												
Fluoranthene	mg/kg	SOLID	23000	6300	0.19	0.18	0.62	<0.1000	<0.1000								0.1		<0.0800	0.55	0.7	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.03	0.302	<0.0170	0.0441	<0.0170	127
Fluorene	mg/kg	SOLID	63000	20000	<0.0300	<0.0300	0.16	<0.1000	<0.1000								<0.0900		<0.0800	<0.1300	<0.1500	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0300	0.22	<0.0100	<0.0100	<0.0100	0.876
Fluorochloridone*	mg/kg	SOLID	-	-																												
Fluoroxypyr	mg/kg	SOLID	-	-																												
Fluquinconazole*	mg/kg	SOLID	-	-																												
Flurtamone*	mg/kg	SOLID	-	-																												
Flusilazole*	mg/kg	SOLID	-	-																												
Flutolanil*	mg/kg	SOLID	-	-																												
Flutriafol*	mg/kg	SOLID	-	-																												
Fluxapyroxad*	mg/kg	SOLID	-	-																												
Folpet	mg/kg	SOLID	-	-																												
Fonophos*	mg/kg	SOLID	-	-																												
Forchlorfenuron*	mg/kg	SOLID	-	-																												
Formetanate*	mg/kg	SOLID	-	-																												
Formothion*	mg/kg	SOLID	-	-																												
Fraction of non-crushable material*	%	SOLID	-	-													0		0	0	0	0	0	0	0	0						
Fraction of sample above 4mm*	%	SOLID	-	-													23		68	32	35	7.3	11.6	5.3	38.7	0						
Fuberidazole*	mg/kg	SOLID	-	-																												
Furalaxyl*	mg/kg	SOLID	-	-																												
Furathiocarb*	mg/kg	SOLID	-	-																												
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																												
GRO >C5-10	mg/kg	SOLID	-	-				<0.1000	<0.1000																							
GRO >C5-12	mg/kg	SOLID	-	-																												
GRO >C7-8	mg/kg	SOLID	-	-																												
GRO >C8-10	mg/kg	SOLID	-	-													<2.0000		<2.0000	8.67	7.21	<2.0000	<2.0000	<2.0000	<2.0000	<2.0000						
GRO Surrogate % recovery	%	SOLID	-	-																												
Haloxyfop etotyl*	mg/kg	SOLID	-	-																												
Haloxyfop Methyl*	mg/kg	SOLID	-	-																												
Heptachlor	mg/kg	SOLID	-	-																												
Heptachlor Epoxide	mg/kg	SOLID	-	-																												
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																												
Heptanoic Acid	mg/kg	SOLID	-	-																												
Heptenophos	mg/kg	SOLID	-	-																												
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																												
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48																												
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-																												
Hexachloroethane	mg/kg	SOLID	21	158																												
Hexaconazole	mg/kg	SOLID	-	-																												
Hexaflumuron*	mg/kg	SOLID	-	-																												
Hexazinone	mg/kg	SOLID	-	-																												
Hexythiazox*	mg/kg	SOLID	-	-																												
Imazalil*	mg/kg	SOLID	-	-																												
Imidacloprid*	mg/kg	SOLID	-	-																												
Imidan	mg/kg	SOLID	-	-																												
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	<0.0300	<0.0300	<0.0300	<0.1000	<0.1000								<0.0900		<0.0800	0.2	0.2	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.04	0.31	<0.0180	0.031	<0.0180	25.4
Indoxacarb*	mg/kg	SOLID	-	-																												
Iodofenphos	mg/kg	SOLID	-	-																												
Iprodione*	mg/kg	SOLID	-	-																												
Iprovalicarb*	mg/kg	SOLID	-	-																												
Isazofos*	mg/kg	SOLID	-	-																												
Isocarbophos*	mg/kg	SOLID	-	-																												
Isodrin	mg/kg	SOLID	-	-																												
Isofenphos Methyl*	mg/kg	SOLID	-	-																												
Isofenphos*	mg/kg	SOLID	-	-																												
Isomethiozin*	mg/kg	SOLID	-	-																												
Isophorone	mg/kg	SOLID	-	-																												
Isoprocarb*	mg/kg	SOLID	-	-																												
Isopropylbenzene	mg/kg	SOLID	1300	23000																												
Isoprothiolane*	mg/kg	SOLID	-	-																												
Isoproturon	mg/kg	SOLID	-	-																												
Isopyrazam*	mg/kg	SOLID	-	-																												
Isothiazolinone*	mg/kg	SOLID	-	-																												
Isoxaben*	mg/kg	SOLID	-	-																												
Karbutilate*	mg/kg	SOLID	-	-																												
Kresoxim Methyl*	mg/kg	SOLID	-	-																												
Lambda Cyhalothrin	mg/kg	SOLID	-	-																												
Lead	mg/kg	SOLID	2300	1300	77	220	120	27	9								25.1		13.6	765.1	642.1	11.8	16.8	8.7	6.9	6.8	5.4		12.2	20.4	3.02	14
Lenacil*	mg/kg	SOLID	-	-																												
Leptophos	mg/kg	SOLID	-	-																												
Linuron	mg/kg	SOLID	-	-																												
Lufenuron*	mg/kg	SOLID	-	-																												
m,p xylenes	mg/kg	SOLID	-	-				<0.0100	<0.0100								<0.0050		<0.0040	<0.0060	0.009	<0.0050	<0.0050	<0.0040	<0.0050	<0.0040			<0.0060	<0.0060	<0.0060	<0.0060
m,p,o Xylenes	mg/kg	SOLID	-	-																									<0.0090	<0.0090	<0.0090	<0.0090
Malaoxon*	mg/kg	SOLID	-	-																												
Malathion	mg/kg	SOLID	-	-																												
Mandipropamid*	mg/kg	SOLID	-	-																												
MCPA-thioethyl*	mg/kg	SOLID	-	-																												
Mecarbam*	mg/kg	SOLID	-	-																												
Mecoprop	mg/kg	SOLID	-	-																												
Mefenacet*	mg/kg	SOLID	-	-																												

Max of Normalised Results																																			
					ML157-CR013	ML157-CR014	ML157-CR014	ML157-CR014	ML157-CR015	ML157-CR015	ML157-CR021	ML157-CR021	ML157-CR022	ML157-CR027	ML157-CR027	ML157-CR027	ML157-CT011	ML157-CT013	ML157-CT014	ML157-CT015	ML157-CT017	ML157-CT018	ML157-CT018	ML157-CT019	ML157-CT019	ML157-CT027	ML157-CT027	ML157-CT039	ML157-CT039	ML157-CT039	ML157-TP001	ML157-TP063	ML157-WS036	ML157-WS067	ML157-WS067
					Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment	Packington Embankment	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting
					0.9	0.05	0.6	2.2	0.5	1	0.05	9.5	1	0.05	0.5	0.9	0.3	1	0.7	0.5	0.4	0.1	0.5	0.05	1	0.05	1	0.05	0.2	0.9	1	0.7	0.7	0.05	2.8
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GFSG	MGR	MGR	MMG	MGR	MMG	TOP	MMG	MGR	MGR	MGR	MMG	MMG	MGR	SUPDC	SUPDC	SUPDC	MGR	SUPDC	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	GFDUD	TOP	GFDUD
Endosulfan II	mg/kg	SOLID	6300	2400																															
Endosulphan sulphate*	mg/kg	SOLID	-	-																															
Endrin	mg/kg	SOLID	-	-																															
Enterococci	CFU/g	SOLID	-	-																															
EPH >C10-12	mg/kg	SOLID	-	-																											<2.0000	<2.0000	<2.0000	<2.0000	<2.0000
EPH >C10-35	mg/kg	SOLID	-	-																															
EPH >C10-40	mg/kg	SOLID	-	-									<10.0000																						
EPH >C12-16	mg/kg	SOLID	-	-																											<2.0000	<2.0000	<2.0000	<2.0000	<2.0000
EPH >C16-21	mg/kg	SOLID	-	-																											5.59	2.55	<2.0000	<2.0000	<2.0000
EPH >C21-35	mg/kg	SOLID	-	-																											24	10.1	<4.6500	27.2	7.07
EPH >C8-40	mg/kg	SOLID	-	-																											33	16	<11.0000	33	11
EPH/TPH >C10-12	mg/kg	SOLID	-	-	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000					<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000		<10.0000	<10.0000	<10.0000		<10.0000	<10.0000					
EPH/TPH >C10-25	mg/kg	SOLID	-	-							<10.0000	<10.0000																							
EPH/TPH >C12-16	mg/kg	SOLID	-	-	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000					<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000		<10.0000	<10.0000	<10.0000		<10.0000	<10.0000					
EPH/TPH >C16-21	mg/kg	SOLID	-	-	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000					<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000		<10.0000	34.6	<10.0000		79.6	<10.0000					
EPH/TPH >C21-40	mg/kg	SOLID	-	-	<10.0000	40.4	<10.0000	<10.0000	39	<10.0000					<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	642	<10.0000		31.5	633	40		4400	248					
EPH/TPH >C24-40	mg/kg	SOLID	-	-							<10.0000	<10.0000																							
EPH/TPH >C35-40	mg/kg	SOLID	-	-																															
EPH/TPH >C6-8	mg/kg	SOLID	-	-	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000					<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000		<10.0000	<10.0000	<10.0000		<10.0000	<10.0000	<0.2000				
EPH/TPH >C8-10	mg/kg	SOLID	-	-	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000					<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000		<10.0000	<10.0000	<10.0000		<10.0000	<10.0000					
Epoxiconazole*	mg/kg	SOLID	-	-																															
EPTC*	mg/kg	SOLID	-	-																															
Escherichia coli (Confirmed)	N/A	SOLID	-	-																															
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																															
Etaconazole*	mg/kg	SOLID	-	-																															
Ethidimuron*	mg/kg	SOLID	-	-																															
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																															
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																															
Ethiofencarb*	mg/kg	SOLID	-	-																															
Ethion	mg/kg	SOLID	-	-																															
Ethiprole*	mg/kg	SOLID	-	-																															
Ethirimol*	mg/kg	SOLID	-	-																															
Ethofumesate	mg/kg	SOLID	-	-																															
Ethoprophos	mg/kg	SOLID	-	-																															
Ethoxyquin*	mg/kg	SOLID	-	-																															
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0100	<0.0100	<0.0100		<0.0030	<0.0030	<0.0030	0.0033	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030		<0.0030	<0.0030	<0.0030		<0.0030	<0.0030	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Ethylparathion	mg/kg	SOLID	-	-																															
Etofenprox*	mg/kg	SOLID	-	-																															
Etoxazole*	mg/kg	SOLID	-	-																															
Etrimphos	mg/kg	SOLID	-	-																															
Famoxadone*	mg/kg	SOLID	-	-																															
Famphur	mg/kg	SOLID	-	-																															
Fenamidone*	mg/kg	SOLID	-	-																															
Fenamiphos sulfone*	mg/kg	SOLID	-	-																															
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																															
Fenamiphos*	mg/kg	SOLID	-	-																															
Fenarimol	mg/kg	SOLID	-	-																															
Fenazaquin*	mg/kg	SOLID	-	-																															
Fenbuconazole*	mg/kg	SOLID	-	-																															
Fenchlorphos oxon*	mg/kg	SOLID	-	-																															
Fenhexamid*	mg/kg	SOLID	-	-																															
Fenitrothion	mg/kg	SOLID	-	-																															
Fenpiclonil*	mg/kg	SOLID	-	-																															
Fenpropathrin*	mg/kg	SOLID	-	-																															
Fenpropidin*	mg/kg	SOLID	-	-																															
Fenpropimorph*	mg/kg	SOLID	-	-																															
Fenpyroximate*	mg/kg	SOLID	-	-																															
Fenson*	mg/kg	SOLID	-	-																															
Fensulfothion	mg/kg	SOLID	-	-																															
Fenthion	mg/kg	SOLID	-	-																															
Fenthion Sulphone*	mg/kg	SOLID	-	-																															
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																															
Fenuron	mg/kg	SOLID	-	-																															
Fenvalerate	mg/kg	SOLID	-	-																															
Fipronil sulphone*	mg/kg	SOLID	-	-																															
Fipronil*	mg/kg	SOLID	-	-																															
Flamprop-isopropyl	mg/kg	SOLID	-	-																															
Flonicamid*	mg/kg	SOLID	-	-																															
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																															
Fluazinam*	mg/kg	SOLID	-	-																															
Flucythrinate*	mg/kg	SOLID	-	-																															
Fludioxonil*	mg/kg	SOLID	-	-																															
Flufenacet*	mg/kg	SOLID	-	-																															
Flufenoxuron*	mg/kg	SOLID	-	-																															
Flumetralin*	mg/kg	SOLID	-	-																															
Flumioxazin*	mg/kg	SOLID	-	-																															
Flumorph*	mg/kg	SOLID	-	-																															
Fluometuron*	mg/kg	SOLID	-	-																															
Fluopicolide*	mg/kg	SOLID	-	-																															
Fluopyram*	mg/kg	SOLID	-	-																															
Fluoranthene	mg/kg	SOLID	23000	6300	0.0446	0.248	<0.0170	<0.0170	<0.0170	<0.0170	<0.1000	<0.1000	<0.0300	<0.1700	<0.0170	<0.0170	0.0447	0.0744	<0.0170	<0.0170	0.0234	<0.0170	<0.0170	0.351	0.0643	4.96	0.143	<0.1700	<0.1700	<0.0170	7	<0.0900	<0.0900	<0.1000	<0.0800
Fluorene	mg/kg	SOLID	63000	20000	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.1000	<0.1000	<0.0300	<0.1000	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.1000	<0.0100	0.196	<0.0100	<0.1000	<0.1000	<0.0100	0.8	<0.0900	<0.0900	<0.1000	<0.0800
Fluorochloridone*	mg/kg	SOLID	-	-																															
Fluoroxypyr	mg/kg	SOLID	-	-																															
Fluquinconazole*	mg/kg	SOLID	-	-																															
Flurtamone*	mg/kg	SOLID	-	-																															
Flusilazole*	mg/kg	SOLID	-	-																															
Flutolanil*	mg/kg	SOLID	-	-																															
Flutriafol*	mg/kg	SOLID	-	-																															
Fluxapyroxad*	mg/kg	SOLID	-	-																															
Folpet	mg/kg	SOLID	-	-																															
Fonophos*	mg/kg	SOLID	-	-																															
Forchlorfenuron*	mg/kg	SOLID	-	-																															
Formetanate*	mg/kg	SOLID	-	-																															
Formothion*	mg/kg	SOLID	-	-																															
Fraction of non-crushable material*	%	SOLID	-	-																											0	0	0	0	0
Fraction of sample above 4mm*	%	SOLID	-	-																											11	9.6	2.4	1.7	0
Fuberidazole*	mg/kg	SOLID	-	-																															
Furalaxyl*	mg/kg	SOLID	-	-																															
Furathiocarb*	mg/kg	SOLID	-	-																															
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																															
GRO >C5-10	mg/kg	SOLID	-	-							<0.1000	<0.1000																			<0.2000				
GRO >C5-12	mg/kg	SOLID	-	-																															
GRO >C7-8	mg/kg	SOLID	-	-																											<0.0100				
GRO >C8-10	mg/kg	SOLID	-	-																											<2.0000	<2.0000	<2.0000	<2.0000	<2.0000
GRO Surrogate % recovery	%	SOLID	-	-																															
Haloxyfop etotyl*	mg/kg	SOLID	-	-																															
Haloxyfop Methyl*	mg/kg	SOLID	-	-																															
Heptachlor	mg/kg	SOLID	-	-																															
Heptachlor Epoxide	mg/kg	SOLID	-	-																															
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																															
Heptanoic Acid	mg/kg	SOLID	-	-																											<0.1000				
Heptenophos	mg/kg	SOLID	-	-																															
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																															
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48																											<0.0020				
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-																											<0.1000				
Hexachloroethane	mg/kg	SOLID	21	158																											<0.1000				
Hexaconazole	mg/kg	SOLID	-	-																															
Hexaflumuron*	mg/kg	SOLID	-	-																															
Hexazinone	mg/kg	SOLID	-	-																															
Hexythiazox*	mg/kg	SOLID	-	-																															
Imazalil*	mg/kg	SOLID	-	-																															
Imidacloprid*	mg/kg	SOLID	-	-																															
Imidan	mg/kg	SOLID	-	-																															
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	<0.0180	0.0706	<0.0180	<0.0180	<0.0180	<0.0180	<0.1000	<0.1000	<0.0300	<0.1800	<0.0180	<0.0180	0.0256	0.0545	<0.0180	<0.0180	<0.0180	<0.0180	<0.0180	<0.1800	0.0266	1.06	0.0878	<0.1800	<0.1800	<0.0180	1.5	<0.0900	<0.0900	<0.1000	<0.0800
Indoxacarb*	mg/kg	SOLID	-	-																															
Iodofenphos	mg/kg	SOLID	-	-																															
Iprodione*	mg/kg	SOLID	-	-																															
Iprovalicarb*	mg/kg	SOLID	-	-																															
Isazofos*	mg/kg	SOLID	-	-																															
Isocarbophos*	mg/kg	SOLID	-	-																															
Isodrin	mg/kg	SOLID	-	-																															
Isofenphos Methyl*	mg/kg	SOLID	-	-																															
Isofenphos*	mg/kg	SOLID	-	-																															
Isomethiozin*	mg/kg	SOLID	-	-																															
Isophorone	mg/kg	SOLID	-	-																											<0.1000				
Isoprocarb*	mg/kg	SOLID	-	-																															
Isopropylbenzene	mg/kg	SOLID	1300	23000																											<0.0010				
Isoprothiolane*	mg/kg	SOLID	-	-																															
Isoproturon	mg/kg	SOLID	-	-																															
Isopyrazam*	mg/kg	SOLID	-	-																															
Isothiazolinone*	mg/kg	SOLID	-	-																															
Isoxaben*	mg/kg	SOLID	-	-																															
Karbutilate*	mg/kg	SOLID	-	-																															
Kresoxim Methyl*	mg/kg	SOLID	-	-																															
Lambda Cyhalothrin	mg/kg	SOLID	-	-																															
Lead	mg/kg	SOLID	2300	1300	<0.7000	4.8	5.63	2.03	5.64	8.71	10	42	11		5.69	4.3	6.06	22.4	4.95	6.15	11.6	19.8	6.05		11	125	8.22		5.8	3.06	21.4	5.6	4.3	19.8	3.5
Lenacil*	mg/kg	SOLID	-	-																															
Leptophos	mg/kg	SOLID	-	-																															
Linuron	mg/kg	SOLID	-	-																															
Lufenuron*	mg/kg	SOLID	-	-																															
m,p xylenes	mg/kg	SOLID	-	-	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060					<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060		<0.0060	<0.0060	<0.0060		<0.0060	<0.0060	<0.0050	<0.0040	<0.0040	<0.0050	<0.0040
m,p,o Xylenes	mg/kg	SOLID	-	-	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090					<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090		<0.0090	<0.0090	<0.0090		<0.0090	<0.0090					
Malaoxon*	mg/kg	SOLID	-	-																															
Malathion	mg/kg	SOLID	-	-																															
Mandipropamid*	mg/kg	SOLID	-	-																															
MCPA-thioethyl*	mg/kg	SOLID	-	-																															
Mecarbam*	mg/kg	SOLID	-	-																															
Mecoprop	mg/kg	SOLID	-	-																															
Mefenacet*	mg/kg	SOLID	-	-																															

Max of Normalised Results																										
					ML158-CP002	ML158-CP002	ML158-CP002	ML158-CP005	ML158-CP005	ML158-CP005	ML158-CP007	ML158-CP007	ML158-CP007	ML158-CP021	ML158-CP021	ML158-CP402	ML158-CP402	ML158-CR003	ML158-CR003	ML158-CR007	ML158-CR007	ML158-TP008	ML158-TP008	ML158-TP008	ML158-WS012	ML158-WS012
					Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Packington Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure
					1.05	3.05	3.65	0.5	1	1.3	1.05	3.05	3.85	0.05	0.4	0.3	0.5	0.05	1.05	0.05	5.05	1.05	2.05	3.05	0.4	1.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	GFDUD	MGR	MGR	GFDUD	MGR	MGR	GFDUD	MGR	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	MGR	GFDUD
Endosulfan II	mg/kg	SOLID	6300	2400																						
Endosulphan sulphate*	mg/kg	SOLID	-	-																						
Endrin	mg/kg	SOLID	-	-																						
Enterococci	CFU/g	SOLID	-	-																						
EPH >C10-12	mg/kg	SOLID	-	-																						
EPH >C10-35	mg/kg	SOLID	-	-												68	21									
EPH >C10-40	mg/kg	SOLID	-	-																						
EPH >C12-16	mg/kg	SOLID	-	-																						
EPH >C16-21	mg/kg	SOLID	-	-																						
EPH >C21-35	mg/kg	SOLID	-	-																						
EPH >C8-40	mg/kg	SOLID	-	-																						
EPH/TPH >C10-12	mg/kg	SOLID	-	-	67.8	88.4	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000			<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000
EPH/TPH >C10-25	mg/kg	SOLID	-	-																						
EPH/TPH >C12-16	mg/kg	SOLID	-	-	150	389	31.8	125	29	<10.0000	<10.0000	14.3	<10.0000	<10.0000	<10.0000			<10.0000	<10.0000	14.8	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000
EPH/TPH >C16-21	mg/kg	SOLID	-	-	388	1070	106	1200	226	21.6	15	45.8	<10.0000	<10.0000	<10.0000			<10.0000	<10.0000	<10.0000	20.4	16.2	26.2	<10.0000	<10.0000	<10.0000
EPH/TPH >C21-40	mg/kg	SOLID	-	-	1580	4960	504	7640	1620	158	226	315	<10.0000	62.5	15.1			39.2	73.8	90.9	207	127	793	19.4	51	17.1
EPH/TPH >C24-40	mg/kg	SOLID	-	-																						
EPH/TPH >C35-40	mg/kg	SOLID	-	-												12	4									
EPH/TPH >C6-8	mg/kg	SOLID	-	-	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000			<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000
EPH/TPH >C8-10	mg/kg	SOLID	-	-	15.1	16.5	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000			<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000
Epoxiconazole*	mg/kg	SOLID	-	-																						
EPTC*	mg/kg	SOLID	-	-																						
Escherichia coli (Confirmed)	N/A	SOLID	-	-																						
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																						
Etaconazole*	mg/kg	SOLID	-	-																						
Ethidimuron*	mg/kg	SOLID	-	-																						
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																						
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																						
Ethiofencarb*	mg/kg	SOLID	-	-																						
Ethion	mg/kg	SOLID	-	-																						
Ethiprole*	mg/kg	SOLID	-	-																						
Ethirimol*	mg/kg	SOLID	-	-																						
Ethofumesate	mg/kg	SOLID	-	-																						
Ethoprophos	mg/kg	SOLID	-	-																						
Ethoxyquin*	mg/kg	SOLID	-	-																						
Ethylbenzene	mg/kg	SOLID	5700	17000	0.00363	0.0329	0.0209	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0100	<0.0100	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Ethylparathion	mg/kg	SOLID	-	-																						
Etofenprox*	mg/kg	SOLID	-	-																						
Etoxazole*	mg/kg	SOLID	-	-																						
Etrimphos	mg/kg	SOLID	-	-																						
Famoxadone*	mg/kg	SOLID	-	-																						
Famphur	mg/kg	SOLID	-	-																						
Fenamidone*	mg/kg	SOLID	-	-																						
Fenamiphos sulfone*	mg/kg	SOLID	-	-																						
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																						
Fenamiphos*	mg/kg	SOLID	-	-																						
Fenarimol	mg/kg	SOLID	-	-																						
Fenazaquin*	mg/kg	SOLID	-	-																						
Fenbuconazole*	mg/kg	SOLID	-	-																						
Fenchlorphos oxon*	mg/kg	SOLID	-	-																						
Fenhexamid*	mg/kg	SOLID	-	-																						
Fenitrothion	mg/kg	SOLID	-	-																						
Fenpiclonil*	mg/kg	SOLID	-	-																						
Fenpropathrin*	mg/kg	SOLID	-	-																						
Fenpropidin*	mg/kg	SOLID	-	-																						
Fenpropimorph*	mg/kg	SOLID	-	-																						
Fenpyroximate*	mg/kg	SOLID	-	-																						
Fenson*	mg/kg	SOLID	-	-																						
Fensulfothion	mg/kg	SOLID	-	-																						
Fenthion	mg/kg	SOLID	-	-																						
Fenthion Sulphone*	mg/kg	SOLID	-	-																						
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																						
Fenuron	mg/kg	SOLID	-	-																						
Fenvalerate	mg/kg	SOLID	-	-																						
Fipronil sulphone*	mg/kg	SOLID	-	-																						
Fipronil*	mg/kg	SOLID	-	-																						
Flamprop-isopropyl	mg/kg	SOLID	-	-																						
Flonicamid*	mg/kg	SOLID	-	-																						
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																						
Fluazinam*	mg/kg	SOLID	-	-																						
Flucythrinate*	mg/kg	SOLID	-	-																						
Fludioxonil*	mg/kg	SOLID	-	-																						
Flufenacet*	mg/kg	SOLID	-	-																						
Flufenoxuron*	mg/kg	SOLID	-	-																						
Flumetralin*	mg/kg	SOLID	-	-																						
Flumioxazin*	mg/kg	SOLID	-	-																						
Flumorph*	mg/kg	SOLID	-	-																						
Fluometuron*	mg/kg	SOLID	-	-																						
Fluopicolide*	mg/kg	SOLID	-	-																						
Fluopyram*	mg/kg	SOLID	-	-																						
Fluoranthene	mg/kg	SOLID	23000	6300	4.64	9.82	1.33	75.4	6.36	0.932	0.106	0.218	<0.0170	0.152	0.0653	0.1	<0.1000	0.175	0.0241	0.0921	0.708	0.0633	0.935	0.0806	0.0614	<0.0170
Fluorene	mg/kg	SOLID	63000	20000	1.11	2.59	0.34	5.13	0.415	0.0679	<0.0100	0.0393	<0.0100	<0.0100	<0.0100	<0.1000	<0.1000	0.0237	<0.0100	<0.0100	0.163	<0.0100	<0.1000	<0.0100	<0.0100	<0.0100
Fluorochloridone*	mg/kg	SOLID	-	-																						
Fluoroxypyr	mg/kg	SOLID	-	-																						
Fluquinconazole*	mg/kg	SOLID	-	-																						
Flurtamone*	mg/kg	SOLID	-	-																						
Flusilazole*	mg/kg	SOLID	-	-																						
Flutolanil*	mg/kg	SOLID	-	-																						
Flutriafol*	mg/kg	SOLID	-	-																						
Fluxapyroxad*	mg/kg	SOLID	-	-																						
Folpet	mg/kg	SOLID	-	-																						
Fonophos*	mg/kg	SOLID	-	-																						
Forchlorfenuron*	mg/kg	SOLID	-	-																						
Formetanate*	mg/kg	SOLID	-	-																						
Formothion*	mg/kg	SOLID	-	-																						
Fraction of non-crushable material*	%	SOLID	-	-																						
Fraction of sample above 4mm*	%	SOLID	-	-																						
Fuberidazole*	mg/kg	SOLID	-	-																						
Furalaxyl*	mg/kg	SOLID	-	-																						
Furathiocarb*	mg/kg	SOLID	-	-																						
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																						
GRO >C5-10	mg/kg	SOLID	-	-												<0.1000	<0.1000									
GRO >C5-12	mg/kg	SOLID	-	-	1.78	9.82	4.62		0.838		<0.0440			<0.0440					<0.0440		0.353		<0.0440			
GRO >C7-8	mg/kg	SOLID	-	-																						
GRO >C8-10	mg/kg	SOLID	-	-																						
GRO Surrogate % recovery	%	SOLID	-	-	74	22	42		85		55			76					82		86		67			
Haloxyfop etotyl*	mg/kg	SOLID	-	-																						
Haloxyfop Methyl*	mg/kg	SOLID	-	-																						
Heptachlor	mg/kg	SOLID	-	-																						
Heptachlor Epoxide	mg/kg	SOLID	-	-																						
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																						
Heptanoic Acid	mg/kg	SOLID	-	-																						
Heptenophos	mg/kg	SOLID	-	-																						
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48					<0.1000			<0.0200				<0.1000	<0.1000						<0.0200			
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.2000	<0.2000						<0.1000			
Hexachloroethane	mg/kg	SOLID	21	158					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Hexaconazole	mg/kg	SOLID	-	-																						
Hexaflumuron*	mg/kg	SOLID	-	-																						
Hexazinone	mg/kg	SOLID	-	-																						
Hexythiazox*	mg/kg	SOLID	-	-																						
Imazalil*	mg/kg	SOLID	-	-																						
Imidacloprid*	mg/kg	SOLID	-	-																						
Imidan	mg/kg	SOLID	-	-																						
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	1.15	3.14	0.63	15.7	2.14	0.282	0.0981	0.0651	<0.0180	0.0789	0.0307	<0.1000	<0.1000	<0.0180	<0.0180	0.057	0.17	0.023	0.94	0.0437	0.046	<0.0180
Indoxacarb*	mg/kg	SOLID	-	-																						
Iodofenphos	mg/kg	SOLID	-	-																						
Iprodione*	mg/kg	SOLID	-	-																						
Iprovalicarb*	mg/kg	SOLID	-	-																						
Isazofos*	mg/kg	SOLID	-	-																						
Isocarbophos*	mg/kg	SOLID	-	-																						
Isodrin	mg/kg	SOLID	-	-																						
Isofenphos Methyl*	mg/kg	SOLID	-	-																						
Isofenphos*	mg/kg	SOLID	-	-																						
Isomethiozin*	mg/kg	SOLID	-	-																						
Isophorone	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Isoprocarb*	mg/kg	SOLID	-	-																						
Isopropylbenzene	mg/kg	SOLID	1300	23000					<0.0500			<0.0050				<0.0500	<0.0500						<0.0050			
Isoprothiolane*	mg/kg	SOLID	-	-																						
Isoproturon	mg/kg	SOLID	-	-																						
Isopyrazam*	mg/kg	SOLID	-	-																						
Isothiazolinone*	mg/kg	SOLID	-	-																						
Isoxaben*	mg/kg	SOLID	-	-																						
Karbutilate*	mg/kg	SOLID	-	-																						
Kresoxim Methyl*	mg/kg	SOLID	-	-																						
Lambda Cyhalothrin	mg/kg	SOLID	-	-																						
Lead	mg/kg	SOLID	2300	1300	118	589	80.4	48.7	116	24.2	24.5	30.9	13.1	49.8	25.8	27	8	36.2	16.7	51.8	5.92	60.3	14.5	12.5	14.2	13.2
Lenacil*	mg/kg	SOLID	-	-																						
Leptophos	mg/kg	SOLID	-	-																						
Linuron	mg/kg	SOLID	-	-																						
Lufenuron*	mg/kg	SOLID	-	-																						
m,p xylenes	mg/kg	SOLID	-	-	0.0145	0.063	0.0313	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0100	<0.0100	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
m,p,o Xylenes	mg/kg	SOLID	-	-	0.0278	0.0931	0.0603	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090			<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090
Malaoxon*	mg/kg	SOLID	-	-																						
Malathion	mg/kg	SOLID	-	-																						
Mandipropamid*	mg/kg	SOLID	-	-																						
MCPA-thioethyl*	mg/kg	SOLID	-	-																						
Mecarbam*	mg/kg	SOLID	-	-																						
Mecoprop	mg/kg	SOLID	-	-																						
Mefenacet*	mg/kg	SOLID	-	-																						

Max of Normalised Results																										
					ML158-WS013	ML158-WS014	ML158-WS015	ML158-WS016	ML158-WS016	ML159-CP003	ML159-CP003	ML159-CP003	ML159-CP018	ML159-CR003	ML159-CR003	ML159-CR008a	ML159-CR018	ML159-CR018	ML159-CR408	ML159-CR408	ML159-CR408	ML159-CR408	ML159-CR410	ML159-CR410	ML159-TP004	ML159-TP015
					Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	M6 Motorway South Viaduct	M6 Motorway Box Structure	M6 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	M6 Motorway Box Structure	M6 Motorway Box Structure	Pool Wood Embankment	M6 Motorway Box Structure
					1	0.5	0.2	1	3	0.05	1.05	1.2	0	0.05	0.6	1.2	1.6	3.6	0.3	0.5	1	1.5	0.3	1	0.05	0.15
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	TOP	MGR	GFDUD	MGR	MGR	MGR	GFDUD	GFDUD	GFDUD	GFDUD	GFDUD	GFDUD	TOP	MGR
Endosulfan II	mg/kg	SOLID	6300	2400																						
Endosulphan sulphate*	mg/kg	SOLID	-	-																						
Endrin	mg/kg	SOLID	-	-																						
Enterococci	CFU/g	SOLID	-	-																						
EPH >C10-12	mg/kg	SOLID	-	-																						
EPH >C10-35	mg/kg	SOLID	-	-															33		8	<1.0000	26	<1.0000		
EPH >C10-40	mg/kg	SOLID	-	-																						
EPH >C12-16	mg/kg	SOLID	-	-																						
EPH >C16-21	mg/kg	SOLID	-	-																						
EPH >C21-35	mg/kg	SOLID	-	-																						
EPH >C8-40	mg/kg	SOLID	-	-												29	78	18								62
EPH/TPH >C10-12	mg/kg	SOLID	-	-	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000										<10.0000	
EPH/TPH >C10-25	mg/kg	SOLID	-	-																						
EPH/TPH >C12-16	mg/kg	SOLID	-	-	<10.0000	<10.0000	<10.0000	<10.0000	16.9	26.1	13.5	<10.0000	<10.0000	<10.0000	<10.0000										<10.0000	
EPH/TPH >C16-21	mg/kg	SOLID	-	-	<10.0000	<10.0000	<10.0000	<10.0000	33	401	143	<10.0000	<10.0000	17	<10.0000										<10.0000	
EPH/TPH >C21-40	mg/kg	SOLID	-	-	49.3	<10.0000	213	81.8	134	5270	1240	33	162	157	46.2										76.5	
EPH/TPH >C24-40	mg/kg	SOLID	-	-																						
EPH/TPH >C35-40	mg/kg	SOLID	-	-															6		2	<1.0000	2	<1.0000		
EPH/TPH >C6-8	mg/kg	SOLID	-	-	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000										<10.0000	
EPH/TPH >C8-10	mg/kg	SOLID	-	-	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000										<10.0000	
Epoxiconazole*	mg/kg	SOLID	-	-																						
EPTC*	mg/kg	SOLID	-	-																						
Escherichia coli (Confirmed)	N/A	SOLID	-	-																						
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																						
Etaconazole*	mg/kg	SOLID	-	-																						
Ethidimuron*	mg/kg	SOLID	-	-																						
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																						
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																						
Ethiofencarb*	mg/kg	SOLID	-	-																						
Ethion	mg/kg	SOLID	-	-																						
Ethiprole*	mg/kg	SOLID	-	-																						
Ethirimol*	mg/kg	SOLID	-	-																						
Ethofumesate	mg/kg	SOLID	-	-																						
Ethoprophos	mg/kg	SOLID	-	-																						
Ethoxyquin*	mg/kg	SOLID	-	-																						
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0020	<0.0020	<0.0020	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0030	<0.0020
Ethylparathion	mg/kg	SOLID	-	-																						
Etofenprox*	mg/kg	SOLID	-	-																						
Etoxazole*	mg/kg	SOLID	-	-																						
Etrimphos	mg/kg	SOLID	-	-																						
Famoxadone*	mg/kg	SOLID	-	-																						
Famphur	mg/kg	SOLID	-	-																						
Fenamidone*	mg/kg	SOLID	-	-																						
Fenamiphos sulfone*	mg/kg	SOLID	-	-																						
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																						
Fenamiphos*	mg/kg	SOLID	-	-																						
Fenarimol	mg/kg	SOLID	-	-																						
Fenazaquin*	mg/kg	SOLID	-	-																						
Fenbuconazole*	mg/kg	SOLID	-	-																						
Fenchlorphos oxon*	mg/kg	SOLID	-	-																						
Fenhexamid*	mg/kg	SOLID	-	-																						
Fenitrothion	mg/kg	SOLID	-	-																						
Fenpiclonil*	mg/kg	SOLID	-	-																						
Fenpropathrin*	mg/kg	SOLID	-	-																						
Fenpropidin*	mg/kg	SOLID	-	-																						
Fenpropimorph*	mg/kg	SOLID	-	-																						
Fenpyroximate*	mg/kg	SOLID	-	-																						
Fenson*	mg/kg	SOLID	-	-																						
Fensulfothion	mg/kg	SOLID	-	-																						
Fenthion	mg/kg	SOLID	-	-																						
Fenthion Sulphone*	mg/kg	SOLID	-	-																						
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																						
Fenuron	mg/kg	SOLID	-	-																						
Fenvalerate	mg/kg	SOLID	-	-																						
Fipronil sulphone*	mg/kg	SOLID	-	-																						
Fipronil*	mg/kg	SOLID	-	-																						
Flamprop-isopropyl	mg/kg	SOLID	-	-																						
Flonicamid*	mg/kg	SOLID	-	-																						
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																						
Fluazinam*	mg/kg	SOLID	-	-																						
Flucythrinate*	mg/kg	SOLID	-	-																						
Fludioxonil*	mg/kg	SOLID	-	-																						
Flufenacet*	mg/kg	SOLID	-	-																						
Flufenoxuron*	mg/kg	SOLID	-	-																						
Flumetralin*	mg/kg	SOLID	-	-																						
Flumioxazin*	mg/kg	SOLID	-	-																						
Flumorph*	mg/kg	SOLID	-	-																						
Fluometuron*	mg/kg	SOLID	-	-																						
Fluopicolide*	mg/kg	SOLID	-	-																						
Fluopyram*	mg/kg	SOLID	-	-																						
Fluoranthene	mg/kg	SOLID	23000	6300	0.328	0.0704	1.12	0.0422	0.162	1.72	0.126	0.0461	0.0701	0.131	0.1	<0.0900	0.45	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.0615	<0.0900
Fluorene	mg/kg	SOLID	63000	20000	<0.0100	<0.0100	0.0201	<0.0100	0.029	0.0474	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0900	<0.0900	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.0100	<0.0900
Fluorochloridone*	mg/kg	SOLID	-	-																						
Fluoroxypyr	mg/kg	SOLID	-	-																						
Fluquinconazole*	mg/kg	SOLID	-	-																						
Flurtamone*	mg/kg	SOLID	-	-																						
Flusilazole*	mg/kg	SOLID	-	-																						
Flutolanil*	mg/kg	SOLID	-	-																						
Flutriafol*	mg/kg	SOLID	-	-																						
Fluxapyroxad*	mg/kg	SOLID	-	-																						
Folpet	mg/kg	SOLID	-	-																						
Fonophos*	mg/kg	SOLID	-	-																						
Forchlorfenuron*	mg/kg	SOLID	-	-																						
Formetanate*	mg/kg	SOLID	-	-																						
Formothion*	mg/kg	SOLID	-	-																						
Fraction of non-crushable material*	%	SOLID	-	-												0	0	0								0
Fraction of sample above 4mm*	%	SOLID	-	-												28	75	82								30
Fuberidazole*	mg/kg	SOLID	-	-																						
Furalaxyl*	mg/kg	SOLID	-	-																						
Furathiocarb*	mg/kg	SOLID	-	-																						
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																						
GRO >C5-10	mg/kg	SOLID	-	-															<0.1000		<0.1000	<0.1000	<0.1000	<0.1000		
GRO >C5-12	mg/kg	SOLID	-	-			0.101																			
GRO >C7-8	mg/kg	SOLID	-	-																						
GRO >C8-10	mg/kg	SOLID	-	-																						
GRO Surrogate % recovery	%	SOLID	-	-			55																			
Haloxyfop etotyl*	mg/kg	SOLID	-	-																						
Haloxyfop Methyl*	mg/kg	SOLID	-	-																						
Heptachlor	mg/kg	SOLID	-	-																						
Heptachlor Epoxide	mg/kg	SOLID	-	-																						
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																						
Heptanoic Acid	mg/kg	SOLID	-	-														<0.1000								
Heptenophos	mg/kg	SOLID	-	-																						
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																						
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48														<0.0020								
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-														<0.1000								
Hexachloroethane	mg/kg	SOLID	21	158														<0.1000								
Hexaconazole	mg/kg	SOLID	-	-																						
Hexaflumuron*	mg/kg	SOLID	-	-																						
Hexazinone	mg/kg	SOLID	-	-																						
Hexythiazox*	mg/kg	SOLID	-	-																						
Imazalil*	mg/kg	SOLID	-	-																						
Imidacloprid*	mg/kg	SOLID	-	-																						
Imidan	mg/kg	SOLID	-	-																						
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	0.0834	0.049	0.363	0.0244	0.022	0.583	0.0539	<0.0180	0.0536	0.0759	0.0419	<0.0900	0.12	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.0231	<0.0900
Indoxacarb*	mg/kg	SOLID	-	-																						
Iodofenphos	mg/kg	SOLID	-	-																						
Iprodione*	mg/kg	SOLID	-	-																						
Iprovalicarb*	mg/kg	SOLID	-	-																						
Isazofos*	mg/kg	SOLID	-	-																						
Isocarbophos*	mg/kg	SOLID	-	-																						
Isodrin	mg/kg	SOLID	-	-																						
Isofenphos Methyl*	mg/kg	SOLID	-	-																						
Isofenphos*	mg/kg	SOLID	-	-																						
Isomethiozin*	mg/kg	SOLID	-	-																						
Isophorone	mg/kg	SOLID	-	-														<0.1000								
Isoprocarb*	mg/kg	SOLID	-	-																						
Isopropylbenzene	mg/kg	SOLID	1300	23000														<0.0010								
Isoprothiolane*	mg/kg	SOLID	-	-																						
Isoproturon	mg/kg	SOLID	-	-																						
Isopyrazam*	mg/kg	SOLID	-	-																						
Isothiazolinone*	mg/kg	SOLID	-	-																						
Isoxaben*	mg/kg	SOLID	-	-																						
Karbutilate*	mg/kg	SOLID	-	-																						
Kresoxim Methyl*	mg/kg	SOLID	-	-																						
Lambda Cyhalothrin	mg/kg	SOLID	-	-																						
Lead	mg/kg	SOLID	2300	1300	16.9	15.6	53.1	17.7	34.3	1280	215	142	49.4	40.1	32.8	8.5	8.7	6.4	34		27	5	28	6	34.3	23.9
Lenacil*	mg/kg	SOLID	-	-																						
Leptophos	mg/kg	SOLID	-	-																						
Linuron	mg/kg	SOLID	-	-																						
Lufenuron*	mg/kg	SOLID	-	-																						
m,p xylenes	mg/kg	SOLID	-	-	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	0.00756	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0040	<0.0040	<0.0040	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0060	<0.0050
m,p,o Xylenes	mg/kg	SOLID	-	-	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	0.0126	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090										<0.0090	
Malaoxon*	mg/kg	SOLID	-	-																						
Malathion	mg/kg	SOLID	-	-																						
Mandipropamid*	mg/kg	SOLID	-	-																						
MCPA-thioethyl*	mg/kg	SOLID	-	-																						
Mecarbam*	mg/kg	SOLID	-	-																						
Mecoprop	mg/kg	SOLID	-	-																						
Mefenacet*	mg/kg	SOLID	-	-																						

Max of Normalised Results																									
					ML159-TP015	ML159-WS002	ML159-WS002a	ML160-CP010	ML160-CP041	ML160-CP041	ML160-CR030	ML160-CR033	ML160-CR035	ML160-CR035	ML160-WS003	ML160-WS003	ML161-CP032	ML161-CP032	ML161-CR009	ML161-CR009	ML161-CR021	ML161-TP405	ML161-TP405	ML161-WS002	ML162-CR004
					M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway North Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	Coleshill West Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill West Viaduct	M42 Coleshill Box Structure
					0.45	0.5	1.1	0.5	0.2	0.6	1.5	1.5	0.75	1.1	0.3	1	0.9	1.2	0.2	0.5	0.5	0.05	0.5	0.5	0.6
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GFDUD	MGR	MGR	RTD1	MGR	HEAD	MGR	ALV	MGR	HEAD	MGR	MGR	MGR	MMG	MGR	MGR	MGR	TOP	RTD1	MGR	HEAD
Endosulfan II	mg/kg	SOLID	6300	2400																					
Endosulphan sulphate*	mg/kg	SOLID	-	-																					
Endrin	mg/kg	SOLID	-	-																					
Enterococci	CFU/g	SOLID	-	-																					
EPH >C10-12	mg/kg	SOLID	-	-																					
EPH >C10-35	mg/kg	SOLID	-	-																		6	<1.0000		
EPH >C10-40	mg/kg	SOLID	-	-																					
EPH >C12-16	mg/kg	SOLID	-	-																					
EPH >C16-21	mg/kg	SOLID	-	-																					
EPH >C21-35	mg/kg	SOLID	-	-																					
EPH >C8-40	mg/kg	SOLID	-	-	17	24	36		88	46	35		41	45	17	20	30	14	194	317	141			41	22
EPH/TPH >C10-12	mg/kg	SOLID	-	-																					
EPH/TPH >C10-25	mg/kg	SOLID	-	-																					
EPH/TPH >C12-16	mg/kg	SOLID	-	-																					
EPH/TPH >C16-21	mg/kg	SOLID	-	-																					
EPH/TPH >C21-40	mg/kg	SOLID	-	-																					
EPH/TPH >C24-40	mg/kg	SOLID	-	-																					
EPH/TPH >C35-40	mg/kg	SOLID	-	-																		<1.0000	<1.0000		
EPH/TPH >C6-8	mg/kg	SOLID	-	-													<0.3000								
EPH/TPH >C8-10	mg/kg	SOLID	-	-																					
Epoxiconazole*	mg/kg	SOLID	-	-																					
EPTC*	mg/kg	SOLID	-	-																					
Escherichia coli (Confirmed)	N/A	SOLID	-	-																					
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																					
Etaconazole*	mg/kg	SOLID	-	-																					
Ethidimuron*	mg/kg	SOLID	-	-																					
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																					
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																					
Ethiofencarb*	mg/kg	SOLID	-	-																					
Ethion	mg/kg	SOLID	-	-																					
Ethiprole*	mg/kg	SOLID	-	-																					
Ethirimol*	mg/kg	SOLID	-	-																					
Ethofumesate	mg/kg	SOLID	-	-																					
Ethoprophos	mg/kg	SOLID	-	-																					
Ethoxyquin*	mg/kg	SOLID	-	-																					
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0020	<0.0020	<0.0020		<0.0030	<0.0030	<0.0020		<0.0020	<0.0020	<0.0020	<0.0030	<0.0030	<0.0030	<0.0020	<0.0020	<0.0020	<0.0100	<0.0100	<0.0030	<0.0020
Ethylparathion	mg/kg	SOLID	-	-																					
Etofenprox*	mg/kg	SOLID	-	-																					
Etoxazole*	mg/kg	SOLID	-	-																					
Etrimphos	mg/kg	SOLID	-	-																					
Famoxadone*	mg/kg	SOLID	-	-																					
Famphur	mg/kg	SOLID	-	-																					
Fenamidone*	mg/kg	SOLID	-	-																					
Fenamiphos sulfone*	mg/kg	SOLID	-	-																					
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																					
Fenamiphos*	mg/kg	SOLID	-	-																					
Fenarimol	mg/kg	SOLID	-	-																					
Fenazaquin*	mg/kg	SOLID	-	-																					
Fenbuconazole*	mg/kg	SOLID	-	-																					
Fenchlorphos oxon*	mg/kg	SOLID	-	-																					
Fenhexamid*	mg/kg	SOLID	-	-																					
Fenitrothion	mg/kg	SOLID	-	-																					
Fenpiclonil*	mg/kg	SOLID	-	-																					
Fenpropathrin*	mg/kg	SOLID	-	-																					
Fenpropidin*	mg/kg	SOLID	-	-																					
Fenpropimorph*	mg/kg	SOLID	-	-																					
Fenpyroximate*	mg/kg	SOLID	-	-																					
Fenson*	mg/kg	SOLID	-	-																					
Fensulfothion	mg/kg	SOLID	-	-																					
Fenthion	mg/kg	SOLID	-	-																					
Fenthion Sulphone*	mg/kg	SOLID	-	-																					
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																					
Fenuron	mg/kg	SOLID	-	-																					
Fenvalerate	mg/kg	SOLID	-	-																					
Fipronil sulphone*	mg/kg	SOLID	-	-																					
Fipronil*	mg/kg	SOLID	-	-																					
Flamprop-isopropyl	mg/kg	SOLID	-	-																					
Flonicamid*	mg/kg	SOLID	-	-																					
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																					
Fluazinam*	mg/kg	SOLID	-	-																					
Flucythrinate*	mg/kg	SOLID	-	-																					
Fludioxonil*	mg/kg	SOLID	-	-																					
Flufenacet*	mg/kg	SOLID	-	-																					
Flufenoxuron*	mg/kg	SOLID	-	-																					
Flumetralin*	mg/kg	SOLID	-	-																					
Flumioxazin*	mg/kg	SOLID	-	-																					
Flumorph*	mg/kg	SOLID	-	-																					
Fluometuron*	mg/kg	SOLID	-	-																					
Fluopicolide*	mg/kg	SOLID	-	-																					
Fluopyram*	mg/kg	SOLID	-	-																					
Fluoranthene	mg/kg	SOLID	23000	6300	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	0.11	<0.0900	0.1	<0.1000	<0.1000	<0.0900
Fluorene	mg/kg	SOLID	63000	20000	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Fluorochloridone*	mg/kg	SOLID	-	-																					
Fluoroxypyr	mg/kg	SOLID	-	-																					
Fluquinconazole*	mg/kg	SOLID	-	-																					
Flurtamone*	mg/kg	SOLID	-	-																					
Flusilazole*	mg/kg	SOLID	-	-																					
Flutolanil*	mg/kg	SOLID	-	-																					
Flutriafol*	mg/kg	SOLID	-	-																					
Fluxapyroxad*	mg/kg	SOLID	-	-																					
Folpet	mg/kg	SOLID	-	-																					
Fonophos*	mg/kg	SOLID	-	-																					
Forchlorfenuron*	mg/kg	SOLID	-	-																					
Formetanate*	mg/kg	SOLID	-	-																					
Formothion*	mg/kg	SOLID	-	-																					
Fraction of non-crushable material*	%	SOLID	-	-	0	0	0		0	0	0		0	0	0	0	0	0	0	0	0			0	0
Fraction of sample above 4mm*	%	SOLID	-	-	35	30.3	2.3		14	45	3.4		44	48	52.9	43	0	0	19	13	53			5.1	29
Fuberidazole*	mg/kg	SOLID	-	-																					
Furalaxyl*	mg/kg	SOLID	-	-																					
Furathiocarb*	mg/kg	SOLID	-	-																					
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																					
GRO >C5-10	mg/kg	SOLID	-	-													<0.3000					<0.1000	<0.1000		
GRO >C5-12	mg/kg	SOLID	-	-																					
GRO >C7-8	mg/kg	SOLID	-	-													<0.0100								
GRO >C8-10	mg/kg	SOLID	-	-																					
GRO Surrogate % recovery	%	SOLID	-	-																					
Haloxyfop etotyl*	mg/kg	SOLID	-	-																					
Haloxyfop Methyl*	mg/kg	SOLID	-	-																					
Heptachlor	mg/kg	SOLID	-	-																					
Heptachlor Epoxide	mg/kg	SOLID	-	-																					
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																					
Heptanoic Acid	mg/kg	SOLID	-	-																					
Heptenophos	mg/kg	SOLID	-	-																					
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																					
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48																					
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-																					
Hexachloroethane	mg/kg	SOLID	21	158																					
Hexaconazole	mg/kg	SOLID	-	-																					
Hexaflumuron*	mg/kg	SOLID	-	-																					
Hexazinone	mg/kg	SOLID	-	-																					
Hexythiazox*	mg/kg	SOLID	-	-																					
Imazalil*	mg/kg	SOLID	-	-																					
Imidacloprid*	mg/kg	SOLID	-	-																					
Imidan	mg/kg	SOLID	-	-																					
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Indoxacarb*	mg/kg	SOLID	-	-																					
Iodofenphos	mg/kg	SOLID	-	-																					
Iprodione*	mg/kg	SOLID	-	-																					
Iprovalicarb*	mg/kg	SOLID	-	-																					
Isazofos*	mg/kg	SOLID	-	-																					
Isocarbophos*	mg/kg	SOLID	-	-																					
Isodrin	mg/kg	SOLID	-	-																					
Isofenphos Methyl*	mg/kg	SOLID	-	-																					
Isofenphos*	mg/kg	SOLID	-	-																					
Isomethiozin*	mg/kg	SOLID	-	-																					
Isophorone	mg/kg	SOLID	-	-																					
Isoprocarb*	mg/kg	SOLID	-	-																					
Isopropylbenzene	mg/kg	SOLID	1300	23000																					
Isoprothiolane*	mg/kg	SOLID	-	-																					
Isoproturon	mg/kg	SOLID	-	-																					
Isopyrazam*	mg/kg	SOLID	-	-																					
Isothiazolinone*	mg/kg	SOLID	-	-																					
Isoxaben*	mg/kg	SOLID	-	-																					
Karbutilate*	mg/kg	SOLID	-	-																					
Kresoxim Methyl*	mg/kg	SOLID	-	-																					
Lambda Cyhalothrin	mg/kg	SOLID	-	-																					
Lead	mg/kg	SOLID	2300	1300	6	7.8	10		30	24.5	12		13.7	12	23.8	15	7.9	6.1	75.7	95	18.9	220	17	9.6	22.9
Lenacil*	mg/kg	SOLID	-	-																					
Leptophos	mg/kg	SOLID	-	-																					
Linuron	mg/kg	SOLID	-	-																					
Lufenuron*	mg/kg	SOLID	-	-																					
m,p xylenes	mg/kg	SOLID	-	-	<0.0040	<0.0040	<0.0040		<0.0060	<0.0050	<0.0050		<0.0050	<0.0050	<0.0040	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0040	<0.0100	<0.0100	<0.0050	<0.0050
m,p,o Xylenes	mg/kg	SOLID	-	-																					
Malaoxon*	mg/kg	SOLID	-	-																					
Malathion	mg/kg	SOLID	-	-																					
Mandipropamid*	mg/kg	SOLID	-	-																					
MCPA-thioethyl*	mg/kg	SOLID	-	-																					
Mecarbam*	mg/kg	SOLID	-	-																					
Mecoprop	mg/kg	SOLID	-	-																					
Mefenacet*	mg/kg	SOLID	-	-																					

Max of Normalised Results																												
					ML162-CR024	ML162-CR024	ML162-CR024	ML162-CR026	ML162-CR026	ML162-CR026	ML162-CR028	ML162-CR401	ML162-CR401	ML162-CR402	ML162-CR402	ML162-CR402	ML162-CR403	ML162-CR403	ML162-CR404	ML162-CR404	ML162-TP402	ML162-TP402	ML163-CP035	ML163-CP038	ML163-CP401	ML163-CP401	ML163-CP401	ML163-CR007
					M42 Coleshill North Viaduct	M42 Coleshill North Viaduct	M42 Coleshill North Viaduct	Gilson Embankment	Gilson Embankment	Gilson Embankment	M42 Coleshill North Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Gilson Embankment	Gilson Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Gilson Cutting	Gilson Cutting	Gilson Cutting	Gilson Embankment
					0.05	0.5	2.1	21.8	22.3	24.8	2.3	0.3	1	0.3	1	3	0.3	1	0.3	1	0.3	1	1	0.5	0.05	0.5	2	0.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	ALV	MMG	MMG	MMG	ALV	ALV	ALV	MGR	MGR	MGR	GFDMP	GFDMP	RTD2	RTD2	TOP	ALV	ALV	RTD1	TOP	GFDUD	GFDUD	GFDUD
Endosulfan II	mg/kg	SOLID	6300	2400															<0.0100									
Endosulphan sulphate*	mg/kg	SOLID	-	-															<0.0100									
Endrin	mg/kg	SOLID	-	-															<0.0100									
Enterococci	CFU/g	SOLID	-	-													<20.0000	<20.0000										
EPH >C10-12	mg/kg	SOLID	-	-																								
EPH >C10-35	mg/kg	SOLID	-	-	13	1	<1.0000					8	2	790	560	420	12	13	16	<1.0000	1	1			86	30	1	14
EPH >C10-40	mg/kg	SOLID	-	-																								
EPH >C12-16	mg/kg	SOLID	-	-																								
EPH >C16-21	mg/kg	SOLID	-	-																								
EPH >C21-35	mg/kg	SOLID	-	-																								
EPH >C8-40	mg/kg	SOLID	-	-																			16	60				
EPH/TPH >C10-12	mg/kg	SOLID	-	-																								
EPH/TPH >C10-25	mg/kg	SOLID	-	-																								
EPH/TPH >C12-16	mg/kg	SOLID	-	-																								
EPH/TPH >C16-21	mg/kg	SOLID	-	-																								
EPH/TPH >C21-40	mg/kg	SOLID	-	-																								
EPH/TPH >C24-40	mg/kg	SOLID	-	-																								
EPH/TPH >C35-40	mg/kg	SOLID	-	-	3	<1.0000	<1.0000					2	1	230	220	150	2	3	2	<1.0000	<1.0000	<1.0000			8	4	<1.0000	4
EPH/TPH >C6-8	mg/kg	SOLID	-	-																								
EPH/TPH >C8-10	mg/kg	SOLID	-	-																								
Epoxiconazole*	mg/kg	SOLID	-	-															<0.0100									
EPTC*	mg/kg	SOLID	-	-															<0.0100									
Escherichia coli (Confirmed)	N/A	SOLID	-	-																								
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-													<10.0000	<10.0000										
Etaconazole*	mg/kg	SOLID	-	-															<0.0100									
Ethidimuron*	mg/kg	SOLID	-	-															<0.0100									
Ethiofencarb sulfone*	mg/kg	SOLID	-	-															<0.0100									
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-															<0.0100									
Ethiofencarb*	mg/kg	SOLID	-	-															<0.0100									
Ethion	mg/kg	SOLID	-	-															<0.0100									
Ethiprole*	mg/kg	SOLID	-	-															<0.0100									
Ethirimol*	mg/kg	SOLID	-	-															<0.0100									
Ethofumesate	mg/kg	SOLID	-	-															<0.0100									
Ethoprophos	mg/kg	SOLID	-	-															<0.0100									
Ethoxyquin*	mg/kg	SOLID	-	-															<0.0100									
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0100	<0.0100	<0.0100					<0.0100	<0.0100	<0.0200	<0.0200	<0.0200	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0020	<0.0020	<0.0100	<0.0100	<0.0100	<0.0100
Ethylparathion	mg/kg	SOLID	-	-															<0.0100									
Etofenprox*	mg/kg	SOLID	-	-															<0.0100									
Etoxazole*	mg/kg	SOLID	-	-															<0.0100									
Etrimphos	mg/kg	SOLID	-	-															<0.0100									
Famoxadone*	mg/kg	SOLID	-	-															<0.0100									
Famphur	mg/kg	SOLID	-	-															<0.0100									
Fenamidone*	mg/kg	SOLID	-	-															<0.0100									
Fenamiphos sulfone*	mg/kg	SOLID	-	-															<0.0100									
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-															<0.0100									
Fenamiphos*	mg/kg	SOLID	-	-															<0.0100									
Fenarimol	mg/kg	SOLID	-	-															<0.0100									
Fenazaquin*	mg/kg	SOLID	-	-															<0.0100									
Fenbuconazole*	mg/kg	SOLID	-	-															<0.0100									
Fenchlorphos oxon*	mg/kg	SOLID	-	-															<0.0100									
Fenhexamid*	mg/kg	SOLID	-	-															<0.0100									
Fenitrothion	mg/kg	SOLID	-	-															<0.0100									
Fenpiclonil*	mg/kg	SOLID	-	-															<0.0100									
Fenpropathrin*	mg/kg	SOLID	-	-															<0.0100									
Fenpropidin*	mg/kg	SOLID	-	-															<0.0100									
Fenpropimorph*	mg/kg	SOLID	-	-															<0.0100									
Fenpyroximate*	mg/kg	SOLID	-	-															<0.0100									
Fenson*	mg/kg	SOLID	-	-															<0.0100									
Fensulfothion	mg/kg	SOLID	-	-															<0.0100									
Fenthion	mg/kg	SOLID	-	-															<0.0100									
Fenthion Sulphone*	mg/kg	SOLID	-	-															<0.0100									
Fenthion Sulphoxide*	mg/kg	SOLID	-	-															<0.0100									
Fenuron	mg/kg	SOLID	-	-															<0.0100									
Fenvalerate	mg/kg	SOLID	-	-															<0.0100									
Fipronil sulphone*	mg/kg	SOLID	-	-															<0.0100									
Fipronil*	mg/kg	SOLID	-	-															<0.0100									
Flamprop-isopropyl	mg/kg	SOLID	-	-															<0.0100									
Flonicamid*	mg/kg	SOLID	-	-															<0.0100									
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-															<0.0100									
Fluazinam*	mg/kg	SOLID	-	-															<0.0100									
Flucythrinate*	mg/kg	SOLID	-	-															<0.0100									
Fludioxonil*	mg/kg	SOLID	-	-															<0.0100									
Flufenacet*	mg/kg	SOLID	-	-															<0.0100									
Flufenoxuron*	mg/kg	SOLID	-	-															<0.0100									
Flumetralin*	mg/kg	SOLID	-	-															<0.0100									
Flumioxazin*	mg/kg	SOLID	-	-															<0.0100									
Flumorph*	mg/kg	SOLID	-	-															<0.0100									
Fluometuron*	mg/kg	SOLID	-	-															<0.0100									
Fluopicolide*	mg/kg	SOLID	-	-															<0.0100									
Fluopyram*	mg/kg	SOLID	-	-															<0.0100									
Fluoranthene	mg/kg	SOLID	23000	6300	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	0.1	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	1.8	0.3	<0.1000	<0.1000
Fluorene	mg/kg	SOLID	63000	20000	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Fluorochloridone*	mg/kg	SOLID	-	-															<0.0100									
Fluoroxypyr	mg/kg	SOLID	-	-															<0.0100									
Fluquinconazole*	mg/kg	SOLID	-	-															<0.0100									
Flurtamone*	mg/kg	SOLID	-	-															<0.0100									
Flusilazole*	mg/kg	SOLID	-	-															<0.0100									
Flutolanil*	mg/kg	SOLID	-	-															<0.0100									
Flutriafol*	mg/kg	SOLID	-	-															<0.0100									
Fluxapyroxad*	mg/kg	SOLID	-	-															<0.0100									
Folpet	mg/kg	SOLID	-	-															<0.0100									
Fonophos*	mg/kg	SOLID	-	-															<0.0100									
Forchlorfenuron*	mg/kg	SOLID	-	-															<0.0100									
Formetanate*	mg/kg	SOLID	-	-															<0.0100									
Formothion*	mg/kg	SOLID	-	-															<0.0100									
Fraction of non-crushable material*	%	SOLID	-	-																			0	0				
Fraction of sample above 4mm*	%	SOLID	-	-																			3	35.2				
Fuberidazole*	mg/kg	SOLID	-	-															<0.0100									
Furalaxyl*	mg/kg	SOLID	-	-															<0.0100									
Furathiocarb*	mg/kg	SOLID	-	-															<0.0100									
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14															<0.0100									
GRO >C5-10	mg/kg	SOLID	-	-	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<0.2000	<0.2000	<0.2000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000			<0.1000	<0.1000	<0.1000	<0.1000
GRO >C5-12	mg/kg	SOLID	-	-																								
GRO >C7-8	mg/kg	SOLID	-	-																								
GRO >C8-10	mg/kg	SOLID	-	-																								
GRO Surrogate % recovery	%	SOLID	-	-																								
Haloxyfop etotyl*	mg/kg	SOLID	-	-															<0.0100									
Haloxyfop Methyl*	mg/kg	SOLID	-	-															<0.0100									
Heptachlor	mg/kg	SOLID	-	-															<0.0100									
Heptachlor Epoxide	mg/kg	SOLID	-	-															<0.0100									
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-															<0.0100									
Heptanoic Acid	mg/kg	SOLID	-	-																								
Heptenophos	mg/kg	SOLID	-	-															<0.0100									
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30															<0.0100							<0.1000		
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48																				<0.0020		<0.1000		
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-																						<0.6000		
Hexachloroethane	mg/kg	SOLID	21	158																						<0.1000		
Hexaconazole	mg/kg	SOLID	-	-															<0.0100									
Hexaflumuron*	mg/kg	SOLID	-	-															<0.0100									
Hexazinone	mg/kg	SOLID	-	-															<0.0100									
Hexythiazox*	mg/kg	SOLID	-	-															<0.0100									
Imazalil*	mg/kg	SOLID	-	-															<0.0100									
Imidacloprid*	mg/kg	SOLID	-	-															<0.0100									
Imidan	mg/kg	SOLID	-	-															<0.0100									
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	0.5	0.1	<0.1000	<0.1000
Indoxacarb*	mg/kg	SOLID	-	-															<0.0100									
Iodofenphos	mg/kg	SOLID	-	-															<0.0100									
Iprodione*	mg/kg	SOLID	-	-															<0.0100									
Iprovalicarb*	mg/kg	SOLID	-	-															<0.0100									
Isazofos*	mg/kg	SOLID	-	-															<0.0100									
Isocarbophos*	mg/kg	SOLID	-	-															<0.0100									
Isodrin	mg/kg	SOLID	-	-															<0.0100									
Isofenphos Methyl*	mg/kg	SOLID	-	-															<0.0100									
Isofenphos*	mg/kg	SOLID	-	-															<0.0100									
Isomethiozin*	mg/kg	SOLID	-	-															<0.0100									
Isophorone	mg/kg	SOLID	-	-																						<0.1000		
Isoprocarb*	mg/kg	SOLID	-	-															<0.0100									
Isopropylbenzene	mg/kg	SOLID	1300	23000																				<0.0010		<0.0500		
Isoprothiolane*	mg/kg	SOLID	-	-															<0.0100									
Isoproturon	mg/kg	SOLID	-	-															<0.0100									
Isopyrazam*	mg/kg	SOLID	-	-															<0.0100									
Isothiazolinone*	mg/kg	SOLID	-	-															<0.0100									
Isoxaben*	mg/kg	SOLID	-	-															<0.0100									
Karbutilate*	mg/kg	SOLID	-	-															<0.0100									
Kresoxim Methyl*	mg/kg	SOLID	-	-															<0.0100									
Lambda Cyhalothrin	mg/kg	SOLID	-	-															<0.0100									
Lead	mg/kg	SOLID	2300	1300	48	11	11					8	22	18	18	140	40	17	32	13	31	6	11.4	131.1	77	55	10	17
Lenacil*	mg/kg	SOLID	-	-															<0.0100									
Leptophos	mg/kg	SOLID	-	-															<0.0100									
Linuron	mg/kg	SOLID	-	-															<0.0100									
Lufenuron*	mg/kg	SOLID	-	-															<0.0100									
m,p xylenes	mg/kg	SOLID	-	-	<0.0100	<0.0100	<0.0100					<0.0100	<0.0100	<0.0200	<0.0200	<0.0200	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0040	<0.0040	<0.0100	<0.0100	<0.0100	<0.0100
m,p,o Xylenes	mg/kg	SOLID	-	-																								
Malaoxon*	mg/kg	SOLID	-	-															<0.0100									
Malathion	mg/kg	SOLID	-	-															<0.0100									
Mandipropamid*	mg/kg	SOLID	-	-															<0.0100									
MCPA-thioethyl*	mg/kg	SOLID	-	-															<0.0100									
Mecarbam*	mg/kg	SOLID	-	-															<0.0100									
Mecoprop	mg/kg	SOLID	-	-															<0.0100									
Mefenacet*	mg/kg	SOLID	-	-															<0.0100									

Max of Normalised Results																											
					ML163-CR007	ML163-CR007	ML163-CR008	ML163-CR008	ML163-CR008	ML163-CR008	ML163-CR010	ML163-CR010	ML163-CR010	ML163-CR016	ML163-CR016	ML163-CR020	ML163-CR020	ML163-CR020	ML163-CR021a	ML163-CR021a	ML163-CR021a	ML163-CR401	ML163-CR401	ML163-CR401	ML163-TP009	ML163-TP020	ML163-TP021
					Gilson Embankment	Gilson Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Gilson Embankment	Gilson Embankment	Gilson Embankment	Gilson Cutting	Lichfield Road Embankment	Lichfield Road Embankment
					1	2	0.05	0.6	1.2	1.5	0.4	1.5	2	0.5	1	0.3	0.5	0.9	0.4	0.9	1.5	0.05	0.5	1	3.5	1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GLLD	GLLD	MGR	MGR	MGR	RTD1	MGR	RTD1	RTD1	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	ALV	TOP	ALV	ALV	MMG	GLLD	MGR
Endosulfan II	mg/kg	SOLID	6300	2400																							
Endosulphan sulphate*	mg/kg	SOLID	-	-																							
Endrin	mg/kg	SOLID	-	-																							
Enterococci	CFU/g	SOLID	-	-																							
EPH >C10-12	mg/kg	SOLID	-	-																							
EPH >C10-35	mg/kg	SOLID	-	-	<1.0000	<1.0000																12	<1.0000	<1.0000			
EPH >C10-40	mg/kg	SOLID	-	-																							
EPH >C12-16	mg/kg	SOLID	-	-																							
EPH >C16-21	mg/kg	SOLID	-	-																							
EPH >C21-35	mg/kg	SOLID	-	-																							
EPH >C8-40	mg/kg	SOLID	-	-			83	23	<12.0000	<12.0000	47		17	41	<11.0000		2480	99	35	59	14					26	89
EPH/TPH >C10-12	mg/kg	SOLID	-	-																							
EPH/TPH >C10-25	mg/kg	SOLID	-	-																							
EPH/TPH >C12-16	mg/kg	SOLID	-	-																							
EPH/TPH >C16-21	mg/kg	SOLID	-	-																							
EPH/TPH >C21-40	mg/kg	SOLID	-	-																							
EPH/TPH >C24-40	mg/kg	SOLID	-	-																							
EPH/TPH >C35-40	mg/kg	SOLID	-	-	<1.0000	<1.0000																1	<1.0000	<1.0000			
EPH/TPH >C6-8	mg/kg	SOLID	-	-			<0.2000	<0.2000	<0.2000	<0.2000							<0.2000										
EPH/TPH >C8-10	mg/kg	SOLID	-	-																							
Epoxiconazole*	mg/kg	SOLID	-	-																							
EPTC*	mg/kg	SOLID	-	-																							
Escherichia coli (Confirmed)	N/A	SOLID	-	-																							
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																							
Etaconazole*	mg/kg	SOLID	-	-																							
Ethidimuron*	mg/kg	SOLID	-	-																							
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																							
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																							
Ethiofencarb*	mg/kg	SOLID	-	-																							
Ethion	mg/kg	SOLID	-	-																							
Ethiprole*	mg/kg	SOLID	-	-																							
Ethirimol*	mg/kg	SOLID	-	-																							
Ethofumesate	mg/kg	SOLID	-	-																							
Ethoprophos	mg/kg	SOLID	-	-																							
Ethoxyquin*	mg/kg	SOLID	-	-																							
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0100	<0.0100	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020		<0.0020	<0.0020	<0.0020		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0100	<0.0100	<0.0100		<0.0020	<0.0020
Ethylparathion	mg/kg	SOLID	-	-																							
Etofenprox*	mg/kg	SOLID	-	-																							
Etoxazole*	mg/kg	SOLID	-	-																							
Etrimphos	mg/kg	SOLID	-	-																							
Famoxadone*	mg/kg	SOLID	-	-																							
Famphur	mg/kg	SOLID	-	-																							
Fenamidone*	mg/kg	SOLID	-	-																							
Fenamiphos sulfone*	mg/kg	SOLID	-	-																							
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																							
Fenamiphos*	mg/kg	SOLID	-	-																							
Fenarimol	mg/kg	SOLID	-	-																							
Fenazaquin*	mg/kg	SOLID	-	-																							
Fenbuconazole*	mg/kg	SOLID	-	-																							
Fenchlorphos oxon*	mg/kg	SOLID	-	-																							
Fenhexamid*	mg/kg	SOLID	-	-																							
Fenitrothion	mg/kg	SOLID	-	-																							
Fenpiclonil*	mg/kg	SOLID	-	-																							
Fenpropathrin*	mg/kg	SOLID	-	-																							
Fenpropidin*	mg/kg	SOLID	-	-																							
Fenpropimorph*	mg/kg	SOLID	-	-																							
Fenpyroximate*	mg/kg	SOLID	-	-																							
Fenson*	mg/kg	SOLID	-	-																							
Fensulfothion	mg/kg	SOLID	-	-																							
Fenthion	mg/kg	SOLID	-	-																							
Fenthion Sulphone*	mg/kg	SOLID	-	-																							
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																							
Fenuron	mg/kg	SOLID	-	-																							
Fenvalerate	mg/kg	SOLID	-	-																							
Fipronil sulphone*	mg/kg	SOLID	-	-																							
Fipronil*	mg/kg	SOLID	-	-																							
Flamprop-isopropyl	mg/kg	SOLID	-	-																							
Flonicamid*	mg/kg	SOLID	-	-																							
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																							
Fluazinam*	mg/kg	SOLID	-	-																							
Flucythrinate*	mg/kg	SOLID	-	-																							
Fludioxonil*	mg/kg	SOLID	-	-																							
Flufenacet*	mg/kg	SOLID	-	-																							
Flufenoxuron*	mg/kg	SOLID	-	-																							
Flumetralin*	mg/kg	SOLID	-	-																							
Flumioxazin*	mg/kg	SOLID	-	-																							
Flumorph*	mg/kg	SOLID	-	-																							
Fluometuron*	mg/kg	SOLID	-	-																							
Fluopicolide*	mg/kg	SOLID	-	-																							
Fluopyram*	mg/kg	SOLID	-	-																							
Fluoranthene	mg/kg	SOLID	23000	6300	<0.1000	<0.1000	0.62	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	2.47		3.41	<0.0900	<0.0900	0.63	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	0.14
Fluorene	mg/kg	SOLID	63000	20000	<0.1000	<0.1000	<0.0900	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	<0.0900		0.49	<0.0900	<0.0900	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	<0.0900
Fluorochloridone*	mg/kg	SOLID	-	-																							
Fluoroxypyr	mg/kg	SOLID	-	-																							
Fluquinconazole*	mg/kg	SOLID	-	-																							
Flurtamone*	mg/kg	SOLID	-	-																							
Flusilazole*	mg/kg	SOLID	-	-																							
Flutolanil*	mg/kg	SOLID	-	-																							
Flutriafol*	mg/kg	SOLID	-	-																							
Fluxapyroxad*	mg/kg	SOLID	-	-																							
Folpet	mg/kg	SOLID	-	-																							
Fonophos*	mg/kg	SOLID	-	-																							
Forchlorfenuron*	mg/kg	SOLID	-	-																							
Formetanate*	mg/kg	SOLID	-	-																							
Formothion*	mg/kg	SOLID	-	-																							
Fraction of non-crushable material*	%	SOLID	-	-			0	0	0	0	0		0	0	0		0	0	0	0	0					0	0
Fraction of sample above 4mm*	%	SOLID	-	-			43	0	29	27	40		51	41.3	47.4		42	34	38.1	33.6	32.7					0	13.7
Fuberidazole*	mg/kg	SOLID	-	-																							
Furalaxyl*	mg/kg	SOLID	-	-																							
Furathiocarb*	mg/kg	SOLID	-	-																							
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																							
GRO >C5-10	mg/kg	SOLID	-	-	<0.1000	<0.1000	<0.2000	<0.2000	<0.2000	<0.2000							<0.2000					<0.1000	<0.1000	<0.1000			
GRO >C5-12	mg/kg	SOLID	-	-																							
GRO >C7-8	mg/kg	SOLID	-	-			<0.0100	<0.0100	<0.0100	<0.0100							<0.0100										
GRO >C8-10	mg/kg	SOLID	-	-																							
GRO Surrogate % recovery	%	SOLID	-	-																							
Haloxyfop etotyl*	mg/kg	SOLID	-	-																							
Haloxyfop Methyl*	mg/kg	SOLID	-	-																							
Heptachlor	mg/kg	SOLID	-	-																							
Heptachlor Epoxide	mg/kg	SOLID	-	-																							
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																							
Heptanoic Acid	mg/kg	SOLID	-	-													<2.0000										
Heptenophos	mg/kg	SOLID	-	-																							
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																							
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48													<0.0020									<0.0020	<0.0020
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-													<2.0000										
Hexachloroethane	mg/kg	SOLID	21	158													<2.0000										
Hexaconazole	mg/kg	SOLID	-	-																							
Hexaflumuron*	mg/kg	SOLID	-	-																							
Hexazinone	mg/kg	SOLID	-	-																							
Hexythiazox*	mg/kg	SOLID	-	-																							
Imazalil*	mg/kg	SOLID	-	-																							
Imidacloprid*	mg/kg	SOLID	-	-																							
Imidan	mg/kg	SOLID	-	-																							
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	<0.1000	<0.1000	0.22	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	1.27		0.79	<0.0900	<0.0900	0.17	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	<0.0900
Indoxacarb*	mg/kg	SOLID	-	-																							
Iodofenphos	mg/kg	SOLID	-	-																							
Iprodione*	mg/kg	SOLID	-	-																							
Iprovalicarb*	mg/kg	SOLID	-	-																							
Isazofos*	mg/kg	SOLID	-	-																							
Isocarbophos*	mg/kg	SOLID	-	-																							
Isodrin	mg/kg	SOLID	-	-																							
Isofenphos Methyl*	mg/kg	SOLID	-	-																							
Isofenphos*	mg/kg	SOLID	-	-																							
Isomethiozin*	mg/kg	SOLID	-	-																							
Isophorone	mg/kg	SOLID	-	-													<2.0000										
Isoprocarb*	mg/kg	SOLID	-	-																							
Isopropylbenzene	mg/kg	SOLID	1300	23000													<0.0010									<0.0010	<0.0010
Isoprothiolane*	mg/kg	SOLID	-	-																							
Isoproturon	mg/kg	SOLID	-	-																							
Isopyrazam*	mg/kg	SOLID	-	-																							
Isothiazolinone*	mg/kg	SOLID	-	-																							
Isoxaben*	mg/kg	SOLID	-	-																							
Karbutilate*	mg/kg	SOLID	-	-																							
Kresoxim Methyl*	mg/kg	SOLID	-	-																							
Lambda Cyhalothrin	mg/kg	SOLID	-	-																							
Lead	mg/kg	SOLID	2300	1300	17	5	48.1	11.9	698.6	13.8	23.5		7	21	7.2		25.9	4.7	18.4	41	8.6	40	12	13		4.4	35.9
Lenacil*	mg/kg	SOLID	-	-																							
Leptophos	mg/kg	SOLID	-	-																							
Linuron	mg/kg	SOLID	-	-																							
Lufenuron*	mg/kg	SOLID	-	-																							
m,p-xylenes	mg/kg	SOLID	-	-	<0.0100	<0.0100	<0.0050	<0.0040	<0.0050	<0.0050	<0.0050		<0.0050	<0.0050	<0.0040		<0.0040	<0.0040	<0.0050	<0.0050	<0.0040	<0.0100	<0.0100	<0.0100		<0.0040	<0.0050
m,p,o Xylenes	mg/kg	SOLID	-	-																							
Malaoxon*	mg/kg	SOLID	-	-																							
Malathion	mg/kg	SOLID	-	-																							
Mandipropamid*	mg/kg	SOLID	-	-																							
MCPA-thioethyl*	mg/kg	SOLID	-	-																							
Mecarbam*	mg/kg	SOLID	-	-																							
Mecoprop	mg/kg	SOLID	-	-																							
Mefenacet*	mg/kg	SOLID	-	-																							

Max of Normalised Results																									
					ML163-TP021	ML164-CP003	ML164-CP003	ML164-CP003	ML164-CP004	ML164-CP004	ML164-CP004	ML164-CP010	ML164-CP010	ML164-CP021	ML164-CP021	ML164-CP021	ML164-CP023	ML164-CP023	ML164-CP036	ML164-CP036	ML164-CP036	ML164-CR009	ML164-CR009	ML164-CR009	ML164-CR011
					Lichfield Road Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watton House Embankment	Watton House Embankment	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct
					0.5	0.9	2	3.5	1	3	4	0.5	1	0.5	1	3	0.05	1.5	1	3	5	0.05	0.4	1.5	0.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	MGR	TILMP	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	ALV	MGR	MGR	MGR	MGR
Endosulfan II	mg/kg	SOLID	6300	2400																					
Endosulphan sulphate*	mg/kg	SOLID	-	-																					
Endrin	mg/kg	SOLID	-	-																					
Enterococci	CFU/g	SOLID	-	-																					
EPH >C10-12	mg/kg	SOLID	-	-																					
EPH >C10-35	mg/kg	SOLID	-	-																					
EPH >C10-40	mg/kg	SOLID	-	-																					
EPH >C12-16	mg/kg	SOLID	-	-																					
EPH >C16-21	mg/kg	SOLID	-	-																					
EPH >C21-35	mg/kg	SOLID	-	-																					
EPH >C8-40	mg/kg	SOLID	-	-	25	377	554	18	183	243	132	49	76	80		22	70	50	135	43	<13.0000	229	146	437	153
EPH/TPH >C10-12	mg/kg	SOLID	-	-																					
EPH/TPH >C10-25	mg/kg	SOLID	-	-																					
EPH/TPH >C12-16	mg/kg	SOLID	-	-																					
EPH/TPH >C16-21	mg/kg	SOLID	-	-																					
EPH/TPH >C21-40	mg/kg	SOLID	-	-																					
EPH/TPH >C24-40	mg/kg	SOLID	-	-																					
EPH/TPH >C35-40	mg/kg	SOLID	-	-																					
EPH/TPH >C6-8	mg/kg	SOLID	-	-		<0.2000			<0.2000																
EPH/TPH >C8-10	mg/kg	SOLID	-	-																					
Epoxiconazole*	mg/kg	SOLID	-	-																					
EPTC*	mg/kg	SOLID	-	-																					
Escherichia coli (Confirmed)	N/A	SOLID	-	-					4590																
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																					
Etaconazole*	mg/kg	SOLID	-	-																					
Ethidimuron*	mg/kg	SOLID	-	-																					
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																					
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																					
Ethiofencarb*	mg/kg	SOLID	-	-																					
Ethion	mg/kg	SOLID	-	-																					
Ethiprole*	mg/kg	SOLID	-	-																					
Ethirimol*	mg/kg	SOLID	-	-																					
Ethofumesate	mg/kg	SOLID	-	-																					
Ethoprophos	mg/kg	SOLID	-	-																					
Ethoxyquin*	mg/kg	SOLID	-	-																					
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0030	<0.0020	<0.0020	<0.0020	<0.0020
Ethylparathion	mg/kg	SOLID	-	-																					
Etofenprox*	mg/kg	SOLID	-	-																					
Etoxazole*	mg/kg	SOLID	-	-																					
Etrimphos	mg/kg	SOLID	-	-																					
Famoxadone*	mg/kg	SOLID	-	-																					
Famphur	mg/kg	SOLID	-	-																					
Fenamidone*	mg/kg	SOLID	-	-																					
Fenamiphos sulfone*	mg/kg	SOLID	-	-																					
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																					
Fenamiphos*	mg/kg	SOLID	-	-																					
Fenarimol	mg/kg	SOLID	-	-																					
Fenazaquin*	mg/kg	SOLID	-	-																					
Fenbuconazole*	mg/kg	SOLID	-	-																					
Fenchlorphos oxon*	mg/kg	SOLID	-	-																					
Fenhexamid*	mg/kg	SOLID	-	-																					
Fenitrothion	mg/kg	SOLID	-	-																					
Fenpiclonil*	mg/kg	SOLID	-	-																					
Fenpropathrin*	mg/kg	SOLID	-	-																					
Fenpropidin*	mg/kg	SOLID	-	-																					
Fenpropimorph*	mg/kg	SOLID	-	-																					
Fenpyroximate*	mg/kg	SOLID	-	-																					
Fenson*	mg/kg	SOLID	-	-																					
Fensulfothion	mg/kg	SOLID	-	-																					
Fenthion	mg/kg	SOLID	-	-																					
Fenthion Sulphone*	mg/kg	SOLID	-	-																					
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																					
Fenuron	mg/kg	SOLID	-	-																					
Fenvalerate	mg/kg	SOLID	-	-																					
Fipronil sulphone*	mg/kg	SOLID	-	-																					
Fipronil*	mg/kg	SOLID	-	-																					
Flamprop-isopropyl	mg/kg	SOLID	-	-																					
Flonicamid*	mg/kg	SOLID	-	-																					
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																					
Fluazinam*	mg/kg	SOLID	-	-																					
Flucythrinate*	mg/kg	SOLID	-	-																					
Fludioxonil*	mg/kg	SOLID	-	-																					
Flufenacet*	mg/kg	SOLID	-	-																					
Flufenoxuron*	mg/kg	SOLID	-	-																					
Flumetralin*	mg/kg	SOLID	-	-																					
Flumioxazin*	mg/kg	SOLID	-	-																					
Flumorph*	mg/kg	SOLID	-	-																					
Fluometuron*	mg/kg	SOLID	-	-																					
Fluopicolide*	mg/kg	SOLID	-	-																					
Fluopyram*	mg/kg	SOLID	-	-																					
Fluoranthene	mg/kg	SOLID	23000	6300	<0.0900	1.6	20.2	<0.0900	1.93	2.68	1.49	0.2	0.21	0.18		<0.0900		<0.0900	1.05	0.18	<0.1000	0.91	0.41	0.84	670
Fluorene	mg/kg	SOLID	63000	20000	<0.0900	<0.0900	6	<0.0900	0.1	0.23	0.11	<0.0900	<0.0900	<0.0900		<0.0900		<0.0900	0.15	<0.0900	<0.1000	<0.1000	<0.0900	<0.0900	<0.0900
Fluorochloridone*	mg/kg	SOLID	-	-																					
Fluoroxypyr	mg/kg	SOLID	-	-																					
Fluquinconazole*	mg/kg	SOLID	-	-																					
Flurtamone*	mg/kg	SOLID	-	-																					
Flusilazole*	mg/kg	SOLID	-	-																					
Flutolanil*	mg/kg	SOLID	-	-																					
Flutriafol*	mg/kg	SOLID	-	-																					
Fluxapyroxad*	mg/kg	SOLID	-	-																					
Folpet	mg/kg	SOLID	-	-																					
Fonophos*	mg/kg	SOLID	-	-																					
Forchlorfenuron*	mg/kg	SOLID	-	-																					
Formetanate*	mg/kg	SOLID	-	-																					
Formothion*	mg/kg	SOLID	-	-																					
Fraction of non-crushable material*	%	SOLID	-	-	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0
Fraction of sample above 4mm*	%	SOLID	-	-	23.5	33.7	56.8	6.6	40.5	13.3	44.9	84	56	18.9		53.6	4	22	45.2	64.3	15.4	61.6	53.3	58.3	35
Fuberidazole*	mg/kg	SOLID	-	-																					
Furalaxyl*	mg/kg	SOLID	-	-																					
Furathiocarb*	mg/kg	SOLID	-	-																					
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																					
GRO >C5-10	mg/kg	SOLID	-	-		<0.2000			<0.2000																
GRO >C5-12	mg/kg	SOLID	-	-																					
GRO >C7-8	mg/kg	SOLID	-	-		<0.0100			<0.0100																
GRO >C8-10	mg/kg	SOLID	-	-																					
GRO Surrogate % recovery	%	SOLID	-	-																					
Haloxyfop etotyl*	mg/kg	SOLID	-	-																					
Haloxyfop Methyl*	mg/kg	SOLID	-	-																					
Heptachlor	mg/kg	SOLID	-	-																					
Heptachlor Epoxide	mg/kg	SOLID	-	-																					
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																					
Heptanoic Acid	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
Heptenophos	mg/kg	SOLID	-	-																					
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																					
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48	<0.0020		<0.0020			<0.0020										<0.0020					
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
Hexachloroethane	mg/kg	SOLID	21	158			<0.1000			<0.1000										<0.1000					
Hexaconazole	mg/kg	SOLID	-	-																					
Hexaflumuron*	mg/kg	SOLID	-	-																					
Hexazinone	mg/kg	SOLID	-	-																					
Hexythiazox*	mg/kg	SOLID	-	-																					
Imazalil*	mg/kg	SOLID	-	-																					
Imidacloprid*	mg/kg	SOLID	-	-																					
Imidan	mg/kg	SOLID	-	-																					
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	<0.0900	0.5	5	<0.0900	1.27	750	0.44	0.15	0.14	<0.0900		<0.0900		<0.0900	0.53	0.14	0.1	730	0.4	1.39	0.42
Indoxacarb*	mg/kg	SOLID	-	-																					
Iodofenphos	mg/kg	SOLID	-	-																					
Iprodione*	mg/kg	SOLID	-	-																					
Iprovalicarb*	mg/kg	SOLID	-	-																					
Isazofos*	mg/kg	SOLID	-	-																					
Isocarbophos*	mg/kg	SOLID	-	-																					
Isodrin	mg/kg	SOLID	-	-																					
Isofenphos Methyl*	mg/kg	SOLID	-	-																					
Isofenphos*	mg/kg	SOLID	-	-																					
Isomethiozin*	mg/kg	SOLID	-	-																					
Isophorone	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
Isoprocarb*	mg/kg	SOLID	-	-																					
Isopropylbenzene	mg/kg	SOLID	1300	23000	<0.0010		<0.0010			<0.0010										<0.0010					
Isoprothiolane*	mg/kg	SOLID	-	-																					
Isoproturon	mg/kg	SOLID	-	-																					
Isopyrazam*	mg/kg	SOLID	-	-																					
Isothiazolinone*	mg/kg	SOLID	-	-																					
Isoxaben*	mg/kg	SOLID	-	-																					
Karbutilate*	mg/kg	SOLID	-	-																					
Kresoxim Methyl*	mg/kg	SOLID	-	-																					
Lambda Cyhalothrin	mg/kg	SOLID	-	-																					
Lead	mg/kg	SOLID	2300	1300	9.5	64.5	49.8	12.5	30.5	35.7	26.2	41.7	15.4	17.3		11.6	50.8	7.6	35	14.9	15	118.1	46.8	42.9	36
Lenacil*	mg/kg	SOLID	-	-																					
Leptophos	mg/kg	SOLID	-	-																					
Linuron	mg/kg	SOLID	-	-																					
Lufenuron*	mg/kg	SOLID	-	-																					
m,p xylenes	mg/kg	SOLID	-	-	<0.0040	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0040	<0.0040	<0.0040		<0.0050	<0.0050	<0.0050	<0.0050	<0.0040	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
m,p,o Xylenes	mg/kg	SOLID	-	-																					
Malaoxon*	mg/kg	SOLID	-	-																					
Malathion	mg/kg	SOLID	-	-																					
Mandipropamid*	mg/kg	SOLID	-	-																					
MCPA-thioethyl*	mg/kg	SOLID	-	-																					
Mecarbam*	mg/kg	SOLID	-	-																					
Mecoprop	mg/kg	SOLID	-	-																					
Mefenacet*	mg/kg	SOLID	-	-																					

Max of Normalised Results																									
					ML164-CR011	ML164-CR011	ML164-CR013	ML164-CR013	ML164-CR013	ML164-CR029	ML164-CR029	ML164-CR029	ML164-CR030	ML164-CR032	ML164-CR032	ML164-CR044	ML164-CR044	ML164-CR044	ML164-CR044	ML164-CR045	ML164-CR045	ML164-CR045	ML164-CR046a	ML164-CR046a	ML164-CR046a
					Watten House West Viaduct	Watten House West Viaduct	Watton House Embankment	Watton House Embankment	Watton House Embankment	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct
					0.75	1.1	0.2	1	4	0.35	3.2	4	0.9	0.5	1.2	0.5	1	2	2.5	0.8	1.2	3	0.8	1.2	2.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	RTD1	MGR	MGR	ALV	MGR	MGR	TILMP	RTD1	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	MGR
Endosulfan II	mg/kg	SOLID	6300	2400																					
Endosulphan sulphate*	mg/kg	SOLID	-	-																					
Endrin	mg/kg	SOLID	-	-																					
Enterococci	CFU/g	SOLID	-	-																					
EPH >C10-12	mg/kg	SOLID	-	-																					
EPH >C10-35	mg/kg	SOLID	-	-																					
EPH >C10-40	mg/kg	SOLID	-	-																					
EPH >C12-16	mg/kg	SOLID	-	-																					
EPH >C16-21	mg/kg	SOLID	-	-																					
EPH >C21-35	mg/kg	SOLID	-	-																					
EPH >C8-40	mg/kg	SOLID	-	-	61	13	365	8080	112	1330	5840	72	<11.0000	515	28	93		<14.0000		29	12	15	261	55	307
EPH/TPH >C10-12	mg/kg	SOLID	-	-																					
EPH/TPH >C10-25	mg/kg	SOLID	-	-																					
EPH/TPH >C12-16	mg/kg	SOLID	-	-																					
EPH/TPH >C16-21	mg/kg	SOLID	-	-																					
EPH/TPH >C21-40	mg/kg	SOLID	-	-																					
EPH/TPH >C24-40	mg/kg	SOLID	-	-																					
EPH/TPH >C35-40	mg/kg	SOLID	-	-																					
EPH/TPH >C6-8	mg/kg	SOLID	-	-							<0.2000				<0.2000										
EPH/TPH >C8-10	mg/kg	SOLID	-	-																					
Epoxiconazole*	mg/kg	SOLID	-	-																					
EPTC*	mg/kg	SOLID	-	-																					
Escherichia coli (Confirmed)	N/A	SOLID	-	-																					
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																					
Etaconazole*	mg/kg	SOLID	-	-																					
Ethidimuron*	mg/kg	SOLID	-	-																					
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																					
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																					
Ethiofencarb*	mg/kg	SOLID	-	-																					
Ethion	mg/kg	SOLID	-	-																					
Ethiprole*	mg/kg	SOLID	-	-																					
Ethirimol*	mg/kg	SOLID	-	-																					
Ethofumesate	mg/kg	SOLID	-	-																					
Ethoprophos	mg/kg	SOLID	-	-																					
Ethoxyquin*	mg/kg	SOLID	-	-																					
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0020	<0.0020	<0.0020	0.091	<0.0030	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020		<0.0030		<0.0020	<0.0020	<0.0020	0.011	0.006	<0.0020
Ethylparathion	mg/kg	SOLID	-	-																					
Etofenprox*	mg/kg	SOLID	-	-																					
Etoxazole*	mg/kg	SOLID	-	-																					
Etrimphos	mg/kg	SOLID	-	-																					
Famoxadone*	mg/kg	SOLID	-	-																					
Famphur	mg/kg	SOLID	-	-																					
Fenamidone*	mg/kg	SOLID	-	-																					
Fenamiphos sulfone*	mg/kg	SOLID	-	-																					
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																					
Fenamiphos*	mg/kg	SOLID	-	-																					
Fenarimol	mg/kg	SOLID	-	-																					
Fenazaquin*	mg/kg	SOLID	-	-																					
Fenbuconazole*	mg/kg	SOLID	-	-																					
Fenchlorphos oxon*	mg/kg	SOLID	-	-																					
Fenhexamid*	mg/kg	SOLID	-	-																					
Fenitrothion	mg/kg	SOLID	-	-																					
Fenpiclonil*	mg/kg	SOLID	-	-																					
Fenpropathrin*	mg/kg	SOLID	-	-																					
Fenpropidin*	mg/kg	SOLID	-	-																					
Fenpropimorph*	mg/kg	SOLID	-	-																					
Fenpyroximate*	mg/kg	SOLID	-	-																					
Fenson*	mg/kg	SOLID	-	-																					
Fensulfothion	mg/kg	SOLID	-	-																					
Fenthion	mg/kg	SOLID	-	-																					
Fenthion Sulphone*	mg/kg	SOLID	-	-																					
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																					
Fenuron	mg/kg	SOLID	-	-																					
Fenvalerate	mg/kg	SOLID	-	-																					
Fipronil sulphone*	mg/kg	SOLID	-	-																					
Fipronil*	mg/kg	SOLID	-	-																					
Flamprop-isopropyl	mg/kg	SOLID	-	-																					
Flonicamid*	mg/kg	SOLID	-	-																					
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																					
Fluazinam*	mg/kg	SOLID	-	-																					
Flucythrinate*	mg/kg	SOLID	-	-																					
Fludioxonil*	mg/kg	SOLID	-	-																					
Flufenacet*	mg/kg	SOLID	-	-																					
Flufenoxuron*	mg/kg	SOLID	-	-																					
Flumetralin*	mg/kg	SOLID	-	-																					
Flumioxazin*	mg/kg	SOLID	-	-																					
Flumorph*	mg/kg	SOLID	-	-																					
Fluometuron*	mg/kg	SOLID	-	-																					
Fluopicolide*	mg/kg	SOLID	-	-																					
Fluopyram*	mg/kg	SOLID	-	-																					
Fluoranthene	mg/kg	SOLID	23000	6300	0.13	<0.0900	2.2	<0.1000	0.13	10.06	<0.1000	<0.1000	<0.0800	2.73	<0.0900	0.31		<0.1100		<0.0900	<0.0900	<0.0900	1.4	0.79	0.77
Fluorene	mg/kg	SOLID	63000	20000	<0.0900	<0.0900	<0.0900	1.06	<0.1100	0.25	<0.1000	<0.1000	<0.0800	<0.0900	<0.0900	<0.0900		<0.1100		<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000
Fluorochloridone*	mg/kg	SOLID	-	-																					
Fluoroxypyr	mg/kg	SOLID	-	-																					
Fluquinconazole*	mg/kg	SOLID	-	-																					
Flurtamone*	mg/kg	SOLID	-	-																					
Flusilazole*	mg/kg	SOLID	-	-																					
Flutolanil*	mg/kg	SOLID	-	-																					
Flutriafol*	mg/kg	SOLID	-	-																					
Fluxapyroxad*	mg/kg	SOLID	-	-																					
Folpet	mg/kg	SOLID	-	-																					
Fonophos*	mg/kg	SOLID	-	-																					
Forchlorfenuron*	mg/kg	SOLID	-	-																					
Formetanate*	mg/kg	SOLID	-	-																					
Formothion*	mg/kg	SOLID	-	-																					
Fraction of non-crushable material*	%	SOLID	-	-	0	0	0	0	0	0	0	0	0	0		0		0		0	0	0	0	0	0
Fraction of sample above 4mm*	%	SOLID	-	-	46	37	65	36	0	59.4	87.4	3.8	26.8	49.5		53		0		44.4	15.1	50.1	74.8	39.1	52.9
Fuberidazole*	mg/kg	SOLID	-	-																					
Furalaxyl*	mg/kg	SOLID	-	-																					
Furathiocarb*	mg/kg	SOLID	-	-																					
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																					
GRO >C5-10	mg/kg	SOLID	-	-							4.2				<0.2000										
GRO >C5-12	mg/kg	SOLID	-	-																					
GRO >C7-8	mg/kg	SOLID	-	-							<0.0100				<0.0100										
GRO >C8-10	mg/kg	SOLID	-	-																					
GRO Surrogate % recovery	%	SOLID	-	-																					
Haloxyfop etotyl*	mg/kg	SOLID	-	-																					
Haloxyfop Methyl*	mg/kg	SOLID	-	-																					
Heptachlor	mg/kg	SOLID	-	-																					
Heptachlor Epoxide	mg/kg	SOLID	-	-																					
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																					
Heptanoic Acid	mg/kg	SOLID	-	-																					
Heptenophos	mg/kg	SOLID	-	-																					
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																					
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48																					
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-																					
Hexachloroethane	mg/kg	SOLID	21	158																					
Hexaconazole	mg/kg	SOLID	-	-																					
Hexaflumuron*	mg/kg	SOLID	-	-																					
Hexazinone	mg/kg	SOLID	-	-																					
Hexythiazox*	mg/kg	SOLID	-	-																					
Imazalil*	mg/kg	SOLID	-	-																					
Imidacloprid*	mg/kg	SOLID	-	-																					
Imidan	mg/kg	SOLID	-	-																					
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	0.1	<0.0900	1.09	<0.1000	<0.1100	3.1	<0.1000	<0.1000	<0.0800	1.72	<0.0900	0.25		<0.1100		<0.0900	<0.0900	<0.0900	0.5	0.21	0.18
Indoxacarb*	mg/kg	SOLID	-	-																					
Iodofenphos	mg/kg	SOLID	-	-																					
Iprodione*	mg/kg	SOLID	-	-																					
Iprovalicarb*	mg/kg	SOLID	-	-																					
Isazofos*	mg/kg	SOLID	-	-																					
Isocarbophos*	mg/kg	SOLID	-	-																					
Isodrin	mg/kg	SOLID	-	-																					
Isofenphos Methyl*	mg/kg	SOLID	-	-																					
Isofenphos*	mg/kg	SOLID	-	-																					
Isomethiozin*	mg/kg	SOLID	-	-																					
Isophorone	mg/kg	SOLID	-	-																					
Isoprocarb*	mg/kg	SOLID	-	-																					
Isopropylbenzene	mg/kg	SOLID	1300	23000																					
Isoprothiolane*	mg/kg	SOLID	-	-																					
Isoproturon	mg/kg	SOLID	-	-																					
Isopyrazam*	mg/kg	SOLID	-	-																					
Isothiazolinone*	mg/kg	SOLID	-	-																					
Isoxaben*	mg/kg	SOLID	-	-																					
Karbutilate*	mg/kg	SOLID	-	-																					
Kresoxim Methyl*	mg/kg	SOLID	-	-																					
Lambda Cyhalothrin	mg/kg	SOLID	-	-																					
Lead	mg/kg	SOLID	2300	1300	24.6	7.6	47.9	18	79.4	32.2	8.53	7.4	5.8	88.5	13.9	33.5		41		16.7	8.2	11.3	37.1	22.4	36.5
Lenacil*	mg/kg	SOLID	-	-																					
Leptophos	mg/kg	SOLID	-	-																					
Linuron	mg/kg	SOLID	-	-																					
Lufenuron*	mg/kg	SOLID	-	-																					
m,p xylenes	mg/kg	SOLID	-	-	<0.0040	<0.0040	<0.0050	0.02	<0.0060	<0.0050	<0.0050	<0.0050	<0.0040	<0.0050	<0.0050	<0.0040		<0.0050		<0.0050	<0.0050	<0.0050	0.023	0.014	<0.0050
m,p,o Xylenes	mg/kg	SOLID	-	-																					
Malaoxon*	mg/kg	SOLID	-	-																					
Malathion	mg/kg	SOLID	-	-																					
Mandipropamid*	mg/kg	SOLID	-	-																					
MCPA-thioethyl*	mg/kg	SOLID	-	-																					
Mecarbam*	mg/kg	SOLID	-	-																					
Mecoprop	mg/kg	SOLID	-	-																					
Mefenacet*	mg/kg	SOLID	-	-																					

Max of Normalised Results																						
					ML164-CR404	ML164-CR404	ML164-CR404	ML164-TP011	ML164-TP011	ML164-TP015	ML164-TP015	ML164-TP015	ML164-TP015	NC120-CR401	NC120-CR401	NC137-CT401	NC137-CT401	NC145-CR401	NC145-CR401	ND000-CR001	ND000-CR001	ND000-CR020
					Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)
					0.05	0.5	7.2	0.7	2.5	0.05	0.35	1.1	1.7	0.3	1	0.5	1	0.1	0.5	0.5	2	0.4
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	RTD1	MGR	RTD1	GLLD	GLLD	RTD2	RTD2	RTD2	RTD2	TOP	GFDUD	MGR	MGR	MGR
Endosulfan II	mg/kg	SOLID	6300	2400																		
Endosulphan sulphate*	mg/kg	SOLID	-	-																		
Endrin	mg/kg	SOLID	-	-																		
Enterococci	CFU/g	SOLID	-	-										40	<20.0000							
EPH >C10-12	mg/kg	SOLID	-	-																		
EPH >C10-35	mg/kg	SOLID	-	-	160	71	30							96	16	8	3	15	3			
EPH >C10-40	mg/kg	SOLID	-	-																		
EPH >C12-16	mg/kg	SOLID	-	-																		
EPH >C16-21	mg/kg	SOLID	-	-																		
EPH >C21-35	mg/kg	SOLID	-	-																		
EPH >C8-40	mg/kg	SOLID	-	-				449	14	5350	17	<11.0000	<12.0000							49	153	196
EPH/TPH >C10-12	mg/kg	SOLID	-	-																		
EPH/TPH >C10-25	mg/kg	SOLID	-	-																		
EPH/TPH >C12-16	mg/kg	SOLID	-	-																		
EPH/TPH >C16-21	mg/kg	SOLID	-	-																		
EPH/TPH >C21-40	mg/kg	SOLID	-	-																		
EPH/TPH >C24-40	mg/kg	SOLID	-	-																		
EPH/TPH >C35-40	mg/kg	SOLID	-	-	18	9	2							6	1	1	<1.0000	1	<1.0000			
EPH/TPH >C6-8	mg/kg	SOLID	-	-						<0.2000	<0.2000	<0.2000	<0.2000									
EPH/TPH >C8-10	mg/kg	SOLID	-	-																		
Epoxiconazole*	mg/kg	SOLID	-	-																		
EPTC*	mg/kg	SOLID	-	-																		
Escherichia coli (Confirmed)	N/A	SOLID	-	-																		
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-										<10.0000	<10.0000							
Etaconazole*	mg/kg	SOLID	-	-																		
Ethidimuron*	mg/kg	SOLID	-	-																		
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																		
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																		
Ethiofencarb*	mg/kg	SOLID	-	-																		
Ethion	mg/kg	SOLID	-	-																		
Ethiprole*	mg/kg	SOLID	-	-																		
Ethirimol*	mg/kg	SOLID	-	-																		
Ethofumesate	mg/kg	SOLID	-	-																		
Ethoprophos	mg/kg	SOLID	-	-																		
Ethoxyquin*	mg/kg	SOLID	-	-																		
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0100	<0.0100	<0.0100	<0.0030	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0020	<0.0020	<0.0020
Ethylparathion	mg/kg	SOLID	-	-																		
Etofenprox*	mg/kg	SOLID	-	-																		
Etoxazole*	mg/kg	SOLID	-	-																		
Etrimphos	mg/kg	SOLID	-	-																		
Famoxadone*	mg/kg	SOLID	-	-																		
Famphur	mg/kg	SOLID	-	-																		
Fenamidone*	mg/kg	SOLID	-	-																		
Fenamiphos sulfone*	mg/kg	SOLID	-	-																		
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																		
Fenamiphos*	mg/kg	SOLID	-	-																		
Fenarimol	mg/kg	SOLID	-	-																		
Fenazaquin*	mg/kg	SOLID	-	-																		
Fenbuconazole*	mg/kg	SOLID	-	-																		
Fenchlorphos oxon*	mg/kg	SOLID	-	-																		
Fenhexamid*	mg/kg	SOLID	-	-																		
Fenitrothion	mg/kg	SOLID	-	-																		
Fenpiclonil*	mg/kg	SOLID	-	-																		
Fenpropathrin*	mg/kg	SOLID	-	-																		
Fenpropidin*	mg/kg	SOLID	-	-																		
Fenpropimorph*	mg/kg	SOLID	-	-																		
Fenpyroximate*	mg/kg	SOLID	-	-																		
Fenson*	mg/kg	SOLID	-	-																		
Fensulfothion	mg/kg	SOLID	-	-																		
Fenthion	mg/kg	SOLID	-	-																		
Fenthion Sulphone*	mg/kg	SOLID	-	-																		
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																		
Fenuron	mg/kg	SOLID	-	-																		
Fenvalerate	mg/kg	SOLID	-	-																		
Fipronil sulphone*	mg/kg	SOLID	-	-																		
Fipronil*	mg/kg	SOLID	-	-																		
Flamprop-isopropyl	mg/kg	SOLID	-	-																		
Flonicamid*	mg/kg	SOLID	-	-																		
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																		
Fluazinam*	mg/kg	SOLID	-	-																		
Flucythrinate*	mg/kg	SOLID	-	-																		
Fludioxonil*	mg/kg	SOLID	-	-																		
Flufenacet*	mg/kg	SOLID	-	-																		
Flufenoxuron*	mg/kg	SOLID	-	-																		
Flumetralin*	mg/kg	SOLID	-	-																		
Flumioxazin*	mg/kg	SOLID	-	-																		
Flumorph*	mg/kg	SOLID	-	-																		
Fluometuron*	mg/kg	SOLID	-	-																		
Fluopicolide*	mg/kg	SOLID	-	-																		
Fluopyram*	mg/kg	SOLID	-	-																		
Fluoranthene	mg/kg	SOLID	23000	6300	2.8	0.2	<0.1000	0.43	<0.1000	66.7	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	1.22	0.3
Fluorene	mg/kg	SOLID	63000	20000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	3.45	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000
Fluorochloridone*	mg/kg	SOLID	-	-																		
Fluoroxypyr	mg/kg	SOLID	-	-																		
Fluquinconazole*	mg/kg	SOLID	-	-																		
Flurtamone*	mg/kg	SOLID	-	-																		
Flusilazole*	mg/kg	SOLID	-	-																		
Flutolanil*	mg/kg	SOLID	-	-																		
Flutriafol*	mg/kg	SOLID	-	-																		
Fluxapyroxad*	mg/kg	SOLID	-	-																		
Folpet	mg/kg	SOLID	-	-																		
Fonophos*	mg/kg	SOLID	-	-																		
Forchlorfenuron*	mg/kg	SOLID	-	-																		
Formetanate*	mg/kg	SOLID	-	-																		
Formothion*	mg/kg	SOLID	-	-																		
Fraction of non-crushable material*	%	SOLID	-	-				0	0	0	0	0	0							0	0	0
Fraction of sample above 4mm*	%	SOLID	-	-				5805	0	43	37	29	0							51	48.1	55
Fuberidazole*	mg/kg	SOLID	-	-																		
Furalaxyl*	mg/kg	SOLID	-	-																		
Furathiocarb*	mg/kg	SOLID	-	-																		
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																		
GRO >C5-10	mg/kg	SOLID	-	-	<0.1000	<0.1000	<0.1000			<0.2000	<0.2000	<0.2000	<0.2000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000			
GRO >C5-12	mg/kg	SOLID	-	-																		
GRO >C7-8	mg/kg	SOLID	-	-						<0.0100	<0.0100	<0.0100	<0.0100									
GRO >C8-10	mg/kg	SOLID	-	-																		
GRO Surrogate % recovery	%	SOLID	-	-																		
Haloxyfop etotyl*	mg/kg	SOLID	-	-																		
Haloxyfop Methyl*	mg/kg	SOLID	-	-																		
Heptachlor	mg/kg	SOLID	-	-																		
Heptachlor Epoxide	mg/kg	SOLID	-	-																		
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																		
Heptanoic Acid	mg/kg	SOLID	-	-																		
Heptenophos	mg/kg	SOLID	-	-																		
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																		
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48																		
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-																		
Hexachloroethane	mg/kg	SOLID	21	158																		
Hexaconazole	mg/kg	SOLID	-	-																		
Hexaflumuron*	mg/kg	SOLID	-	-																		
Hexazinone	mg/kg	SOLID	-	-																		
Hexythiazox*	mg/kg	SOLID	-	-																		
Imazalil*	mg/kg	SOLID	-	-																		
Imidacloprid*	mg/kg	SOLID	-	-																		
Imidan	mg/kg	SOLID	-	-																		
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	1.3	0.1	<0.1000	0.27	<0.1000	23.5	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	1	0.22
Indoxacarb*	mg/kg	SOLID	-	-																		
Iodofenphos	mg/kg	SOLID	-	-																		
Iprodione*	mg/kg	SOLID	-	-																		
Iprovalicarb*	mg/kg	SOLID	-	-																		
Isazofos*	mg/kg	SOLID	-	-																		
Isocarbophos*	mg/kg	SOLID	-	-																		
Isodrin	mg/kg	SOLID	-	-																		
Isofenphos Methyl*	mg/kg	SOLID	-	-																		
Isofenphos*	mg/kg	SOLID	-	-																		
Isomethiozin*	mg/kg	SOLID	-	-																		
Isophorone	mg/kg	SOLID	-	-																		
Isoprocarb*	mg/kg	SOLID	-	-																		
Isopropylbenzene	mg/kg	SOLID	1300	23000																		
Isoprothiolane*	mg/kg	SOLID	-	-																		
Isoproturon	mg/kg	SOLID	-	-																		
Isopyrazam*	mg/kg	SOLID	-	-																		
Isothiazolinone*	mg/kg	SOLID	-	-																		
Isoxaben*	mg/kg	SOLID	-	-																		
Karbutilate*	mg/kg	SOLID	-	-																		
Kresoxim Methyl*	mg/kg	SOLID	-	-																		
Lambda Cyhalothrin	mg/kg	SOLID	-	-																		
Lead	mg/kg	SOLID	2300	1300	52	82	6	320.4	16.6	36.6	11.7	5.1	7.1	58	35	24	12	60	26	14.2	26	43.8
Lenacil*	mg/kg	SOLID	-	-																		
Leptophos	mg/kg	SOLID	-	-																		
Linuron	mg/kg	SOLID	-	-																		
Lufenuron*	mg/kg	SOLID	-	-																		
m,p xylenes	mg/kg	SOLID	-	-	<0.0100	<0.0100	<0.0100	<0.0050	<0.0050	<0.0040	<0.0040	<0.0040	<0.0050	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0040	<0.0050	<0.0050
m,p,o Xylenes	mg/kg	SOLID	-	-																		
Malaoxon*	mg/kg	SOLID	-	-																		
Malathion	mg/kg	SOLID	-	-																		
Mandipropamid*	mg/kg	SOLID	-	-																		
MCPA-thioethyl*	mg/kg	SOLID	-	-																		
Mecarbam*	mg/kg	SOLID	-	-																		
Mecoprop	mg/kg	SOLID	-	-																		
Mefenacet*	mg/kg	SOLID	-	-																		

Max of Normalised Results																	
					ND000-CR020	ND000-CR020	ND000-CR020	ND000-TP035	ND000-TP035	ND001-CP002	ND001-CP002	ND001-CP043	ND001-CP043	ND001-CP049	ND001-CP049	ND001-CR001	ND001-CR002
					Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Chattle Hill Box Structure	Chattle Hill Box Structure	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton No. 3 Viaduct
					1	4	5	0.4	0.8	0.5	1	0.5	2	0.4	0.6	0.5	0.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	RTD1	MGR	ALV	RTD1	RTD1	MGR	MGR	MGR	MGR
Endosulfan II	mg/kg	SOLID	6300	2400													
Endosulphan sulphate*	mg/kg	SOLID	-	-													
Endrin	mg/kg	SOLID	-	-													
Enterococci	CFU/g	SOLID	-	-													
EPH >C10-12	mg/kg	SOLID	-	-													
EPH >C10-35	mg/kg	SOLID	-	-													
EPH >C10-40	mg/kg	SOLID	-	-													
EPH >C12-16	mg/kg	SOLID	-	-													
EPH >C16-21	mg/kg	SOLID	-	-													
EPH >C21-35	mg/kg	SOLID	-	-													
EPH >C8-40	mg/kg	SOLID	-	-	334	43	42	59	39	62	18	46	41	947	987	75	111
EPH/TPH >C10-12	mg/kg	SOLID	-	-													
EPH/TPH >C10-25	mg/kg	SOLID	-	-													
EPH/TPH >C12-16	mg/kg	SOLID	-	-													
EPH/TPH >C16-21	mg/kg	SOLID	-	-													
EPH/TPH >C21-40	mg/kg	SOLID	-	-													
EPH/TPH >C24-40	mg/kg	SOLID	-	-													
EPH/TPH >C35-40	mg/kg	SOLID	-	-													
EPH/TPH >C6-8	mg/kg	SOLID	-	-											<0.2000		
EPH/TPH >C8-10	mg/kg	SOLID	-	-													
Epoxiconazole*	mg/kg	SOLID	-	-													
EPTC*	mg/kg	SOLID	-	-													
Escherichia coli (Confirmed)	N/A	SOLID	-	-													
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-													
Etaconazole*	mg/kg	SOLID	-	-													
Ethidimuron*	mg/kg	SOLID	-	-													
Ethiofencarb sulfone*	mg/kg	SOLID	-	-													
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-													
Ethiofencarb*	mg/kg	SOLID	-	-													
Ethion	mg/kg	SOLID	-	-													
Ethiprole*	mg/kg	SOLID	-	-													
Ethirimol*	mg/kg	SOLID	-	-													
Ethofumesate	mg/kg	SOLID	-	-													
Ethoprophos	mg/kg	SOLID	-	-													
Ethoxyquin*	mg/kg	SOLID	-	-													
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Ethylparathion	mg/kg	SOLID	-	-													
Etofenprox*	mg/kg	SOLID	-	-													
Etoxazole*	mg/kg	SOLID	-	-													
Etrimphos	mg/kg	SOLID	-	-													
Famoxadone*	mg/kg	SOLID	-	-													
Famphur	mg/kg	SOLID	-	-													
Fenamidone*	mg/kg	SOLID	-	-													
Fenamiphos sulfone*	mg/kg	SOLID	-	-													
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-													
Fenamiphos*	mg/kg	SOLID	-	-													
Fenarimol	mg/kg	SOLID	-	-													
Fenazaquin*	mg/kg	SOLID	-	-													
Fenbuconazole*	mg/kg	SOLID	-	-													
Fenchlorphos oxon*	mg/kg	SOLID	-	-													
Fenhexamid*	mg/kg	SOLID	-	-													
Fenitrothion	mg/kg	SOLID	-	-													
Fenpiclonil*	mg/kg	SOLID	-	-													
Fenpropathrin*	mg/kg	SOLID	-	-													
Fenpropidin*	mg/kg	SOLID	-	-													
Fenpropimorph*	mg/kg	SOLID	-	-													
Fenpyroximate*	mg/kg	SOLID	-	-													
Fenson*	mg/kg	SOLID	-	-													
Fensulfothion	mg/kg	SOLID	-	-													
Fenthion	mg/kg	SOLID	-	-													
Fenthion Sulphone*	mg/kg	SOLID	-	-													
Fenthion Sulphoxide*	mg/kg	SOLID	-	-													
Fenuron	mg/kg	SOLID	-	-													
Fenvalerate	mg/kg	SOLID	-	-													
Fipronil sulphone*	mg/kg	SOLID	-	-													
Fipronil*	mg/kg	SOLID	-	-													
Flamprop-isopropyl	mg/kg	SOLID	-	-													
Flonicamid*	mg/kg	SOLID	-	-													
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-													
Fluazinam*	mg/kg	SOLID	-	-													
Flucythrinate*	mg/kg	SOLID	-	-													
Fludioxonil*	mg/kg	SOLID	-	-													
Flufenacet*	mg/kg	SOLID	-	-													
Flufenoxuron*	mg/kg	SOLID	-	-													
Flumetralin*	mg/kg	SOLID	-	-													
Flumioxazin*	mg/kg	SOLID	-	-													
Flumorph*	mg/kg	SOLID	-	-													
Fluometuron*	mg/kg	SOLID	-	-													
Fluopicolide*	mg/kg	SOLID	-	-													
Fluopyram*	mg/kg	SOLID	-	-													
Fluoranthene	mg/kg	SOLID	23000	6300	1.21	0.14	<0.0900	0.17	<0.0900	0.1	<0.0900	<0.0900	<0.0900	2	9.88	0.2	0.09
Fluorene	mg/kg	SOLID	63000	20000	<0.0900	<0.0900	<0.0900	<0.0800	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0800	0.6	<0.0900	<0.0900
Fluorochloridone*	mg/kg	SOLID	-	-													
Fluoroxypyr	mg/kg	SOLID	-	-													
Fluquinconazole*	mg/kg	SOLID	-	-													
Flurtamone*	mg/kg	SOLID	-	-													
Flusilazole*	mg/kg	SOLID	-	-													
Flutolanil*	mg/kg	SOLID	-	-													
Flutriafol*	mg/kg	SOLID	-	-													
Fluxapyroxad*	mg/kg	SOLID	-	-													
Folpet	mg/kg	SOLID	-	-													
Fonophos*	mg/kg	SOLID	-	-													
Forchlorfenuron*	mg/kg	SOLID	-	-													
Formetanate*	mg/kg	SOLID	-	-													
Formothion*	mg/kg	SOLID	-	-													
Fraction of non-crushable material*	%	SOLID	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0
Fraction of sample above 4mm*	%	SOLID	-	-	64	68	39	32.1	42.3	23	32	47.6	33.9	36.5	46	55	30
Fuberidazole*	mg/kg	SOLID	-	-													
Furalaxyl*	mg/kg	SOLID	-	-													
Furathiocarb*	mg/kg	SOLID	-	-													
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14													
GRO >C5-10	mg/kg	SOLID	-	-											<0.2000		
GRO >C5-12	mg/kg	SOLID	-	-													
GRO >C7-8	mg/kg	SOLID	-	-													
GRO >C8-10	mg/kg	SOLID	-	-											<0.0100		
GRO Surrogate % recovery	%	SOLID	-	-													
Haloxyfop etotyl*	mg/kg	SOLID	-	-													
Haloxyfop Methyl*	mg/kg	SOLID	-	-													
Heptachlor	mg/kg	SOLID	-	-													
Heptachlor Epoxide	mg/kg	SOLID	-	-													
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-													
Heptanoic Acid	mg/kg	SOLID	-	-													
Heptenophos	mg/kg	SOLID	-	-													
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30													
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48													<0.0020
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-													
Hexachloroethane	mg/kg	SOLID	21	158													
Hexaconazole	mg/kg	SOLID	-	-													
Hexaflumuron*	mg/kg	SOLID	-	-													
Hexazinone	mg/kg	SOLID	-	-													
Hexythiazox*	mg/kg	SOLID	-	-													
Imazalil*	mg/kg	SOLID	-	-													
Imidacloprid*	mg/kg	SOLID	-	-													
Imidan	mg/kg	SOLID	-	-													
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	0.78	<0.0900	<0.0900	0.18	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	3.41	3.32	0.19	<0.0900
Indoxacarb*	mg/kg	SOLID	-	-													
Iodofenphos	mg/kg	SOLID	-	-													
Iprodione*	mg/kg	SOLID	-	-													
Iprovalicarb*	mg/kg	SOLID	-	-													
Isazofos*	mg/kg	SOLID	-	-													
Isocarbophos*	mg/kg	SOLID	-	-													
Isodrin	mg/kg	SOLID	-	-													
Isofenphos Methyl*	mg/kg	SOLID	-	-													
Isofenphos*	mg/kg	SOLID	-	-													
Isomethiozin*	mg/kg	SOLID	-	-													
Isophorone	mg/kg	SOLID	-	-													
Isoprocarb*	mg/kg	SOLID	-	-													
Isopropylbenzene	mg/kg	SOLID	1300	23000													<0.0010
Isoprothiolane*	mg/kg	SOLID	-	-													
Isoproturon	mg/kg	SOLID	-	-													
Isopyrazam*	mg/kg	SOLID	-	-													
Isothiazolinone*	mg/kg	SOLID	-	-													
Isoxaben*	mg/kg	SOLID	-	-													
Karbutilate*	mg/kg	SOLID	-	-													
Kresoxim Methyl*	mg/kg	SOLID	-	-													
Lambda Cyhalothrin	mg/kg	SOLID	-	-													
Lead	mg/kg	SOLID	2300	1300	33.4	6.61	10.9	20.8	28.8	27.3	5	7.3	6.6	69.3	75	30.6	15.1
Lenacil*	mg/kg	SOLID	-	-													
Leptophos	mg/kg	SOLID	-	-													
Linuron	mg/kg	SOLID	-	-													
Lufenuron*	mg/kg	SOLID	-	-													
m,p xylenes	mg/kg	SOLID	-	-	<0.0050	<0.0040	<0.0050	<0.0040	<0.0040	<0.0050	<0.0050	<0.0050	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
m,p,o Xylenes	mg/kg	SOLID	-	-													
Malaoxon*	mg/kg	SOLID	-	-													
Malathion	mg/kg	SOLID	-	-													
Mandipropamid*	mg/kg	SOLID	-	-													
MCPA-thioethyl*	mg/kg	SOLID	-	-													
Mecarbam*	mg/kg	SOLID	-	-													
Mecoprop	mg/kg	SOLID	-	-													
Mefenacet*	mg/kg	SOLID	-	-													

Max of Normalised Results																									
					ND001-CR002	ND001-CR005	ND001-CR011	ND001-CR011	ND001-CR013	ND001-CR013	ND001-CR014	ND001-CR014	ND001-CR014	ND001-CR017	ND001-CR017	ND001-CR022	ND001-CR031	ND001-CR040	ND001-CR041	ND001-CR042	ND001-CR043	ND001-TP002	ND001-TP002	ND001-WS002	ND001-WS003
					Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct
					1.5	0.6	0.05	1.2	0.5	2	0.05	1.1	1.7	0.7	1.2	0.1	0.05	1.4	0.2	0.5	1	0.05	0.3	0.1	0.1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	TOP	RTD1	MGR	GFDUD	MGR	MGR	RTD1	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	MGR	MGR
Endosulfan II	mg/kg	SOLID	6300	2400																					
Endosulphan sulphate*	mg/kg	SOLID	-	-																					
Endrin	mg/kg	SOLID	-	-																					
Enterococci	CFU/g	SOLID	-	-																					
EPH >C10-12	mg/kg	SOLID	-	-																					
EPH >C10-35	mg/kg	SOLID	-	-																					
EPH >C10-40	mg/kg	SOLID	-	-																					
EPH >C12-16	mg/kg	SOLID	-	-																					
EPH >C16-21	mg/kg	SOLID	-	-																					
EPH >C21-35	mg/kg	SOLID	-	-																					
EPH >C8-40	mg/kg	SOLID	-	-	89		89	20	106	32	39	2290	44	30	18	114	118	132	13	1130	27	98	12	100	134
EPH/TPH >C10-12	mg/kg	SOLID	-	-																					
EPH/TPH >C10-25	mg/kg	SOLID	-	-																					
EPH/TPH >C12-16	mg/kg	SOLID	-	-																					
EPH/TPH >C16-21	mg/kg	SOLID	-	-																					
EPH/TPH >C21-40	mg/kg	SOLID	-	-																					
EPH/TPH >C24-40	mg/kg	SOLID	-	-																					
EPH/TPH >C35-40	mg/kg	SOLID	-	-																					
EPH/TPH >C6-8	mg/kg	SOLID	-	-																					
EPH/TPH >C8-10	mg/kg	SOLID	-	-																					
Epoxiconazole*	mg/kg	SOLID	-	-																					
EPTC*	mg/kg	SOLID	-	-																					
Escherichia coli (Confirmed)	N/A	SOLID	-	-																					
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-																					
Etaconazole*	mg/kg	SOLID	-	-																					
Ethidimuron*	mg/kg	SOLID	-	-																					
Ethiofencarb sulfone*	mg/kg	SOLID	-	-																					
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-																					
Ethiofencarb*	mg/kg	SOLID	-	-																					
Ethion	mg/kg	SOLID	-	-																					
Ethiprole*	mg/kg	SOLID	-	-																					
Ethirimol*	mg/kg	SOLID	-	-																					
Ethofumesate	mg/kg	SOLID	-	-																					
Ethoprophos	mg/kg	SOLID	-	-																					
Ethoxyquin*	mg/kg	SOLID	-	-																					
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0020		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Ethylparathion	mg/kg	SOLID	-	-																					
Etofenprox*	mg/kg	SOLID	-	-																					
Etoxazole*	mg/kg	SOLID	-	-																					
Etrimphos	mg/kg	SOLID	-	-																					
Famoxadone*	mg/kg	SOLID	-	-																					
Famphur	mg/kg	SOLID	-	-																					
Fenamidone*	mg/kg	SOLID	-	-																					
Fenamiphos sulfone*	mg/kg	SOLID	-	-																					
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-																					
Fenamiphos*	mg/kg	SOLID	-	-																					
Fenarimol	mg/kg	SOLID	-	-																					
Fenazaquin*	mg/kg	SOLID	-	-																					
Fenbuconazole*	mg/kg	SOLID	-	-																					
Fenchlorphos oxon*	mg/kg	SOLID	-	-																					
Fenhexamid*	mg/kg	SOLID	-	-																					
Fenitrothion	mg/kg	SOLID	-	-																					
Fenpiclonil*	mg/kg	SOLID	-	-																					
Fenpropathrin*	mg/kg	SOLID	-	-																					
Fenpropidin*	mg/kg	SOLID	-	-																					
Fenpropimorph*	mg/kg	SOLID	-	-																					
Fenpyroximate*	mg/kg	SOLID	-	-																					
Fenson*	mg/kg	SOLID	-	-																					
Fensulfothion	mg/kg	SOLID	-	-																					
Fenthion	mg/kg	SOLID	-	-																					
Fenthion Sulphone*	mg/kg	SOLID	-	-																					
Fenthion Sulphoxide*	mg/kg	SOLID	-	-																					
Fenuron	mg/kg	SOLID	-	-																					
Fenvalerate	mg/kg	SOLID	-	-																					
Fipronil sulphone*	mg/kg	SOLID	-	-																					
Fipronil*	mg/kg	SOLID	-	-																					
Flamprop-isopropyl	mg/kg	SOLID	-	-																					
Flonicamid*	mg/kg	SOLID	-	-																					
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-																					
Fluazinam*	mg/kg	SOLID	-	-																					
Flucythrinate*	mg/kg	SOLID	-	-																					
Fludioxonil*	mg/kg	SOLID	-	-																					
Flufenacet*	mg/kg	SOLID	-	-																					
Flufenoxuron*	mg/kg	SOLID	-	-																					
Flumetralin*	mg/kg	SOLID	-	-																					
Flumioxazin*	mg/kg	SOLID	-	-																					
Flumorph*	mg/kg	SOLID	-	-																					
Fluometuron*	mg/kg	SOLID	-	-																					
Fluopicolide*	mg/kg	SOLID	-	-																					
Fluopyram*	mg/kg	SOLID	-	-																					
Fluoranthene	mg/kg	SOLID	23000	6300	<0.0900		<0.0900	<0.0900	0.11	<0.0900	<0.0900	0.39	<0.0900	<0.0900	<0.0900	0.1	0.49	<0.0900	<0.0900	3.22	<0.0900	0.1	<0.0900	0.13	<0.0900
Fluorene	mg/kg	SOLID	63000	20000	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.1000	<0.0900	<0.0900	<0.0900
Fluorochloridone*	mg/kg	SOLID	-	-																					
Fluoroxypyr	mg/kg	SOLID	-	-																					
Fluquinconazole*	mg/kg	SOLID	-	-																					
Flurtamone*	mg/kg	SOLID	-	-																					
Flusilazole*	mg/kg	SOLID	-	-																					
Flutolanil*	mg/kg	SOLID	-	-																					
Flutriafol*	mg/kg	SOLID	-	-																					
Fluxapyroxad*	mg/kg	SOLID	-	-																					
Folpet	mg/kg	SOLID	-	-																					
Fonophos*	mg/kg	SOLID	-	-																					
Forchlorfenuron*	mg/kg	SOLID	-	-																					
Formetanate*	mg/kg	SOLID	-	-																					
Formothion*	mg/kg	SOLID	-	-																					
Fraction of non-crushable material*	%	SOLID	-	-	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fraction of sample above 4mm*	%	SOLID	-	-	8		32.9	29.4	48	48	44.2	57.9	36.4	38.9	44.6	60	60.4	48	31.4	32.7	41	27.8	30	59	14
Fuberidazole*	mg/kg	SOLID	-	-																					
Furalaxyl*	mg/kg	SOLID	-	-																					
Furathiocarb*	mg/kg	SOLID	-	-																					
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14																					
GRO >C5-10	mg/kg	SOLID	-	-																					
GRO >C5-12	mg/kg	SOLID	-	-																					
GRO >C7-8	mg/kg	SOLID	-	-																					
GRO >C8-10	mg/kg	SOLID	-	-																					
GRO Surrogate % recovery	%	SOLID	-	-																					
Haloxyfop etotyl*	mg/kg	SOLID	-	-																					
Haloxyfop Methyl*	mg/kg	SOLID	-	-																					
Heptachlor	mg/kg	SOLID	-	-																					
Heptachlor Epoxide	mg/kg	SOLID	-	-																					
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-																					
Heptanoic Acid	mg/kg	SOLID	-	-																					
Heptenophos	mg/kg	SOLID	-	-																					
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30																					
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48	<0.0020																			<0.0020	<0.0020
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-																					
Hexachloroethane	mg/kg	SOLID	21	158																					
Hexaconazole	mg/kg	SOLID	-	-																					
Hexaflumuron*	mg/kg	SOLID	-	-																					
Hexazinone	mg/kg	SOLID	-	-																					
Hexythiazox*	mg/kg	SOLID	-	-																					
Imazalil*	mg/kg	SOLID	-	-																					
Imidacloprid*	mg/kg	SOLID	-	-																					
Imidan	mg/kg	SOLID	-	-																					
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.29	<0.0900	<0.0900	<0.0900	<0.0900	0.17	<0.0900	<0.0900	0.82	<0.0900	<0.1000	<0.0900	<0.0900	<0.0900
Indoxacarb*	mg/kg	SOLID	-	-																					
Iodofenphos	mg/kg	SOLID	-	-																					
Iprodione*	mg/kg	SOLID	-	-																					
Iprovalicarb*	mg/kg	SOLID	-	-																					
Isazofos*	mg/kg	SOLID	-	-																					
Isocarbophos*	mg/kg	SOLID	-	-																					
Isodrin	mg/kg	SOLID	-	-																					
Isofenphos Methyl*	mg/kg	SOLID	-	-																					
Isofenphos*	mg/kg	SOLID	-	-																					
Isomethiozin*	mg/kg	SOLID	-	-																					
Isophorone	mg/kg	SOLID	-	-																					
Isoprocarb*	mg/kg	SOLID	-	-																					
Isopropylbenzene	mg/kg	SOLID	1300	23000	<0.0010																			<0.0010	<0.0010
Isoprothiolane*	mg/kg	SOLID	-	-																					
Isoproturon	mg/kg	SOLID	-	-																					
Isopyrazam*	mg/kg	SOLID	-	-																					
Isothiazolinone*	mg/kg	SOLID	-	-																					
Isoxaben*	mg/kg	SOLID	-	-																					
Karbutilate*	mg/kg	SOLID	-	-																					
Kresoxim Methyl*	mg/kg	SOLID	-	-																					
Lambda Cyhalothrin	mg/kg	SOLID	-	-																					
Lead	mg/kg	SOLID	2300	1300	7.9		22.6	4.8	77.7	7.1	12.3	7.6	5.5	14.6	9.2	38	31.6	4.4	6.6	53.5	5.6	50.1	11.8	34	40.2
Lenacil*	mg/kg	SOLID	-	-																					
Leptophos	mg/kg	SOLID	-	-																					
Linuron	mg/kg	SOLID	-	-																					
Lufenuron*	mg/kg	SOLID	-	-																					
m,p xylenes	mg/kg	SOLID	-	-	<0.0050		<0.0050	<0.0040	<0.0050	<0.0040	<0.0040	<0.0040	<0.0040	<0.0050	<0.0050	<0.0050	<0.0040	<0.0040	<0.0040	<0.0040	<0.0050	<0.0050	<0.0040	<0.0050	<0.0050
m,p,o Xylenes	mg/kg	SOLID	-	-																					
Malaoxon*	mg/kg	SOLID	-	-																					
Malathion	mg/kg	SOLID	-	-																					
Mandipropamid*	mg/kg	SOLID	-	-																					
MCPA-thioethyl*	mg/kg	SOLID	-	-																					
Mecarbam*	mg/kg	SOLID	-	-																					
Mecoprop	mg/kg	SOLID	-	-																					
Mefenacet*	mg/kg	SOLID	-	-																					

Max of Normalised Results								
					ND001-WS003	ND002-CP019	ND002-CR013	ND003-CR004
					Water Orton No. 3 Viaduct	Marsh Lane Embankment	Marsh Lane Embankment	Marsh Lane Embankment
					1.1	1.5	0.2	0.6
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	MGR	MGR
Endosulfan II	mg/kg	SOLID	6300	2400				
Endosulphan sulphate*	mg/kg	SOLID	-	-				
Endrin	mg/kg	SOLID	-	-				
Enterococci	CFU/g	SOLID	-	-				
EPH >C10-12	mg/kg	SOLID	-	-				
EPH >C10-35	mg/kg	SOLID	-	-				
EPH >C10-40	mg/kg	SOLID	-	-				
EPH >C12-16	mg/kg	SOLID	-	-				
EPH >C16-21	mg/kg	SOLID	-	-				
EPH >C21-35	mg/kg	SOLID	-	-				
EPH >C8-40	mg/kg	SOLID	-	-	55	92	64	18
EPH/TPH >C10-12	mg/kg	SOLID	-	-				
EPH/TPH >C10-25	mg/kg	SOLID	-	-				
EPH/TPH >C12-16	mg/kg	SOLID	-	-				
EPH/TPH >C16-21	mg/kg	SOLID	-	-				
EPH/TPH >C21-40	mg/kg	SOLID	-	-				
EPH/TPH >C24-40	mg/kg	SOLID	-	-				
EPH/TPH >C35-40	mg/kg	SOLID	-	-				
EPH/TPH >C6-8	mg/kg	SOLID	-	-				
EPH/TPH >C8-10	mg/kg	SOLID	-	-				
Epoxiconazole*	mg/kg	SOLID	-	-				
EPTC*	mg/kg	SOLID	-	-				
Escherichia coli (Confirmed)	N/A	SOLID	-	-				
Escherichia coli (Confirmed)	CFU/g	SOLID	-	-				
Etaconazole*	mg/kg	SOLID	-	-				
Ethidimuron*	mg/kg	SOLID	-	-				
Ethiofencarb sulfone*	mg/kg	SOLID	-	-				
Ethiofencarb sulfoxide*	mg/kg	SOLID	-	-				
Ethiofencarb*	mg/kg	SOLID	-	-				
Ethion	mg/kg	SOLID	-	-				
Ethiprole*	mg/kg	SOLID	-	-				
Ethirimol*	mg/kg	SOLID	-	-				
Ethofumesate	mg/kg	SOLID	-	-				
Ethoprophos	mg/kg	SOLID	-	-				
Ethoxyquin*	mg/kg	SOLID	-	-				
Ethylbenzene	mg/kg	SOLID	5700	17000	<0.0020	<0.0030	<0.0030	<0.0030
Ethylparathion	mg/kg	SOLID	-	-				
Etofenprox*	mg/kg	SOLID	-	-				
Etoxazole*	mg/kg	SOLID	-	-				
Etrimphos	mg/kg	SOLID	-	-				
Famoxadone*	mg/kg	SOLID	-	-				
Famphur	mg/kg	SOLID	-	-				
Fenamidone*	mg/kg	SOLID	-	-				
Fenamiphos sulfone*	mg/kg	SOLID	-	-				
Fenamiphos sulfoxide*	mg/kg	SOLID	-	-				
Fenamiphos*	mg/kg	SOLID	-	-				
Fenarimol	mg/kg	SOLID	-	-				
Fenazaquin*	mg/kg	SOLID	-	-				
Fenbuconazole*	mg/kg	SOLID	-	-				
Fenchlorphos oxon*	mg/kg	SOLID	-	-				
Fenhexamid*	mg/kg	SOLID	-	-				
Fenitrothion	mg/kg	SOLID	-	-				
Fenpiclonil*	mg/kg	SOLID	-	-				
Fenpropathrin*	mg/kg	SOLID	-	-				
Fenpropidin*	mg/kg	SOLID	-	-				
Fenpropimorph*	mg/kg	SOLID	-	-				
Fenpyroximate*	mg/kg	SOLID	-	-				
Fenson*	mg/kg	SOLID	-	-				
Fensulfothion	mg/kg	SOLID	-	-				
Fenthion	mg/kg	SOLID	-	-				
Fenthion Sulphone*	mg/kg	SOLID	-	-				
Fenthion Sulphoxide*	mg/kg	SOLID	-	-				
Fenuron	mg/kg	SOLID	-	-				
Fenvalerate	mg/kg	SOLID	-	-				
Fipronil sulphone*	mg/kg	SOLID	-	-				
Fipronil*	mg/kg	SOLID	-	-				
Flamprop-isopropyl	mg/kg	SOLID	-	-				
Flonicamid*	mg/kg	SOLID	-	-				
Fluazifop-P-Butyl*	mg/kg	SOLID	-	-				
Fluazinam*	mg/kg	SOLID	-	-				
Flucythrinate*	mg/kg	SOLID	-	-				
Fludioxonil*	mg/kg	SOLID	-	-				
Flufenacet*	mg/kg	SOLID	-	-				
Flufenoxuron*	mg/kg	SOLID	-	-				
Flumetralin*	mg/kg	SOLID	-	-				
Flumioxazin*	mg/kg	SOLID	-	-				
Flumorph*	mg/kg	SOLID	-	-				
Fluometuron*	mg/kg	SOLID	-	-				
Fluopicolide*	mg/kg	SOLID	-	-				
Fluopyram*	mg/kg	SOLID	-	-				
Fluoranthene	mg/kg	SOLID	23000	6300	<0.0900	<0.1300	<0.1100	<0.1000
Fluorene	mg/kg	SOLID	63000	20000	<0.0900	<0.1300	<0.1100	<0.1000
Fluorochloridone*	mg/kg	SOLID	-	-				
Fluoroxypyr	mg/kg	SOLID	-	-				
Fluquinconazole*	mg/kg	SOLID	-	-				
Flurtamone*	mg/kg	SOLID	-	-				
Flusilazole*	mg/kg	SOLID	-	-				
Flutolanil*	mg/kg	SOLID	-	-				
Flutriafol*	mg/kg	SOLID	-	-				
Fluxapyroxad*	mg/kg	SOLID	-	-				
Folpet	mg/kg	SOLID	-	-				
Fonophos*	mg/kg	SOLID	-	-				
Forchlorfenuron*	mg/kg	SOLID	-	-				
Formetanate*	mg/kg	SOLID	-	-				
Formothion*	mg/kg	SOLID	-	-				
Fraction of non-crushable material*	%	SOLID	-	-	0	0	0	0
Fraction of sample above 4mm*	%	SOLID	-	-	48	32	0	11.6
Fuberidazole*	mg/kg	SOLID	-	-				
Furalaxyl*	mg/kg	SOLID	-	-				
Furathiocarb*	mg/kg	SOLID	-	-				
gamma-hexachlorocyclohexane	mg/kg	SOLID	67	14				
GRO >C5-10	mg/kg	SOLID	-	-				
GRO >C5-12	mg/kg	SOLID	-	-				
GRO >C7-8	mg/kg	SOLID	-	-				
GRO >C8-10	mg/kg	SOLID	-	-				
GRO Surrogate % recovery	%	SOLID	-	-				
Haloxyfop etotyl*	mg/kg	SOLID	-	-				
Haloxyfop Methyl*	mg/kg	SOLID	-	-				
Heptachlor	mg/kg	SOLID	-	-				
Heptachlor Epoxide	mg/kg	SOLID	-	-				
Heptachlor exo Epoxide*	mg/kg	SOLID	-	-				
Heptanoic Acid	mg/kg	SOLID	-	-				
Heptenophos	mg/kg	SOLID	-	-				
Hexachlorobenzene (HCB)	mg/kg	SOLID	110	30				
Hexachlorobutadiene (HCBD)	mg/kg	SOLID	31	48	<0.0020			
Hexachlorocyclopentadiene	mg/kg	SOLID	-	-				
Hexachloroethane	mg/kg	SOLID	21	158				
Hexaconazole	mg/kg	SOLID	-	-				
Hexaflumuron*	mg/kg	SOLID	-	-				
Hexazinone	mg/kg	SOLID	-	-				
Hexythiazox*	mg/kg	SOLID	-	-				
Imazalil*	mg/kg	SOLID	-	-				
Imidacloprid*	mg/kg	SOLID	-	-				
Imidan	mg/kg	SOLID	-	-				
Indeno(1,2,3-cd)pyrene	mg/kg	SOLID	500	150	<0.0900	<0.1300	<0.1100	<0.1000
Indoxacarb*	mg/kg	SOLID	-	-				
Iodofenphos	mg/kg	SOLID	-	-				
Iprodione*	mg/kg	SOLID	-	-				
Iprovalicarb*	mg/kg	SOLID	-	-				
Isazofos*	mg/kg	SOLID	-	-				
Isocarbophos*	mg/kg	SOLID	-	-				
Isodrin	mg/kg	SOLID	-	-				
Isofenphos Methyl*	mg/kg	SOLID	-	-				
Isofenphos*	mg/kg	SOLID	-	-				
Isomethiozin*	mg/kg	SOLID	-	-				
Isophorone	mg/kg	SOLID	-	-				
Isoprocarb*	mg/kg	SOLID	-	-				
Isopropylbenzene	mg/kg	SOLID	1300	23000	<0.0010			
Isoprothiolane*	mg/kg	SOLID	-	-				
Isoproturon	mg/kg	SOLID	-	-				
Isopyrazam*	mg/kg	SOLID	-	-				
Isothiazolinone*	mg/kg	SOLID	-	-				
Isoxaben*	mg/kg	SOLID	-	-				
Karbutilate*	mg/kg	SOLID	-	-				
Kresoxim Methyl*	mg/kg	SOLID	-	-				
Lambda Cyhalothrin	mg/kg	SOLID	-	-				
Lead	mg/kg	SOLID	2300	1300	8	108.6	43.2	21.8
Lenacil*	mg/kg	SOLID	-	-				
Leptophos	mg/kg	SOLID	-	-				
Linuron	mg/kg	SOLID	-	-				
Lufenuron*	mg/kg	SOLID	-	-				
m,p xylenes	mg/kg	SOLID	-	-	<0.0040	<0.0060	<0.0050	<0.0050
m,p,o Xylenes	mg/kg	SOLID	-	-				
Malaoxon*	mg/kg	SOLID	-	-				
Malathion	mg/kg	SOLID	-	-				
Mandipropamid*	mg/kg	SOLID	-	-				
MCPA-thioethyl*	mg/kg	SOLID	-	-				
Mecarbam*	mg/kg	SOLID	-	-				
Mecoprop	mg/kg	SOLID	-	-				
Mefenacet*	mg/kg	SOLID	-	-				

Max of Normalised Results					Location ID	Asset	Sample Depth	Geology Code													
					BD161-CP028	BD161-CR008	BD161-CR008	BD161-CR010	BD161-TP002	BD161-TP008	BD161-TP035	BD161-TP036	BD161-WS003	BD161-WS003	BD162-CP044	BD162-CR003	BD162-CR020	BD162-CR020	BD162-TP003	BD163-CP043	BD163-CP043
					Coleshill No. 3 Embankment	Coleshill West Viaduct	Coleshill West Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Green Lane Embankment	Green Lane Embankment	Green Lane Embankment	Green Lane Embankment	Coleshill No. 3 Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment
					1.2	0.5	2	0.5	0.15	0.15	0.1	2	0.2	1.1	0.7	0.5	0.5	1	0.65	1	1.7
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TILMP	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	MGR	TILMP	MGR	TILMP	MGR	MGR	MGR
Mepanipyrim*	mg/kg	SOLID	-	-																	
Mephosfolan*	mg/kg	SOLID	-	-																	
Mepronil*	mg/kg	SOLID	-	-																	
Mercury	mg/kg	SOLID	58	30		<0.5100	<0.5000	<0.5000	<0.5000	<0.5000	0.62		<0.5400	0.9	<0.5000	<0.5000	<0.5000	<0.6000	<0.5000	<0.5000	
Metaflumizone*	mg/kg	SOLID	-	-																	
Metalaxyl*	mg/kg	SOLID	-	-																	
Metamitron*	mg/kg	SOLID	-	-																	
Metazachlor	mg/kg	SOLID	-	-																	
Metconazole*	mg/kg	SOLID	-	-																	
Methabenzthiazuran	mg/kg	SOLID	-	-																	
Methacriphos	mg/kg	SOLID	-	-																	
Methamidophos	mg/kg	SOLID	-	-																	
Methidathion*	mg/kg	SOLID	-	-																	
Methiocarb	mg/kg	SOLID	-	-																	
Methiocarb sulfone*	mg/kg	SOLID	-	-																	
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																	
Methomyl*	mg/kg	SOLID	-	-																	
Methoxychlor	mg/kg	SOLID	-	-																	
Methoxyfenozide*	mg/kg	SOLID	-	-																	
Methyl Paraoxon*	mg/kg	SOLID	-	-																	
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000					<0.0010		<0.0010										
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																	
Methylparathion	mg/kg	SOLID	-	-																	
Metobromuron*	mg/kg	SOLID	-	-																	
Metolachlor	mg/kg	SOLID	-	-																	
Metolcarb*	mg/kg	SOLID	-	-																	
Metrafenone*	mg/kg	SOLID	-	-																	
Metribuzin	mg/kg	SOLID	-	-																	
Mevinphos	mg/kg	SOLID	-	-																	
Mirex	mg/kg	SOLID	-	-																	
Molinate	mg/kg	SOLID	-	-																	
Monlinuran	mg/kg	SOLID	-	-																	
Monocrotophos	mg/kg	SOLID	-	-																	
Monuron	mg/kg	SOLID	-	-																	
Myclobutanil*	mg/kg	SOLID	-	-																	
Naphthalene1-methyl-	mg/kg	SOLID	-	-																	
Naphthalene-d8	%	SOLID	-	-																	
Napropamide	mg/kg	SOLID	-	-																	
Napthalene	mg/kg	SOLID	190	1200		0.78	<0.1000	<0.0900	<0.0060	<0.0900	<0.0070		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Natural Moisture Content 105C	%	SOLID	-	-		11.1	17.9	15.1	10.2	12.3	28.5		18.1	19.1	17	15.9	16.5	20.7	16	10.8	
n-Butylbenzene	mg/kg	SOLID	-	-					<0.0010		<0.0010										
Neburon*	mg/kg	SOLID	-	-																	
Nickel	mg/kg	SOLID	980	800		56.2	21.6	18.5	23.6	12.3	45.1		17.6	18.2	4.3	22	18.1	51.9	17.6	29	
Nitenpyram*	mg/kg	SOLID	-	-																	
Nitrobenzene	mg/kg	SOLID	-	-																	
Nitrofen	mg/kg	SOLID	-	-																	
Nitrothal isopropyl*	mg/kg	SOLID	-	-																	
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																	
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																	
Non-Asbestos Fibre	N/A	SOLID	-	-																	
Non-Asbestos Fibre	No units	SOLID	-	-																	
Novaluron*	mg/kg	SOLID	-	-																	
n-propylbenzene	mg/kg	SOLID	3900	36000					<0.0010		<0.0010										
Nuarimol*	mg/kg	SOLID	-	-																	
Number of Additional Peaks	mg/kg	SOLID	-	-																	
o,p - DDT	mg/kg	SOLID	-	-																	
Octhilinone*	mg/kg	SOLID	-	-																	
Ofurace*	mg/kg	SOLID	-	-																	
Omethoate*	mg/kg	SOLID	-	-																	
Organic matter	% M/M	SOLID	-	-		15	1.79	1.05	1.42	3.08	6.37		3.27	3.71	2.18	0.52	0.65	0.47	1.29	0.72	
Organic matter	%	SOLID	-	-	0.4							1.1									
Orysastrobin*	mg/kg	SOLID	-	-																	
Oxadiargyl*	mg/kg	SOLID	-	-																	
Oxadiazon*	mg/kg	SOLID	-	-																	
Oxadixyl*	mg/kg	SOLID	-	-																	
Oxamyl	mg/kg	SOLID	-	-																	
Oxycarboxin*	mg/kg	SOLID	-	-																	
Oxydisulfoton	mg/kg	SOLID	-	-																	
Oxyfluorfen*	mg/kg	SOLID	-	-																	
O-Xylene	mg/kg	SOLID	6600	17000		0.004	<0.0020	<0.0020	<0.0020	<0.0020	<0.0030		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0030	<0.0020	<0.0020	
p,p - DDT	mg/kg	SOLID	-	-																	
p,p-DDD*	mg/kg	SOLID	-	-																	
Paclobutrazol*	mg/kg	SOLID	-	-																	
PAH 17 Total	mg/kg	SOLID	-	-																	
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																	
PAH,Total	mg/kg	SOLID	-	-		<5.0500	<1.5600	<1.5100	<9.1000	<1.4600	<6.3100		<1.5600	<1.5800	<1.5400	<1.5200	<1.5300	<1.8500	<1.5200	<1.4300	
Paraoxon*	mg/kg	SOLID	-	-																	
PCB 105	mg/kg	SOLID	-	-																	
PCB 114	mg/kg	SOLID	-	-																	
PCB 123	mg/kg	SOLID	-	-																	
PCB 126	mg/kg	SOLID	-	-																	
PCB 157	mg/kg	SOLID	-	-																	
PCB 167	mg/kg	SOLID	-	-																	
PCB 169	mg/kg	SOLID	-	-																	
PCB 189	mg/kg	SOLID	-	-																	
PCB 77	mg/kg	SOLID	-	-																	
PCB 81	mg/kg	SOLID	-	-																	
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																	
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																	
Penconazole*	mg/kg	SOLID	-	-																	
Pencycuron*	mg/kg	SOLID	-	-																	
Pendimethalin	mg/kg	SOLID	-	-																	
Pentachloroaniline*	mg/kg	SOLID	-	-																	
Pentachloronitrobenzene	mg/kg	SOLID	-	-																	
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110																	
Pentanochlor*	mg/kg	SOLID	-	-																	
Permethrin	mg/kg	SOLID	-	-																	
Perylene-d12	%	SOLID	-	-																	
Pethoxamid*	mg/kg	SOLID	-	-																	
pH	pH Units	SOLID	-	-		6.9	8.6	9.8	8.3	8.6	7.1		7.9	8	5.9	7.6	7	7.5	7.8	9.3	
pH	-	SOLID	-	-																	
Phenanthrene	mg/kg	SOLID	22000	6200		0.85	<0.1000	<0.0900	0.38	<0.0900	0.15		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Phenanthrene-d10	%	SOLID	-	-																	
Phenmedipham*	mg/kg	SOLID	-	-																	
Phenol	mg/kg	SOLID	440	440																	
Phenol	mg/kg	SOLID	-	-																	
Phenol (Monohydric)	mg/kg	SOLID	-	-																	
Phenol Index	mg/kg	SOLID	-	-		<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.7000		<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.7000	<0.6000	<0.6000	
Phenothrin*	mg/kg	SOLID	-	-																	
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																	
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																	
Phenthoate*	mg/kg	SOLID	-	-																	
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																	
Phorate	mg/kg	SOLID	-	-																	
Phorate sulfone*	mg/kg	SOLID	-	-																	
Phorate sulfoxide*	mg/kg	SOLID	-	-																	
Phosalone	mg/kg	SOLID	-	-																	
Phosfolan*	mg/kg	SOLID	-	-																	
Phosphamidon	mg/kg	SOLID	-	-																	
Phosphorothioic acid	mg/kg	SOLID	-	-																	
Phoxim*	mg/kg	SOLID	-	-																	
Phthalimide*	mg/kg	SOLID	-	-																	
Picoxystrobin*	mg/kg	SOLID	-	-																	
Piperonyl Butoxide*	mg/kg	SOLID	-	-																	
Pirimicarb	mg/kg	SOLID	-	-																	
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																	
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																	
Pirimiphos-methyl	mg/kg	SOLID	-	-																	
Pretilachlor*	mg/kg	SOLID	-	-																	
Prochloraz*	mg/kg	SOLID	-	-																	
Procymidone*	mg/kg	SOLID	-	-																	
Profenofos*	mg/kg	SOLID	-	-																	
Prometon	mg/kg	SOLID	-	-																	
Prometryne	mg/kg	SOLID	-	-																	
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-																	
Propamocarb*	mg/kg	SOLID	-	-																	
Propanil	mg/kg	SOLID	-	-																	
Propaphos*	mg/kg	SOLID	-	-																	
Propaquizafop*	mg/kg	SOLID	-	-																	
Propargite	mg/kg	SOLID	-	-																	
Propazine	mg/kg	SOLID	-	-																	
Propetamphos	mg/kg	SOLID	-	-																	
Propham	mg/kg	SOLID	-	-																	
Propiconazole*	mg/kg	SOLID	-	-																	
Propoxur*	mg/kg	SOLID	-	-																	
Propyzamide	mg/kg	SOLID	-	-																	
Proquinazid*	mg/kg	SOLID	-	-																	
Prosulfocarb*	mg/kg	SOLID	-	-																	
Prothioconazole desthio*	mg/kg	SOLID	-	-																	
Pyraclostrobin*	mg/kg	SOLID	-	-																	
Pyraflufen ethyl*	mg/kg	SOLID	-	-																	
Pyrazophos*	mg/kg	SOLID	-	-																	
Pyrene	mg/kg	SOLID	54000	15000		0.46	<0.1000	<0.0900	1.02	<0.0900	700		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1200	<0.1000	<0.0900	
Pyrethrin I*	mg/kg	SOLID	-	-																	
Pyridaben*	mg/kg	SOLID	-	-																	
Pyridaphenthion*	mg/kg	SOLID	-	-																	
Pyrifenox*	mg/kg	SOLID	-	-																	
Pyrimethanil*	mg/kg	SOLID	-	-																	
Pyriproxyfen	mg/kg	SOLID	-	-																	
Quinalphos*	mg/kg	SOLID	-	-																	

Max of Normalised Results																								
					BD163-CP043	BD163-CP043	BD163-CP043	BD163-CR006	BD163-CR014	BD163-CR014	BD163-CR014	BD163-CR022	BD163-CR022	BD163-CR022	BD163-TP013	BD163-TP013a	BD163-TP016	BD163-TP016	BD163-WS001	BD163-WS001	BD164-CR011	BS161-CP401	BS161-CP401	BS161-CP401	BS161-CP401
					Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Green Lane Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Green Lane Embankment	Green Lane Embankment	Water Orton Cutting	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment
					2	3	5	0.8	0.5	2	4	7	9	12.8	0.8	1.5	0.6	2.3	0.2	0.5	0.7	0.05	0.3	0.5	1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	TOP	RTD2	RTD2	RTD2
Mepanipyrim*	mg/kg	SOLID	-	-																					
Mephosfolan*	mg/kg	SOLID	-	-																					
Mepronil*	mg/kg	SOLID	-	-																					
Mercury	mg/kg	SOLID	58	30		<0.5000	<0.5000	<0.5000	<0.6000	<0.5000	<0.6000	<0.5000	<0.6000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.6000	<0.5000	<0.5000	<1.0000	<1.0000	<1.0000	<1.0000
Metaflumizone*	mg/kg	SOLID	-	-																					
Metalaxyl*	mg/kg	SOLID	-	-																					
Metamitron*	mg/kg	SOLID	-	-																					
Metazachlor	mg/kg	SOLID	-	-																					
Metconazole*	mg/kg	SOLID	-	-																					
Methabenzthiazuron	mg/kg	SOLID	-	-																					
Methacriphos	mg/kg	SOLID	-	-																					
Methamidophos	mg/kg	SOLID	-	-																					
Methidathion*	mg/kg	SOLID	-	-																					
Methiocarb	mg/kg	SOLID	-	-																					
Methiocarb sulfone*	mg/kg	SOLID	-	-																					
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																					
Methomyl*	mg/kg	SOLID	-	-																					
Methoxychlor	mg/kg	SOLID	-	-																					
Methoxyfenozide*	mg/kg	SOLID	-	-																					
Methyl Paraoxon*	mg/kg	SOLID	-	-																					
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000																		<0.0100		<0.0100	
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																					
Methylparathion	mg/kg	SOLID	-	-																					
Metobromuron*	mg/kg	SOLID	-	-																					
Metolachlor	mg/kg	SOLID	-	-																					
Metolcarb*	mg/kg	SOLID	-	-																					
Metrafenone*	mg/kg	SOLID	-	-																					
Metribuzin	mg/kg	SOLID	-	-																					
Mevinphos	mg/kg	SOLID	-	-																					
Mirex	mg/kg	SOLID	-	-																					
Molinate	mg/kg	SOLID	-	-																					
Monlinuran	mg/kg	SOLID	-	-																					
Monocrotophos	mg/kg	SOLID	-	-																					
Monuron	mg/kg	SOLID	-	-																					
Myclobutanil*	mg/kg	SOLID	-	-																					
Naphthalene1-methyl-	mg/kg	SOLID	-	-																					
Naphthalene-d8	%	SOLID	-	-																					
Napropamide	mg/kg	SOLID	-	-																					
Napthalene	mg/kg	SOLID	190	1200		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000
Natural Moisture Content 105C	%	SOLID	-	-		16.5	18.6	18.6	21.3	19.1	22	17.6	22.6	23.1	18.1	15.5	20.3	18	21.7	14.9	14.7				
n-Butylbenzene	mg/kg	SOLID	-	-																					
Neburon*	mg/kg	SOLID	-	-																					
Nickel	mg/kg	SOLID	980	800		32.2	26	50	18.3	27.6	35.2	26.7	29	28.2	15	27.5	27.5	30.2	19.3	18.6	26.3	12	13	17	14
Nitenpyram*	mg/kg	SOLID	-	-																					
Nitrobenzene	mg/kg	SOLID	-	-																		<0.1000		<0.1000	
Nitrofen	mg/kg	SOLID	-	-																					
Nitrothal isopropyl*	mg/kg	SOLID	-	-																					
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																					
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																					
Non-Asbestos Fibre	N/A	SOLID	-	-																					
Non-Asbestos Fibre	No units	SOLID	-	-																					
Novaluron*	mg/kg	SOLID	-	-																					
n-propylbenzene	mg/kg	SOLID	3900	36000																		<0.0500		<0.0500	
Nuarimol*	mg/kg	SOLID	-	-																					
Number of Additional Peaks	mg/kg	SOLID	-	-																					
o,p - DDT	mg/kg	SOLID	-	-																					
Octhilinone*	mg/kg	SOLID	-	-																					
Ofurace*	mg/kg	SOLID	-	-																					
Omethoate*	mg/kg	SOLID	-	-																					
Organic matter	% M/M	SOLID	-	-		0.38	1.47	0.44	2.06	0.65	0.44	1.08	0.59	0.28	1.08	1.77	0.46	0.43	1.42	1.18	1.23				
Organic matter	%	SOLID	-	-																		2.9	3.2	0.5	1.1
Orysastrobin*	mg/kg	SOLID	-	-																					
Oxadiargyl*	mg/kg	SOLID	-	-																					
Oxadiazon*	mg/kg	SOLID	-	-																					
Oxadixyl*	mg/kg	SOLID	-	-																					
Oxamyl	mg/kg	SOLID	-	-																					
Oxycarboxin*	mg/kg	SOLID	-	-																					
Oxydisulfoton	mg/kg	SOLID	-	-																					
Oxyfluorfen*	mg/kg	SOLID	-	-																					
O-Xylene	mg/kg	SOLID	6600	17000		<0.0020	<0.0020	<0.0020	<0.0030	<0.0020	<0.0030	<0.0020	<0.0030	<0.0030	<0.0020	<0.0020	<0.0030	<0.0020	<0.0030	<0.0020	<0.0020	<0.0100	<0.0100	<0.0100	<0.0100
p,p - DDT	mg/kg	SOLID	-	-																					
p,p-DDD*	mg/kg	SOLID	-	-																					
Paclobutrazol*	mg/kg	SOLID	-	-																					
PAH 17 Total	mg/kg	SOLID	-	-																					
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																					
PAH,Total	mg/kg	SOLID	-	-		<1.5900	<1.5800	<1.5700	<1.6300	<1.5800	<22.6500	<2.0500	<1.6700	<1.7400	<1.5600	<1.5100	<1.6100	<1.5600	<1.6300	<1.5000	<1.8100	<0.1000	0.4	<0.1000	<0.1000
Paraoxon*	mg/kg	SOLID	-	-																					
PCB 105	mg/kg	SOLID	-	-																					
PCB 114	mg/kg	SOLID	-	-																					
PCB 123	mg/kg	SOLID	-	-																					
PCB 126	mg/kg	SOLID	-	-																					
PCB 157	mg/kg	SOLID	-	-																					
PCB 167	mg/kg	SOLID	-	-																					
PCB 169	mg/kg	SOLID	-	-																					
PCB 189	mg/kg	SOLID	-	-																					
PCB 77	mg/kg	SOLID	-	-																					
PCB 81	mg/kg	SOLID	-	-																					
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																					
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																					
Penconazole*	mg/kg	SOLID	-	-																					
Pencycuron*	mg/kg	SOLID	-	-																					
Pendimethalin	mg/kg	SOLID	-	-																					
Pentachloroaniline*	mg/kg	SOLID	-	-																					
Pentachloronitrobenzene	mg/kg	SOLID	-	-																					
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110																		<0.1000		<0.1000	
Pentanochlor*	mg/kg	SOLID	-	-																					
Permethrin	mg/kg	SOLID	-	-																					
Perylene-d12	%	SOLID	-	-																					
Pethoxamid*	mg/kg	SOLID	-	-																					
pH	pH Units	SOLID	-	-		9.2	8.6	7.7	7.7	8.5	8.6	8	8.1	8.6	8.7	8.4	8.9	8.5	8.4	8.6	8.6				
pH	-	SOLID	-	-																		6.4	6.3	7.3	6.8
Phenanthrene	mg/kg	SOLID	22000	6200		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	1.55	0.17	<0.1000	0.1	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	0.22	<0.1000	0.2	<0.1000	<0.1000
Phenanthrene-d10	%	SOLID	-	-																					
Phenmedipham*	mg/kg	SOLID	-	-																					
Phenol	mg/kg	SOLID	440	440																		<0.1000		<0.1000	
Phenol	mg/kg	SOLID	-	-																		<1.0000	<1.0000	<1.0000	<1.0000
Phenol (Monohydric)	mg/kg	SOLID	-	-																					
Phenol Index	mg/kg	SOLID	-	-		<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.7000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000				
Phenothrin*	mg/kg	SOLID	-	-																					
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																					
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																					
Phenthoate*	mg/kg	SOLID	-	-																					
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																					
Phorate	mg/kg	SOLID	-	-																					
Phorate sulfone*	mg/kg	SOLID	-	-																					
Phorate sulfoxide*	mg/kg	SOLID	-	-																					
Phosalone	mg/kg	SOLID	-	-																					
Phosfolan*	mg/kg	SOLID	-	-																					
Phosphamidon	mg/kg	SOLID	-	-																					
Phosphorothioic acid	mg/kg	SOLID	-	-																					
Phoxim*	mg/kg	SOLID	-	-																					
Phthalimide*	mg/kg	SOLID	-	-																					
Picoxystrobin*	mg/kg	SOLID	-	-																					
Piperonyl Butoxide*	mg/kg	SOLID	-	-																					
Pirimicarb	mg/kg	SOLID	-	-																					
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																					
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																					
Pirimiphos-methyl	mg/kg	SOLID	-	-																					
Pretilachlor*	mg/kg	SOLID	-	-																					
Prochloraz*	mg/kg	SOLID	-	-																					
Procymidone*	mg/kg	SOLID	-	-																					
Profenofos*	mg/kg	SOLID	-	-																					
Prometon	mg/kg	SOLID	-	-																					
Prometryne	mg/kg	SOLID	-	-																					
Propachlor (2-Chloro-N-(1-Methylethyl)-N-Phenylac	mg/kg	SOLID	-	-																					
Propamocarb*	mg/kg	SOLID	-	-																					
Propanil	mg/kg	SOLID	-	-																					
Propaphos*	mg/kg	SOLID	-	-																					
Propaquizafop*	mg/kg	SOLID	-	-																					
Propargite	mg/kg	SOLID	-	-																					
Propazine	mg/kg	SOLID	-	-																					
Propetamphos	mg/kg	SOLID	-	-																					
Propham	mg/kg	SOLID	-	-																					
Propiconazole*	mg/kg	SOLID	-	-																					
Propoxur*	mg/kg	SOLID	-	-																					
Propyzamide	mg/kg	SOLID	-	-																					
Proquinazid*	mg/kg	SOLID	-	-																					
Prosulfocarb*	mg/kg	SOLID	-	-																					
Prothioconazole desthio*	mg/kg	SOLID	-	-																					
Pyraclostrobin*	mg/kg	SOLID	-	-																					
Pyraflufen ethyl*	mg/kg	SOLID	-	-																					
Pyrazophos*	mg/kg	SOLID	-	-																					
Pyrene	mg/kg	SOLID	54000	15000		0.1	0.1	<0.1000	<0.1000	<0.1000	4.42	0.19	<0.1000	0.12	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900	0.14	<0.1000	0.1	<0.1000	<0.1000
Pyrethrin I*	mg/kg	SOLID	-	-																					
Pyridaben*	mg/kg	SOLID	-	-																					
Pyridaphenthion*	mg/kg	SOLID	-	-																					
Pyrifenox*	mg/kg	SOLID	-	-																					
Pyrimethanil*	mg/kg	SOLID	-	-																					
Pyriproxyfen	mg/kg	SOLID	-	-																					
Quinalphos*	mg/kg	SOLID	-	-																					

Max of Normalised Results					
					BS161-CP401
					Coleshill No. 3 Embankment
					2.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD2
Mepanipyrim*	mg/kg	SOLID	-	-	
Mephosfolan*	mg/kg	SOLID	-	-	
Mepronil*	mg/kg	SOLID	-	-	
Mercury	mg/kg	SOLID	58	30	<1.0000
Metaflumizone*	mg/kg	SOLID	-	-	
Metalaxyl*	mg/kg	SOLID	-	-	
Metamitron*	mg/kg	SOLID	-	-	
Metazachlor	mg/kg	SOLID	-	-	
Metconazole*	mg/kg	SOLID	-	-	
Methabenzthiazuran	mg/kg	SOLID	-	-	
Methacriphos	mg/kg	SOLID	-	-	
Methamidophos	mg/kg	SOLID	-	-	
Methidathion*	mg/kg	SOLID	-	-	
Methiocarb	mg/kg	SOLID	-	-	
Methiocarb sulfone*	mg/kg	SOLID	-	-	
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-	
Methomyl*	mg/kg	SOLID	-	-	
Methoxychlor	mg/kg	SOLID	-	-	
Methoxyfenozide*	mg/kg	SOLID	-	-	
Methyl Paraoxon*	mg/kg	SOLID	-	-	
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000	<0.0100
Methyl tert-pentyl ether	mg/kg	SOLID	-	-	
Methylparathion	mg/kg	SOLID	-	-	
Metobromuron*	mg/kg	SOLID	-	-	
Metolachlor	mg/kg	SOLID	-	-	
Metolcarb*	mg/kg	SOLID	-	-	
Metrafenone*	mg/kg	SOLID	-	-	
Metribuzin	mg/kg	SOLID	-	-	
Mevinphos	mg/kg	SOLID	-	-	
Mirex	mg/kg	SOLID	-	-	
Molinate	mg/kg	SOLID	-	-	
Monlinuran	mg/kg	SOLID	-	-	
Monocrotophos	mg/kg	SOLID	-	-	
Monuron	mg/kg	SOLID	-	-	
Myclobutanil*	mg/kg	SOLID	-	-	
Naphthalene1-methyl-	mg/kg	SOLID	-	-	
Naphthalene-d8	%	SOLID	-	-	
Napropamide	mg/kg	SOLID	-	-	
Napthalene	mg/kg	SOLID	190	1200	<0.1000
Natural Moisture Content 105C	%	SOLID	-	-	
n-Butylbenzene	mg/kg	SOLID	-	-	
Neburon*	mg/kg	SOLID	-	-	
Nickel	mg/kg	SOLID	980	800	26
Nitenpyram*	mg/kg	SOLID	-	-	
Nitrobenzene	mg/kg	SOLID	-	-	<0.1000
Nitrofen	mg/kg	SOLID	-	-	
Nitrothal isopropyl*	mg/kg	SOLID	-	-	
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-	
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-	
Non-Asbestos Fibre	N/A	SOLID	-	-	
Non-Asbestos Fibre	No units	SOLID	-	-	
Novaluron*	mg/kg	SOLID	-	-	
n-propylbenzene	mg/kg	SOLID	3900	36000	<0.0500
Nuarimol*	mg/kg	SOLID	-	-	
Number of Additional Peaks	mg/kg	SOLID	-	-	
o,p - DDT	mg/kg	SOLID	-	-	
Octhilinone*	mg/kg	SOLID	-	-	
Ofurace*	mg/kg	SOLID	-	-	
Omethoate*	mg/kg	SOLID	-	-	
Organic matter	% M/M	SOLID	-	-	
Organic matter	%	SOLID	-	-	0.2
Orysastrobin*	mg/kg	SOLID	-	-	
Oxadiargyl*	mg/kg	SOLID	-	-	
Oxadiazon*	mg/kg	SOLID	-	-	
Oxadixyl*	mg/kg	SOLID	-	-	
Oxamyl	mg/kg	SOLID	-	-	
Oxycarboxin*	mg/kg	SOLID	-	-	
Oxydisulfoton	mg/kg	SOLID	-	-	
Oxyfluorfen*	mg/kg	SOLID	-	-	
O-Xylene	mg/kg	SOLID	6600	17000	<0.0100
p,p - DDT	mg/kg	SOLID	-	-	
p,p-DDD*	mg/kg	SOLID	-	-	
Paclobutrazol*	mg/kg	SOLID	-	-	
PAH 17 Total	mg/kg	SOLID	-	-	
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-	
PAH,Total	mg/kg	SOLID	-	-	<0.1000
Paraoxon*	mg/kg	SOLID	-	-	
PCB 105	mg/kg	SOLID	-	-	
PCB 114	mg/kg	SOLID	-	-	
PCB 123	mg/kg	SOLID	-	-	
PCB 126	mg/kg	SOLID	-	-	
PCB 157	mg/kg	SOLID	-	-	
PCB 167	mg/kg	SOLID	-	-	
PCB 169	mg/kg	SOLID	-	-	
PCB 189	mg/kg	SOLID	-	-	
PCB 77	mg/kg	SOLID	-	-	
PCB 81	mg/kg	SOLID	-	-	
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-	
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-	
Penconazole*	mg/kg	SOLID	-	-	
Pencycuron*	mg/kg	SOLID	-	-	
Pendimethalin	mg/kg	SOLID	-	-	
Pentachloroaniline*	mg/kg	SOLID	-	-	
Pentachloronitrobenzene	mg/kg	SOLID	-	-	
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110	<0.1000
Pentanochlor*	mg/kg	SOLID	-	-	
Permethrin	mg/kg	SOLID	-	-	
Perylene-d12	%	SOLID	-	-	
Pethoxamid*	mg/kg	SOLID	-	-	
pH	pH Units	SOLID	-	-	7.3
pH	-	SOLID	-	-	
Phenanthrene	mg/kg	SOLID	22000	6200	<0.1000
Phenanthrene-d10	%	SOLID	-	-	
Phenmedipham*	mg/kg	SOLID	-	-	
Phenol	mg/kg	SOLID	440	440	<0.1000
Phenol	mg/kg	SOLID	-	-	<1.0000
Phenol (Monohydric)	mg/kg	SOLID	-	-	
Phenol Index	mg/kg	SOLID	-	-	
Phenothrin*	mg/kg	SOLID	-	-	
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-	
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-	
Phenthoate*	mg/kg	SOLID	-	-	
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-	
Phorate	mg/kg	SOLID	-	-	
Phorate sulfone*	mg/kg	SOLID	-	-	
Phorate sulfoxide*	mg/kg	SOLID	-	-	
Phosalone	mg/kg	SOLID	-	-	
Phosfolan*	mg/kg	SOLID	-	-	
Phosphamidon	mg/kg	SOLID	-	-	
Phosphorothioic acid	mg/kg	SOLID	-	-	
Phoxim*	mg/kg	SOLID	-	-	
Phthalimide*	mg/kg	SOLID	-	-	
Picoxystrobin*	mg/kg	SOLID	-	-	
Piperonyl Butoxide*	mg/kg	SOLID	-	-	
Pirimicarb	mg/kg	SOLID	-	-	
Pirimicarb desmethyl*	mg/kg	SOLID	-	-	
Pirimiphos-Ethyl	mg/kg	SOLID	-	-	
Pirimiphos-methyl	mg/kg	SOLID	-	-	
Pretilachlor*	mg/kg	SOLID	-	-	
Prochloraz*	mg/kg	SOLID	-	-	
Procymidone*	mg/kg	SOLID	-	-	
Profenofos*	mg/kg	SOLID	-	-	
Prometon	mg/kg	SOLID	-	-	
Prometryne	mg/kg	SOLID	-	-	
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-	
Propamocarb*	mg/kg	SOLID	-	-	
Propanil	mg/kg	SOLID	-	-	
Propaphos*	mg/kg	SOLID	-	-	
Propaquizafop*	mg/kg	SOLID	-	-	
Propargite	mg/kg	SOLID	-	-	
Propazine	mg/kg	SOLID	-	-	
Propetamphos	mg/kg	SOLID	-	-	
Propham	mg/kg	SOLID	-	-	
Propiconazole*	mg/kg	SOLID	-	-	
Propoxur*	mg/kg	SOLID	-	-	
Propyzamide	mg/kg	SOLID	-	-	
Proquinazid*	mg/kg	SOLID	-	-	
Prosulfocarb*	mg/kg	SOLID	-	-	
Prothioconazole desthio*	mg/kg	SOLID	-	-	
Pyraclostrobin*	mg/kg	SOLID	-	-	
Pyraflufen ethyl*	mg/kg	SOLID	-	-	
Pyrazophos*	mg/kg	SOLID	-	-	
Pyrene	mg/kg	SOLID	54000	15000	<0.1000
Pyrethrin I*	mg/kg	SOLID	-	-	
Pyridaben*	mg/kg	SOLID	-	-	
Pyridaphenthion*	mg/kg	SOLID	-	-	
Pyrifenox*	mg/kg	SOLID	-	-	
Pyrimethanil*	mg/kg	SOLID	-	-	
Pyriproxyfen	mg/kg	SOLID	-	-	
Quinalphos*	mg/kg	SOLID	-	-	

Max of Normalised Results																											
					BS161-CT401	BS162-CR401a	BS162-CR401a	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR413
					Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	Coleshill No. 3 Embankment
					0.1	0.35	1	0.3	1	2	4	6.5	9.5	10.5	13.5	16.5	0.1	0.3	1	2	5.5	7.5	10.5	12	15	18.5	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	RTD1	RTD2	RTD2	RTD2	RTD2	SIM	SIM	SIM	SIM	SIM	TOP	RTD	RTD	RTD	SIM	SIM	SIM	SIM	SIM	SIM	TOP
Mepanipyrim*	mg/kg	SOLID	-	-														<0.0100									
Mephosfolan*	mg/kg	SOLID	-	-														<0.0100									
Mepronil*	mg/kg	SOLID	-	-														<0.0100									
Mercury	mg/kg	SOLID	58	30		<1.0000	<1.0000	<1.0000	<1.0000									<1.0000	<1.0000								<1.0000
Metaflumizone*	mg/kg	SOLID	-	-														<0.0100									
Metalaxyl*	mg/kg	SOLID	-	-														<0.0100									
Metamitron*	mg/kg	SOLID	-	-														<0.0100									
Metazachlor	mg/kg	SOLID	-	-														<0.0100									
Metconazole*	mg/kg	SOLID	-	-														<0.0100									
Methabenzthiazuran	mg/kg	SOLID	-	-														<0.0100									
Methacriphos	mg/kg	SOLID	-	-														<0.0100									
Methamidophos	mg/kg	SOLID	-	-														<0.0100									
Methidathion*	mg/kg	SOLID	-	-														<0.0100									
Methiocarb	mg/kg	SOLID	-	-														<0.0100									
Methiocarb sulfone*	mg/kg	SOLID	-	-														<0.0100									
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-														<0.0100									
Methomyl*	mg/kg	SOLID	-	-														<0.0100									
Methoxychlor	mg/kg	SOLID	-	-														<0.0100									
Methoxyfenozide*	mg/kg	SOLID	-	-														<0.0100									
Methyl Paraoxon*	mg/kg	SOLID	-	-														<0.0100									
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000		<0.0100	<0.0100																				
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																							
Methylparathion	mg/kg	SOLID	-	-														<0.0100									
Metobromuron*	mg/kg	SOLID	-	-														<0.0100									
Metolachlor	mg/kg	SOLID	-	-														<0.0100									
Metolcarb*	mg/kg	SOLID	-	-														<0.0100									
Metrafenone*	mg/kg	SOLID	-	-														<0.0100									
Metribuzin	mg/kg	SOLID	-	-														<0.0100									
Mevinphos	mg/kg	SOLID	-	-														<0.0100									
Mirex	mg/kg	SOLID	-	-														<0.0100									
Molinate	mg/kg	SOLID	-	-														<0.0100									
Monlinuran	mg/kg	SOLID	-	-														<0.0100									
Monocrotophos	mg/kg	SOLID	-	-														<1.0000									
Monuron	mg/kg	SOLID	-	-														<0.0100									
Myclobutanil*	mg/kg	SOLID	-	-														<0.0100									
Naphthalene1-methyl-	mg/kg	SOLID	-	-																							
Naphthalene-d8	%	SOLID	-	-																							
Napropamide	mg/kg	SOLID	-	-														<0.0100									
Napthalene	mg/kg	SOLID	190	1200		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Natural Moisture Content 105C	%	SOLID	-	-																							
n-Butylbenzene	mg/kg	SOLID	-	-																							
Neburon*	mg/kg	SOLID	-	-														<0.0100									
Nickel	mg/kg	SOLID	980	800		22	14	13	8									13	7								16
Nitenpyram*	mg/kg	SOLID	-	-														<0.0100									
Nitrobenzene	mg/kg	SOLID	-	-		<0.1000	<0.1000																				
Nitrofen	mg/kg	SOLID	-	-														<0.0100									
Nitrothal isopropyl*	mg/kg	SOLID	-	-														<0.0100									
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																							
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																							
Non-Asbestos Fibre	N/A	SOLID	-	-																							
Non-Asbestos Fibre	No units	SOLID	-	-																							
Novaluron*	mg/kg	SOLID	-	-														<0.0100									
n-propylbenzene	mg/kg	SOLID	3900	36000		<0.0500	<0.0500																				
Nuarimol*	mg/kg	SOLID	-	-														<0.0100									
Number of Additional Peaks	mg/kg	SOLID	-	-																							
o,p - DDT	mg/kg	SOLID	-	-														<0.0100									
Octhilinone*	mg/kg	SOLID	-	-														<0.0100									
Ofurace*	mg/kg	SOLID	-	-														<0.0100									
Omethoate*	mg/kg	SOLID	-	-														<0.0100									
Organic matter	% M/M	SOLID	-	-																							
Organic matter	%	SOLID	-	-		1.8	0.8	6.2	0.6								4	2.3	0.3								4.9
Orysastrobin*	mg/kg	SOLID	-	-														<0.0100									
Oxadiargyl*	mg/kg	SOLID	-	-														<0.0100									
Oxadiazon*	mg/kg	SOLID	-	-														<0.0100									
Oxadixyl*	mg/kg	SOLID	-	-														<0.0100									
Oxamyl	mg/kg	SOLID	-	-														<0.0100									
Oxycarboxin*	mg/kg	SOLID	-	-														<0.0100									
Oxydisulfoton	mg/kg	SOLID	-	-														<0.0100									
Oxyfluorfen*	mg/kg	SOLID	-	-														<0.0100									
O-Xylene	mg/kg	SOLID	6600	17000		<0.0100	<0.0100	<0.0100	<0.0100									<0.0100	<0.0100								<0.0100
p,p - DDT	mg/kg	SOLID	-	-														<0.0100									
p,p-DDD*	mg/kg	SOLID	-	-														<0.0100									
Paclobutrazol*	mg/kg	SOLID	-	-														<0.0100									
PAH 17 Total	mg/kg	SOLID	-	-																							
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																							
PAH,Total	mg/kg	SOLID	-	-		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								0.3
Paraoxon*	mg/kg	SOLID	-	-														<0.0100									
PCB 105	mg/kg	SOLID	-	-																							
PCB 114	mg/kg	SOLID	-	-																							
PCB 123	mg/kg	SOLID	-	-																							
PCB 126	mg/kg	SOLID	-	-																							
PCB 157	mg/kg	SOLID	-	-																							
PCB 167	mg/kg	SOLID	-	-																							
PCB 169	mg/kg	SOLID	-	-																							
PCB 189	mg/kg	SOLID	-	-																							
PCB 77	mg/kg	SOLID	-	-																							
PCB 81	mg/kg	SOLID	-	-																							
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																							
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																							
Penconazole*	mg/kg	SOLID	-	-														<0.0100									
Pencycuron*	mg/kg	SOLID	-	-														<0.0100									
Pendimethalin	mg/kg	SOLID	-	-														0.04									
Pentachloroaniline*	mg/kg	SOLID	-	-														<0.0100									
Pentachloronitrobenzene	mg/kg	SOLID	-	-														<0.0100									
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110		<0.1000	<0.1000											<0.0100									
Pentanochlor*	mg/kg	SOLID	-	-														<0.0100									
Permethrin	mg/kg	SOLID	-	-														<0.0100									
Perylene-d12	%	SOLID	-	-																							
Pethoxamid*	mg/kg	SOLID	-	-														<0.0100									
pH	pH Units	SOLID	-	-		6.7	7.5	6.2	6.3	8.3	8.6	8.4	8.5	8.2	8.4	8.3		6.2	7.3	8.4	8.6	8.3	8.9	8.7	8.5	8.6	6.8
pH	-	SOLID	-	-																							
Phenanthrene	mg/kg	SOLID	22000	6200		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								<0.1000
Phenanthrene-d10	%	SOLID	-	-																							
Phenmedipham*	mg/kg	SOLID	-	-														<0.0100									
Phenol	mg/kg	SOLID	440	440		<0.1000	<0.1000																				
Phenol	mg/kg	SOLID	-	-		<1.0000	<1.0000	<1.0000	<1.0000									<1.0000	<1.0000								<1.0000
Phenol (Monohydric)	mg/kg	SOLID	-	-																							
Phenol Index	mg/kg	SOLID	-	-																							
Phenothrin*	mg/kg	SOLID	-	-														<0.0100									
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-														<0.0100									
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-														<0.0100									
Phenthoate*	mg/kg	SOLID	-	-														<0.0100									
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-														<0.0100									
Phorate	mg/kg	SOLID	-	-														<0.0100									
Phorate sulfone*	mg/kg	SOLID	-	-														<0.0100									
Phorate sulfoxide*	mg/kg	SOLID	-	-														<0.0100									
Phosalone	mg/kg	SOLID	-	-														<0.0100									
Phosfolan*	mg/kg	SOLID	-	-														<0.0100									
Phosphamidon	mg/kg	SOLID	-	-														<0.0100									
Phosphorothioic acid	mg/kg	SOLID	-	-														<0.0100									
Phoxim*	mg/kg	SOLID	-	-														<0.0100									
Phthalimide*	mg/kg	SOLID	-	-														<0.0100									
Picoxystrobin*	mg/kg	SOLID	-	-														<0.0100									
Piperonyl Butoxide*	mg/kg	SOLID	-	-														<0.0100									
Pirimicarb	mg/kg	SOLID	-	-														<0.0100									
Pirimicarb desmethyl*	mg/kg	SOLID	-	-														<0.0100									
Pirimiphos-Ethyl	mg/kg	SOLID	-	-														<0.0100									
Pirimiphos-methyl	mg/kg	SOLID	-	-														<0.0100									
Pretilachlor*	mg/kg	SOLID	-	-														<0.0100									
Prochloraz*	mg/kg	SOLID	-	-														<0.0100									
Procymidone*	mg/kg	SOLID	-	-														<0.0100									
Profenofos*	mg/kg	SOLID	-	-														<0.0100									
Prometon	mg/kg	SOLID	-	-														<0.0100									
Prometryne	mg/kg	SOLID	-	-														<0.0100									
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-														<0.0100									
Propamocarb*	mg/kg	SOLID	-	-														<0.0100									
Propanil	mg/kg	SOLID	-	-														<0.0100									
Propaphos*	mg/kg	SOLID	-	-														<0.0100									
Propaquizafop*	mg/kg	SOLID	-	-														<0.0100									
Propargite	mg/kg	SOLID	-	-														<0.0100									
Propazine	mg/kg	SOLID	-	-														<0.0100									
Propetamphos	mg/kg	SOLID	-	-														<0.0100									
Propham	mg/kg	SOLID	-	-														<0.0100									
Propiconazole*	mg/kg	SOLID	-	-														<0.0100									
Propoxur*	mg/kg	SOLID	-	-														<0.0100									
Propyzamide	mg/kg	SOLID	-	-														<0.0100									
Proquinazid*	mg/kg	SOLID	-	-														<0.0100									
Prosulfocarb*	mg/kg	SOLID	-	-														<0.0100									
Prothioconazole desthio*	mg/kg	SOLID	-	-														<0.0100									
Pyraclostrobin*	mg/kg	SOLID	-	-														<0.0100									
Pyraflufen ethyl*	mg/kg	SOLID	-	-														<0.0100									
Pyrazophos*	mg/kg	SOLID	-	-														<0.0100									
Pyrene	mg/kg	SOLID	54000	15000		<0.1000	<0.1000	<0.1000	<0.1000									<0.1000	<0.1000								0.1
Pyrethrin I*	mg/kg	SOLID	-	-														<0.0100									
Pyridaben*	mg/kg	SOLID	-	-														<0.0100									
Pyridaphenthion*	mg/kg	SOLID	-	-														<0.0100									
Pyrifenox*	mg/kg	SOLID	-	-														<0.0100									
Pyrimethanil*	mg/kg	SOLID	-	-														<0.0100									
Pyriproxyfen	mg/kg	SOLID	-	-														<0.0100									
Quinalphos*	mg/kg	SOLID	-	-														<0.0100									

Max of Normalised Results																														
					BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	ML154-TP023	ML155-CP019	ML155-CP019	ML155-CP019	ML155-CP024	ML155-CP024	ML155-CP024	ML155-CP044	ML155-CP044	ML155-CP044	ML155-CR001	ML155-CR001	ML155-CR005	ML155-CR022	ML155-CR022	ML155-CR403	ML155-CR403	ML155-CR403
					Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting
					0.1	0.5	1	4	6.5	9.5	10.5	13.5	1	0.1	1	2	0.05	0.6	3	0.05	0.5	1	0.05	1	0	0.5	0.9	0.3	0.5	1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	RTD1	RTD1	RTD1	SIM	SIM	SIM	SIM	TILMP	TOP	TILMP	TILMP	TOP	GFDMP	GFDMP	TOP	TILMP	TILMP	TOP	ALV	MGR	MGR	MGR	MGR	MGR	BCMU
Mepanipyrim*	mg/kg	SOLID	-	-																										
Mephosfolan*	mg/kg	SOLID	-	-																										
Mepronil*	mg/kg	SOLID	-	-																										
Mercury	mg/kg	SOLID	58	30		<1.0000	<1.0000						<1.0000	<1.0000	<1.0000		<0.5000	<0.5000	<0.5000	<1.0000		<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	
Metaflumizone*	mg/kg	SOLID	-	-																										
Metalaxyl*	mg/kg	SOLID	-	-																										
Metamitron*	mg/kg	SOLID	-	-																										
Metazachlor	mg/kg	SOLID	-	-																										
Metconazole*	mg/kg	SOLID	-	-																										
Methabenzthiazuron	mg/kg	SOLID	-	-																										
Methacriphos	mg/kg	SOLID	-	-																										
Methamidophos	mg/kg	SOLID	-	-																										
Methidathion*	mg/kg	SOLID	-	-																										
Methiocarb	mg/kg	SOLID	-	-																										
Methiocarb sulfone*	mg/kg	SOLID	-	-																										
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																										
Methomyl*	mg/kg	SOLID	-	-																										
Methoxychlor	mg/kg	SOLID	-	-																										
Methoxyfenozide*	mg/kg	SOLID	-	-																										
Methyl Paraoxon*	mg/kg	SOLID	-	-																										
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000										<0.0100	<0.0100					<0.0100			<0.0100	<0.0100						
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																										
Methylparathion	mg/kg	SOLID	-	-																										
Metobromuron*	mg/kg	SOLID	-	-																										
Metolachlor	mg/kg	SOLID	-	-																										
Metolcarb*	mg/kg	SOLID	-	-																										
Metrafenone*	mg/kg	SOLID	-	-																										
Metribuzin	mg/kg	SOLID	-	-																										
Mevinphos	mg/kg	SOLID	-	-																										
Mirex	mg/kg	SOLID	-	-																										
Molinate	mg/kg	SOLID	-	-																										
Monlinuran	mg/kg	SOLID	-	-																										
Monocrotophos	mg/kg	SOLID	-	-																										
Monuron	mg/kg	SOLID	-	-																										
Myclobutanil*	mg/kg	SOLID	-	-																										
Naphthalene1-methyl-	mg/kg	SOLID	-	-																										
Naphthalene-d8	%	SOLID	-	-																										
Napropamide	mg/kg	SOLID	-	-																										
Napthalene	mg/kg	SOLID	190	1200		<0.1000	<0.1000						<0.1000	<0.1000	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	
Natural Moisture Content 105C	%	SOLID	-	-									17	13	19		17.5	11.6	18.2	12		8.3	14	9.4	19	21	14			
n-Butylbenzene	mg/kg	SOLID	-	-																										
Neburon*	mg/kg	SOLID	-	-																										
Nickel	mg/kg	SOLID	980	800		11	6						40	13	23		10	12.2	29	11		12	12	19	21	24	18	6	32	
Nitenpyram*	mg/kg	SOLID	-	-																										
Nitrobenzene	mg/kg	SOLID	-	-										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Nitrofen	mg/kg	SOLID	-	-																										
Nitrothal isopropyl*	mg/kg	SOLID	-	-																										
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																										
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																										
Non-Asbestos Fibre	N/A	SOLID	-	-																										
Non-Asbestos Fibre	No units	SOLID	-	-																										
Novaluron*	mg/kg	SOLID	-	-																										
n-propylbenzene	mg/kg	SOLID	3900	36000										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Nuarimol*	mg/kg	SOLID	-	-																										
Number of Additional Peaks	mg/kg	SOLID	-	-																										
o,p - DDT	mg/kg	SOLID	-	-																										
Octhilinone*	mg/kg	SOLID	-	-																										
Ofurace*	mg/kg	SOLID	-	-																										
Omethoate*	mg/kg	SOLID	-	-																										
Organic matter	% M/M	SOLID	-	-													2.08	0.34	0.29											
Organic matter	%	SOLID	-	-	4.3	1.4	0.5						0.4	2.9	1.1					3.3		0.3	3	0.2	4.7	3.2	1.2	<0.1000	0.2	
Orysastrobin*	mg/kg	SOLID	-	-																										
Oxadiargyl*	mg/kg	SOLID	-	-																										
Oxadiazon*	mg/kg	SOLID	-	-																										
Oxadixyl*	mg/kg	SOLID	-	-																										
Oxamyl	mg/kg	SOLID	-	-																										
Oxycarboxin*	mg/kg	SOLID	-	-																										
Oxydisulfoton	mg/kg	SOLID	-	-																										
Oxyfluorfen*	mg/kg	SOLID	-	-																										
O-Xylene	mg/kg	SOLID	6600	17000		<0.0100	<0.0100						<0.0100	<0.0100	<0.0100		<0.0020	<0.0020	<0.0020	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	
p,p - DDT	mg/kg	SOLID	-	-																										
p,p-DDD*	mg/kg	SOLID	-	-																										
Paclobutrazol*	mg/kg	SOLID	-	-																										
PAH 17 Total	mg/kg	SOLID	-	-																										
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																										
PAH,Total	mg/kg	SOLID	-	-		<0.1000	<0.1000						<0.1000	1	<0.1000		<1.5500	<1.4500	<1.5600	<0.1000		<0.1000	<0.1000	<0.1000	8.7	7.5	<0.1000	<0.1000	<0.1000	
Paraoxon*	mg/kg	SOLID	-	-																										
PCB 105	mg/kg	SOLID	-	-																										
PCB 114	mg/kg	SOLID	-	-																										
PCB 123	mg/kg	SOLID	-	-																										
PCB 126	mg/kg	SOLID	-	-																										
PCB 157	mg/kg	SOLID	-	-																										
PCB 167	mg/kg	SOLID	-	-																										
PCB 169	mg/kg	SOLID	-	-																										
PCB 189	mg/kg	SOLID	-	-																										
PCB 77	mg/kg	SOLID	-	-																										
PCB 81	mg/kg	SOLID	-	-																										
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																										
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																										
Penconazole*	mg/kg	SOLID	-	-																										
Pencycuron*	mg/kg	SOLID	-	-																										
Pendimethalin	mg/kg	SOLID	-	-																										
Pentachloroaniline*	mg/kg	SOLID	-	-																										
Pentachloronitrobenzene	mg/kg	SOLID	-	-																										
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110										<0.5000	<0.5000					<0.5000			<0.5000	<0.5000						
Pentanochlor*	mg/kg	SOLID	-	-																										
Permethrin	mg/kg	SOLID	-	-																										
Perylene-d12	%	SOLID	-	-																										
Pethoxamid*	mg/kg	SOLID	-	-																										
pH	pH Units	SOLID	-	-		7	7.4	8.5	8.3	8.2	8.2	8.3					7.1	7.9	7.3									8.9	8.1	8.3
pH	-	SOLID	-	-																										
Phenanthrene	mg/kg	SOLID	22000	6200		<0.1000	<0.1000						<0.1000	0.1	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	0.3	1.4	<0.1000	<0.1000	<0.1000	
Phenanthrene-d10	%	SOLID	-	-																										
Phenmedipham*	mg/kg	SOLID	-	-																										
Phenol	mg/kg	SOLID	440	440										<0.1000	<0.1000					<0.1000			<0.1000	<0.1000						
Phenol	mg/kg	SOLID	-	-		<1.0000	<1.0000						<1.0000	<1.0000	<1.0000					<1.0000		<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	
Phenol (Monohydric)	mg/kg	SOLID	-	-																										
Phenol Index	mg/kg	SOLID	-	-													<0.6000	<0.6000	<0.6000											
Phenothrin*	mg/kg	SOLID	-	-																										
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																										
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																										
Phenthoate*	mg/kg	SOLID	-	-																										
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																										
Phorate	mg/kg	SOLID	-	-																										
Phorate sulfone*	mg/kg	SOLID	-	-																										
Phorate sulfoxide*	mg/kg	SOLID	-	-																										
Phosalone	mg/kg	SOLID	-	-																										
Phosfolan*	mg/kg	SOLID	-	-																										
Phosphamidon	mg/kg	SOLID	-	-																										
Phosphorothioic acid	mg/kg	SOLID	-	-																										
Phoxim*	mg/kg	SOLID	-	-																										
Phthalimide*	mg/kg	SOLID	-	-																										
Picoxystrobin*	mg/kg	SOLID	-	-																										
Piperonyl Butoxide*	mg/kg	SOLID	-	-																										
Pirimicarb	mg/kg	SOLID	-	-																										
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																										
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																										
Pirimiphos-methyl	mg/kg	SOLID	-	-																										
Pretilachlor*	mg/kg	SOLID	-	-																										
Prochloraz*	mg/kg	SOLID	-	-																										
Procymidone*	mg/kg	SOLID	-	-																										
Profenofos*	mg/kg	SOLID	-	-																										
Prometon	mg/kg	SOLID	-	-																										
Prometryne	mg/kg	SOLID	-	-																										
Propachlor (2-Chloro-N-(1-Methylethyl)-N-Phenylac	mg/kg	SOLID	-	-																										
Propamocarb*	mg/kg	SOLID	-	-																										
Propanil	mg/kg	SOLID	-	-																										
Propaphos*	mg/kg	SOLID	-	-																										
Propaquizafop*	mg/kg	SOLID	-	-																										
Propargite	mg/kg	SOLID	-	-																										
Propazine	mg/kg	SOLID	-	-																										
Propetamphos	mg/kg	SOLID	-	-																										
Propham	mg/kg	SOLID	-	-																										
Propiconazole*	mg/kg	SOLID	-	-																										
Propoxur*	mg/kg	SOLID	-	-																										
Propyzamide	mg/kg	SOLID	-	-																										
Proquinazid*	mg/kg	SOLID	-	-																										
Prosulfocarb*	mg/kg	SOLID	-	-																										
Prothioconazole desthio*	mg/kg	SOLID	-	-																										
Pyraclostrobin*	mg/kg	SOLID	-	-																										
Pyraflufen ethyl*	mg/kg	SOLID	-	-																										
Pyrazophos*	mg/kg	SOLID	-	-																										
Pyrene	mg/kg	SOLID	54000	15000		<0.1000	<0.1000						<0.1000	0.2	<0.1000		<0.1000	<0.0900	<0.1000	<0.1000		<0.1000	<0.1000	<0.1000	1.5	1.1	<0.1000	<0.1000	<0.1000	
Pyrethrin I*	mg/kg	SOLID	-	-																										
Pyridaben*	mg/kg	SOLID	-	-																										
Pyridaphenthion*	mg/kg	SOLID	-	-																										
Pyrifenox*	mg/kg	SOLID	-	-																										
Pyrimethanil*	mg/kg	SOLID	-	-																										
Pyriproxyfen	mg/kg	SOLID	-	-																										
Quinalphos*	mg/kg	SOLID	-	-																										

Max of Normalised Results																																		
					ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-RC007	ML155-TP018	ML155-TP018	ML155-TP025	ML155-TP025
					Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting
					2	4.11	5.3	6.83	12.09	13.43	15.42	16.7	18.6	0.05	0.3	1	3	5.24	7.2	9.18	10.6	12	14.35	0.3	0.5	2	9.2	16.06	19.5	1.7	0	0.5	0	0.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	MGR	MGR	MGR	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	GFDMP	GFDMP	GFDMP	BCMU	BCMU	BCMU	MMG	MGR	MGR	TOP	TILMP
Mepanipyrim*	mg/kg	SOLID	-	-																														
Mephosfolan*	mg/kg	SOLID	-	-																														
Mepronil*	mg/kg	SOLID	-	-																														
Mercury	mg/kg	SOLID	58	30	<1.0000									<1.0000	<1.0000	<1.0000								<1.0000	<1.0000						<1.0000	<1.0000	<1.0000	1
Metaflumizone*	mg/kg	SOLID	-	-																														
Metalaxyl*	mg/kg	SOLID	-	-																														
Metamitron*	mg/kg	SOLID	-	-																														
Metazachlor	mg/kg	SOLID	-	-																														
Metconazole*	mg/kg	SOLID	-	-																														
Methabenzthiazuran	mg/kg	SOLID	-	-																														
Methacriphos	mg/kg	SOLID	-	-																														
Methamidophos	mg/kg	SOLID	-	-																														
Methidathion*	mg/kg	SOLID	-	-																														
Methiocarb	mg/kg	SOLID	-	-																														
Methiocarb sulfone*	mg/kg	SOLID	-	-																														
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																														
Methomyl*	mg/kg	SOLID	-	-																														
Methoxychlor	mg/kg	SOLID	-	-																														
Methoxyfenozide*	mg/kg	SOLID	-	-																														
Methyl Paraoxon*	mg/kg	SOLID	-	-																														
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000																														
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																														
Methylparathion	mg/kg	SOLID	-	-																														
Metobromuron*	mg/kg	SOLID	-	-																														
Metolachlor	mg/kg	SOLID	-	-																														
Metolcarb*	mg/kg	SOLID	-	-																														
Metrafenone*	mg/kg	SOLID	-	-																														
Metribuzin	mg/kg	SOLID	-	-																														
Mevinphos	mg/kg	SOLID	-	-																														
Mirex	mg/kg	SOLID	-	-																														
Molinate	mg/kg	SOLID	-	-																														
Monlinuran	mg/kg	SOLID	-	-																														
Monocrotophos	mg/kg	SOLID	-	-																														
Monuron	mg/kg	SOLID	-	-																														
Myclobutanil*	mg/kg	SOLID	-	-																														
Naphthalene1-methyl-	mg/kg	SOLID	-	-																														
Naphthalene-d8	%	SOLID	-	-																														
Napropamide	mg/kg	SOLID	-	-																														
Napthalene	mg/kg	SOLID	190	1200	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	<0.1000	<0.1000
Natural Moisture Content 105C	%	SOLID	-	-																											14	13	13	13
n-Butylbenzene	mg/kg	SOLID	-	-																														
Neburon*	mg/kg	SOLID	-	-																														
Nickel	mg/kg	SOLID	980	800	28									24	24	21								8	36						13	11	18	18
Nitenpyram*	mg/kg	SOLID	-	-																														
Nitrobenzene	mg/kg	SOLID	-	-																														
Nitrofen	mg/kg	SOLID	-	-																														
Nitrothal isopropyl*	mg/kg	SOLID	-	-																														
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																														
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																														
Non-Asbestos Fibre	N/A	SOLID	-	-																														
Non-Asbestos Fibre	No units	SOLID	-	-																														
Novaluron*	mg/kg	SOLID	-	-																														
n-propylbenzene	mg/kg	SOLID	3900	36000																														
Nuarimol*	mg/kg	SOLID	-	-																														
Number of Additional Peaks	mg/kg	SOLID	-	-																														
o,p - DDT	mg/kg	SOLID	-	-																														
Octhilinone*	mg/kg	SOLID	-	-																														
Ofurace*	mg/kg	SOLID	-	-																														
Omethoate*	mg/kg	SOLID	-	-																														
Organic matter	% M/M	SOLID	-	-																														
Organic matter	%	SOLID	-	-	1.8									2.5	2.9	4.2								<0.1000	0.2						3	0.8	0.8	3.4
Orysastrobin*	mg/kg	SOLID	-	-																														
Oxadiargyl*	mg/kg	SOLID	-	-																														
Oxadiazon*	mg/kg	SOLID	-	-																														
Oxadixyl*	mg/kg	SOLID	-	-																														
Oxamyl	mg/kg	SOLID	-	-																														
Oxycarboxin*	mg/kg	SOLID	-	-																														
Oxydisulfoton	mg/kg	SOLID	-	-																														
Oxyfluorfen*	mg/kg	SOLID	-	-																														
O-Xylene	mg/kg	SOLID	6600	17000	<0.0100									<0.0100	<0.0100	<0.0100								<0.0100	<0.0100						<0.0100	<0.0100	<0.0100	<0.0100
p,p - DDT	mg/kg	SOLID	-	-																														
p,p-DDD*	mg/kg	SOLID	-	-																														
Paclobutrazol*	mg/kg	SOLID	-	-																														
PAH 17 Total	mg/kg	SOLID	-	-																														
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																														
PAH,Total	mg/kg	SOLID	-	-	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	3.9	1.4
Paraoxon*	mg/kg	SOLID	-	-																														
PCB 105	mg/kg	SOLID	-	-																														
PCB 114	mg/kg	SOLID	-	-																														
PCB 123	mg/kg	SOLID	-	-																														
PCB 126	mg/kg	SOLID	-	-																														
PCB 157	mg/kg	SOLID	-	-																														
PCB 167	mg/kg	SOLID	-	-																														
PCB 169	mg/kg	SOLID	-	-																														
PCB 189	mg/kg	SOLID	-	-																														
PCB 77	mg/kg	SOLID	-	-																														
PCB 81	mg/kg	SOLID	-	-																														
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																														
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																														
Penconazole*	mg/kg	SOLID	-	-																														
Pencycuron*	mg/kg	SOLID	-	-																														
Pendimethalin	mg/kg	SOLID	-	-																														
Pentachloroaniline*	mg/kg	SOLID	-	-																														
Pentachloronitrobenzene	mg/kg	SOLID	-	-																														
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110																														
Pentanochlor*	mg/kg	SOLID	-	-																														
Permethrin	mg/kg	SOLID	-	-																														
Perylene-d12	%	SOLID	-	-																														
Pethoxamid*	mg/kg	SOLID	-	-																														
pH	pH Units	SOLID	-	-	8.3	8.6	8.7	8.7	8.7	8.5	8.6	8.7	8.7	8.3	8.3	8.4	8.5	9	8.7	8.7	8.7	8.6	8.8	7.7	7.7	8.5	8.8	8.7	8.9					
pH	-	SOLID	-	-																														
Phenanthrene	mg/kg	SOLID	22000	6200	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	0.1	<0.1000
Phenanthrene-d10	%	SOLID	-	-																														
Phenmedipham*	mg/kg	SOLID	-	-																														
Phenol	mg/kg	SOLID	440	440																														
Phenol	mg/kg	SOLID	-	-	<1.0000									<1.0000	<1.0000	<1.0000								<1.0000	<1.0000						<1.0000	<1.0000	<1.0000	<1.0000
Phenol (Monohydric)	mg/kg	SOLID	-	-																														
Phenol Index	mg/kg	SOLID	-	-																														
Phenothrin*	mg/kg	SOLID	-	-																														
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																														
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																														
Phenthoate*	mg/kg	SOLID	-	-																														
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																														
Phorate	mg/kg	SOLID	-	-																														
Phorate sulfone*	mg/kg	SOLID	-	-																														
Phorate sulfoxide*	mg/kg	SOLID	-	-																														
Phosalone	mg/kg	SOLID	-	-																														
Phosfolan*	mg/kg	SOLID	-	-																														
Phosphamidon	mg/kg	SOLID	-	-																														
Phosphorothioic acid	mg/kg	SOLID	-	-																														
Phoxim*	mg/kg	SOLID	-	-																														
Phthalimide*	mg/kg	SOLID	-	-																														
Picoxystrobin*	mg/kg	SOLID	-	-																														
Piperonyl Butoxide*	mg/kg	SOLID	-	-																														
Pirimicarb	mg/kg	SOLID	-	-																														
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																														
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																														
Pirimiphos-methyl	mg/kg	SOLID	-	-																														
Pretilachlor*	mg/kg	SOLID	-	-																														
Prochloraz*	mg/kg	SOLID	-	-																														
Procymidone*	mg/kg	SOLID	-	-																														
Profenofos*	mg/kg	SOLID	-	-																														
Prometon	mg/kg	SOLID	-	-																														
Prometryne	mg/kg	SOLID	-	-																														
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-																														
Propamocarb*	mg/kg	SOLID	-	-																														
Propanil	mg/kg	SOLID	-	-																														
Propaphos*	mg/kg	SOLID	-	-																														
Propaquizafop*	mg/kg	SOLID	-	-																														
Propargite	mg/kg	SOLID	-	-																														
Propazine	mg/kg	SOLID	-	-																														
Propetamphos	mg/kg	SOLID	-	-																														
Propham	mg/kg	SOLID	-	-																														
Propiconazole*	mg/kg	SOLID	-	-																														
Propoxur*	mg/kg	SOLID	-	-																														
Propyzamide	mg/kg	SOLID	-	-																														
Proquinazid*	mg/kg	SOLID	-	-																														
Prosulfocarb*	mg/kg	SOLID	-	-																														
Prothioconazole desthio*	mg/kg	SOLID	-	-																														
Pyraclostrobin*	mg/kg	SOLID	-	-																														
Pyraflufen ethyl*	mg/kg	SOLID	-	-																														
Pyrazophos*	mg/kg	SOLID	-	-																														
Pyrene	mg/kg	SOLID	54000	15000	<0.1000									<0.1000	<0.1000	<0.1000								<0.1000	<0.1000						<0.1000	<0.1000	0.6	0.2
Pyrethrin I*	mg/kg	SOLID	-	-																														
Pyridaben*	mg/kg	SOLID	-	-																														
Pyridaphenthion*	mg/kg	SOLID	-	-																														
Pyrifenox*	mg/kg	SOLID	-	-																														
Pyrimethanil*	mg/kg	SOLID	-	-																														
Pyriproxyfen	mg/kg	SOLID	-	-																														
Quinalphos*	mg/kg	SOLID	-	-																														

Max of Normalised Results																											
					ML155-TP041	ML155-WS001	ML155-WS002	ML155-WS024	ML155-WS042	ML155-WS044	ML155-WS044	ML156-CP008	ML156-CP008	ML156-CP023	ML156-CP028	ML156-CP028	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR014	ML156-CR014	ML156-CR020	ML156-CR021	ML156-CR023	ML156-CR025
					Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station
					0	1.67	0.4	0.3	2	0	0.3	0.35	2.35	0.5	1	6	1.5	3	5.5	6.9	9.4	0.5	12.2	0.2	2.25	0.1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	TILMP	TILMP	ALV	TOP	ALV	MGR	MGR	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MMG	GFDUD	MMG	MGR	MMG	TOP	MGR
Mepanipyrim*	mg/kg	SOLID	-	-																							
Mephosfolan*	mg/kg	SOLID	-	-																							
Mepronil*	mg/kg	SOLID	-	-																							
Mercury	mg/kg	SOLID	58	30	<1.0000		<1.0000			<1.0000	<1.0000	<0.5700	0.63	<0.5100	<0.5000				<1.0000			<0.5000	<0.5000	<0.0500		<0.0500	<0.0500
Metaflumizone*	mg/kg	SOLID	-	-																							
Metalaxyl*	mg/kg	SOLID	-	-																							
Metamitron*	mg/kg	SOLID	-	-																							
Metazachlor	mg/kg	SOLID	-	-																							
Metconazole*	mg/kg	SOLID	-	-																							
Methabenzthiazuran	mg/kg	SOLID	-	-																							
Methacriphos	mg/kg	SOLID	-	-																							
Methamidophos	mg/kg	SOLID	-	-																							
Methidathion*	mg/kg	SOLID	-	-																							
Methiocarb	mg/kg	SOLID	-	-																							
Methiocarb sulfone*	mg/kg	SOLID	-	-																							
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																							
Methomyl*	mg/kg	SOLID	-	-																							
Methoxychlor	mg/kg	SOLID	-	-																							
Methoxyfenozide*	mg/kg	SOLID	-	-																							
Methyl Paraoxon*	mg/kg	SOLID	-	-																							
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000																							
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																							
Methylparathion	mg/kg	SOLID	-	-																							
Metobromuron*	mg/kg	SOLID	-	-																							
Metolachlor	mg/kg	SOLID	-	-																							
Metolcarb*	mg/kg	SOLID	-	-																							
Metrafenone*	mg/kg	SOLID	-	-																							
Metribuzin	mg/kg	SOLID	-	-																							
Mevinphos	mg/kg	SOLID	-	-																							
Mirex	mg/kg	SOLID	-	-																							
Molinate	mg/kg	SOLID	-	-																							
Monlinuran	mg/kg	SOLID	-	-																							
Monocrotophos	mg/kg	SOLID	-	-																							
Monuron	mg/kg	SOLID	-	-																							
Myclobutanil*	mg/kg	SOLID	-	-																							
Naphthalene1-methyl-	mg/kg	SOLID	-	-																							
Naphthalene-d8	%	SOLID	-	-																							
Napropamide	mg/kg	SOLID	-	-																							
Napthalene	mg/kg	SOLID	190	1200	<0.1000		<0.1000			<0.1000	<0.1000	<0.1400	0.1	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	<0.0300
Natural Moisture Content 105C	%	SOLID	-	-	15		12			11	5	41.1	30	6.9	10.6				18			9.8	29				
n-Butylbenzene	mg/kg	SOLID	-	-																							
Neburon*	mg/kg	SOLID	-	-																							
Nickel	mg/kg	SOLID	980	800	9		19			10	4	155.8	99.4	5.89	9				18			7	30.8	14		14	45
Nitenpyram*	mg/kg	SOLID	-	-																							
Nitrobenzene	mg/kg	SOLID	-	-																							
Nitrofen	mg/kg	SOLID	-	-																							
Nitrothal isopropyl*	mg/kg	SOLID	-	-																							
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																							
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																							
Non-Asbestos Fibre	N/A	SOLID	-	-																							
Non-Asbestos Fibre	No units	SOLID	-	-																							
Novaluron*	mg/kg	SOLID	-	-																							
n-propylbenzene	mg/kg	SOLID	3900	36000																							
Nuarimol*	mg/kg	SOLID	-	-																							
Number of Additional Peaks	mg/kg	SOLID	-	-																							
o,p - DDT	mg/kg	SOLID	-	-																							
Octhilinone*	mg/kg	SOLID	-	-																							
Ofurace*	mg/kg	SOLID	-	-																							
Omethoate*	mg/kg	SOLID	-	-																							
Organic matter	% M/M	SOLID	-	-								38.8	22.7	0.31	0.4							1.05	0.36				
Organic matter	%	SOLID	-	-	4.8		3.1			2.6	0.2								0.4					2.6		2.6	3.7
Orysastrobin*	mg/kg	SOLID	-	-																							
Oxadiargyl*	mg/kg	SOLID	-	-																							
Oxadiazon*	mg/kg	SOLID	-	-																							
Oxadixyl*	mg/kg	SOLID	-	-																							
Oxamyl	mg/kg	SOLID	-	-																							
Oxycarboxin*	mg/kg	SOLID	-	-																							
Oxydisulfoton	mg/kg	SOLID	-	-																							
Oxyfluorfen*	mg/kg	SOLID	-	-																							
O-Xylene	mg/kg	SOLID	6600	17000	<0.0100		<0.0100			<0.0100	<0.0100	<0.0030	0.004	<0.0020	<0.0020				<0.0100			<0.0020	<0.0030				
p,p - DDT	mg/kg	SOLID	-	-																							
p,p-DDD*	mg/kg	SOLID	-	-																							
Paclobutrazol*	mg/kg	SOLID	-	-																							
PAH 17 Total	mg/kg	SOLID	-	-																							
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																							
PAH,Total	mg/kg	SOLID	-	-	<0.1000		1			<0.1000	<0.1000	<2.1700	44.97	<1.3700	<1.4300				<0.1000			<1.4200	<1.8000	<0.1000		<1.6000	7.2
Paraoxon*	mg/kg	SOLID	-	-																							
PCB 105	mg/kg	SOLID	-	-																							
PCB 114	mg/kg	SOLID	-	-																							
PCB 123	mg/kg	SOLID	-	-																							
PCB 126	mg/kg	SOLID	-	-																							
PCB 157	mg/kg	SOLID	-	-																							
PCB 167	mg/kg	SOLID	-	-																							
PCB 169	mg/kg	SOLID	-	-																							
PCB 189	mg/kg	SOLID	-	-																							
PCB 77	mg/kg	SOLID	-	-																							
PCB 81	mg/kg	SOLID	-	-																							
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																							
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																							
Penconazole*	mg/kg	SOLID	-	-																							
Pencycuron*	mg/kg	SOLID	-	-																							
Pendimethalin	mg/kg	SOLID	-	-																							
Pentachloroaniline*	mg/kg	SOLID	-	-																							
Pentachloronitrobenzene	mg/kg	SOLID	-	-																							
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110																							
Pentanochlor*	mg/kg	SOLID	-	-																							
Permethrin	mg/kg	SOLID	-	-																							
Perylene-d12	%	SOLID	-	-																							
Pethoxamid*	mg/kg	SOLID	-	-																							
pH	pH Units	SOLID	-	-								7.9	8	6.6	9	7.8						7.5	8.2	7.4	8.7	7.9	9.1
pH	-	SOLID	-	-																							
Phenanthrene	mg/kg	SOLID	22000	6200	<0.1000		<0.1000			<0.1000	<0.1000	<0.1400	6.27	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	0.1
Phenanthrene-d10	%	SOLID	-	-																							
Phenmedipham*	mg/kg	SOLID	-	-																							
Phenol	mg/kg	SOLID	440	440																							
Phenol	mg/kg	SOLID	-	-	<1.0000		<1.0000			<1.0000	<1.0000								<1.0000								
Phenol (Monohydric)	mg/kg	SOLID	-	-																				0.9		<0.3000	0.4
Phenol Index	mg/kg	SOLID	-	-								<0.8000	<0.7000	<0.5400	<0.6000							<0.6000	<0.7000				
Phenothrin*	mg/kg	SOLID	-	-																							
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																							
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																							
Phenthoate*	mg/kg	SOLID	-	-																							
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																							
Phorate	mg/kg	SOLID	-	-																							
Phorate sulfone*	mg/kg	SOLID	-	-																							
Phorate sulfoxide*	mg/kg	SOLID	-	-																							
Phosalone	mg/kg	SOLID	-	-																							
Phosfolan*	mg/kg	SOLID	-	-																							
Phosphamidon	mg/kg	SOLID	-	-																							
Phosphorothioic acid	mg/kg	SOLID	-	-																							
Phoxim*	mg/kg	SOLID	-	-																							
Phthalimide*	mg/kg	SOLID	-	-																							
Picoxystrobin*	mg/kg	SOLID	-	-																							
Piperonyl Butoxide*	mg/kg	SOLID	-	-																							
Pirimicarb	mg/kg	SOLID	-	-																							
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																							
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																							
Pirimiphos-methyl	mg/kg	SOLID	-	-																							
Pretilachlor*	mg/kg	SOLID	-	-																							
Prochloraz*	mg/kg	SOLID	-	-																							
Procymidone*	mg/kg	SOLID	-	-																							
Profenofos*	mg/kg	SOLID	-	-																							
Prometon	mg/kg	SOLID	-	-																							
Prometryne	mg/kg	SOLID	-	-																							
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-																							
Propamocarb*	mg/kg	SOLID	-	-																							
Propanil	mg/kg	SOLID	-	-																							
Propaphos*	mg/kg	SOLID	-	-																							
Propaquizafop*	mg/kg	SOLID	-	-																							
Propargite	mg/kg	SOLID	-	-																							
Propazine	mg/kg	SOLID	-	-																							
Propetamphos	mg/kg	SOLID	-	-																							
Propham	mg/kg	SOLID	-	-																							
Propiconazole*	mg/kg	SOLID	-	-																							
Propoxur*	mg/kg	SOLID	-	-																							
Propyzamide	mg/kg	SOLID	-	-																							
Proquinazid*	mg/kg	SOLID	-	-																							
Prosulfocarb*	mg/kg	SOLID	-	-																							
Prothioconazole desthio*	mg/kg	SOLID	-	-																							
Pyraclostrobin*	mg/kg	SOLID	-	-																							
Pyraflufen ethyl*	mg/kg	SOLID	-	-																							
Pyrazophos*	mg/kg	SOLID	-	-																							
Pyrene	mg/kg	SOLID	54000	15000	<0.1000		0.1			<0.1000	<0.1000	<0.1400	8.94	<0.0900	<0.0900				<0.1000			<0.0900	<0.1100	<0.0300		<0.1000	1.6
Pyrethrin I*	mg/kg	SOLID	-	-																							
Pyridaben*	mg/kg	SOLID	-	-																							
Pyridaphenthion*	mg/kg	SOLID	-	-																							
Pyrifenox*	mg/kg	SOLID	-	-																							
Pyrimethanil*	mg/kg	SOLID	-	-																							
Pyriproxyfen	mg/kg	SOLID	-	-																							
Quinalphos*	mg/kg	SOLID	-	-																							

Max of Normalised Results																																
					ML156-CR025	ML156-CR027	ML156-CR035	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-TP006	ML156-TP008	ML156-TP027	ML156-TP036	ML156-TP036	ML156-TP100	ML156-TP101	ML156-WS025	ML157-CP001	ML157-CP024	ML157-CR010	ML157-CR012	ML157-CR012	ML157-CR012	ML157-CR012	ML157-CR013
					Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting
					0.3	0.2	0.3	0.3	1	3.87	5.06	9.2	10.4	12.7	15.89	19.3	0.3	1.5	1	2.5	4	0.6	0.3	0.3	0.5	1	0.75	0.05	0.1	0.4	1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	GFDMP	GFDMP	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	TOP	MMG	GFDUD	MGR	MGR	GFDUD	TOP	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MMG	MGR
Mepanipyrim*	mg/kg	SOLID	-	-																												
Mephosfolan*	mg/kg	SOLID	-	-																												
Mepronil*	mg/kg	SOLID	-	-																												
Mercury	mg/kg	SOLID	58	30	0.05	0.5	0.05	<1.0000	<1.0000								<0.5000		<0.5000	1.71	2.17	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.0500		<0.1400	<0.1400	<0.1400	<0.1400
Metaflumizone*	mg/kg	SOLID	-	-																												
Metalaxyl*	mg/kg	SOLID	-	-																												
Metamitron*	mg/kg	SOLID	-	-																												
Metazachlor	mg/kg	SOLID	-	-																												
Metconazole*	mg/kg	SOLID	-	-																												
Methabenzthiazuran	mg/kg	SOLID	-	-																												
Methacriphos	mg/kg	SOLID	-	-																												
Methamidophos	mg/kg	SOLID	-	-																												
Methidathion*	mg/kg	SOLID	-	-																												
Methiocarb	mg/kg	SOLID	-	-																												
Methiocarb sulfone*	mg/kg	SOLID	-	-																												
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																												
Methomyl*	mg/kg	SOLID	-	-																												
Methoxychlor	mg/kg	SOLID	-	-																												
Methoxyfenozide*	mg/kg	SOLID	-	-																												
Methyl Paraoxon*	mg/kg	SOLID	-	-																												
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000																												
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																												
Methylparathion	mg/kg	SOLID	-	-																												
Metobromuron*	mg/kg	SOLID	-	-																												
Metolachlor	mg/kg	SOLID	-	-																												
Metolcarb*	mg/kg	SOLID	-	-																												
Metrafenone*	mg/kg	SOLID	-	-																												
Metribuzin	mg/kg	SOLID	-	-																												
Mevinphos	mg/kg	SOLID	-	-																												
Mirex	mg/kg	SOLID	-	-																												
Molinate	mg/kg	SOLID	-	-																												
Monlinuran	mg/kg	SOLID	-	-																												
Monocrotophos	mg/kg	SOLID	-	-																												
Monuron	mg/kg	SOLID	-	-																												
Myclobutanil*	mg/kg	SOLID	-	-																												
Naphthalene1-methyl-	mg/kg	SOLID	-	-																												
Naphthalene-d8	%	SOLID	-	-																								93	101	101	95.6	98.6
Napropamide	mg/kg	SOLID	-	-																												
Napthalene	mg/kg	SOLID	190	1200	<0.0300	<0.0300	<0.0300	<0.1000	<0.1000								<0.0900		<0.0800	<0.1300	0.35	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0300	0.202	<0.0090	<0.0090	<0.0090	0.154
Natural Moisture Content 105C	%	SOLID	-	-													12.9		5.6	38.3	45.5	13.1	14.8	8	12.9	6.9						
n-Butylbenzene	mg/kg	SOLID	-	-																												
Neburon*	mg/kg	SOLID	-	-																												
Nickel	mg/kg	SOLID	980	800	51	59	24	29	18								13.7		13.9	983	144.8	7	6.7	8.4	8.7	6.4	27		18.3	9.67	14.6	19.1
Nitenpyram*	mg/kg	SOLID	-	-																												
Nitrobenzene	mg/kg	SOLID	-	-																												
Nitrofen	mg/kg	SOLID	-	-																												
Nitrothal isopropyl*	mg/kg	SOLID	-	-																												
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																												
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																												
Non-Asbestos Fibre	N/A	SOLID	-	-																												
Non-Asbestos Fibre	No units	SOLID	-	-																									#VALUE!	#VALUE!		#VALUE!
Novaluron*	mg/kg	SOLID	-	-																												
n-propylbenzene	mg/kg	SOLID	3900	36000																												
Nuarimol*	mg/kg	SOLID	-	-																												
Number of Additional Peaks	mg/kg	SOLID	-	-																												
o,p - DDT	mg/kg	SOLID	-	-																												
Octhilinone*	mg/kg	SOLID	-	-																												
Ofurace*	mg/kg	SOLID	-	-																												
Omethoate*	mg/kg	SOLID	-	-																												
Organic matter	% M/M	SOLID	-	-													1.16		0.53	30.6	34.5	0.7	1.67	0.63	0.74	0.52						
Organic matter	%	SOLID	-	-	1.4	2.6	2.3	3.8	0.4																		0.1		<0.3500	0.907	<0.3500	1.32
Orysastrobin*	mg/kg	SOLID	-	-																												
Oxadiargyl*	mg/kg	SOLID	-	-																												
Oxadiazon*	mg/kg	SOLID	-	-																												
Oxadixyl*	mg/kg	SOLID	-	-																												
Oxamyl	mg/kg	SOLID	-	-																												
Oxycarboxin*	mg/kg	SOLID	-	-																												
Oxydisulfoton	mg/kg	SOLID	-	-																												
Oxyfluorfen*	mg/kg	SOLID	-	-																												
O-Xylene	mg/kg	SOLID	6600	17000				<0.0100	<0.0100								<0.0020		<0.0020	<0.0030	0.007	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020			<0.0030	<0.0030	<0.0030	<0.0030
p,p - DDT	mg/kg	SOLID	-	-																												
p,p-DDD*	mg/kg	SOLID	-	-																												
Paclobutrazol*	mg/kg	SOLID	-	-																												
PAH 17 Total	mg/kg	SOLID	-	-																								<100.0000				
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																								4.62	<0.1180	0.347	<0.1180	564
PAH,Total	mg/kg	SOLID	-	-	0.97	0.92	3	<0.1000	<0.1000								<1.5400		<1.3600	<3.9500	<6.0200	<1.4700	<1.5000	<1.3900	<1.4700	<1.3700	0.23					
Paraoxon*	mg/kg	SOLID	-	-																												
PCB 105	mg/kg	SOLID	-	-																												
PCB 114	mg/kg	SOLID	-	-																												
PCB 123	mg/kg	SOLID	-	-																												
PCB 126	mg/kg	SOLID	-	-																												
PCB 157	mg/kg	SOLID	-	-																												
PCB 167	mg/kg	SOLID	-	-																												
PCB 169	mg/kg	SOLID	-	-																												
PCB 189	mg/kg	SOLID	-	-																												
PCB 77	mg/kg	SOLID	-	-																												
PCB 81	mg/kg	SOLID	-	-																												
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																												
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																												
Penconazole*	mg/kg	SOLID	-	-																												
Pencycuron*	mg/kg	SOLID	-	-																												
Pendimethalin	mg/kg	SOLID	-	-																												
Pentachloroaniline*	mg/kg	SOLID	-	-																												
Pentachloronitrobenzene	mg/kg	SOLID	-	-																												
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110																												
Pentanochlor*	mg/kg	SOLID	-	-																												
Permethrin	mg/kg	SOLID	-	-																												
Perylene-d12	%	SOLID	-	-																								74.9	97.8	95.6	92.1	110
Pethoxamid*	mg/kg	SOLID	-	-																												
pH	pH Units	SOLID	-	-	8.9	8.2	8.8	6.5	7.1	8.8	8.7	8.7	8.8	8.7	8.8	8.6	7.8		7.3	8	7.9	8.7	8.2	7.4	8.6	7.4	12		8.16	7.54	7.44	9.21
pH	-	SOLID	-	-																												
Phenanthrene	mg/kg	SOLID	22000	6200	0.11	0.14	0.46	<0.1000	<0.1000								<0.0900		<0.0800	0.47	0.72	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0300	0.348	<0.0150	0.0206	<0.0150	21.5
Phenanthrene-d10	%	SOLID	-	-																								85.6	97.6	96.6	89.7	91.8
Phenmedipham*	mg/kg	SOLID	-	-																												
Phenol	mg/kg	SOLID	440	440																								<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Phenol	mg/kg	SOLID	-	-				<1.0000	<1.0000																							
Phenol (Monohydric)	mg/kg	SOLID	-	-	<0.3000	0.9	1.6																				<0.3000		<0.0350	<0.0350	<0.0350	<0.0350
Phenol Index	mg/kg	SOLID	-	-													<0.6000		<0.5000	<0.8000	<0.9000	<0.6000	<0.6000	<0.5000	<0.6000	<0.5000						
Phenothrin*	mg/kg	SOLID	-	-																												
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																												
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																												
Phenthoate*	mg/kg	SOLID	-	-																												
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																												
Phorate	mg/kg	SOLID	-	-																												
Phorate sulfone*	mg/kg	SOLID	-	-																												
Phorate sulfoxide*	mg/kg	SOLID	-	-																												
Phosalone	mg/kg	SOLID	-	-																												
Phosfolan*	mg/kg	SOLID	-	-																												
Phosphamidon	mg/kg	SOLID	-	-																												
Phosphorothioic acid	mg/kg	SOLID	-	-																												
Phoxim*	mg/kg	SOLID	-	-																												
Phthalimide*	mg/kg	SOLID	-	-																												
Picoxystrobin*	mg/kg	SOLID	-	-																												
Piperonyl Butoxide*	mg/kg	SOLID	-	-																												
Pirimicarb	mg/kg	SOLID	-	-																												
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																												
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																												
Pirimiphos-methyl	mg/kg	SOLID	-	-																												
Pretilachlor*	mg/kg	SOLID	-	-																												
Prochloraz*	mg/kg	SOLID	-	-																												
Procymidone*	mg/kg	SOLID	-	-																												
Profenofos*	mg/kg	SOLID	-	-																												
Prometon	mg/kg	SOLID	-	-																												
Prometryne	mg/kg	SOLID	-	-																												
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-																												
Propamocarb*	mg/kg	SOLID	-	-																												
Propanil	mg/kg	SOLID	-	-																												
Propaphos*	mg/kg	SOLID	-	-																												
Propaquizafop*	mg/kg	SOLID	-	-																												
Propargite	mg/kg	SOLID	-	-																												
Propazine	mg/kg	SOLID	-	-																												
Propetamphos	mg/kg	SOLID	-	-																												
Propham	mg/kg	SOLID	-	-																												
Propiconazole*	mg/kg	SOLID	-	-																												
Propoxur*	mg/kg	SOLID	-	-																												
Propyzamide	mg/kg	SOLID	-	-																												
Proquinazid*	mg/kg	SOLID	-	-																												
Prosulfocarb*	mg/kg	SOLID	-	-																												
Prothioconazole desthio*	mg/kg	SOLID	-	-																												
Pyraclostrobin*	mg/kg	SOLID	-	-																												
Pyraflufen ethyl*	mg/kg	SOLID	-	-																												
Pyrazophos*	mg/kg	SOLID	-	-																												
Pyrene	mg/kg	SOLID	54000	15000	0.16	0.21	0.51	<0.1000	<0.1000								0.1		<0.0800	0.44	0.84	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.03	0.319	<0.0150	0.0373	<0.0150	107
Pyrethrin I*	mg/kg	SOLID	-	-																												
Pyridaben*	mg/kg	SOLID	-	-																												
Pyridaphenthion*	mg/kg	SOLID	-	-																												
Pyrifenox*	mg/kg	SOLID	-	-																												
Pyrimethanil*	mg/kg	SOLID	-	-																												
Pyriproxyfen	mg/kg	SOLID	-	-																												
Quinalphos*	mg/kg	SOLID	-	-																												

Max of Normalised Results																																			
					ML157-CR013	ML157-CR014	ML157-CR014	ML157-CR014	ML157-CR015	ML157-CR015	ML157-CR021	ML157-CR021	ML157-CR022	ML157-CR027	ML157-CR027	ML157-CR027	ML157-CT011	ML157-CT013	ML157-CT014	ML157-CT015	ML157-CT017	ML157-CT018	ML157-CT018	ML157-CT019	ML157-CT019	ML157-CT027	ML157-CT027	ML157-CT039	ML157-CT039	ML157-CT039	ML157-TP001	ML157-TP063	ML157-WS036	ML157-WS067	ML157-WS067
					Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment	Packington Embankment	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting
					0.9	0.05	0.6	2.2	0.5	1	0.05	9.5	1	0.05	0.5	0.9	0.3	1	0.7	0.5	0.4	0.1	0.5	0.05	1	0.05	1	0.05	0.2	0.9	1	0.7	0.7	0.05	2.8
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GFSG	MGR	MGR	MMG	MGR	MMG	TOP	MMG	MGR	MGR	MGR	MMG	MMG	MGR	SUPDC	SUPDC	SUPDC	MGR	SUPDC	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	GFDUD	TOP	GFDUD
Mepanipyrim*	mg/kg	SOLID	-	-																															
Mephosfolan*	mg/kg	SOLID	-	-																															
Mepronil*	mg/kg	SOLID	-	-																															
Mercury	mg/kg	SOLID	58	30	<0.1400	<0.1400	<0.1400	<0.1400	<0.1400	<0.1400	<0.0500	0.06	<0.0500		0.553	0.659	0.81	0.336	0.725	0.401	0.226	0.491	0.364		0.386	0.741	0.38		0.471	0.479	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000
Metaflumizone*	mg/kg	SOLID	-	-																															
Metalaxyl*	mg/kg	SOLID	-	-																															
Metamitron*	mg/kg	SOLID	-	-																															
Metazachlor	mg/kg	SOLID	-	-																															
Metconazole*	mg/kg	SOLID	-	-																															
Methabenzthiazuran	mg/kg	SOLID	-	-																															
Methacriphos	mg/kg	SOLID	-	-																															
Methamidophos	mg/kg	SOLID	-	-																															
Methidathion*	mg/kg	SOLID	-	-																															
Methiocarb	mg/kg	SOLID	-	-																															
Methiocarb sulfone*	mg/kg	SOLID	-	-																															
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																															
Methomyl*	mg/kg	SOLID	-	-																															
Methoxychlor	mg/kg	SOLID	-	-																															
Methoxyfenozide*	mg/kg	SOLID	-	-																															
Methyl Paraoxon*	mg/kg	SOLID	-	-																															
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000																											<0.0010				
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																															
Methylparathion	mg/kg	SOLID	-	-																															
Metobromuron*	mg/kg	SOLID	-	-																															
Metolachlor	mg/kg	SOLID	-	-																															
Metolcarb*	mg/kg	SOLID	-	-																															
Metrafenone*	mg/kg	SOLID	-	-																															
Metribuzin	mg/kg	SOLID	-	-																															
Mevinphos	mg/kg	SOLID	-	-																															
Mirex	mg/kg	SOLID	-	-																															
Molinate	mg/kg	SOLID	-	-																															
Monlinuran	mg/kg	SOLID	-	-																															
Monocrotophos	mg/kg	SOLID	-	-																															
Monuron	mg/kg	SOLID	-	-																															
Myclobutanil*	mg/kg	SOLID	-	-																															
Naphthalene1-methyl-	mg/kg	SOLID	-	-																											<0.1000				
Naphthalene-d8	%	SOLID	-	-	100	99.3	97.4	127	98.8	102				103	92.3	111	93.1	99.4	94.1	93.4	92.6	96.6	100	92.8	102	101	91.7	101	98.4	95.6					
Napropamide	mg/kg	SOLID	-	-																															
Napthalene	mg/kg	SOLID	190	1200	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.1000	<0.1000	<0.0300	<0.0900	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	0.158	<0.0090	0.0621	<0.0090	<0.0900	<0.0900	<0.0090	0.009	<0.0900	<0.0900	<0.1000	<0.0800
Natural Moisture Content 105C	%	SOLID	-	-																											13.4	7.6	5.9	16.1	5.4
n-Butylbenzene	mg/kg	SOLID	-	-																											<0.0010				
Neburon*	mg/kg	SOLID	-	-																															
Nickel	mg/kg	SOLID	980	800	40.7	11.6	13.1	26.8	24.2	18.1	5.8	25	30		20.2	26.5	28.4	10.9	45.5	14	8.27	25.4	14.5		7.24	36.8	18.9		15.9	11.1	6	7.6	5.8	6.9	4.3
Nitenpyram*	mg/kg	SOLID	-	-																															
Nitrobenzene	mg/kg	SOLID	-	-																											<0.6000				
Nitrofen	mg/kg	SOLID	-	-																															
Nitrothal isopropyl*	mg/kg	SOLID	-	-																															
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																											<1.0000				
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																											<0.1000				
Non-Asbestos Fibre	N/A	SOLID	-	-																															
Non-Asbestos Fibre	No units	SOLID	-	-			#VALUE!		#VALUE!					#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!		#VALUE!	#VALUE!	#VALUE!						
Novaluron*	mg/kg	SOLID	-	-																															
n-propylbenzene	mg/kg	SOLID	3900	36000																											<0.0010				
Nuarimol*	mg/kg	SOLID	-	-																															
Number of Additional Peaks	mg/kg	SOLID	-	-																															
o,p - DDT	mg/kg	SOLID	-	-																															
Octhilinone*	mg/kg	SOLID	-	-																															
Ofurace*	mg/kg	SOLID	-	-																															
Omethoate*	mg/kg	SOLID	-	-																															
Organic matter	% M/M	SOLID	-	-																											1.31	0.48	0.28	2.34	0.24
Organic matter	%	SOLID	-	-	<0.3500	0.69	<0.3500	<0.3500	0.359	<0.3500	0.8	0.4	0.3		<0.3500	0.393	<0.3500	1.11	<0.3500	<0.3500	0.567	1.2	<0.3500		<0.3500	5.36	<0.3500		3.33	<0.3500					
Orysastrobin*	mg/kg	SOLID	-	-																															
Oxadiargyl*	mg/kg	SOLID	-	-																															
Oxadiazon*	mg/kg	SOLID	-	-																															
Oxadixyl*	mg/kg	SOLID	-	-																															
Oxamyl	mg/kg	SOLID	-	-																															
Oxycarboxin*	mg/kg	SOLID	-	-																															
Oxydisulfoton	mg/kg	SOLID	-	-																															
Oxyfluorfen*	mg/kg	SOLID	-	-																															
O-Xylene	mg/kg	SOLID	6600	17000	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030					<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030		<0.0030	<0.0030	<0.0030		<0.0030	<0.0030	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
p,p - DDT	mg/kg	SOLID	-	-																															
p,p-DDD*	mg/kg	SOLID	-	-																															
Paclobutrazol*	mg/kg	SOLID	-	-																															
PAH 17 Total	mg/kg	SOLID	-	-										<100.0000										<100.0000				<100.0000							
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-	0.149	1.28	<0.1180	<0.1180	<0.1180	<0.1180				<1.1800	<0.1180	<0.1180	0.31	0.606	<0.1180	<0.1180	0.128	<0.1180	<0.1180	2.61	0.397	25.6	1.11	<1.1800	<1.1800	<0.1180					
PAH,Total	mg/kg	SOLID	-	-							<1.6000	<1.6000	<0.1000																		<2.8200	<1.3900	<1.3600	<1.5300	<1.3500
Paraoxon*	mg/kg	SOLID	-	-																															
PCB 105	mg/kg	SOLID	-	-																															
PCB 114	mg/kg	SOLID	-	-																															
PCB 123	mg/kg	SOLID	-	-																															
PCB 126	mg/kg	SOLID	-	-																															
PCB 157	mg/kg	SOLID	-	-																															
PCB 167	mg/kg	SOLID	-	-																															
PCB 169	mg/kg	SOLID	-	-																															
PCB 189	mg/kg	SOLID	-	-																															
PCB 77	mg/kg	SOLID	-	-																															
PCB 81	mg/kg	SOLID	-	-																															
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																															
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																															
Penconazole*	mg/kg	SOLID	-	-																															
Pencycuron*	mg/kg	SOLID	-	-																															
Pendimethalin	mg/kg	SOLID	-	-																															
Pentachloroaniline*	mg/kg	SOLID	-	-																															
Pentachloronitrobenzene	mg/kg	SOLID	-	-																															
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110																											<0.6000				
Pentanochlor*	mg/kg	SOLID	-	-																															
Permethrin	mg/kg	SOLID	-	-																															
Perylene-d12	%	SOLID	-	-	87.9	90.8	94.6	112	87.6	86.9				109	90.5	103	106	106	88.7	94.8	94.7	101	87.7	101	88.7	106	114	113	114	103					
Pethoxamid*	mg/kg	SOLID	-	-																															
pH	pH Units	SOLID	-	-	7.68	8.52	7.86	8.06	9	8.96	7.2	8.6	7.8		8.41	8.53	7.65	7.85	7.74	7.86	8.14	8.78	8.03		9.78	8.46	8.77		9.86	9.28	7.5	8.6	7.9	7.4	6.1
pH	-	SOLID	-	-																															
Phenanthrene	mg/kg	SOLID	22000	6200	<0.0150	0.105	<0.0150	<0.0150	<0.0150	<0.0150	<0.1000	<0.1000	<0.0300	<0.1500	<0.0150	<0.0150	<0.0150	0.0304	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	0.55	0.04	3.16	0.069	<0.1500	<0.1500	<0.0150	6.4	<0.0900	<0.0900	<0.1000	<0.0800
Phenanthrene-d10	%	SOLID	-	-	91.5	92.4	92.1	119	97.2	92.7				96.4	92.5	111	99.4	94	90.8	86.8	93.5	87.2	90.4	89.1	93.8	96.9	97	95.7	88.1	90.2					
Phenmedipham*	mg/kg	SOLID	-	-																															
Phenol	mg/kg	SOLID	440	440	<0.0100	0.0448	<0.0100	<0.0100	<0.0100	<0.0100				<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.0228	<0.0100	<0.0100	<0.0100	<0.0100	<0.1000				
Phenol	mg/kg	SOLID	-	-																															
Phenol (Monohydric)	mg/kg	SOLID	-	-	<0.0350	0.0448	<0.0350	<0.0350	<0.0350	<0.0350	<0.3000	<0.3000	<0.3000		<0.0350	<0.0350	<0.0350	<0.0350	<0.0350	<0.0350	<0.0350	<0.0350	<0.0350		<0.0350	<0.0350	<0.0350		<0.0350	<0.0350					
Phenol Index	mg/kg	SOLID	-	-																											<0.6000	<0.5000	<0.5000	<0.6000	<0.5000
Phenothrin*	mg/kg	SOLID	-	-																															
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																															
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																															
Phenthoate*	mg/kg	SOLID	-	-																															
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																															
Phorate	mg/kg	SOLID	-	-																															
Phorate sulfone*	mg/kg	SOLID	-	-																															
Phorate sulfoxide*	mg/kg	SOLID	-	-																															
Phosalone	mg/kg	SOLID	-	-																															
Phosfolan*	mg/kg	SOLID	-	-																															
Phosphamidon	mg/kg	SOLID	-	-																															
Phosphorothioic acid	mg/kg	SOLID	-	-																															
Phoxim*	mg/kg	SOLID	-	-																															
Phthalimide*	mg/kg	SOLID	-	-																															
Picoxystrobin*	mg/kg	SOLID	-	-																															
Piperonyl Butoxide*	mg/kg	SOLID	-	-																															
Pirimicarb	mg/kg	SOLID	-	-																															
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																															
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																															
Pirimiphos-methyl	mg/kg	SOLID	-	-																															
Pretilachlor*	mg/kg	SOLID	-	-																															
Prochloraz*	mg/kg	SOLID	-	-																															
Procymidone*	mg/kg	SOLID	-	-																															
Profenofos*	mg/kg	SOLID	-	-																															
Prometon	mg/kg	SOLID	-	-																															
Prometryne	mg/kg	SOLID	-	-																															
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-																															
Propamocarb*	mg/kg	SOLID	-	-																															
Propanil	mg/kg	SOLID	-	-																															
Propaphos*	mg/kg	SOLID	-	-																															
Propaquizafop*	mg/kg	SOLID	-	-																															
Propargite	mg/kg	SOLID	-	-																															
Propazine	mg/kg	SOLID	-	-																															
Propetamphos	mg/kg	SOLID	-	-																															
Propham	mg/kg	SOLID	-	-																															
Propiconazole*	mg/kg	SOLID	-	-																															
Propoxur*	mg/kg	SOLID	-	-																															
Propyzamide	mg/kg	SOLID	-	-																															
Proquinazid*	mg/kg	SOLID	-	-																															
Prosulfocarb*	mg/kg	SOLID	-	-																															
Prothioconazole desthio*	mg/kg	SOLID	-	-																															
Pyraclostrobin*	mg/kg	SOLID	-	-																															
Pyraflufen ethyl*	mg/kg	SOLID	-	-																															
Pyrazophos*	mg/kg	SOLID	-	-																															
Pyrene	mg/kg	SOLID	54000	15000	0.039	0.218	<0.0150	<0.0150	<0.0150	<0.0150	<0.1000	<0.1000	<0.0300	<0.1500	<0.0150	<0.0150	0.0428	0.0648	<0.0150	<0.0150	0.0219	0.0178	<0.0150	0.47	0.0573	4.01	0.13	<0.1500	<0.1500	<0.0150	5.9	<0.0900	<0.0900	<0.1000	<0.0800
Pyrethrin I*	mg/kg	SOLID	-	-																															
Pyridaben*	mg/kg	SOLID	-	-																															
Pyridaphenthion*	mg/kg	SOLID	-	-																															
Pyrifenox*	mg/kg	SOLID	-	-																															
Pyrimethanil*	mg/kg	SOLID	-	-																															
Pyriproxyfen	mg/kg	SOLID	-	-																															
Quinalphos*	mg/kg	SOLID	-	-																															

Max of Normalised Results																										
					ML158-CP002	ML158-CP002	ML158-CP002	ML158-CP005	ML158-CP005	ML158-CP005	ML158-CP007	ML158-CP007	ML158-CP007	ML158-CP021	ML158-CP021	ML158-CP402	ML158-CP402	ML158-CR003	ML158-CR003	ML158-CR007	ML158-CR007	ML158-TP008	ML158-TP008	ML158-TP008	ML158-WS012	ML158-WS012
					Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Packington Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure
					1.05	3.05	3.65	0.5	1	1.3	1.05	3.05	3.85	0.05	0.4	0.3	0.5	0.05	1.05	0.05	5.05	1.05	2.05	3.05	0.4	1.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	GFDUD	MGR	MGR	GFDUD	MGR	MGR	GFDUD	MGR	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	MGR	GFDUD
Mepanipyrim*	mg/kg	SOLID	-	-																						
Mephosfolan*	mg/kg	SOLID	-	-																						
Mepronil*	mg/kg	SOLID	-	-																						
Mercury	mg/kg	SOLID	58	30	2.32	5.45	0.805	<0.1400	0.232	<0.1400	0.141	<0.1400	<0.1400	<0.1400	<0.1400	<1.0000	<1.0000	<0.1400	<0.1400	<0.1400	<0.1400	0.15	0.243	<0.1400	<0.1400	<0.1400
Metaflumizone*	mg/kg	SOLID	-	-																						
Metalaxyl*	mg/kg	SOLID	-	-																						
Metamitron*	mg/kg	SOLID	-	-																						
Metazachlor	mg/kg	SOLID	-	-																						
Metconazole*	mg/kg	SOLID	-	-																						
Methabenzthiazuran	mg/kg	SOLID	-	-																						
Methacriphos	mg/kg	SOLID	-	-																						
Methamidophos	mg/kg	SOLID	-	-																						
Methidathion*	mg/kg	SOLID	-	-																						
Methiocarb	mg/kg	SOLID	-	-																						
Methiocarb sulfone*	mg/kg	SOLID	-	-																						
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																						
Methomyl*	mg/kg	SOLID	-	-																						
Methoxychlor	mg/kg	SOLID	-	-																						
Methoxyfenozide*	mg/kg	SOLID	-	-																						
Methyl Paraoxon*	mg/kg	SOLID	-	-																						
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000	<0.0050	<0.0050	<0.0050		<0.0050		<0.0050	<0.0100		<0.0050		<0.0100	<0.0100		<0.0050		<0.0050		<0.0050			
Methyl tert-pentyl ether	mg/kg	SOLID	-	-					<0.1000			<0.0100											<0.0100			
Methylparathion	mg/kg	SOLID	-	-																						
Metobromuron*	mg/kg	SOLID	-	-																						
Metolachlor	mg/kg	SOLID	-	-																						
Metolcarb*	mg/kg	SOLID	-	-																						
Metrafenone*	mg/kg	SOLID	-	-																						
Metribuzin	mg/kg	SOLID	-	-																						
Mevinphos	mg/kg	SOLID	-	-																						
Mirex	mg/kg	SOLID	-	-																						
Molinate	mg/kg	SOLID	-	-																						
Monlinuran	mg/kg	SOLID	-	-																						
Monocrotophos	mg/kg	SOLID	-	-																						
Monuron	mg/kg	SOLID	-	-																						
Myclobutanil*	mg/kg	SOLID	-	-																						
Naphthalene1-methyl-	mg/kg	SOLID	-	-																						
Naphthalene-d8	%	SOLID	-	-	98.3	100	96.7	99.7	108	108	106	97.2	94.8	97.4	108			95.7	105	107	102	100	103	101	111	102
Napropamide	mg/kg	SOLID	-	-																						
Napthalene	mg/kg	SOLID	190	1200	3.49	7.8	1.03	0.548	0.54	0.0623	0.0442	0.184	<0.0090	0.0493	<0.0090	<0.1000	<0.1000	<0.0090	<0.0090	<0.0090	0.044	<0.0090	0.118	<0.0090	0.00984	<0.0090
Natural Moisture Content 105C	%	SOLID	-	-																						
n-Butylbenzene	mg/kg	SOLID	-	-					<0.1100			<0.0110											<0.0110			
Neburon*	mg/kg	SOLID	-	-																						
Nickel	mg/kg	SOLID	980	800	32	105	30	21.3	28.8	13.5	9.77	10.3	14	9.89	9.26	6	10	17.6	15.4	16.5	3.32	17.1	9.69	12.9	9.08	15.7
Nitenpyram*	mg/kg	SOLID	-	-																						
Nitrobenzene	mg/kg	SOLID	-	-					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Nitrofen	mg/kg	SOLID	-	-																						
Nitrothal isopropyl*	mg/kg	SOLID	-	-																						
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-					<0.1000			<0.1000											<0.1000			
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																						
Non-Asbestos Fibre	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!			#VALUE!			#VALUE!					#VALUE!		#VALUE!	#VALUE!			#VALUE!	
Non-Asbestos Fibre	No units	SOLID	-	-																						
Novaluron*	mg/kg	SOLID	-	-																						
n-propylbenzene	mg/kg	SOLID	3900	36000					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Nuarimol*	mg/kg	SOLID	-	-																						
Number of Additional Peaks	mg/kg	SOLID	-	-					387																	
o,p - DDT	mg/kg	SOLID	-	-																						
Octhilinone*	mg/kg	SOLID	-	-																						
Ofurace*	mg/kg	SOLID	-	-																						
Omethoate*	mg/kg	SOLID	-	-																						
Organic matter	% M/M	SOLID	-	-																						
Organic matter	%	SOLID	-	-	3.91	16.8	1.34	3.98	6.02	2	3.69	3.53	<0.3500	3.26	1.19	4.7	0.7	2.47	1.13	<0.3500	0.695	1.32	1.09	0.355	0.543	<0.3500
Orysastrobin*	mg/kg	SOLID	-	-																						
Oxadiargyl*	mg/kg	SOLID	-	-																						
Oxadiazon*	mg/kg	SOLID	-	-																						
Oxadixyl*	mg/kg	SOLID	-	-																						
Oxamyl	mg/kg	SOLID	-	-																						
Oxycarboxin*	mg/kg	SOLID	-	-																						
Oxydisulfoton	mg/kg	SOLID	-	-																						
Oxyfluorfen*	mg/kg	SOLID	-	-																						
O-Xylene	mg/kg	SOLID	6600	17000	0.0133	0.0301	0.029	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0100	<0.0100	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
p,p - DDT	mg/kg	SOLID	-	-																						
p,p-DDD*	mg/kg	SOLID	-	-																						
Paclobutrazol*	mg/kg	SOLID	-	-																						
PAH 17 Total	mg/kg	SOLID	-	-																						
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-	30.6	73.4	11.4	365	36.4	5.14	1.06	1.59	<0.1180	1.15	0.472			0.814	<0.1180	0.695	4.42	0.432	9.99	0.594	0.456	<0.1180
PAH,Total	mg/kg	SOLID	-	-												0.2	<0.1000									
Paraoxon*	mg/kg	SOLID	-	-																						
PCB 105	mg/kg	SOLID	-	-	0.0312																					
PCB 114	mg/kg	SOLID	-	-	<0.0030																					
PCB 123	mg/kg	SOLID	-	-	<0.0030																					
PCB 126	mg/kg	SOLID	-	-	<0.0030																					
PCB 157	mg/kg	SOLID	-	-	<0.0030																					
PCB 167	mg/kg	SOLID	-	-	<0.0030																					
PCB 169	mg/kg	SOLID	-	-	<0.0030																					
PCB 189	mg/kg	SOLID	-	-	<0.0030																					
PCB 77	mg/kg	SOLID	-	-	0.008																					
PCB 81	mg/kg	SOLID	-	-	<0.0030																					
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-	0.0603																					
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-	0.00645																					
Penconazole*	mg/kg	SOLID	-	-																						
Pencycuron*	mg/kg	SOLID	-	-																						
Pendimethalin	mg/kg	SOLID	-	-																						
Pentachloroaniline*	mg/kg	SOLID	-	-																						
Pentachloronitrobenzene	mg/kg	SOLID	-	-																						
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Pentanochlor*	mg/kg	SOLID	-	-																						
Permethrin	mg/kg	SOLID	-	-																						
Perylene-d12	%	SOLID	-	-	115	118	112	108	118	112	108	91.8	85	94.1	115			80.2	94.3	107	108	102	101	108	114	92.9
Pethoxamid*	mg/kg	SOLID	-	-																						
pH	pH Units	SOLID	-	-												6.8	7.1									
pH	-	SOLID	-	-																						
Phenanthrene	mg/kg	SOLID	22000	6200	4.21	9.37	1.33	32.1	2.77	0.433	0.087	0.185	<0.0150	0.0914	0.0404	<0.1000	<0.1000	0.122	<0.0150	0.0356	0.611	0.0626	0.374	0.0573	0.0188	<0.0150
Phenanthrene-d10	%	SOLID	-	-	94.6	95.9	94.1	103	112	113	106	103	99.3	96.6	115			89.6	102	97.9	99.1	102	96.6	103	111	99
Phenmedipham*	mg/kg	SOLID	-	-																						
Phenol	mg/kg	SOLID	440	440					<0.1000			<0.1000				<0.1000	<0.1000						<0.1000			
Phenol	mg/kg	SOLID	-	-												<1.0000	<1.0000									
Phenol (Monohydric)	mg/kg	SOLID	-	-																						
Phenol Index	mg/kg	SOLID	-	-																						
Phenothrin*	mg/kg	SOLID	-	-																						
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																						
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																						
Phenthoate*	mg/kg	SOLID	-	-																						
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																						
Phorate	mg/kg	SOLID	-	-																						
Phorate sulfone*	mg/kg	SOLID	-	-																						
Phorate sulfoxide*	mg/kg	SOLID	-	-																						
Phosalone	mg/kg	SOLID	-	-																						
Phosfolan*	mg/kg	SOLID	-	-																						
Phosphamidon	mg/kg	SOLID	-	-																						
Phosphorothioic acid	mg/kg	SOLID	-	-																						
Phoxim*	mg/kg	SOLID	-	-																						
Phthalimide*	mg/kg	SOLID	-	-																						
Picoxystrobin*	mg/kg	SOLID	-	-																						
Piperonyl Butoxide*	mg/kg	SOLID	-	-																						
Pirimicarb	mg/kg	SOLID	-	-																						
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																						
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																						
Pirimiphos-methyl	mg/kg	SOLID	-	-																						
Pretilachlor*	mg/kg	SOLID	-	-																						
Prochloraz*	mg/kg	SOLID	-	-																						
Procymidone*	mg/kg	SOLID	-	-																						
Profenofos*	mg/kg	SOLID	-	-																						
Prometon	mg/kg	SOLID	-	-																						
Prometryne	mg/kg	SOLID	-	-																						
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-																						
Propamocarb*	mg/kg	SOLID	-	-																						
Propanil	mg/kg	SOLID	-	-																						
Propaphos*	mg/kg	SOLID	-	-																						
Propaquizafop*	mg/kg	SOLID	-	-																						
Propargite	mg/kg	SOLID	-	-																						
Propazine	mg/kg	SOLID	-	-																						
Propetamphos	mg/kg	SOLID	-	-																						
Propham	mg/kg	SOLID	-	-																						
Propiconazole*	mg/kg	SOLID	-	-																						
Propoxur*	mg/kg	SOLID	-	-																						
Propyzamide	mg/kg	SOLID	-	-																						
Proquinazid*	mg/kg	SOLID	-	-																						
Prosulfocarb*	mg/kg	SOLID	-	-																						
Prothioconazole desthio*	mg/kg	SOLID	-	-																						
Pyraclostrobin*	mg/kg	SOLID	-	-																						
Pyraflufen ethyl*	mg/kg	SOLID	-	-																						
Pyrazophos*	mg/kg	SOLID	-	-																						
Pyrene	mg/kg	SOLID	54000	15000	3.82	8.76	1.23	69.5	5.84	0.859	0.11	0.214	<0.0150	0.142	0.0568	0.1	<0.1000	0.148	0.0217	0.0847	0.556	0.0548	0.905	0.0781	0.0537	<0.0150
Pyrethrin I*	mg/kg	SOLID	-	-																						
Pyridaben*	mg/kg	SOLID	-	-																						
Pyridaphenthion*	mg/kg	SOLID	-	-																						
Pyrifenox*	mg/kg	SOLID	-	-																						
Pyrimethanil*	mg/kg	SOLID	-	-																						
Pyriproxyfen	mg/kg	SOLID	-	-																						
Quinalphos*	mg/kg	SOLID	-	-																						

Max of Normalised Results																										
					ML158-WS013	ML158-WS014	ML158-WS015	ML158-WS016	ML158-WS016	ML159-CP003	ML159-CP003	ML159-CP003	ML159-CP018	ML159-CR003	ML159-CR003	ML159-CR008a	ML159-CR018	ML159-CR018	ML159-CR408	ML159-CR408	ML159-CR408	ML159-CR408	ML159-CR410	ML159-CR410	ML159-TP004	ML159-TP015
					Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	M6 Motorway South Viaduct	M6 Motorway Box Structure	M6 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	M6 Motorway Box Structure	M6 Motorway Box Structure	Pool Wood Embankment	M6 Motorway Box Structure
					1	0.5	0.2	1	3	0.05	1.05	1.2	0	0.05	0.6	1.2	1.6	3.6	0.3	0.5	1	1.5	0.3	1	0.05	0.15
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	TOP	MGR	GFDUD	MGR	MGR	MGR	GFDUD	GFDUD	GFDUD	GFDUD	GFDUD	GFDUD	TOP	MGR
Mepanipyrim*	mg/kg	SOLID	-	-																						
Mephosfolan*	mg/kg	SOLID	-	-																						
Mepronil*	mg/kg	SOLID	-	-																						
Mercury	mg/kg	SOLID	58	30	<0.1400	<0.1400	<0.1400	<0.1400	<0.1400	<0.1400	<0.1400	<0.1400	<0.1400	<0.1400	<0.1400	<0.5000	<0.5000	<0.5000	<1.0000		<1.0000	<1.0000	<1.0000	<1.0000	<0.1400	<0.5000
Metaflumizone*	mg/kg	SOLID	-	-																						
Metalaxyl*	mg/kg	SOLID	-	-																						
Metamitron*	mg/kg	SOLID	-	-																						
Metazachlor	mg/kg	SOLID	-	-																						
Metconazole*	mg/kg	SOLID	-	-																						
Methabenzthiazuran	mg/kg	SOLID	-	-																						
Methacriphos	mg/kg	SOLID	-	-																						
Methamidophos	mg/kg	SOLID	-	-																						
Methidathion*	mg/kg	SOLID	-	-																						
Methiocarb	mg/kg	SOLID	-	-																						
Methiocarb sulfone*	mg/kg	SOLID	-	-																						
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																						
Methomyl*	mg/kg	SOLID	-	-																						
Methoxychlor	mg/kg	SOLID	-	-																						
Methoxyfenozide*	mg/kg	SOLID	-	-																						
Methyl Paraoxon*	mg/kg	SOLID	-	-																						
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000			<0.0050											<0.0010								
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																						
Methylparathion	mg/kg	SOLID	-	-																						
Metobromuron*	mg/kg	SOLID	-	-																						
Metolachlor	mg/kg	SOLID	-	-																						
Metolcarb*	mg/kg	SOLID	-	-																						
Metrafenone*	mg/kg	SOLID	-	-																						
Metribuzin	mg/kg	SOLID	-	-																						
Mevinphos	mg/kg	SOLID	-	-																						
Mirex	mg/kg	SOLID	-	-																						
Molinate	mg/kg	SOLID	-	-																						
Monlinuran	mg/kg	SOLID	-	-																						
Monocrotophos	mg/kg	SOLID	-	-																						
Monuron	mg/kg	SOLID	-	-																						
Myclobutanil*	mg/kg	SOLID	-	-																						
Naphthalene1-methyl-	mg/kg	SOLID	-	-														<0.1000								
Naphthalene-d8	%	SOLID	-	-	98.3	102	104	97.8	102	97.8	95.6	95.6	93.1	105	99.5										99.6	
Napropamide	mg/kg	SOLID	-	-																						
Napthalene	mg/kg	SOLID	190	1200	<0.0090	0.0324	0.0181	<0.0090	0.0463	0.228	0.0961	<0.0090	<0.0090	<0.0090	<0.0090	<0.0900	<0.0900	<0.0060	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	<0.0090	<0.0900
Natural Moisture Content 105C	%	SOLID	-	-												8.4	7.5	10.5								13
n-Butylbenzene	mg/kg	SOLID	-	-														<0.0010								
Neburon*	mg/kg	SOLID	-	-																						
Nickel	mg/kg	SOLID	980	800	9.55	12.5	11.3	15.9	26.9	595	487	64.2	13.6	14.9	12.4	7.9	16.8	12	15		9	6	<1.0000	4	16.9	9.3
Nitenpyram*	mg/kg	SOLID	-	-																						
Nitrobenzene	mg/kg	SOLID	-	-														<0.6000								
Nitrofen	mg/kg	SOLID	-	-																						
Nitrothal isopropyl*	mg/kg	SOLID	-	-																						
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-														<1.0000								
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-														<0.1000								
Non-Asbestos Fibre	N/A	SOLID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!				#VALUE!											#VALUE!	
Non-Asbestos Fibre	No units	SOLID	-	-																						
Novaluron*	mg/kg	SOLID	-	-																						
n-propylbenzene	mg/kg	SOLID	3900	36000														<0.0010								
Nuarimol*	mg/kg	SOLID	-	-																						
Number of Additional Peaks	mg/kg	SOLID	-	-																						
o,p - DDT	mg/kg	SOLID	-	-																						
Octhilinone*	mg/kg	SOLID	-	-																						
Ofurace*	mg/kg	SOLID	-	-																						
Omethoate*	mg/kg	SOLID	-	-																						
Organic matter	% M/M	SOLID	-	-												0.63	0.28	0.17								1.57
Organic matter	%	SOLID	-	-	1.64	<0.3500	3.83	1.46	4.05	21	11.6	0.924	3.17	3.62	2.26				2.6		1.7	0.3	3.2	0.4	6.55	
Orysastrobin*	mg/kg	SOLID	-	-																						
Oxadiargyl*	mg/kg	SOLID	-	-																						
Oxadiazon*	mg/kg	SOLID	-	-																						
Oxadixyl*	mg/kg	SOLID	-	-																						
Oxamyl	mg/kg	SOLID	-	-																						
Oxycarboxin*	mg/kg	SOLID	-	-																						
Oxydisulfoton	mg/kg	SOLID	-	-																						
Oxyfluorfen*	mg/kg	SOLID	-	-																						
O-Xylene	mg/kg	SOLID	6600	17000	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.00504	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0020	<0.0020	<0.0020	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0030	<0.0020
p,p - DDT	mg/kg	SOLID	-	-																						
p,p-DDD*	mg/kg	SOLID	-	-																						
Paclobutrazol*	mg/kg	SOLID	-	-																						
PAH 17 Total	mg/kg	SOLID	-	-																						
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-	1.67	0.623	6	0.307	0.902	11.5	1.08	0.266	0.657	0.977	0.62										0.347	
PAH,Total	mg/kg	SOLID	-	-												<1.4000	<2.4600	<1.4300	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000		<1.4700
Paraoxon*	mg/kg	SOLID	-	-																						
PCB 105	mg/kg	SOLID	-	-																						
PCB 114	mg/kg	SOLID	-	-																						
PCB 123	mg/kg	SOLID	-	-																						
PCB 126	mg/kg	SOLID	-	-																						
PCB 157	mg/kg	SOLID	-	-																						
PCB 167	mg/kg	SOLID	-	-																						
PCB 169	mg/kg	SOLID	-	-																						
PCB 189	mg/kg	SOLID	-	-																						
PCB 77	mg/kg	SOLID	-	-																						
PCB 81	mg/kg	SOLID	-	-																						
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																						
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																						
Penconazole*	mg/kg	SOLID	-	-																						
Pencycuron*	mg/kg	SOLID	-	-																						
Pendimethalin	mg/kg	SOLID	-	-																						
Pentachloroaniline*	mg/kg	SOLID	-	-																						
Pentachloronitrobenzene	mg/kg	SOLID	-	-																						
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110														<0.6000								
Pentanochlor*	mg/kg	SOLID	-	-																						
Permethrin	mg/kg	SOLID	-	-																						
Perylene-d12	%	SOLID	-	-	92.1	93.9	106	91.5	91.8	114	90.7	87.9	90.9	97.1	92.9										106	
Pethoxamid*	mg/kg	SOLID	-	-																						
pH	pH Units	SOLID	-	-												7.8	8.8	6.8	7.6		8	8.1	5	5.6		7.4
pH	-	SOLID	-	-																						
Phenanthrene	mg/kg	SOLID	22000	6200	0.169	0.0705	0.454	0.0226	0.154	1.01	0.244	0.0385	0.024	0.059	0.0692	<0.0900	0.16	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.0337	<0.0900
Phenanthrene-d10	%	SOLID	-	-	90.7	105	108	102	98.3	95.2	99.2	90.8	88.8	99.9	95.6										101	
Phenmedipham*	mg/kg	SOLID	-	-																						
Phenol	mg/kg	SOLID	440	440														<0.1000								
Phenol	mg/kg	SOLID	-	-															<1.0000		<1.0000	<1.0000	<1.0000	<1.0000		
Phenol (Monohydric)	mg/kg	SOLID	-	-																						
Phenol Index	mg/kg	SOLID	-	-												<0.5000	<0.5000	<0.6000								<0.6000
Phenothrin*	mg/kg	SOLID	-	-																						
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																						
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																						
Phenthoate*	mg/kg	SOLID	-	-																						
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																						
Phorate	mg/kg	SOLID	-	-																						
Phorate sulfone*	mg/kg	SOLID	-	-																						
Phorate sulfoxide*	mg/kg	SOLID	-	-																						
Phosalone	mg/kg	SOLID	-	-																						
Phosfolan*	mg/kg	SOLID	-	-																						
Phosphamidon	mg/kg	SOLID	-	-																						
Phosphorothioic acid	mg/kg	SOLID	-	-																						
Phoxim*	mg/kg	SOLID	-	-																						
Phthalimide*	mg/kg	SOLID	-	-																						
Picoxystrobin*	mg/kg	SOLID	-	-																						
Piperonyl Butoxide*	mg/kg	SOLID	-	-																						
Pirimicarb	mg/kg	SOLID	-	-																						
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																						
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																						
Pirimiphos-methyl	mg/kg	SOLID	-	-																						
Pretilachlor*	mg/kg	SOLID	-	-																						
Prochloraz*	mg/kg	SOLID	-	-																						
Procymidone*	mg/kg	SOLID	-	-																						
Profenofos*	mg/kg	SOLID	-	-																						
Prometon	mg/kg	SOLID	-	-																						
Prometryne	mg/kg	SOLID	-	-																						
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-																						
Propamocarb*	mg/kg	SOLID	-	-																						
Propanil	mg/kg	SOLID	-	-																						
Propaphos*	mg/kg	SOLID	-	-																						
Propaquizafop*	mg/kg	SOLID	-	-																						
Propargite	mg/kg	SOLID	-	-																						
Propazine	mg/kg	SOLID	-	-																						
Propetamphos	mg/kg	SOLID	-	-																						
Propham	mg/kg	SOLID	-	-																						
Propiconazole*	mg/kg	SOLID	-	-																						
Propoxur*	mg/kg	SOLID	-	-																						
Propyzamide	mg/kg	SOLID	-	-																						
Proquinazid*	mg/kg	SOLID	-	-																						
Prosulfocarb*	mg/kg	SOLID	-	-																						
Prothioconazole desthio*	mg/kg	SOLID	-	-																						
Pyraclostrobin*	mg/kg	SOLID	-	-																						
Pyraflufen ethyl*	mg/kg	SOLID	-	-																						
Pyrazophos*	mg/kg	SOLID	-	-																						
Pyrene	mg/kg	SOLID	54000	15000	0.268	0.0853	0.979	0.0404	0.144	1.42	0.118	0.0403	0.0652	0.123	0.0835	<0.0900	0.3	<0.0900	<0.1000		<0.1000	<0.1000	<0.1000	<0.1000	0.0472	<0.0900
Pyrethrin I*	mg/kg	SOLID	-	-																						
Pyridaben*	mg/kg	SOLID	-	-																						
Pyridaphenthion*	mg/kg	SOLID	-	-																						
Pyrifenox*	mg/kg	SOLID	-	-																						
Pyrimethanil*	mg/kg	SOLID	-	-																						
Pyriproxyfen	mg/kg	SOLID	-	-																						
Quinalphos*	mg/kg	SOLID	-	-																						

Max of Normalised Results																									
					ML159-TP015	ML159-WS002	ML159-WS002a	ML160-CP010	ML160-CP041	ML160-CP041	ML160-CR030	ML160-CR033	ML160-CR035	ML160-CR035	ML160-WS003	ML160-WS003	ML161-CP032	ML161-CP032	ML161-CR009	ML161-CR009	ML161-CR021	ML161-TP405	ML161-TP405	ML161-WS002	ML162-CR004
					M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway North Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	Coleshill West Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill West Viaduct	M42 Coleshill Box Structure
					0.45	0.5	1.1	0.5	0.2	0.6	1.5	1.5	0.75	1.1	0.3	1	0.9	1.2	0.2	0.5	0.5	0.05	0.5	0.5	0.6
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GFDUD	MGR	MGR	RTD1	MGR	HEAD	MGR	ALV	MGR	HEAD	MGR	MGR	MGR	MMG	MGR	MGR	MGR	TOP	RTD1	MGR	HEAD
Mepanipyrim*	mg/kg	SOLID	-	-																					
Mephosfolan*	mg/kg	SOLID	-	-																					
Mepronil*	mg/kg	SOLID	-	-																					
Mercury	mg/kg	SOLID	58	30	<0.5000	<0.5000	<0.5000		<0.6000	<0.5000	<0.5000		<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<1.0000	<1.0000	<0.6000	<0.5000
Metaflumizone*	mg/kg	SOLID	-	-																					
Metalaxyl*	mg/kg	SOLID	-	-																					
Metamitron*	mg/kg	SOLID	-	-																					
Metazachlor	mg/kg	SOLID	-	-																					
Metconazole*	mg/kg	SOLID	-	-																					
Methabenzthiazuran	mg/kg	SOLID	-	-																					
Methacriphos	mg/kg	SOLID	-	-																					
Methamidophos	mg/kg	SOLID	-	-																					
Methidathion*	mg/kg	SOLID	-	-																					
Methiocarb	mg/kg	SOLID	-	-																					
Methiocarb sulfone*	mg/kg	SOLID	-	-																					
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																					
Methomyl*	mg/kg	SOLID	-	-																					
Methoxychlor	mg/kg	SOLID	-	-																					
Methoxyfenozide*	mg/kg	SOLID	-	-																					
Methyl Paraoxon*	mg/kg	SOLID	-	-																					
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000																					
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																					
Methylparathion	mg/kg	SOLID	-	-																					
Metobromuron*	mg/kg	SOLID	-	-																					
Metolachlor	mg/kg	SOLID	-	-																					
Metolcarb*	mg/kg	SOLID	-	-																					
Metrafenone*	mg/kg	SOLID	-	-																					
Metribuzin	mg/kg	SOLID	-	-																					
Mevinphos	mg/kg	SOLID	-	-																					
Mirex	mg/kg	SOLID	-	-																					
Molinate	mg/kg	SOLID	-	-																					
Monlinuran	mg/kg	SOLID	-	-																					
Monocrotophos	mg/kg	SOLID	-	-																					
Monuron	mg/kg	SOLID	-	-																					
Myclobutanil*	mg/kg	SOLID	-	-																					
Naphthalene1-methyl-	mg/kg	SOLID	-	-																					
Naphthalene-d8	%	SOLID	-	-																					
Napropamide	mg/kg	SOLID	-	-																					
Napthalene	mg/kg	SOLID	190	1200	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Natural Moisture Content 105C	%	SOLID	-	-	7.1	8.6	9.1		28.1	21.3	16.2		16.9	18.2	5.5	21.4	24.5	23	15.5	15.2	7.6			20.2	13.6
n-Butylbenzene	mg/kg	SOLID	-	-																					
Neburon*	mg/kg	SOLID	-	-																					
Nickel	mg/kg	SOLID	980	800	7.4	6.6	7.6		11	12	32.4		10	8.5	9.9	25.6	29.7	28	12.9	11	11.4	20	19	14.9	18.4
Nitenpyram*	mg/kg	SOLID	-	-																					
Nitrobenzene	mg/kg	SOLID	-	-																					
Nitrofen	mg/kg	SOLID	-	-																					
Nitrothal isopropyl*	mg/kg	SOLID	-	-																					
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																					
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																					
Non-Asbestos Fibre	N/A	SOLID	-	-																					
Non-Asbestos Fibre	No units	SOLID	-	-																					
Novaluron*	mg/kg	SOLID	-	-																					
n-propylbenzene	mg/kg	SOLID	3900	36000																					
Nuarimol*	mg/kg	SOLID	-	-																					
Number of Additional Peaks	mg/kg	SOLID	-	-																					
o,p - DDT	mg/kg	SOLID	-	-																					
Octhilinone*	mg/kg	SOLID	-	-																					
Ofurace*	mg/kg	SOLID	-	-																					
Omethoate*	mg/kg	SOLID	-	-																					
Organic matter	% M/M	SOLID	-	-	0.22	0.49	0.56		2.5	1.72	0.22		0.74	0.8	0.43	0.26	0.41	0.34	2.66	4.1	0.76			0.74	0.76
Organic matter	%	SOLID	-	-				0.4				0.6										12	1.6		
Orysastrobin*	mg/kg	SOLID	-	-																					
Oxadiargyl*	mg/kg	SOLID	-	-																					
Oxadiazon*	mg/kg	SOLID	-	-																					
Oxadixyl*	mg/kg	SOLID	-	-																					
Oxamyl	mg/kg	SOLID	-	-																					
Oxycarboxin*	mg/kg	SOLID	-	-																					
Oxydisulfoton	mg/kg	SOLID	-	-																					
Oxyfluorfen*	mg/kg	SOLID	-	-																					
O-Xylene	mg/kg	SOLID	6600	17000	<0.0020	<0.0020	<0.0020		<0.0030	<0.0030	<0.0020		<0.0020	<0.0020	<0.0020	<0.0030	<0.0030	<0.0030	<0.0020	<0.0020	<0.0020	<0.0100	<0.0100	<0.0030	<0.0020
p,p - DDT	mg/kg	SOLID	-	-																					
p,p-DDD*	mg/kg	SOLID	-	-																					
Paclobutrazol*	mg/kg	SOLID	-	-																					
PAH 17 Total	mg/kg	SOLID	-	-																					
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																					
PAH,Total	mg/kg	SOLID	-	-	<1.3800	<1.4000	<1.4100		<1.7800	<1.6300	<1.5400		<1.5400	<1.5600	<1.3500	<1.6300	<1.7000	<1.6600	<1.5100	<1.5400	<1.3900	0.1	<0.1000	<1.6000	<1.4800
Paraoxon*	mg/kg	SOLID	-	-																					
PCB 105	mg/kg	SOLID	-	-																					
PCB 114	mg/kg	SOLID	-	-																					
PCB 123	mg/kg	SOLID	-	-																					
PCB 126	mg/kg	SOLID	-	-																					
PCB 157	mg/kg	SOLID	-	-																					
PCB 167	mg/kg	SOLID	-	-																					
PCB 169	mg/kg	SOLID	-	-																					
PCB 189	mg/kg	SOLID	-	-																					
PCB 77	mg/kg	SOLID	-	-																					
PCB 81	mg/kg	SOLID	-	-																					
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																					
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																					
Penconazole*	mg/kg	SOLID	-	-																					
Pencycuron*	mg/kg	SOLID	-	-																					
Pendimethalin	mg/kg	SOLID	-	-																					
Pentachloroaniline*	mg/kg	SOLID	-	-																					
Pentachloronitrobenzene	mg/kg	SOLID	-	-																					
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110																					
Pentanochlor*	mg/kg	SOLID	-	-																					
Permethrin	mg/kg	SOLID	-	-																					
Perylene-d12	%	SOLID	-	-																					
Pethoxamid*	mg/kg	SOLID	-	-																					
pH	pH Units	SOLID	-	-	8.1	8.5	8.2		6.6	6.9	9.1		7.2	8.2	8.4	8.9	8.4	8.3	6.8	6.4	8.7	7.1	7.3	8.1	8.2
pH	-	SOLID	-	-																					
Phenanthrene	mg/kg	SOLID	22000	6200	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Phenanthrene-d10	%	SOLID	-	-																					
Phenmedipham*	mg/kg	SOLID	-	-																					
Phenol	mg/kg	SOLID	440	440																					
Phenol	mg/kg	SOLID	-	-																		<1.0000	<1.0000		
Phenol (Monohydric)	mg/kg	SOLID	-	-																					
Phenol Index	mg/kg	SOLID	-	-	<0.5000	<0.5000	<0.6000		<0.0700	<0.0600	<0.6000		<0.0600	<0.0600	<0.5000	<0.6000	<0.7000	<0.6000	<0.6000	<0.6000	<0.5000				<0.6000
Phenothrin*	mg/kg	SOLID	-	-																					
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																					
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																					
Phenthoate*	mg/kg	SOLID	-	-																					
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																					
Phorate	mg/kg	SOLID	-	-																					
Phorate sulfone*	mg/kg	SOLID	-	-																					
Phorate sulfoxide*	mg/kg	SOLID	-	-																					
Phosalone	mg/kg	SOLID	-	-																					
Phosfolan*	mg/kg	SOLID	-	-																					
Phosphamidon	mg/kg	SOLID	-	-																					
Phosphorothioic acid	mg/kg	SOLID	-	-																					
Phoxim*	mg/kg	SOLID	-	-																					
Phthalimide*	mg/kg	SOLID	-	-																					
Picoxystrobin*	mg/kg	SOLID	-	-																					
Piperonyl Butoxide*	mg/kg	SOLID	-	-																					
Pirimicarb	mg/kg	SOLID	-	-																					
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																					
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																					
Pirimiphos-methyl	mg/kg	SOLID	-	-																					
Pretilachlor*	mg/kg	SOLID	-	-																					
Prochloraz*	mg/kg	SOLID	-	-																					
Procymidone*	mg/kg	SOLID	-	-																					
Profenofos*	mg/kg	SOLID	-	-																					
Prometon	mg/kg	SOLID	-	-																					
Prometryne	mg/kg	SOLID	-	-																					
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-																					
Propamocarb*	mg/kg	SOLID	-	-																					
Propanil	mg/kg	SOLID	-	-																					
Propaphos*	mg/kg	SOLID	-	-																					
Propaquizafop*	mg/kg	SOLID	-	-																					
Propargite	mg/kg	SOLID	-	-																					
Propazine	mg/kg	SOLID	-	-																					
Propetamphos	mg/kg	SOLID	-	-																					
Propham	mg/kg	SOLID	-	-																					
Propiconazole*	mg/kg	SOLID	-	-																					
Propoxur*	mg/kg	SOLID	-	-																					
Propyzamide	mg/kg	SOLID	-	-																					
Proquinazid*	mg/kg	SOLID	-	-																					
Prosulfocarb*	mg/kg	SOLID	-	-																					
Prothioconazole desthio*	mg/kg	SOLID	-	-																					
Pyraclostrobin*	mg/kg	SOLID	-	-																					
Pyraflufen ethyl*	mg/kg	SOLID	-	-																					
Pyrazophos*	mg/kg	SOLID	-	-																					
Pyrene	mg/kg	SOLID	54000	15000	<0.0900	<0.0900	<0.0900		<0.1100	<0.1000	<0.1000		<0.1000	<0.1000	<0.0800	<0.1000	<0.1100	<0.1000	<0.0900	0.09	<0.0900	<0.1000	<0.1000	<0.1000	<0.0900
Pyrethrin I*	mg/kg	SOLID	-	-																					
Pyridaben*	mg/kg	SOLID	-	-																					
Pyridaphenthion*	mg/kg	SOLID	-	-																					
Pyrifenox*	mg/kg	SOLID	-	-																					
Pyrimethanil*	mg/kg	SOLID	-	-																					
Pyriproxyfen	mg/kg	SOLID	-	-																					
Quinalphos*	mg/kg	SOLID	-	-																					

Max of Normalised Results																												
					ML162-CR024	ML162-CR024	ML162-CR024	ML162-CR026	ML162-CR026	ML162-CR026	ML162-CR028	ML162-CR401	ML162-CR401	ML162-CR402	ML162-CR402	ML162-CR402	ML162-CR403	ML162-CR403	ML162-CR404	ML162-CR404	ML162-TP402	ML162-TP402	ML163-CP035	ML163-CP038	ML163-CP401	ML163-CP401	ML163-CP401	ML163-CR007
					M42 Coleshill North Viaduct	M42 Coleshill North Viaduct	M42 Coleshill North Viaduct	Gilson Embankment	Gilson Embankment	Gilson Embankment	M42 Coleshill North Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Gilson Embankment	Gilson Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Gilson Cutting	Gilson Cutting	Gilson Cutting	Gilson Embankment
					0.05	0.5	2.1	21.8	22.3	24.8	2.3	0.3	1	0.3	1	3	0.3	1	0.3	1	0.3	1	1	0.5	0.05	0.5	2	0.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	ALV	MMG	MMG	MMG	ALV	ALV	ALV	MGR	MGR	MGR	GFDMP	GFDMP	RTD2	RTD2	TOP	ALV	ALV	RTD1	TOP	GFDUD	GFDUD	GFDUD
Mepanipyrim*	mg/kg	SOLID	-	-															<0.0100									
Mephosfolan*	mg/kg	SOLID	-	-															<0.0100									
Mepronil*	mg/kg	SOLID	-	-															<0.0100									
Mercury	mg/kg	SOLID	58	30	<1.0000	<1.0000	<1.0000					<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<0.5000	<0.5000	<1.0000	<1.0000	<1.0000	<1.0000
Metaflumizone*	mg/kg	SOLID	-	-															<0.0100									
Metalaxyl*	mg/kg	SOLID	-	-															<0.0100									
Metamitron*	mg/kg	SOLID	-	-															<0.0100									
Metazachlor	mg/kg	SOLID	-	-															<0.0100									
Metconazole*	mg/kg	SOLID	-	-															<0.0100									
Methabenzthiazuran	mg/kg	SOLID	-	-															<0.0100									
Methacriphos	mg/kg	SOLID	-	-															<0.0100									
Methamidophos	mg/kg	SOLID	-	-															<0.0100									
Methidathion*	mg/kg	SOLID	-	-															<0.0100									
Methiocarb	mg/kg	SOLID	-	-															<0.0100									
Methiocarb sulfone*	mg/kg	SOLID	-	-															<0.0100									
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-															<0.0100									
Methomyl*	mg/kg	SOLID	-	-															<0.0100									
Methoxychlor	mg/kg	SOLID	-	-															<0.0100									
Methoxyfenozide*	mg/kg	SOLID	-	-															<0.0100									
Methyl Paraoxon*	mg/kg	SOLID	-	-															<0.0100									
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000																				<0.0010		<0.0100		
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																								
Methylparathion	mg/kg	SOLID	-	-															<0.0100									
Metobromuron*	mg/kg	SOLID	-	-															<0.0100									
Metolachlor	mg/kg	SOLID	-	-															<0.0100									
Metolcarb*	mg/kg	SOLID	-	-															<0.0100									
Metrafenone*	mg/kg	SOLID	-	-															<0.0100									
Metribuzin	mg/kg	SOLID	-	-															<0.0100									
Mevinphos	mg/kg	SOLID	-	-															<0.0100									
Mirex	mg/kg	SOLID	-	-															<0.0100									
Molinate	mg/kg	SOLID	-	-															<0.0100									
Monlinuran	mg/kg	SOLID	-	-															<0.0100									
Monocrotophos	mg/kg	SOLID	-	-															<1.0000									
Monuron	mg/kg	SOLID	-	-															<0.0100									
Myclobutanil*	mg/kg	SOLID	-	-															<0.0100									
Naphthalene1-methyl-	mg/kg	SOLID	-	-																								
Naphthalene-d8	%	SOLID	-	-																								
Napropamide	mg/kg	SOLID	-	-															<0.0100									
Napthalene	mg/kg	SOLID	190	1200	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0070	<0.1000	<0.1000	<0.1000	<0.1000
Natural Moisture Content 105C	%	SOLID	-	-																			7.5	8.1				
n-Butylbenzene	mg/kg	SOLID	-	-																				<0.0010				
Neburon*	mg/kg	SOLID	-	-															<0.0100									
Nickel	mg/kg	SOLID	980	800	9	20	32					22	31	10	14	100	15	11	16	10	5	7	10.6	6.9	16	13	18	13
Nitenpyram*	mg/kg	SOLID	-	-															<0.0100									
Nitrobenzene	mg/kg	SOLID	-	-																						<0.1000		
Nitrofen	mg/kg	SOLID	-	-															<0.0100									
Nitrothal isopropyl*	mg/kg	SOLID	-	-															<0.0100									
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																								
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																								
Non-Asbestos Fibre	N/A	SOLID	-	-																								
Non-Asbestos Fibre	No units	SOLID	-	-																								
Novaluron*	mg/kg	SOLID	-	-															<0.0100									
n-propylbenzene	mg/kg	SOLID	3900	36000																				<0.0010		<0.0500		
Nuarimol*	mg/kg	SOLID	-	-															<0.0100									
Number of Additional Peaks	mg/kg	SOLID	-	-																								
o,p - DDT	mg/kg	SOLID	-	-															<0.0100									
Octhilinone*	mg/kg	SOLID	-	-															<0.0100									
Ofurace*	mg/kg	SOLID	-	-															<0.0100									
Omethoate*	mg/kg	SOLID	-	-															<0.0100									
Organic matter	% M/M	SOLID	-	-																			0.69	0.64				
Organic matter	%	SOLID	-	-	5.7	0.4	0.4					0.9	2.1	12	12	5.1	1.4	2.1	3.2	0.7	1.5	<0.1000			3.1	1.6	<0.1000	0.7
Orysastrobin*	mg/kg	SOLID	-	-															<0.0100									
Oxadiargyl*	mg/kg	SOLID	-	-															<0.0100									
Oxadiazon*	mg/kg	SOLID	-	-															<0.0100									
Oxadixyl*	mg/kg	SOLID	-	-															<0.0100									
Oxamyl	mg/kg	SOLID	-	-															<0.0100									
Oxycarboxin*	mg/kg	SOLID	-	-															<0.0100									
Oxydisulfoton	mg/kg	SOLID	-	-															<0.0100									
Oxyfluorfen*	mg/kg	SOLID	-	-															<0.0100									
O-Xylene	mg/kg	SOLID	6600	17000	<0.0100	<0.0100	<0.0100					<0.0100	<0.0100	<0.0200	<0.0200	<0.0200	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0020	<0.0020	<0.0100	<0.0100	<0.0100	<0.0100
p,p - DDT	mg/kg	SOLID	-	-															<0.0100									
p,p-DDD*	mg/kg	SOLID	-	-															<0.0100									
Paclobutrazol*	mg/kg	SOLID	-	-															<0.0100									
PAH 17 Total	mg/kg	SOLID	-	-																								
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																								
PAH,Total	mg/kg	SOLID	-	-	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	0.2	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<1.3800	<1.3900	10	1.8	<0.1000	<0.1000
Paraoxon*	mg/kg	SOLID	-	-															<0.0100									
PCB 105	mg/kg	SOLID	-	-																								
PCB 114	mg/kg	SOLID	-	-																								
PCB 123	mg/kg	SOLID	-	-																								
PCB 126	mg/kg	SOLID	-	-																								
PCB 157	mg/kg	SOLID	-	-																								
PCB 167	mg/kg	SOLID	-	-																								
PCB 169	mg/kg	SOLID	-	-																								
PCB 189	mg/kg	SOLID	-	-																								
PCB 77	mg/kg	SOLID	-	-																								
PCB 81	mg/kg	SOLID	-	-																								
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																								
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																								
Penconazole*	mg/kg	SOLID	-	-															<0.0100									
Pencycuron*	mg/kg	SOLID	-	-															<0.0100									
Pendimethalin	mg/kg	SOLID	-	-															<0.0100									
Pentachloroaniline*	mg/kg	SOLID	-	-															<0.0100									
Pentachloronitrobenzene	mg/kg	SOLID	-	-															<0.0100									
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110															<0.0100							<0.1000		
Pentanochlor*	mg/kg	SOLID	-	-															<0.0100									
Permethrin	mg/kg	SOLID	-	-															<0.0100									
Perylene-d12	%	SOLID	-	-																								
Pethoxamid*	mg/kg	SOLID	-	-															<0.0100									
pH	pH Units	SOLID	-	-	5.6	6.7	7.3	8.7	9	8.9	7.2	7.8	7.8	8.4	8.5	7.6	7.1	7.3	6.2	6.9	6.5	8.6	8.1	7.4	7.4	7.7	6.9	7.3
pH	-	SOLID	-	-																								
Phenanthrene	mg/kg	SOLID	22000	6200	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	1.1	0.2	<0.1000	<0.1000
Phenanthrene-d10	%	SOLID	-	-																								
Phenmedipham*	mg/kg	SOLID	-	-															<0.0100									
Phenol	mg/kg	SOLID	440	440																						<0.1000		
Phenol	mg/kg	SOLID	-	-	<1.0000	<1.0000	<1.0000					<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000			<1.0000	<1.0000	<1.0000	<1.0000
Phenol (Monohydric)	mg/kg	SOLID	-	-																								
Phenol Index	mg/kg	SOLID	-	-																			<0.5000	<0.5000				
Phenothrin*	mg/kg	SOLID	-	-															<0.0100									
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-															<0.0100									
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-															<0.0100									
Phenthoate*	mg/kg	SOLID	-	-															<0.0100									
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-															<0.0100									
Phorate	mg/kg	SOLID	-	-															<0.0100									
Phorate sulfone*	mg/kg	SOLID	-	-															<0.0100									
Phorate sulfoxide*	mg/kg	SOLID	-	-															<0.0100									
Phosalone	mg/kg	SOLID	-	-															<0.0100									
Phosfolan*	mg/kg	SOLID	-	-															<0.0100									
Phosphamidon	mg/kg	SOLID	-	-															<0.0100									
Phosphorothioic acid	mg/kg	SOLID	-	-															<0.0100									
Phoxim*	mg/kg	SOLID	-	-															<0.0100									
Phthalimide*	mg/kg	SOLID	-	-															<0.0100									
Picoxystrobin*	mg/kg	SOLID	-	-															<0.0100									
Piperonyl Butoxide*	mg/kg	SOLID	-	-															<0.0100									
Pirimicarb	mg/kg	SOLID	-	-															<0.0100									
Pirimicarb desmethyl*	mg/kg	SOLID	-	-															<0.0100									
Pirimiphos-Ethyl	mg/kg	SOLID	-	-															<0.0100									
Pirimiphos-methyl	mg/kg	SOLID	-	-															<0.0100									
Pretilachlor*	mg/kg	SOLID	-	-															<0.0100									
Prochloraz*	mg/kg	SOLID	-	-															<0.0100									
Procymidone*	mg/kg	SOLID	-	-															<0.0100									
Profenofos*	mg/kg	SOLID	-	-															<0.0100									
Prometon	mg/kg	SOLID	-	-															<0.0100									
Prometryne	mg/kg	SOLID	-	-															<0.0100									
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-															<0.0100									
Propamocarb*	mg/kg	SOLID	-	-															<0.0100									
Propanil	mg/kg	SOLID	-	-															<0.0100									
Propaphos*	mg/kg	SOLID	-	-															<0.0100									
Propaquizafop*	mg/kg	SOLID	-	-															<0.0100									
Propargite	mg/kg	SOLID	-	-															<0.0100									
Propazine	mg/kg	SOLID	-	-															<0.0100									
Propetamphos	mg/kg	SOLID	-	-															<0.0100									
Propham	mg/kg	SOLID	-	-															<0.0100									
Propiconazole*	mg/kg	SOLID	-	-															<0.0100									
Propoxur*	mg/kg	SOLID	-	-															<0.0100									
Propyzamide	mg/kg	SOLID	-	-															<0.0100									
Proquinazid*	mg/kg	SOLID	-	-															<0.0100									
Prosulfocarb*	mg/kg	SOLID	-	-															<0.0100									
Prothioconazole desthio*	mg/kg	SOLID	-	-															<0.0100									
Pyraclostrobin*	mg/kg	SOLID	-	-															<0.0100									
Pyraflufen ethyl*	mg/kg	SOLID	-	-															<0.0100									
Pyrazophos*	mg/kg	SOLID	-	-															<0.0100									
Pyrene	mg/kg	SOLID	54000	15000	<0.1000	<0.1000	<0.1000					<0.1000	<0.1000	<1.0000	<1.0000	0.1	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.0900	1.4	0.2	<0.1000	<0.1000
Pyrethrin I*	mg/kg	SOLID	-	-															<0.0100									
Pyridaben*	mg/kg	SOLID	-	-															<0.0100									
Pyridaphenthion*	mg/kg	SOLID	-	-															<0.0100									
Pyrifenox*	mg/kg	SOLID	-	-															<0.0100									
Pyrimethanil*	mg/kg	SOLID	-	-															<0.0100									
Pyriproxyfen	mg/kg	SOLID	-	-															<0.0100									
Quinalphos*	mg/kg	SOLID	-	-															<0.0100									

Max of Normalised Results																											
					ML163-CR007	ML163-CR007	ML163-CR008	ML163-CR008	ML163-CR008	ML163-CR008	ML163-CR010	ML163-CR010	ML163-CR010	ML163-CR016	ML163-CR016	ML163-CR020	ML163-CR020	ML163-CR020	ML163-CR021a	ML163-CR021a	ML163-CR021a	ML163-CR401	ML163-CR401	ML163-CR401	ML163-TP009	ML163-TP020	ML163-TP021
					Gilson Embankment	Gilson Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Gilson Embankment	Gilson Embankment	Gilson Embankment	Gilson Cutting	Lichfield Road Embankment	Lichfield Road Embankment
					1	2	0.05	0.6	1.2	1.5	0.4	1.5	2	0.5	1	0.3	0.5	0.9	0.4	0.9	1.5	0.05	0.5	1	3.5	1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GLLD	GLLD	MGR	MGR	MGR	RTD1	MGR	RTD1	RTD1	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	ALV	TOP	ALV	ALV	MMG	GLLD	MGR
Mepanipyrim*	mg/kg	SOLID	-	-																							
Mephosfolan*	mg/kg	SOLID	-	-																							
Mepronil*	mg/kg	SOLID	-	-																							
Mercury	mg/kg	SOLID	58	30	<1.0000	<1.0000	<0.5200	<0.5000	<0.5000	<0.5000	<0.5100		<0.5000	<0.5000	<0.5000		<0.5000	<0.5000	<0.5000	<0.5100	<0.5000	<1.0000	<1.0000	<1.0000		<0.5000	<0.5000
Metaflumizone*	mg/kg	SOLID	-	-																							
Metalaxyl*	mg/kg	SOLID	-	-																							
Metamitron*	mg/kg	SOLID	-	-																							
Metazachlor	mg/kg	SOLID	-	-																							
Metconazole*	mg/kg	SOLID	-	-																							
Methabenzthiazuran	mg/kg	SOLID	-	-																							
Methacriphos	mg/kg	SOLID	-	-																							
Methamidophos	mg/kg	SOLID	-	-																							
Methidathion*	mg/kg	SOLID	-	-																							
Methiocarb	mg/kg	SOLID	-	-																							
Methiocarb sulfone*	mg/kg	SOLID	-	-																							
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																							
Methomyl*	mg/kg	SOLID	-	-																							
Methoxychlor	mg/kg	SOLID	-	-																							
Methoxyfenozide*	mg/kg	SOLID	-	-																							
Methyl Paraoxon*	mg/kg	SOLID	-	-																							
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000													<0.0010									<0.0010	<0.0010
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																							
Methylparathion	mg/kg	SOLID	-	-																							
Metobromuron*	mg/kg	SOLID	-	-																							
Metolachlor	mg/kg	SOLID	-	-																							
Metolcarb*	mg/kg	SOLID	-	-																							
Metrafenone*	mg/kg	SOLID	-	-																							
Metribuzin	mg/kg	SOLID	-	-																							
Mevinphos	mg/kg	SOLID	-	-																							
Mirex	mg/kg	SOLID	-	-																							
Molinate	mg/kg	SOLID	-	-																							
Monlinuran	mg/kg	SOLID	-	-																							
Monocrotophos	mg/kg	SOLID	-	-																							
Monuron	mg/kg	SOLID	-	-																							
Myclobutanil*	mg/kg	SOLID	-	-																							
Naphthalene1-methyl-	mg/kg	SOLID	-	-													<2.0000										
Naphthalene-d8	%	SOLID	-	-																							
Napropamide	mg/kg	SOLID	-	-																							
Napthalene	mg/kg	SOLID	190	1200	<0.1000	<0.1000	<0.0900	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	<0.0900		0.28	<0.0900	<0.0900	<0.1000	<0.0900	<0.1000	<0.1000	<0.1000		<0.0060	<0.0060
Natural Moisture Content 105C	%	SOLID	-	-			14.7	10.1	14.2	13.1	12.4		13.1	11.4	9.4		10.5	9.8	12.3	16.4	8.8					10.1	15.7
n-Butylbenzene	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
Neburon*	mg/kg	SOLID	-	-																							
Nickel	mg/kg	SOLID	980	800	28	19	9.5	7.3	7.9	7.9	11		10.7	7.2	3.9		15.9	4.7	27.3	11.2	8	12	11	57		6.2	9.8
Nitenpyram*	mg/kg	SOLID	-	-																							
Nitrobenzene	mg/kg	SOLID	-	-													<11.0000										
Nitrofen	mg/kg	SOLID	-	-																							
Nitrothal isopropyl*	mg/kg	SOLID	-	-																							
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-													<20.0000										
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-													<2.0000										
Non-Asbestos Fibre	N/A	SOLID	-	-																							
Non-Asbestos Fibre	No units	SOLID	-	-																							
Novaluron*	mg/kg	SOLID	-	-																							
n-propylbenzene	mg/kg	SOLID	3900	36000													<0.0010									<0.0010	<0.0010
Nuarimol*	mg/kg	SOLID	-	-																							
Number of Additional Peaks	mg/kg	SOLID	-	-																							
o,p - DDT	mg/kg	SOLID	-	-																							
Octhilinone*	mg/kg	SOLID	-	-																							
Ofurace*	mg/kg	SOLID	-	-																							
Omethoate*	mg/kg	SOLID	-	-																							
Organic matter	% M/M	SOLID	-	-			2.85	0.69	2.15	0.35	1.61		0.23	1.24	0.41		3.02	0.59	0.71	3.08	0.42					0.14	2.58
Organic matter	%	SOLID	-	-	0.5	<0.1000						0.4										2.7	1	0.2			
Orysastrobin*	mg/kg	SOLID	-	-																							
Oxadiargyl*	mg/kg	SOLID	-	-																							
Oxadiazon*	mg/kg	SOLID	-	-																							
Oxadixyl*	mg/kg	SOLID	-	-																							
Oxamyl	mg/kg	SOLID	-	-																							
Oxycarboxin*	mg/kg	SOLID	-	-																							
Oxydisulfoton	mg/kg	SOLID	-	-																							
Oxyfluorfen*	mg/kg	SOLID	-	-																							
O-Xylene	mg/kg	SOLID	6600	17000	<0.0100	<0.0100	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020		<0.0020	<0.0020	<0.0020		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0100	<0.0100	<0.0100		<0.0020	<0.0020
p,p - DDT	mg/kg	SOLID	-	-																							
p,p-DDD*	mg/kg	SOLID	-	-																							
Paclobutrazol*	mg/kg	SOLID	-	-																							
PAH 17 Total	mg/kg	SOLID	-	-																							
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																							
PAH,Total	mg/kg	SOLID	-	-	<0.1000	<0.1000	<3.8300	<1.4200	<1.4900	<1.4700			<1.4700	<1.4400	<17.5100		18.94	<1.4200	<1.4600	<3.9000	<1.4400	<0.1000	<0.1000	<0.1000		<1.4200	<1.6500
Paraoxon*	mg/kg	SOLID	-	-																							
PCB 105	mg/kg	SOLID	-	-																							
PCB 114	mg/kg	SOLID	-	-																							
PCB 123	mg/kg	SOLID	-	-																							
PCB 126	mg/kg	SOLID	-	-																							
PCB 157	mg/kg	SOLID	-	-																							
PCB 167	mg/kg	SOLID	-	-																							
PCB 169	mg/kg	SOLID	-	-																							
PCB 189	mg/kg	SOLID	-	-																							
PCB 77	mg/kg	SOLID	-	-																							
PCB 81	mg/kg	SOLID	-	-																							
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																							
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																							
Penconazole*	mg/kg	SOLID	-	-																							
Pencycuron*	mg/kg	SOLID	-	-																							
Pendimethalin	mg/kg	SOLID	-	-																							
Pentachloroaniline*	mg/kg	SOLID	-	-																							
Pentachloronitrobenzene	mg/kg	SOLID	-	-																							
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110													<11.0000										
Pentanochlor*	mg/kg	SOLID	-	-																							
Permethrin	mg/kg	SOLID	-	-																							
Perylene-d12	%	SOLID	-	-																							
Pethoxamid*	mg/kg	SOLID	-	-																							
pH	pH Units	SOLID	-	-	7.7	7.8	7.9	8	7.2	8.2	7.9		8	8.6	8.6		11.2	8.9	8.5	7.6	8.2	6.9	6.2	7	7.2	7.7	6.8
pH	-	SOLID	-	-																							
Phenanthrene	mg/kg	SOLID	22000	6200	<0.1000	<0.1000	0.28	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	0.86		3.34	<0.0900	<0.0900	0.5	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	<0.0900
Phenanthrene-d10	%	SOLID	-	-																							
Phenmedipham*	mg/kg	SOLID	-	-																							
Phenol	mg/kg	SOLID	440	440													<2.0000										
Phenol	mg/kg	SOLID	-	-	<1.0000	<1.0000																<1.0000	<1.0000	<1.0000			
Phenol (Monohydric)	mg/kg	SOLID	-	-																							
Phenol Index	mg/kg	SOLID	-	-			<0.6000	<0.6000	<0.6000	<0.6000	<0.6000		<0.6000	<0.6000	<0.6000		<0.6000	<0.6000	<0.6000	<0.6000	<0.5000					<0.6000	<0.6000
Phenothrin*	mg/kg	SOLID	-	-																							
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																							
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																							
Phenthoate*	mg/kg	SOLID	-	-																							
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																							
Phorate	mg/kg	SOLID	-	-																							
Phorate sulfone*	mg/kg	SOLID	-	-																							
Phorate sulfoxide*	mg/kg	SOLID	-	-																							
Phosalone	mg/kg	SOLID	-	-																							
Phosfolan*	mg/kg	SOLID	-	-																							
Phosphamidon	mg/kg	SOLID	-	-																							
Phosphorothioic acid	mg/kg	SOLID	-	-																							
Phoxim*	mg/kg	SOLID	-	-																							
Phthalimide*	mg/kg	SOLID	-	-																							
Picoxystrobin*	mg/kg	SOLID	-	-																							
Piperonyl Butoxide*	mg/kg	SOLID	-	-																							
Pirimicarb	mg/kg	SOLID	-	-																							
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																							
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																							
Pirimiphos-methyl	mg/kg	SOLID	-	-																							
Pretilachlor*	mg/kg	SOLID	-	-																							
Prochloraz*	mg/kg	SOLID	-	-																							
Procymidone*	mg/kg	SOLID	-	-																							
Profenofos*	mg/kg	SOLID	-	-																							
Prometon	mg/kg	SOLID	-	-																							
Prometryne	mg/kg	SOLID	-	-																							
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-																							
Propamocarb*	mg/kg	SOLID	-	-																							
Propanil	mg/kg	SOLID	-	-																							
Propaphos*	mg/kg	SOLID	-	-																							
Propaquizafop*	mg/kg	SOLID	-	-																							
Propargite	mg/kg	SOLID	-	-																							
Propazine	mg/kg	SOLID	-	-																							
Propetamphos	mg/kg	SOLID	-	-																							
Propham	mg/kg	SOLID	-	-																							
Propiconazole*	mg/kg	SOLID	-	-																							
Propoxur*	mg/kg	SOLID	-	-																							
Propyzamide	mg/kg	SOLID	-	-																							
Proquinazid*	mg/kg	SOLID	-	-																							
Prosulfocarb*	mg/kg	SOLID	-	-																							
Prothioconazole desthio*	mg/kg	SOLID	-	-																							
Pyraclostrobin*	mg/kg	SOLID	-	-																							
Pyraflufen ethyl*	mg/kg	SOLID	-	-																							
Pyrazophos*	mg/kg	SOLID	-	-																							
Pyrene	mg/kg	SOLID	54000	15000	<0.1000	<0.1000	0.52	<0.0900	<0.0900	<0.0900			<0.0900	<0.0900	2.15		2.64	<0.0900	<0.0900	0.51	<0.0900	<0.1000	<0.1000	<0.1000		<0.0900	0.1
Pyrethrin I*	mg/kg	SOLID	-	-																							
Pyridaben*	mg/kg	SOLID	-	-																							
Pyridaphenthion*	mg/kg	SOLID	-	-																							
Pyrifenox*	mg/kg	SOLID	-	-																							
Pyrimethanil*	mg/kg	SOLID	-	-																							
Pyriproxyfen	mg/kg	SOLID	-	-																							
Quinalphos*	mg/kg	SOLID	-	-																							

Max of Normalised Results																									
					ML163-TP021	ML164-CP003	ML164-CP003	ML164-CP003	ML164-CP004	ML164-CP004	ML164-CP004	ML164-CP010	ML164-CP010	ML164-CP021	ML164-CP021	ML164-CP021	ML164-CP023	ML164-CP023	ML164-CP036	ML164-CP036	ML164-CP036	ML164-CR009	ML164-CR009	ML164-CR009	ML164-CR011
					Lichfield Road Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watton House Embankment	Watton House Embankment	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct
					0.5	0.9	2	3.5	1	3	4	0.5	1	0.5	1	3	0.05	1.5	1	3	5	0.05	0.4	1.5	0.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	MGR	TILMP	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	ALV	MGR	MGR	MGR	MGR
Mepanipyrim*	mg/kg	SOLID	-	-																					
Mephosfolan*	mg/kg	SOLID	-	-																					
Mepronil*	mg/kg	SOLID	-	-																					
Mercury	mg/kg	SOLID	58	30	<0.5000	<0.5000	<0.5300	<0.5000	<0.5000	<0.5300	<0.5000	<0.5100	<0.5100	<0.5000		<0.5000	<0.5300	<0.5000	<0.5000	<0.5000	<0.6000	1.16	<0.5400	<0.5400	<0.5000
Metaflumizone*	mg/kg	SOLID	-	-																					
Metalaxyl*	mg/kg	SOLID	-	-																					
Metamitron*	mg/kg	SOLID	-	-																					
Metazachlor	mg/kg	SOLID	-	-																					
Metconazole*	mg/kg	SOLID	-	-																					
Methabenzthiazuran	mg/kg	SOLID	-	-																					
Methacriphos	mg/kg	SOLID	-	-																					
Methamidophos	mg/kg	SOLID	-	-																					
Methidathion*	mg/kg	SOLID	-	-																					
Methiocarb	mg/kg	SOLID	-	-																					
Methiocarb sulfone*	mg/kg	SOLID	-	-																					
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																					
Methomyl*	mg/kg	SOLID	-	-																					
Methoxychlor	mg/kg	SOLID	-	-																					
Methoxyfenozide*	mg/kg	SOLID	-	-																					
Methyl Paraoxon*	mg/kg	SOLID	-	-																					
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000	<0.0010		<0.0010			<0.0010										<0.0010					
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																					
Methylparathion	mg/kg	SOLID	-	-																					
Metobromuron*	mg/kg	SOLID	-	-																					
Metolachlor	mg/kg	SOLID	-	-																					
Metolcarb*	mg/kg	SOLID	-	-																					
Metrafenone*	mg/kg	SOLID	-	-																					
Metribuzin	mg/kg	SOLID	-	-																					
Mevinphos	mg/kg	SOLID	-	-																					
Mirex	mg/kg	SOLID	-	-																					
Molinate	mg/kg	SOLID	-	-																					
Monlinuran	mg/kg	SOLID	-	-																					
Monocrotophos	mg/kg	SOLID	-	-																					
Monuron	mg/kg	SOLID	-	-																					
Myclobutanil*	mg/kg	SOLID	-	-																					
Naphthalene1-methyl-	mg/kg	SOLID	-	-			0.5			<0.1000										<0.1000					
Naphthalene-d8	%	SOLID	-	-																					
Napropamide	mg/kg	SOLID	-	-																					
Napthalene	mg/kg	SOLID	190	1200	<0.0070	<0.0900	0.13	<0.0900	0.21	0.15	<0.1000	0.2	<0.0900	<0.0900		<0.0900		<0.0900	<0.0900	<0.0060	<0.1000	<0.1000	<0.0900	<0.0900	<0.0900
Natural Moisture Content 105C	%	SOLID	-	-	8.5	13.6	18.4	14.8	12.8	18.4	16.2	8.6	8.2	11		15	14.3	11.2	13.2	9.7	20.9	16.1	14.3	15.1	15
n-Butylbenzene	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
Neburon*	mg/kg	SOLID	-	-																					
Nickel	mg/kg	SOLID	980	800	5.6	25.4	21.7	35	20.2	23.7	16.6	32.8	20.7	16.1		18.4	9.7	7.8	31	20.1	37	39.2	24.2	30	25.9
Nitenpyram*	mg/kg	SOLID	-	-																					
Nitrobenzene	mg/kg	SOLID	-	-			<0.6000			<0.6000										<0.6000					
Nitrofen	mg/kg	SOLID	-	-																					
Nitrothal isopropyl*	mg/kg	SOLID	-	-																					
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-			<1.1000			<1.1000										<1.0000					
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-			<0.1000			<0.1000										<0.1000					
Non-Asbestos Fibre	N/A	SOLID	-	-																					
Non-Asbestos Fibre	No units	SOLID	-	-																					
Novaluron*	mg/kg	SOLID	-	-																					
n-propylbenzene	mg/kg	SOLID	3900	36000	<0.0010		<0.0010			<0.0010										<0.0010					
Nuarimol*	mg/kg	SOLID	-	-																					
Number of Additional Peaks	mg/kg	SOLID	-	-																					
o,p - DDT	mg/kg	SOLID	-	-																					
Octhilinone*	mg/kg	SOLID	-	-																					
Ofurace*	mg/kg	SOLID	-	-																					
Omethoate*	mg/kg	SOLID	-	-																					
Organic matter	% M/M	SOLID	-	-	0.66	1.34	1.42	0.22	1.74	2.24	1.39	4.39	3.5	0.95		0.49	3.7	0.29	3.91	3.15	0.89	6.15	3.86	4.75	2.34
Organic matter	%	SOLID	-	-											0.7										
Orysastrobin*	mg/kg	SOLID	-	-																					
Oxadiargyl*	mg/kg	SOLID	-	-																					
Oxadiazon*	mg/kg	SOLID	-	-																					
Oxadixyl*	mg/kg	SOLID	-	-																					
Oxamyl	mg/kg	SOLID	-	-																					
Oxycarboxin*	mg/kg	SOLID	-	-																					
Oxydisulfoton	mg/kg	SOLID	-	-																					
Oxyfluorfen*	mg/kg	SOLID	-	-																					
O-Xylene	mg/kg	SOLID	6600	17000	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.002	<0.0020	<0.0020	<0.0020	<0.0020		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0030	<0.0020	<0.0020	<0.0020	<0.0020
p,p - DDT	mg/kg	SOLID	-	-																					
p,p-DDD*	mg/kg	SOLID	-	-																					
Paclobutrazol*	mg/kg	SOLID	-	-																					
PAH 17 Total	mg/kg	SOLID	-	-																					
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																					
PAH,Total	mg/kg	SOLID	-	-	<1.4000	<9.3400	<16.5800	<1.5000	13.1	<14.8500	<8.2000	<2.2900	<1.9800	<1.7400		<1.5100		<1.4400	<7.8900	<2.2700	<1.8000	<7.1200	<3.9600	<10.0900	<5.2600
Paraoxon*	mg/kg	SOLID	-	-																					
PCB 105	mg/kg	SOLID	-	-																					
PCB 114	mg/kg	SOLID	-	-																					
PCB 123	mg/kg	SOLID	-	-																					
PCB 126	mg/kg	SOLID	-	-																					
PCB 157	mg/kg	SOLID	-	-																					
PCB 167	mg/kg	SOLID	-	-																					
PCB 169	mg/kg	SOLID	-	-																					
PCB 189	mg/kg	SOLID	-	-																					
PCB 77	mg/kg	SOLID	-	-																					
PCB 81	mg/kg	SOLID	-	-																					
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																					
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																					
Penconazole*	mg/kg	SOLID	-	-																					
Pencycuron*	mg/kg	SOLID	-	-																					
Pendimethalin	mg/kg	SOLID	-	-																					
Pentachloroaniline*	mg/kg	SOLID	-	-																					
Pentachloronitrobenzene	mg/kg	SOLID	-	-																					
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110			<0.6000			<0.6000										<0.6000					
Pentanochlor*	mg/kg	SOLID	-	-																					
Permethrin	mg/kg	SOLID	-	-																					
Perylene-d12	%	SOLID	-	-																					
Pethoxamid*	mg/kg	SOLID	-	-																					
pH	pH Units	SOLID	-	-	6.2	9.7	10.7	9.2	10.8	10.7	10.5	9.8	8.4	9.8		7.7	6.9	8.3	9.1	8.7	8.6	8	8.1	8.2	7.9
pH	-	SOLID	-	-																					
Phenanthrene	mg/kg	SOLID	22000	6200	<0.0900	0.53	33	<0.0900	0.84	1.88	0.87	0.16	0.1	<0.0900		<0.0900		<0.0900	0.8	0.21	0.11	0.33	0.15	0.19	0.14
Phenanthrene-d10	%	SOLID	-	-																					
Phenmedipham*	mg/kg	SOLID	-	-																					
Phenol	mg/kg	SOLID	440	440			<0.1000			<0.1000										<0.1000					
Phenol	mg/kg	SOLID	-	-																					
Phenol (Monohydric)	mg/kg	SOLID	-	-																					
Phenol Index	mg/kg	SOLID	-	-	<0.5000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.5000	<0.5400	<0.6000		<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000	<0.6000
Phenothrin*	mg/kg	SOLID	-	-																					
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																					
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																					
Phenthoate*	mg/kg	SOLID	-	-																					
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																					
Phorate	mg/kg	SOLID	-	-																					
Phorate sulfone*	mg/kg	SOLID	-	-																					
Phorate sulfoxide*	mg/kg	SOLID	-	-																					
Phosalone	mg/kg	SOLID	-	-																					
Phosfolan*	mg/kg	SOLID	-	-																					
Phosphamidon	mg/kg	SOLID	-	-																					
Phosphorothioic acid	mg/kg	SOLID	-	-																					
Phoxim*	mg/kg	SOLID	-	-																					
Phthalimide*	mg/kg	SOLID	-	-																					
Picoxystrobin*	mg/kg	SOLID	-	-																					
Piperonyl Butoxide*	mg/kg	SOLID	-	-																					
Pirimicarb	mg/kg	SOLID	-	-																					
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																					
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																					
Pirimiphos-methyl	mg/kg	SOLID	-	-																					
Pretilachlor*	mg/kg	SOLID	-	-																					
Prochloraz*	mg/kg	SOLID	-	-																					
Procymidone*	mg/kg	SOLID	-	-																					
Profenofos*	mg/kg	SOLID	-	-																					
Prometon	mg/kg	SOLID	-	-																					
Prometryne	mg/kg	SOLID	-	-																					
Propachlor (2-Chloro-N-(1-Methylethyl)-N-Phenylac	mg/kg	SOLID	-	-																					
Propamocarb*	mg/kg	SOLID	-	-																					
Propanil	mg/kg	SOLID	-	-																					
Propaphos*	mg/kg	SOLID	-	-																					
Propaquizafop*	mg/kg	SOLID	-	-																					
Propargite	mg/kg	SOLID	-	-																					
Propazine	mg/kg	SOLID	-	-																					
Propetamphos	mg/kg	SOLID	-	-																					
Propham	mg/kg	SOLID	-	-																					
Propiconazole*	mg/kg	SOLID	-	-																					
Propoxur*	mg/kg	SOLID	-	-																					
Propyzamide	mg/kg	SOLID	-	-																					
Proquinazid*	mg/kg	SOLID	-	-																					
Prosulfocarb*	mg/kg	SOLID	-	-																					
Prothioconazole desthio*	mg/kg	SOLID	-	-																					
Pyraclostrobin*	mg/kg	SOLID	-	-																					
Pyraflufen ethyl*	mg/kg	SOLID	-	-																					
Pyrazophos*	mg/kg	SOLID	-	-																					
Pyrene	mg/kg	SOLID	54000	15000	<0.0900	1.59	17	<0.0900	1.63	2.19	1.24	0.2	0.2	0.16		<0.0900		<0.0900	0.86	0.14	<0.1000	0.81	0.43	0.97	0.66
Pyrethrin I*	mg/kg	SOLID	-	-																					
Pyridaben*	mg/kg	SOLID	-	-																					
Pyridaphenthion*	mg/kg	SOLID	-	-																					
Pyrifenox*	mg/kg	SOLID	-	-																					
Pyrimethanil*	mg/kg	SOLID	-	-																					
Pyriproxyfen	mg/kg	SOLID	-	-																					
Quinalphos*	mg/kg	SOLID	-	-																					

Max of Normalised Results																									
					ML164-CR011	ML164-CR011	ML164-CR013	ML164-CR013	ML164-CR013	ML164-CR029	ML164-CR029	ML164-CR029	ML164-CR030	ML164-CR032	ML164-CR032	ML164-CR044	ML164-CR044	ML164-CR044	ML164-CR044	ML164-CR045	ML164-CR045	ML164-CR045	ML164-CR046a	ML164-CR046a	ML164-CR046a
					Watten House West Viaduct	Watten House West Viaduct	Watton House Embankment	Watton House Embankment	Watton House Embankment	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct
					0.75	1.1	0.2	1	4	0.35	3.2	4	0.9	0.5	1.2	0.5	1	2	2.5	0.8	1.2	3	0.8	1.2	2.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	RTD1	MGR	MGR	ALV	MGR	MGR	TILMP	RTD1	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	MGR
Mepanipyrim*	mg/kg	SOLID	-	-																					
Mephosfolan*	mg/kg	SOLID	-	-																					
Mepronil*	mg/kg	SOLID	-	-																					
Mercury	mg/kg	SOLID	58	30	<0.5000	<0.5000	<0.5100	<0.5000	0.8	<0.5000	<0.5100	<0.5000	<0.5000	<0.5000	<0.5000	<0.5100		<0.5700		<0.5000	<0.5000	<0.5000	<0.5200	<0.5000	<0.5000
Metaflumizone*	mg/kg	SOLID	-	-																					
Metalaxyl*	mg/kg	SOLID	-	-																					
Metamitron*	mg/kg	SOLID	-	-																					
Metazachlor	mg/kg	SOLID	-	-																					
Metconazole*	mg/kg	SOLID	-	-																					
Methabenzthiazuran	mg/kg	SOLID	-	-																					
Methacriphos	mg/kg	SOLID	-	-																					
Methamidophos	mg/kg	SOLID	-	-																					
Methidathion*	mg/kg	SOLID	-	-																					
Methiocarb	mg/kg	SOLID	-	-																					
Methiocarb sulfone*	mg/kg	SOLID	-	-																					
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																					
Methomyl*	mg/kg	SOLID	-	-																					
Methoxychlor	mg/kg	SOLID	-	-																					
Methoxyfenozide*	mg/kg	SOLID	-	-																					
Methyl Paraoxon*	mg/kg	SOLID	-	-																					
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000																					
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																					
Methylparathion	mg/kg	SOLID	-	-																					
Metobromuron*	mg/kg	SOLID	-	-																					
Metolachlor	mg/kg	SOLID	-	-																					
Metolcarb*	mg/kg	SOLID	-	-																					
Metrafenone*	mg/kg	SOLID	-	-																					
Metribuzin	mg/kg	SOLID	-	-																					
Mevinphos	mg/kg	SOLID	-	-																					
Mirex	mg/kg	SOLID	-	-																					
Molinate	mg/kg	SOLID	-	-																					
Monlinuran	mg/kg	SOLID	-	-																					
Monocrotophos	mg/kg	SOLID	-	-																					
Monuron	mg/kg	SOLID	-	-																					
Myclobutanil*	mg/kg	SOLID	-	-																					
Naphthalene1-methyl-	mg/kg	SOLID	-	-																					
Naphthalene-d8	%	SOLID	-	-																					
Napropamide	mg/kg	SOLID	-	-																					
Napthalene	mg/kg	SOLID	190	1200	<0.0900	<0.0900	<0.0900	1.35	<0.1100	0.1	<0.1000	<0.1000	<0.0800	<0.0900	<0.0900	<0.0900		<0.1100		<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000
Natural Moisture Content 105C	%	SOLID	-	-	9.8	9.2	15.3	16.3	29.7	12.2	17.3	18.3	5.2	13.2	13.9	11.1		27.1		13	13.1	13.7	18	20.3	16.7
n-Butylbenzene	mg/kg	SOLID	-	-																					
Neburon*	mg/kg	SOLID	-	-																					
Nickel	mg/kg	SOLID	980	800	9	7.2	40.5	19.4	48.6	15.8	17.68	35.9	6.7	16.3	9.6	23.6		39.6		26.5	30.9	15.8	21.8	28.9	18.9
Nitenpyram*	mg/kg	SOLID	-	-																					
Nitrobenzene	mg/kg	SOLID	-	-																					
Nitrofen	mg/kg	SOLID	-	-																					
Nitrothal isopropyl*	mg/kg	SOLID	-	-																					
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																					
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																					
Non-Asbestos Fibre	N/A	SOLID	-	-																					
Non-Asbestos Fibre	No units	SOLID	-	-																					
Novaluron*	mg/kg	SOLID	-	-																					
n-propylbenzene	mg/kg	SOLID	3900	36000																					
Nuarimol*	mg/kg	SOLID	-	-																					
Number of Additional Peaks	mg/kg	SOLID	-	-																					
o,p - DDT	mg/kg	SOLID	-	-																					
Octhilinone*	mg/kg	SOLID	-	-																					
Ofurace*	mg/kg	SOLID	-	-																					
Omethoate*	mg/kg	SOLID	-	-																					
Organic matter	% M/M	SOLID	-	-	1.75	0.47	20.5	1.53	3.96	1.31	0.46	0.2	0.29	6.13	0.53	3.03		3.34		1.44	0.28	0.34	1.86	2.53	0.51
Organic matter	%	SOLID	-	-													0.5		1.8						
Orysastrobin*	mg/kg	SOLID	-	-																					
Oxadiargyl*	mg/kg	SOLID	-	-																					
Oxadiazon*	mg/kg	SOLID	-	-																					
Oxadixyl*	mg/kg	SOLID	-	-																					
Oxamyl	mg/kg	SOLID	-	-																					
Oxycarboxin*	mg/kg	SOLID	-	-																					
Oxydisulfoton	mg/kg	SOLID	-	-																					
Oxyfluorfen*	mg/kg	SOLID	-	-																					
O-Xylene	mg/kg	SOLID	6600	17000	<0.0020	<0.0020	<0.0020	0.013	<0.0030	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020		<0.0030		<0.0020	<0.0020	<0.0020	0.013	0.013	<0.0020
p,p - DDT	mg/kg	SOLID	-	-																					
p,p-DDD*	mg/kg	SOLID	-	-																					
Paclobutrazol*	mg/kg	SOLID	-	-																					
PAH 17 Total	mg/kg	SOLID	-	-																					
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																					
PAH,Total	mg/kg	SOLID	-	-	<1.7800	<1.4100	<13.5900	<5.8900	<1.8900	52.71	<1.5800	<1.5700	<1.3500	<18.0000	<1.4900	<2.8200		<1.7600		<1.4700	<1.4700	<1.4800	<8.3300	<4.6500	<4.5500
Paraoxon*	mg/kg	SOLID	-	-																					
PCB 105	mg/kg	SOLID	-	-																					
PCB 114	mg/kg	SOLID	-	-																					
PCB 123	mg/kg	SOLID	-	-																					
PCB 126	mg/kg	SOLID	-	-																					
PCB 157	mg/kg	SOLID	-	-																					
PCB 167	mg/kg	SOLID	-	-																					
PCB 169	mg/kg	SOLID	-	-																					
PCB 189	mg/kg	SOLID	-	-																					
PCB 77	mg/kg	SOLID	-	-																					
PCB 81	mg/kg	SOLID	-	-																					
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																					
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																					
Penconazole*	mg/kg	SOLID	-	-																					
Pencycuron*	mg/kg	SOLID	-	-																					
Pendimethalin	mg/kg	SOLID	-	-																					
Pentachloroaniline*	mg/kg	SOLID	-	-																					
Pentachloronitrobenzene	mg/kg	SOLID	-	-																					
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110																					
Pentanochlor*	mg/kg	SOLID	-	-																					
Permethrin	mg/kg	SOLID	-	-																					
Perylene-d12	%	SOLID	-	-																					
Pethoxamid*	mg/kg	SOLID	-	-																					
pH	pH Units	SOLID	-	-	8.2	8.1	7.8	7.1	7.2	11	9.7	9.3	8.2	8.2	8.1	8.2		9		8.9	9	8.4	10.7	9.4	11.5
pH	-	SOLID	-	-																					
Phenanthrene	mg/kg	SOLID	22000	6200	<0.0900	<0.0900	0.39	1.74	<0.1100	4.31	<0.1000	<0.1000	<0.0800	0.76	<0.0900	0.09		<0.1100		<0.0900	<0.0900	<0.0900	700	0.46	0.44
Phenanthrene-d10	%	SOLID	-	-																					
Phenmedipham*	mg/kg	SOLID	-	-																					
Phenol	mg/kg	SOLID	440	440																					
Phenol	mg/kg	SOLID	-	-																					
Phenol (Monohydric)	mg/kg	SOLID	-	-																					
Phenol Index	mg/kg	SOLID	-	-	<0.6000	<0.6000	<0.6000	<0.6000	<0.7000	<0.6000	<0.6000	<0.6000	<0.5000	<0.6000	<0.6000	<0.6000		<0.7000		<0.6000	<0.6000	<0.6000	0.9	<0.6000	1.1
Phenothrin*	mg/kg	SOLID	-	-																					
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																					
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																					
Phenthoate*	mg/kg	SOLID	-	-																					
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																					
Phorate	mg/kg	SOLID	-	-																					
Phorate sulfone*	mg/kg	SOLID	-	-																					
Phorate sulfoxide*	mg/kg	SOLID	-	-																					
Phosalone	mg/kg	SOLID	-	-																					
Phosfolan*	mg/kg	SOLID	-	-																					
Phosphamidon	mg/kg	SOLID	-	-																					
Phosphorothioic acid	mg/kg	SOLID	-	-																					
Phoxim*	mg/kg	SOLID	-	-																					
Phthalimide*	mg/kg	SOLID	-	-																					
Picoxystrobin*	mg/kg	SOLID	-	-																					
Piperonyl Butoxide*	mg/kg	SOLID	-	-																					
Pirimicarb	mg/kg	SOLID	-	-																					
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																					
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																					
Pirimiphos-methyl	mg/kg	SOLID	-	-																					
Pretilachlor*	mg/kg	SOLID	-	-																					
Prochloraz*	mg/kg	SOLID	-	-																					
Procymidone*	mg/kg	SOLID	-	-																					
Profenofos*	mg/kg	SOLID	-	-																					
Prometon	mg/kg	SOLID	-	-																					
Prometryne	mg/kg	SOLID	-	-																					
Propachlor (2-Chloro-N-(1-Methylethyl)-N-Phenylac	mg/kg	SOLID	-	-																					
Propamocarb*	mg/kg	SOLID	-	-																					
Propanil	mg/kg	SOLID	-	-																					
Propaphos*	mg/kg	SOLID	-	-																					
Propaquizafop*	mg/kg	SOLID	-	-																					
Propargite	mg/kg	SOLID	-	-																					
Propazine	mg/kg	SOLID	-	-																					
Propetamphos	mg/kg	SOLID	-	-																					
Propham	mg/kg	SOLID	-	-																					
Propiconazole*	mg/kg	SOLID	-	-																					
Propoxur*	mg/kg	SOLID	-	-																					
Propyzamide	mg/kg	SOLID	-	-																					
Proquinazid*	mg/kg	SOLID	-	-																					
Prosulfocarb*	mg/kg	SOLID	-	-																					
Prothioconazole desthio*	mg/kg	SOLID	-	-																					
Pyraclostrobin*	mg/kg	SOLID	-	-																					
Pyraflufen ethyl*	mg/kg	SOLID	-	-																					
Pyrazophos*	mg/kg	SOLID	-	-																					
Pyrene	mg/kg	SOLID	54000	15000	0.13	<0.0900	2.26	0.1	0.11	9.78	<0.1000	<0.1000	<0.0800	2.68	<0.0900	0.3		<0.1100		<0.0900	<0.0900	<0.0900	1.27	690	670
Pyrethrin I*	mg/kg	SOLID	-	-																					
Pyridaben*	mg/kg	SOLID	-	-																					
Pyridaphenthion*	mg/kg	SOLID	-	-																					
Pyrifenox*	mg/kg	SOLID	-	-																					
Pyrimethanil*	mg/kg	SOLID	-	-																					
Pyriproxyfen	mg/kg	SOLID	-	-																					
Quinalphos*	mg/kg	SOLID	-	-																					

Max of Normalised Results																						
					ML164-CR404	ML164-CR404	ML164-CR404	ML164-TP011	ML164-TP011	ML164-TP015	ML164-TP015	ML164-TP015	ML164-TP015	NC120-CR401	NC120-CR401	NC137-CT401	NC137-CT401	NC145-CR401	NC145-CR401	ND000-CR001	ND000-CR001	ND000-CR020
					Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)
					0.05	0.5	7.2	0.7	2.5	0.05	0.35	1.1	1.7	0.3	1	0.5	1	0.1	0.5	0.5	2	0.4
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	RTD1	MGR	RTD1	GLLD	GLLD	RTD2	RTD2	RTD2	RTD2	TOP	GFDUD	MGR	MGR	MGR
Mepanipyrim*	mg/kg	SOLID	-	-																		
Mephosfolan*	mg/kg	SOLID	-	-																		
Mepronil*	mg/kg	SOLID	-	-																		
Mercury	mg/kg	SOLID	58	30	<1.0000	<1.0000	<1.0000	1.22	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<0.5000	<0.5400	<0.5500
Metaflumizone*	mg/kg	SOLID	-	-																		
Metalaxyl*	mg/kg	SOLID	-	-																		
Metamitron*	mg/kg	SOLID	-	-																		
Metazachlor	mg/kg	SOLID	-	-																		
Metconazole*	mg/kg	SOLID	-	-																		
Methabenzthiazuran	mg/kg	SOLID	-	-																		
Methacriphos	mg/kg	SOLID	-	-																		
Methamidophos	mg/kg	SOLID	-	-																		
Methidathion*	mg/kg	SOLID	-	-																		
Methiocarb	mg/kg	SOLID	-	-																		
Methiocarb sulfone*	mg/kg	SOLID	-	-																		
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																		
Methomyl*	mg/kg	SOLID	-	-																		
Methoxychlor	mg/kg	SOLID	-	-																		
Methoxyfenozide*	mg/kg	SOLID	-	-																		
Methyl Paraoxon*	mg/kg	SOLID	-	-																		
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000																		
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																		
Methylparathion	mg/kg	SOLID	-	-																		
Metobromuron*	mg/kg	SOLID	-	-																		
Metolachlor	mg/kg	SOLID	-	-																		
Metolcarb*	mg/kg	SOLID	-	-																		
Metrafenone*	mg/kg	SOLID	-	-																		
Metribuzin	mg/kg	SOLID	-	-																		
Mevinphos	mg/kg	SOLID	-	-																		
Mirex	mg/kg	SOLID	-	-																		
Molinate	mg/kg	SOLID	-	-																		
Monlinuran	mg/kg	SOLID	-	-																		
Monocrotophos	mg/kg	SOLID	-	-																		
Monuron	mg/kg	SOLID	-	-																		
Myclobutanil*	mg/kg	SOLID	-	-																		
Naphthalene1-methyl-	mg/kg	SOLID	-	-																		
Naphthalene-d8	%	SOLID	-	-																		
Napropamide	mg/kg	SOLID	-	-																		
Napthalene	mg/kg	SOLID	190	1200	0.1	<0.1000	<0.1000	0.1	<0.1000	0.82	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	<0.1000	<0.1000
Natural Moisture Content 105C	%	SOLID	-	-				21.8	18.8	10.9	6.3	10.6	15.4							7.4	17.2	19.9
n-Butylbenzene	mg/kg	SOLID	-	-																		
Neburon*	mg/kg	SOLID	-	-																		
Nickel	mg/kg	SOLID	980	800	43	36	34	77.4	58.3	5.6	4.6	6.6	18.3	13	12	6	6	14	15	18.7	24.1	26.8
Nitenpyram*	mg/kg	SOLID	-	-																		
Nitrobenzene	mg/kg	SOLID	-	-																		
Nitrofen	mg/kg	SOLID	-	-																		
Nitrothal isopropyl*	mg/kg	SOLID	-	-																		
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																		
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																		
Non-Asbestos Fibre	N/A	SOLID	-	-																		
Non-Asbestos Fibre	No units	SOLID	-	-																		
Novaluron*	mg/kg	SOLID	-	-																		
n-propylbenzene	mg/kg	SOLID	3900	36000																		
Nuarimol*	mg/kg	SOLID	-	-																		
Number of Additional Peaks	mg/kg	SOLID	-	-																		
o,p - DDT	mg/kg	SOLID	-	-																		
Octhilinone*	mg/kg	SOLID	-	-																		
Ofurace*	mg/kg	SOLID	-	-																		
Omethoate*	mg/kg	SOLID	-	-																		
Organic matter	% M/M	SOLID	-	-				35.4	0.59	2.72	0.56	0.17	0.11							1.08	2.2	3.09
Organic matter	%	SOLID	-	-	11	4.7	<0.1000							7.1	6.1	1.8	0.6	2.8	1.3			
Orysastrobin*	mg/kg	SOLID	-	-																		
Oxadiargyl*	mg/kg	SOLID	-	-																		
Oxadiazon*	mg/kg	SOLID	-	-																		
Oxadixyl*	mg/kg	SOLID	-	-																		
Oxamyl	mg/kg	SOLID	-	-																		
Oxycarboxin*	mg/kg	SOLID	-	-																		
Oxydisulfoton	mg/kg	SOLID	-	-																		
Oxyfluorfen*	mg/kg	SOLID	-	-																		
O-Xylene	mg/kg	SOLID	6600	17000	<0.0100	<0.0100	<0.0100	<0.0030	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0020	<0.0020	<0.0020
p,p - DDT	mg/kg	SOLID	-	-																		
p,p-DDD*	mg/kg	SOLID	-	-																		
Paclobutrazol*	mg/kg	SOLID	-	-																		
PAH 17 Total	mg/kg	SOLID	-	-																		
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																		
PAH,Total	mg/kg	SOLID	-	-	20	1.3	<0.1000	<3.5300	<1.5800	376.92	<1.3700	<1.4300	<1.5100	<0.1000	<0.1000	<0.1000	<0.1000	0.1	<0.1000	<1.3900	<9.9600	<2.9100
Paraoxon*	mg/kg	SOLID	-	-																		
PCB 105	mg/kg	SOLID	-	-																		
PCB 114	mg/kg	SOLID	-	-																		
PCB 123	mg/kg	SOLID	-	-																		
PCB 126	mg/kg	SOLID	-	-																		
PCB 157	mg/kg	SOLID	-	-																		
PCB 167	mg/kg	SOLID	-	-																		
PCB 169	mg/kg	SOLID	-	-																		
PCB 189	mg/kg	SOLID	-	-																		
PCB 77	mg/kg	SOLID	-	-																		
PCB 81	mg/kg	SOLID	-	-																		
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																		
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																		
Penconazole*	mg/kg	SOLID	-	-																		
Pencycuron*	mg/kg	SOLID	-	-																		
Pendimethalin	mg/kg	SOLID	-	-																		
Pentachloroaniline*	mg/kg	SOLID	-	-																		
Pentachloronitrobenzene	mg/kg	SOLID	-	-																		
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110																		
Pentanochlor*	mg/kg	SOLID	-	-																		
Permethrin	mg/kg	SOLID	-	-																		
Perylene-d12	%	SOLID	-	-																		
Pethoxamid*	mg/kg	SOLID	-	-																		
pH	pH Units	SOLID	-	-	8.2	8.1	8.2	7.9	8	6.7	7.2	7.5	7.6	6.1	6.2	6.7	5.4	6.4	6.7	8.3	8.4	8.8
pH	-	SOLID	-	-																		
Phenanthrene	mg/kg	SOLID	22000	6200	1.1	<0.1000	<0.1000	0.27	<0.1000	37.6	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	0.1	<0.1000	<0.0900	0.21	0.1
Phenanthrene-d10	%	SOLID	-	-																		
Phenmedipham*	mg/kg	SOLID	-	-																		
Phenol	mg/kg	SOLID	440	440																		
Phenol	mg/kg	SOLID	-	-	<1.0000	<1.0000	<1.0000							<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000			
Phenol (Monohydric)	mg/kg	SOLID	-	-																		
Phenol Index	mg/kg	SOLID	-	-				<0.6000	<0.6000	<0.6000	<0.5000	<0.6000	<0.6000							<0.5000	<0.6000	<0.6000
Phenothrin*	mg/kg	SOLID	-	-																		
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																		
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																		
Phenthoate*	mg/kg	SOLID	-	-																		
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																		
Phorate	mg/kg	SOLID	-	-																		
Phorate sulfone*	mg/kg	SOLID	-	-																		
Phorate sulfoxide*	mg/kg	SOLID	-	-																		
Phosalone	mg/kg	SOLID	-	-																		
Phosfolan*	mg/kg	SOLID	-	-																		
Phosphamidon	mg/kg	SOLID	-	-																		
Phosphorothioic acid	mg/kg	SOLID	-	-																		
Phoxim*	mg/kg	SOLID	-	-																		
Phthalimide*	mg/kg	SOLID	-	-																		
Picoxystrobin*	mg/kg	SOLID	-	-																		
Piperonyl Butoxide*	mg/kg	SOLID	-	-																		
Pirimicarb	mg/kg	SOLID	-	-																		
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																		
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																		
Pirimiphos-methyl	mg/kg	SOLID	-	-																		
Pretilachlor*	mg/kg	SOLID	-	-																		
Prochloraz*	mg/kg	SOLID	-	-																		
Procymidone*	mg/kg	SOLID	-	-																		
Profenofos*	mg/kg	SOLID	-	-																		
Prometon	mg/kg	SOLID	-	-																		
Prometryne	mg/kg	SOLID	-	-																		
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-																		
Propamocarb*	mg/kg	SOLID	-	-																		
Propanil	mg/kg	SOLID	-	-																		
Propaphos*	mg/kg	SOLID	-	-																		
Propaquizafop*	mg/kg	SOLID	-	-																		
Propargite	mg/kg	SOLID	-	-																		
Propazine	mg/kg	SOLID	-	-																		
Propetamphos	mg/kg	SOLID	-	-																		
Propham	mg/kg	SOLID	-	-																		
Propiconazole*	mg/kg	SOLID	-	-																		
Propoxur*	mg/kg	SOLID	-	-																		
Propyzamide	mg/kg	SOLID	-	-																		
Proquinazid*	mg/kg	SOLID	-	-																		
Prosulfocarb*	mg/kg	SOLID	-	-																		
Prothioconazole desthio*	mg/kg	SOLID	-	-																		
Pyraclostrobin*	mg/kg	SOLID	-	-																		
Pyraflufen ethyl*	mg/kg	SOLID	-	-																		
Pyrazophos*	mg/kg	SOLID	-	-																		
Pyrene	mg/kg	SOLID	54000	15000	3	0.2	<0.1000	0.37	<0.1000	61.1	<0.0900	<0.0900	<0.0900	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.0900	1.32	0.29
Pyrethrin I*	mg/kg	SOLID	-	-																		
Pyridaben*	mg/kg	SOLID	-	-																		
Pyridaphenthion*	mg/kg	SOLID	-	-																		
Pyrifenox*	mg/kg	SOLID	-	-																		
Pyrimethanil*	mg/kg	SOLID	-	-																		
Pyriproxyfen	mg/kg	SOLID	-	-																		
Quinalphos*	mg/kg	SOLID	-	-																		

Max of Normalised Results																	
					ND000-CR020	ND000-CR020	ND000-CR020	ND000-TP035	ND000-TP035	ND001-CP002	ND001-CP002	ND001-CP043	ND001-CP043	ND001-CP049	ND001-CP049	ND001-CR001	ND001-CR002
					Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Chattle Hill Box Structure	Chattle Hill Box Structure	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton No. 3 Viaduct
					1	4	5	0.4	0.8	0.5	1	0.5	2	0.4	0.6	0.5	0.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	RTD1	MGR	ALV	RTD1	RTD1	MGR	MGR	MGR	MGR
Mepanipyrim*	mg/kg	SOLID	-	-													
Mephosfolan*	mg/kg	SOLID	-	-													
Mepronil*	mg/kg	SOLID	-	-													
Mercury	mg/kg	SOLID	58	30	<0.5100	<0.5200	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000
Metaflumizone*	mg/kg	SOLID	-	-													
Metalaxyl*	mg/kg	SOLID	-	-													
Metamitron*	mg/kg	SOLID	-	-													
Metazachlor	mg/kg	SOLID	-	-													
Metconazole*	mg/kg	SOLID	-	-													
Methabenzthiazuran	mg/kg	SOLID	-	-													
Methacriphos	mg/kg	SOLID	-	-													
Methamidophos	mg/kg	SOLID	-	-													
Methidathion*	mg/kg	SOLID	-	-													
Methiocarb	mg/kg	SOLID	-	-													
Methiocarb sulfone*	mg/kg	SOLID	-	-													
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-													
Methomyl*	mg/kg	SOLID	-	-													
Methoxychlor	mg/kg	SOLID	-	-													
Methoxyfenozide*	mg/kg	SOLID	-	-													
Methyl Paraoxon*	mg/kg	SOLID	-	-													
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000													<0.0010
Methyl tert-pentyl ether	mg/kg	SOLID	-	-													
Methylparathion	mg/kg	SOLID	-	-													
Metobromuron*	mg/kg	SOLID	-	-													
Metolachlor	mg/kg	SOLID	-	-													
Metolcarb*	mg/kg	SOLID	-	-													
Metrafenone*	mg/kg	SOLID	-	-													
Metribuzin	mg/kg	SOLID	-	-													
Mevinphos	mg/kg	SOLID	-	-													
Mirex	mg/kg	SOLID	-	-													
Molinate	mg/kg	SOLID	-	-													
Monlinuran	mg/kg	SOLID	-	-													
Monocrotophos	mg/kg	SOLID	-	-													
Monuron	mg/kg	SOLID	-	-													
Myclobutanil*	mg/kg	SOLID	-	-													
Naphthalene1-methyl-	mg/kg	SOLID	-	-													
Naphthalene-d8	%	SOLID	-	-													
Napropamide	mg/kg	SOLID	-	-													
Napthalene	mg/kg	SOLID	190	1200	<0.0900	<0.0900	<0.0900	<0.0800	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0800	0.1	<0.0900	0.008
Natural Moisture Content 105C	%	SOLID	-	-	12.3	10.2	15.2	4.5	7.9	11.3	13.4	11.6	8.2	4.8	8	9.9	10.1
n-Butylbenzene	mg/kg	SOLID	-	-													<0.0010
Neburon*	mg/kg	SOLID	-	-													
Nickel	mg/kg	SOLID	980	800	14.2	14.26	13.7	11.4	9	8.3	5.8	8.7	6.5	19.6	28.3	13.4	13.4
Nitenpyram*	mg/kg	SOLID	-	-													
Nitrobenzene	mg/kg	SOLID	-	-													
Nitrofen	mg/kg	SOLID	-	-													
Nitrothal isopropyl*	mg/kg	SOLID	-	-													
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-													
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-													
Non-Asbestos Fibre	N/A	SOLID	-	-													
Non-Asbestos Fibre	No units	SOLID	-	-													
Novaluron*	mg/kg	SOLID	-	-													
n-propylbenzene	mg/kg	SOLID	3900	36000													<0.0010
Nuarimol*	mg/kg	SOLID	-	-													
Number of Additional Peaks	mg/kg	SOLID	-	-													
o,p - DDT	mg/kg	SOLID	-	-													
Octhilinone*	mg/kg	SOLID	-	-													
Ofurace*	mg/kg	SOLID	-	-													
Omethoate*	mg/kg	SOLID	-	-													
Organic matter	% M/M	SOLID	-	-	3.76	0.23	0.74	6.52	2.57	2.18	0.29	0.2	1.33	4.98	14.2	2.81	1.95
Organic matter	%	SOLID	-	-													
Orysastrobin*	mg/kg	SOLID	-	-													
Oxadiargyl*	mg/kg	SOLID	-	-													
Oxadiazon*	mg/kg	SOLID	-	-													
Oxadixyl*	mg/kg	SOLID	-	-													
Oxamyl	mg/kg	SOLID	-	-													
Oxycarboxin*	mg/kg	SOLID	-	-													
Oxydisulfoton	mg/kg	SOLID	-	-													
Oxyfluorfen*	mg/kg	SOLID	-	-													
O-Xylene	mg/kg	SOLID	6600	17000	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
p,p - DDT	mg/kg	SOLID	-	-													
p,p-DDD*	mg/kg	SOLID	-	-													
Paclobutrazol*	mg/kg	SOLID	-	-													
PAH 17 Total	mg/kg	SOLID	-	-													
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-													
PAH,Total	mg/kg	SOLID	-	-	<8.3800	<1.5300	<1.5100	<2.0000	<1.3900	<1.5000	<1.4800	<1.4500	<1.3900	<20.7000	54.88	<2.2600	<1.4600
Paraoxon*	mg/kg	SOLID	-	-													
PCB 105	mg/kg	SOLID	-	-													
PCB 114	mg/kg	SOLID	-	-													
PCB 123	mg/kg	SOLID	-	-													
PCB 126	mg/kg	SOLID	-	-													
PCB 157	mg/kg	SOLID	-	-													
PCB 167	mg/kg	SOLID	-	-													
PCB 169	mg/kg	SOLID	-	-													
PCB 189	mg/kg	SOLID	-	-													
PCB 77	mg/kg	SOLID	-	-													
PCB 81	mg/kg	SOLID	-	-													
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-													
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-													
Penconazole*	mg/kg	SOLID	-	-													
Pencycuron*	mg/kg	SOLID	-	-													
Pendimethalin	mg/kg	SOLID	-	-													
Pentachloroaniline*	mg/kg	SOLID	-	-													
Pentachloronitrobenzene	mg/kg	SOLID	-	-													
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110													
Pentanochlor*	mg/kg	SOLID	-	-													
Permethrin	mg/kg	SOLID	-	-													
Perylene-d12	%	SOLID	-	-													
Pethoxamid*	mg/kg	SOLID	-	-													
pH	pH Units	SOLID	-	-	8.8	8.4	8.3	7.9	6.4	8.2	8.6	11.4	10.3	8	8.4	8	8.9
pH	-	SOLID	-	-													
Phenanthrene	mg/kg	SOLID	22000	6200	0.41	0.1	<0.0900	<0.0800	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	690	6.79	0.09	0.09
Phenanthrene-d10	%	SOLID	-	-													
Phenmedipham*	mg/kg	SOLID	-	-													
Phenol	mg/kg	SOLID	440	440													
Phenol	mg/kg	SOLID	-	-													
Phenol (Monohydric)	mg/kg	SOLID	-	-													
Phenol Index	mg/kg	SOLID	-	-	<0.6000	<0.5600	<0.6000	<0.5000	<0.5000	<0.6000	<0.6000	<0.6000	<0.5000	<0.5000	<0.5000	1.9	<0.6000
Phenothrin*	mg/kg	SOLID	-	-													
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-													
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-													
Phenthoate*	mg/kg	SOLID	-	-													
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-													
Phorate	mg/kg	SOLID	-	-													
Phorate sulfone*	mg/kg	SOLID	-	-													
Phorate sulfoxide*	mg/kg	SOLID	-	-													
Phosalone	mg/kg	SOLID	-	-													
Phosfolan*	mg/kg	SOLID	-	-													
Phosphamidon	mg/kg	SOLID	-	-													
Phosphorothioic acid	mg/kg	SOLID	-	-													
Phoxim*	mg/kg	SOLID	-	-													
Phthalimide*	mg/kg	SOLID	-	-													
Picoxystrobin*	mg/kg	SOLID	-	-													
Piperonyl Butoxide*	mg/kg	SOLID	-	-													
Pirimicarb	mg/kg	SOLID	-	-													
Pirimicarb desmethyl*	mg/kg	SOLID	-	-													
Pirimiphos-Ethyl	mg/kg	SOLID	-	-													
Pirimiphos-methyl	mg/kg	SOLID	-	-													
Pretilachlor*	mg/kg	SOLID	-	-													
Prochloraz*	mg/kg	SOLID	-	-													
Procymidone*	mg/kg	SOLID	-	-													
Profenofos*	mg/kg	SOLID	-	-													
Prometon	mg/kg	SOLID	-	-													
Prometryne	mg/kg	SOLID	-	-													
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-													
Propamocarb*	mg/kg	SOLID	-	-													
Propanil	mg/kg	SOLID	-	-													
Propaphos*	mg/kg	SOLID	-	-													
Propaquizafop*	mg/kg	SOLID	-	-													
Propargite	mg/kg	SOLID	-	-													
Propazine	mg/kg	SOLID	-	-													
Propetamphos	mg/kg	SOLID	-	-													
Propham	mg/kg	SOLID	-	-													
Propiconazole*	mg/kg	SOLID	-	-													
Propoxur*	mg/kg	SOLID	-	-													
Propyzamide	mg/kg	SOLID	-	-													
Proquinazid*	mg/kg	SOLID	-	-													
Prosulfocarb*	mg/kg	SOLID	-	-													
Prothioconazole desthio*	mg/kg	SOLID	-	-													
Pyraclostrobin*	mg/kg	SOLID	-	-													
Pyraflufen ethyl*	mg/kg	SOLID	-	-													
Pyrazophos*	mg/kg	SOLID	-	-													
Pyrene	mg/kg	SOLID	54000	15000	1.08	0.12	<0.0900	0.15	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	2.13	8.92	0.2	<0.0900
Pyrethrin I*	mg/kg	SOLID	-	-													
Pyridaben*	mg/kg	SOLID	-	-													
Pyridaphenthion*	mg/kg	SOLID	-	-													
Pyrifenox*	mg/kg	SOLID	-	-													
Pyrimethanil*	mg/kg	SOLID	-	-													
Pyriproxyfen	mg/kg	SOLID	-	-													
Quinalphos*	mg/kg	SOLID	-	-													

Max of Normalised Results																									
					ND001-CR002	ND001-CR005	ND001-CR011	ND001-CR011	ND001-CR013	ND001-CR013	ND001-CR014	ND001-CR014	ND001-CR014	ND001-CR017	ND001-CR017	ND001-CR022	ND001-CR031	ND001-CR040	ND001-CR041	ND001-CR042	ND001-CR043	ND001-TP002	ND001-TP002	ND001-WS002	ND001-WS003
					Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct
					1.5	0.6	0.05	1.2	0.5	2	0.05	1.1	1.7	0.7	1.2	0.1	0.05	1.4	0.2	0.5	1	0.05	0.3	0.1	0.1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	TOP	RTD1	MGR	GFDUD	MGR	MGR	RTD1	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	MGR	MGR
Mepanipyrim*	mg/kg	SOLID	-	-																					
Mephosfolan*	mg/kg	SOLID	-	-																					
Mepronil*	mg/kg	SOLID	-	-																					
Mercury	mg/kg	SOLID	58	30	<0.5000		<0.5000	<0.5000	<0.5200	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5300	<0.5000	<0.5200	<0.5100
Metaflumizone*	mg/kg	SOLID	-	-																					
Metalaxyl*	mg/kg	SOLID	-	-																					
Metamitron*	mg/kg	SOLID	-	-																					
Metazachlor	mg/kg	SOLID	-	-																					
Metconazole*	mg/kg	SOLID	-	-																					
Methabenzthiazuran	mg/kg	SOLID	-	-																					
Methacriphos	mg/kg	SOLID	-	-																					
Methamidophos	mg/kg	SOLID	-	-																					
Methidathion*	mg/kg	SOLID	-	-																					
Methiocarb	mg/kg	SOLID	-	-																					
Methiocarb sulfone*	mg/kg	SOLID	-	-																					
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-																					
Methomyl*	mg/kg	SOLID	-	-																					
Methoxychlor	mg/kg	SOLID	-	-																					
Methoxyfenozide*	mg/kg	SOLID	-	-																					
Methyl Paraoxon*	mg/kg	SOLID	-	-																					
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000	<0.0010																			<0.0010	<0.0010
Methyl tert-pentyl ether	mg/kg	SOLID	-	-																					
Methylparathion	mg/kg	SOLID	-	-																					
Metobromuron*	mg/kg	SOLID	-	-																					
Metolachlor	mg/kg	SOLID	-	-																					
Metolcarb*	mg/kg	SOLID	-	-																					
Metrafenone*	mg/kg	SOLID	-	-																					
Metribuzin	mg/kg	SOLID	-	-																					
Mevinphos	mg/kg	SOLID	-	-																					
Mirex	mg/kg	SOLID	-	-																					
Molinate	mg/kg	SOLID	-	-																					
Monlinuran	mg/kg	SOLID	-	-																					
Monocrotophos	mg/kg	SOLID	-	-																					
Monuron	mg/kg	SOLID	-	-																					
Myclobutanil*	mg/kg	SOLID	-	-																					
Naphthalene1-methyl-	mg/kg	SOLID	-	-																					
Naphthalene-d8	%	SOLID	-	-																					
Napropamide	mg/kg	SOLID	-	-																					
Napthalene	mg/kg	SOLID	190	1200	<0.0070		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	<0.1000	<0.0900	<0.0060	<0.0060
Natural Moisture Content 105C	%	SOLID	-	-	12.7		13.9	6.1	15.1	7.5	6.8	10.5	9.4	12	14.9	14	10.5	9.7	8.3	11.1	11.8	18	7.8	14.8	14.7
n-Butylbenzene	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
Neburon*	mg/kg	SOLID	-	-																					
Nickel	mg/kg	SOLID	980	800	8.3		7	13.4	11	6.7	15	10.3	8.8	14.8	8.3	10.7	15.4	15.9	7.8	21.7	7.6	14.3	5.9	9.4	6.1
Nitenpyram*	mg/kg	SOLID	-	-																					
Nitrobenzene	mg/kg	SOLID	-	-																					
Nitrofen	mg/kg	SOLID	-	-																					
Nitrothal isopropyl*	mg/kg	SOLID	-	-																					
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-																					
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-																					
Non-Asbestos Fibre	N/A	SOLID	-	-																					
Non-Asbestos Fibre	No units	SOLID	-	-																					
Novaluron*	mg/kg	SOLID	-	-																					
n-propylbenzene	mg/kg	SOLID	3900	36000	<0.0010																			<0.0010	<0.0010
Nuarimol*	mg/kg	SOLID	-	-																					
Number of Additional Peaks	mg/kg	SOLID	-	-																					
o,p - DDT	mg/kg	SOLID	-	-																					
Octhilinone*	mg/kg	SOLID	-	-																					
Ofurace*	mg/kg	SOLID	-	-																					
Omethoate*	mg/kg	SOLID	-	-																					
Organic matter	% M/M	SOLID	-	-	0.76		4.53	0.29	3.61	0.22	5.59	0.85	0.25	1.31	0.84	5.07	2.85	0.2	0.5	1.58	0.23	4.82	0.83	4.42	4.25
Organic matter	%	SOLID	-	-																					
Orysastrobin*	mg/kg	SOLID	-	-																					
Oxadiargyl*	mg/kg	SOLID	-	-																					
Oxadiazon*	mg/kg	SOLID	-	-																					
Oxadixyl*	mg/kg	SOLID	-	-																					
Oxamyl	mg/kg	SOLID	-	-																					
Oxycarboxin*	mg/kg	SOLID	-	-																					
Oxydisulfoton	mg/kg	SOLID	-	-																					
Oxyfluorfen*	mg/kg	SOLID	-	-																					
O-Xylene	mg/kg	SOLID	6600	17000	<0.0020		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
p,p - DDT	mg/kg	SOLID	-	-																					
p,p-DDD*	mg/kg	SOLID	-	-																					
Paclobutrazol*	mg/kg	SOLID	-	-																					
PAH 17 Total	mg/kg	SOLID	-	-																					
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-																					
PAH,Total	mg/kg	SOLID	-	-	<1.4700		<1.4900	<1.3600	<1.5500	<1.3800	<1.3700	<3.7000	<1.4100	<1.4500	<1.5000	<1.5200	<2.9600	<1.4200	<1.4000	<17.1000	<1.4500	<1.6800	<1.3900	<1.5500	<1.5000
Paraoxon*	mg/kg	SOLID	-	-																					
PCB 105	mg/kg	SOLID	-	-																					
PCB 114	mg/kg	SOLID	-	-																					
PCB 123	mg/kg	SOLID	-	-																					
PCB 126	mg/kg	SOLID	-	-																					
PCB 157	mg/kg	SOLID	-	-																					
PCB 167	mg/kg	SOLID	-	-																					
PCB 169	mg/kg	SOLID	-	-																					
PCB 189	mg/kg	SOLID	-	-																					
PCB 77	mg/kg	SOLID	-	-																					
PCB 81	mg/kg	SOLID	-	-																					
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-																					
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-																					
Penconazole*	mg/kg	SOLID	-	-																					
Pencycuron*	mg/kg	SOLID	-	-																					
Pendimethalin	mg/kg	SOLID	-	-																					
Pentachloroaniline*	mg/kg	SOLID	-	-																					
Pentachloronitrobenzene	mg/kg	SOLID	-	-																					
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110																					
Pentanochlor*	mg/kg	SOLID	-	-																					
Permethrin	mg/kg	SOLID	-	-																					
Perylene-d12	%	SOLID	-	-																					
Pethoxamid*	mg/kg	SOLID	-	-																					
pH	pH Units	SOLID	-	-	8.6		7.8	8.4	7	8.3	8	9.7	8.4	6.6	6.5	7.6	7.6	8.7	7.6	11.6	9.2	7.3	7.9	7.2	5.9
pH	-	SOLID	-	-																					
Phenanthrene	mg/kg	SOLID	22000	6200	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.13	<0.0900	<0.0900	<0.0900	<0.0900	0.35	<0.0900	<0.0900	1.28	<0.0900	<0.1000	<0.0900	<0.0900	<0.0900
Phenanthrene-d10	%	SOLID	-	-																					
Phenmedipham*	mg/kg	SOLID	-	-																					
Phenol	mg/kg	SOLID	440	440																					
Phenol	mg/kg	SOLID	-	-																					
Phenol (Monohydric)	mg/kg	SOLID	-	-																					
Phenol Index	mg/kg	SOLID	-	-	<0.6000		<0.6000	<0.5000	<0.6000	<0.5000	<0.5000	<0.6000	<0.6000	<0.6000	0.8	<0.6000	<0.6000	<0.6000	<0.5000	<0.6000	<0.6000	<0.6000	<0.5000	<0.6000	<0.6000
Phenothrin*	mg/kg	SOLID	-	-																					
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-																					
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-																					
Phenthoate*	mg/kg	SOLID	-	-																					
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-																					
Phorate	mg/kg	SOLID	-	-																					
Phorate sulfone*	mg/kg	SOLID	-	-																					
Phorate sulfoxide*	mg/kg	SOLID	-	-																					
Phosalone	mg/kg	SOLID	-	-																					
Phosfolan*	mg/kg	SOLID	-	-																					
Phosphamidon	mg/kg	SOLID	-	-																					
Phosphorothioic acid	mg/kg	SOLID	-	-																					
Phoxim*	mg/kg	SOLID	-	-																					
Phthalimide*	mg/kg	SOLID	-	-																					
Picoxystrobin*	mg/kg	SOLID	-	-																					
Piperonyl Butoxide*	mg/kg	SOLID	-	-																					
Pirimicarb	mg/kg	SOLID	-	-																					
Pirimicarb desmethyl*	mg/kg	SOLID	-	-																					
Pirimiphos-Ethyl	mg/kg	SOLID	-	-																					
Pirimiphos-methyl	mg/kg	SOLID	-	-																					
Pretilachlor*	mg/kg	SOLID	-	-																					
Prochloraz*	mg/kg	SOLID	-	-																					
Procymidone*	mg/kg	SOLID	-	-																					
Profenofos*	mg/kg	SOLID	-	-																					
Prometon	mg/kg	SOLID	-	-																					
Prometryne	mg/kg	SOLID	-	-																					
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-																					
Propamocarb*	mg/kg	SOLID	-	-																					
Propanil	mg/kg	SOLID	-	-																					
Propaphos*	mg/kg	SOLID	-	-																					
Propaquizafop*	mg/kg	SOLID	-	-																					
Propargite	mg/kg	SOLID	-	-																					
Propazine	mg/kg	SOLID	-	-																					
Propetamphos	mg/kg	SOLID	-	-																					
Propham	mg/kg	SOLID	-	-																					
Propiconazole*	mg/kg	SOLID	-	-																					
Propoxur*	mg/kg	SOLID	-	-																					
Propyzamide	mg/kg	SOLID	-	-																					
Proquinazid*	mg/kg	SOLID	-	-																					
Prosulfocarb*	mg/kg	SOLID	-	-																					
Prothioconazole desthio*	mg/kg	SOLID	-	-																					
Pyraclostrobin*	mg/kg	SOLID	-	-																					
Pyraflufen ethyl*	mg/kg	SOLID	-	-																					
Pyrazophos*	mg/kg	SOLID	-	-																					
Pyrene	mg/kg	SOLID	54000	15000	<0.0900		<0.0900	<0.0900	<0.0900	<0.0900	<0.0900	0.41	<0.0900	<0.0900	<0.0900	0.09	0.38	<0.0900	<0.0900	3	<0.0900	0.11	<0.0900	0.11	<0.0900
Pyrethrin I*	mg/kg	SOLID	-	-																					
Pyridaben*	mg/kg	SOLID	-	-																					
Pyridaphenthion*	mg/kg	SOLID	-	-																					
Pyrifenox*	mg/kg	SOLID	-	-																					
Pyrimethanil*	mg/kg	SOLID	-	-																					
Pyriproxyfen	mg/kg	SOLID	-	-																					
Quinalphos*	mg/kg	SOLID	-	-																					

Max of Normalised Results								
					ND001-WS003	ND002-CP019	ND002-CR013	ND003-CR004
					Water Orton No. 3 Viaduct	Marsh Lane Embankment	Marsh Lane Embankment	Marsh Lane Embankment
					1.1	1.5	0.2	0.6
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	MGR	MGR
Mepanipyrim*	mg/kg	SOLID	-	-				
Mephosfolan*	mg/kg	SOLID	-	-				
Mepronil*	mg/kg	SOLID	-	-				
Mercury	mg/kg	SOLID	58	30	<0.5000	<0.6100	<0.5000	<0.6000
Metaflumizone*	mg/kg	SOLID	-	-				
Metalaxyl*	mg/kg	SOLID	-	-				
Metamitron*	mg/kg	SOLID	-	-				
Metazachlor	mg/kg	SOLID	-	-				
Metconazole*	mg/kg	SOLID	-	-				
Methabenzthiazuran	mg/kg	SOLID	-	-				
Methacriphos	mg/kg	SOLID	-	-				
Methamidophos	mg/kg	SOLID	-	-				
Methidathion*	mg/kg	SOLID	-	-				
Methiocarb	mg/kg	SOLID	-	-				
Methiocarb sulfone*	mg/kg	SOLID	-	-				
Methiocarb Sulfoxide*	mg/kg	SOLID	-	-				
Methomyl*	mg/kg	SOLID	-	-				
Methoxychlor	mg/kg	SOLID	-	-				
Methoxyfenozide*	mg/kg	SOLID	-	-				
Methyl Paraoxon*	mg/kg	SOLID	-	-				
Methyl tert-butyl ether (MTBE)	mg/kg	SOLID	7500	98000	<0.0010			
Methyl tert-pentyl ether	mg/kg	SOLID	-	-				
Methylparathion	mg/kg	SOLID	-	-				
Metobromuron*	mg/kg	SOLID	-	-				
Metolachlor	mg/kg	SOLID	-	-				
Metolcarb*	mg/kg	SOLID	-	-				
Metrafenone*	mg/kg	SOLID	-	-				
Metribuzin	mg/kg	SOLID	-	-				
Mevinphos	mg/kg	SOLID	-	-				
Mirex	mg/kg	SOLID	-	-				
Molinate	mg/kg	SOLID	-	-				
Monlinuran	mg/kg	SOLID	-	-				
Monocrotophos	mg/kg	SOLID	-	-				
Monuron	mg/kg	SOLID	-	-				
Myclobutanil*	mg/kg	SOLID	-	-				
Naphthalene1-methyl-	mg/kg	SOLID	-	-				
Naphthalene-d8	%	SOLID	-	-				
Napropamide	mg/kg	SOLID	-	-				
Napthalene	mg/kg	SOLID	190	1200	<0.0050	<0.1300	<0.1100	<0.1000
Natural Moisture Content 105C	%	SOLID	-	-	8.5	37.2	26.5	21.8
n-Butylbenzene	mg/kg	SOLID	-	-	<0.0010			
Neburon*	mg/kg	SOLID	-	-				
Nickel	mg/kg	SOLID	980	800	6.9	46.7	21.5	23
Nitenpyram*	mg/kg	SOLID	-	-				
Nitrobenzene	mg/kg	SOLID	-	-				
Nitrofen	mg/kg	SOLID	-	-				
Nitrothal isopropyl*	mg/kg	SOLID	-	-				
N-Nitroso-Di-N-Propylamine	mg/kg	SOLID	-	-				
N-Nitrosodiphenylamine*	mg/kg	SOLID	-	-				
Non-Asbestos Fibre	N/A	SOLID	-	-				
Non-Asbestos Fibre	No units	SOLID	-	-				
Novaluron*	mg/kg	SOLID	-	-				
n-propylbenzene	mg/kg	SOLID	3900	36000	<0.0010			
Nuarimol*	mg/kg	SOLID	-	-				
Number of Additional Peaks	mg/kg	SOLID	-	-				
o,p - DDT	mg/kg	SOLID	-	-				
Octhilinone*	mg/kg	SOLID	-	-				
Ofurace*	mg/kg	SOLID	-	-				
Omethoate*	mg/kg	SOLID	-	-				
Organic matter	% M/M	SOLID	-	-	0.48	3.17	5.31	1.44
Organic matter	%	SOLID	-	-				
Orysastrobin*	mg/kg	SOLID	-	-				
Oxadiargyl*	mg/kg	SOLID	-	-				
Oxadiazon*	mg/kg	SOLID	-	-				
Oxadixyl*	mg/kg	SOLID	-	-				
Oxamyl	mg/kg	SOLID	-	-				
Oxycarboxin*	mg/kg	SOLID	-	-				
Oxydisulfoton	mg/kg	SOLID	-	-				
Oxyfluorfen*	mg/kg	SOLID	-	-				
O-Xylene	mg/kg	SOLID	6600	17000	<0.0020	<0.0030	<0.0030	<0.0030
p,p - DDT	mg/kg	SOLID	-	-				
p,p-DDD*	mg/kg	SOLID	-	-				
Paclobutrazol*	mg/kg	SOLID	-	-				
PAH 17 Total	mg/kg	SOLID	-	-				
PAH, Total Detected USEPA 16	mg/kg	SOLID	-	-				
PAH,Total	mg/kg	SOLID	-	-	<1.4000	<2.0400	<1.7400	<1.6400
Paraoxon*	mg/kg	SOLID	-	-				
PCB 105	mg/kg	SOLID	-	-				
PCB 114	mg/kg	SOLID	-	-				
PCB 123	mg/kg	SOLID	-	-				
PCB 126	mg/kg	SOLID	-	-				
PCB 157	mg/kg	SOLID	-	-				
PCB 167	mg/kg	SOLID	-	-				
PCB 169	mg/kg	SOLID	-	-				
PCB 189	mg/kg	SOLID	-	-				
PCB 77	mg/kg	SOLID	-	-				
PCB 81	mg/kg	SOLID	-	-				
PCB-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	SOLID	-	-				
PCB-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	SOLID	-	-				
Penconazole*	mg/kg	SOLID	-	-				
Pencycuron*	mg/kg	SOLID	-	-				
Pendimethalin	mg/kg	SOLID	-	-				
Pentachloroaniline*	mg/kg	SOLID	-	-				
Pentachloronitrobenzene	mg/kg	SOLID	-	-				
Pentachlorophenol (PCP)	mg/kg	SOLID	400	110				
Pentanochlor*	mg/kg	SOLID	-	-				
Permethrin	mg/kg	SOLID	-	-				
Perylene-d12	%	SOLID	-	-				
Pethoxamid*	mg/kg	SOLID	-	-				
pH	pH Units	SOLID	-	-	6.8	8.2	6.8	8.2
pH	-	SOLID	-	-				
Phenanthrene	mg/kg	SOLID	22000	6200	<0.0900	<0.1300	<0.1100	<0.1000
Phenanthrene-d10	%	SOLID	-	-				
Phenmedipham*	mg/kg	SOLID	-	-				
Phenol	mg/kg	SOLID	440	440				
Phenol	mg/kg	SOLID	-	-				
Phenol (Monohydric)	mg/kg	SOLID	-	-				
Phenol Index	mg/kg	SOLID	-	-	<0.5000	<0.8000	<0.7000	<0.6000
Phenothrin*	mg/kg	SOLID	-	-				
Phenoxy Acetic acid herbicide: Fenoprop*	mg/kg	SOLID	-	-				
Phenoxy Acetic acid herbicide: MCPA*	mg/kg	SOLID	-	-				
Phenthoate*	mg/kg	SOLID	-	-				
Phenyl phosphonothioic acid	mg/kg	SOLID	-	-				
Phorate	mg/kg	SOLID	-	-				
Phorate sulfone*	mg/kg	SOLID	-	-				
Phorate sulfoxide*	mg/kg	SOLID	-	-				
Phosalone	mg/kg	SOLID	-	-				
Phosfolan*	mg/kg	SOLID	-	-				
Phosphamidon	mg/kg	SOLID	-	-				
Phosphorothioic acid	mg/kg	SOLID	-	-				
Phoxim*	mg/kg	SOLID	-	-				
Phthalimide*	mg/kg	SOLID	-	-				
Picoxystrobin*	mg/kg	SOLID	-	-				
Piperonyl Butoxide*	mg/kg	SOLID	-	-				
Pirimicarb	mg/kg	SOLID	-	-				
Pirimicarb desmethyl*	mg/kg	SOLID	-	-				
Pirimiphos-Ethyl	mg/kg	SOLID	-	-				
Pirimiphos-methyl	mg/kg	SOLID	-	-				
Pretilachlor*	mg/kg	SOLID	-	-				
Prochloraz*	mg/kg	SOLID	-	-				
Procymidone*	mg/kg	SOLID	-	-				
Profenofos*	mg/kg	SOLID	-	-				
Prometon	mg/kg	SOLID	-	-				
Prometryne	mg/kg	SOLID	-	-				
Propachlor (2-Chloro-N-(1-Methylethy)-N-Phenylac	mg/kg	SOLID	-	-				
Propamocarb*	mg/kg	SOLID	-	-				
Propanil	mg/kg	SOLID	-	-				
Propaphos*	mg/kg	SOLID	-	-				
Propaquizafop*	mg/kg	SOLID	-	-				
Propargite	mg/kg	SOLID	-	-				
Propazine	mg/kg	SOLID	-	-				
Propetamphos	mg/kg	SOLID	-	-				
Propham	mg/kg	SOLID	-	-				
Propiconazole*	mg/kg	SOLID	-	-				
Propoxur*	mg/kg	SOLID	-	-				
Propyzamide	mg/kg	SOLID	-	-				
Proquinazid*	mg/kg	SOLID	-	-				
Prosulfocarb*	mg/kg	SOLID	-	-				
Prothioconazole desthio*	mg/kg	SOLID	-	-				
Pyraclostrobin*	mg/kg	SOLID	-	-				
Pyraflufen ethyl*	mg/kg	SOLID	-	-				
Pyrazophos*	mg/kg	SOLID	-	-				
Pyrene	mg/kg	SOLID	54000	15000	<0.0900	<0.1300	<0.1100	<0.1000
Pyrethrin I*	mg/kg	SOLID	-	-				
Pyridaben*	mg/kg	SOLID	-	-				
Pyridaphenthion*	mg/kg	SOLID	-	-				
Pyrifenox*	mg/kg	SOLID	-	-				
Pyrimethanil*	mg/kg	SOLID	-	-				
Pyriproxyfen	mg/kg	SOLID	-	-				
Quinalphos*	mg/kg	SOLID	-	-				

Max of Normalised Results					Location ID	Asset	Sample Depth	Geology Code													
					BD161-CP028	BD161-CR008	BD161-CR008	BD161-CR010	BD161-TP002	BD161-TP008	BD161-TP035	BD161-TP036	BD161-WS003	BD161-WS003	BD162-CP044	BD162-CR003	BD162-CR020	BD162-CR020	BD162-TP003	BD163-CP043	BD163-CP043
					Coleshill No. 3 Embankment	Coleshill West Viaduct	Coleshill West Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Green Lane Embankment	Green Lane Embankment	Green Lane Embankment	Green Lane Embankment	Coleshill No. 3 Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment
					1.2	0.5	2	0.5	0.15	0.15	0.1	2	0.2	1.1	0.7	0.5	0.5	1	0.65	1	1.7
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TILMP	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	MGR	TILMP	MGR	TILMP	MGR	MGR	MGR
Quinoxyfen*	mg/kg	SOLID	-	-																	
Quizalofop-ethyl*	mg/kg	SOLID	-	-																	
Resmethrin*	mg/kg	SOLID	-	-																	
S421*	mg/kg	SOLID	-	-																	
Salmonella SPP	-	SOLID	-	-																	
Salmonella SPP	cfu/25g	SOLID	-	-																	
Secbumeton*	mg/kg	SOLID	-	-																	
Sec-Butylbenzene	mg/kg	SOLID	-	-					<0.0010		<0.0010										
Selenium	mg/kg	SOLID	12000	1800		<0.5000	<0.5000	0.6	<0.5000	<0.5000	1		<0.5000	<0.5000	0.5	<0.5000	<0.5000	0.6	<0.5000	<0.5000	
Silafluofen*	mg/kg	SOLID	-	-																	
Simazine	mg/kg	SOLID	-	-																	
Simeconazole*	mg/kg	SOLID	-	-																	
Spinetoram*	mg/kg	SOLID	-	-																	
Spinosad*	mg/kg	SOLID	-	-																	
Spirodiclofen*	mg/kg	SOLID	-	-																	
Spiromesifen*	mg/kg	SOLID	-	-																	
Spirotetramat*	mg/kg	SOLID	-	-																	
Spiroxamine*	mg/kg	SOLID	-	-																	
Styrene	mg/kg	SOLID	3200	5900					<0.0010		<0.0010										
Sulfallate	mg/kg	SOLID	-	-																	
Sulfentrazone*	mg/kg	SOLID	-	-																	
Sulfotep	mg/kg	SOLID	-	-																	
Sulphate	%	SOLID	-	-																	
Sulphate	g/l	SOLID	-	-																	
Sulphate as SO4	mg/kg	SOLID	-	-																	
Sulphur	%	SOLID	-	-																	
Sulprofos	mg/kg	SOLID	-	-																	
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																	
Tau-Fluvalinate*	mg/kg	SOLID	-	-																	
Tebuconazole*	mg/kg	SOLID	-	-																	
Tebufenozide*	mg/kg	SOLID	-	-																	
Tebufenpyrad*	mg/kg	SOLID	-	-																	
Tebupirimiphos*	mg/kg	SOLID	-	-																	
Tecnazene	mg/kg	SOLID	-	-																	
Teflubenzuron*	mg/kg	SOLID	-	-																	
Tefluthrin*	mg/kg	SOLID	-	-																	
Tempephos	mg/kg	SOLID	-	-																	
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-																	
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																	
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-					<0.0060		<0.0070										
Terbacil	mg/kg	SOLID	-	-																	
Terbufos	mg/kg	SOLID	-	-																	
Terbufos sulfone*	mg/kg	SOLID	-	-																	
Terbufos sulfoxide*	mg/kg	SOLID	-	-																	
Terbumeton*	mg/kg	SOLID	-	-																	
Terbuthylazine	mg/kg	SOLID	-	-																	
Terbutryn	mg/kg	SOLID	-	-																	
Terrazole	mg/kg	SOLID	-	-																	
Tert-Butylbenzene	mg/kg	SOLID	-	-					<0.0010		<0.0010										
Tetrachloroethene	mg/kg	SOLID	19	810					<0.0030		<0.0040										
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190					<0.0010		<0.0010										
Tetrachlorvinphos*	mg/kg	SOLID	-	-																	
Tetraconazole*	mg/kg	SOLID	-	-																	
Tetradifon*	mg/kg	SOLID	-	-																	
Tetramethrin*	mg/kg	SOLID	-	-																	
Tetrasul*	mg/kg	SOLID	-	-																	
Thiabendazole*	mg/kg	SOLID	-	-																	
Thiacloprid*	mg/kg	SOLID	-	-																	
Thiamethoxam*	mg/kg	SOLID	-	-																	
Thiazafluron*	mg/kg	SOLID	-	-																	
Thidiazuron*	mg/kg	SOLID	-	-																	
Thiobencarb*	mg/kg	SOLID	-	-																	
Thiocyclam*	mg/kg	SOLID	-	-																	
Thiodicarb*	mg/kg	SOLID	-	-																	
Thiofanox*	mg/kg	SOLID	-	-																	
Thiometon*	mg/kg	SOLID	-	-																	
Thiophanate Methyl*	mg/kg	SOLID	-	-																	
Tokuthion	mg/kg	SOLID	-	-																	
Tolclofos-methyl*	mg/kg	SOLID	-	-																	
Toluene	mg/kg	SOLID	56000	87000		0.01	<0.0060	<0.0060	<0.0060	<0.0060	<0.0070		<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0070	<0.0060	<0.0060	
Toluene-D8	%	SOLID	-	-																	
Tolylfluanid*	mg/kg	SOLID	-	-																	
Total BTEX	mg/kg	SOLID	-	-																	
Total Coliform count	CFU/g	SOLID	-	-																	
Total Organic Carbon	% M/M	SOLID	-	-		8.7	1.03	0.61	0.82	1.79	3.69		1.89	2.15	1.261	0.3	0.376	0.269	0.75	0.42	
Total Speciated Phenols	mg/kg	SOLID	-	-																	
Total SVOC TIC*	mg/kg	SOLID	-	-																	
Total VOC TIC*	mg/kg	SOLID	-	-																	
Traidimefon	mg/kg	SOLID	-	-																	
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700					<0.0010		<0.0010										
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-					<0.0010		<0.0010										
Triadimenol*	mg/kg	SOLID	-	-																	
Triallate	mg/kg	SOLID	-	-																	
Triazamate*	mg/kg	SOLID	-	-																	
Triazophos	mg/kg	SOLID	-	-																	
Tribenuron methyl*	mg/kg	SOLID	-	-																	
Tribromomethane	mg/kg	SOLID	710	4100					<0.0010		<0.0010										
Trichloroethene	mg/kg	SOLID	1.2	70					<0.0010		<0.0010										
Trichlorofluoromethane	mg/kg	SOLID	-	-					<0.0010		<0.0010										
Tridemorph*	mg/kg	SOLID	-	-																	
Trietazine	mg/kg	SOLID	-	-																	
Trifloxystrobin*	mg/kg	SOLID	-	-																	
Triflumizole*	mg/kg	SOLID	-	-																	
Triflumuron*	mg/kg	SOLID	-	-																	
Trifluralin	mg/kg	SOLID	-	-																	
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																	
Triforine*	mg/kg	SOLID	-	-																	
Triticonazole*	mg/kg	SOLID	-	-																	
Trivalent Chromium	mg/kg	SOLID	8600	33000																	
Uniconazole*	mg/kg	SOLID	-	-																	
Vamidothion*	mg/kg	SOLID	-	-																	
Vanadium	mg/kg	SOLID	9000	5000		51.4	32.2	<0.6000	24.1	17.2	76		17.8	21	12.4	30.9	26.9	45.7	22.3	24.7	
Vernolate	mg/kg	SOLID	-	-																	
Vinclozolin*	mg/kg	SOLID	-	-																	
Water Soluble Boron*	mg/kg	SOLID	-	-																	
Xylene	mg/kg	SOLID	-	-		0.012	<0.0070	<0.0070	<0.0070	<0.0070	<0.0080		<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0090	<0.0070	<0.0070	
Xylenols	mg/kg	SOLID	-	-																	
Zinc	mg/kg	SOLID	730000	170000		360	56.5	74.4	69.6	59.1	238.2		62.5	85	29.3	53.6	47.4	92	41.8	57	
Zoxamide*	mg/kg	SOLID	-	-																	

Max of Normalised Results																									
					BD163-CP043	BD163-CP043	BD163-CP043	BD163-CR006	BD163-CR014	BD163-CR014	BD163-CR014	BD163-CR022	BD163-CR022	BD163-CR022	BD163-TP013	BD163-TP013a	BD163-TP016	BD163-TP016	BD163-WS001	BD163-WS001	BD164-CR011	BS161-CP401	BS161-CP401	BS161-CP401	BS161-CP401
					Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Green Lane Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Green Lane Embankment	Green Lane Embankment	Water Orton Cutting	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment
					2	3	5	0.8	0.5	2	4	7	9	12.8	0.8	1.5	0.6	2.3	0.2	0.5	0.7	0.05	0.3	0.5	1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	TOP	RTD2	RTD2	RTD2
Quinoxyfen*	mg/kg	SOLID	-	-																					
Quizalofop-ethyl*	mg/kg	SOLID	-	-																					
Resmethrin*	mg/kg	SOLID	-	-																					
S421*	mg/kg	SOLID	-	-																					
Salmonella SPP	-	SOLID	-	-																					
Salmonella SPP	cfu/25g	SOLID	-	-																					
Secbumeton*	mg/kg	SOLID	-	-																					
Sec-Butylbenzene	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
Selenium	mg/kg	SOLID	12000	1800		<0.5000	<0.5000	<0.5000	<0.6000	<0.5000	0.7	0.8	<0.6000	0.8	<0.5000	<0.5000	<0.5000	<0.5000	<0.6000	<0.5000	<0.5000	<3.0000	<3.0000	<3.0000	<3.0000
Silafluofen*	mg/kg	SOLID	-	-																					
Simazine	mg/kg	SOLID	-	-																					
Simeconazole*	mg/kg	SOLID	-	-																					
Spinetoram*	mg/kg	SOLID	-	-																					
Spinosad*	mg/kg	SOLID	-	-																					
Spirodiclofen*	mg/kg	SOLID	-	-																					
Spiromesifen*	mg/kg	SOLID	-	-																					
Spirotetramat*	mg/kg	SOLID	-	-																					
Spiroxamine*	mg/kg	SOLID	-	-																					
Styrene	mg/kg	SOLID	3200	5900																		<0.0500		<0.0500	
Sulfallate	mg/kg	SOLID	-	-																					
Sulfentrazone*	mg/kg	SOLID	-	-																					
Sulfotep	mg/kg	SOLID	-	-																					
Sulphate	%	SOLID	-	-																					
Sulphate	g/l	SOLID	-	-																					
Sulphate as SO4	mg/kg	SOLID	-	-																					
Sulphur	%	SOLID	-	-																					
Sulprofos	mg/kg	SOLID	-	-																					
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																					
Tau-Fluvalinate*	mg/kg	SOLID	-	-																					
Tebuconazole*	mg/kg	SOLID	-	-																					
Tebufenozide*	mg/kg	SOLID	-	-																					
Tebufenpyrad*	mg/kg	SOLID	-	-																					
Tebupirimiphos*	mg/kg	SOLID	-	-																					
Tecnazene	mg/kg	SOLID	-	-																					
Teflubenzuron*	mg/kg	SOLID	-	-																					
Tefluthrin*	mg/kg	SOLID	-	-																					
Tempephos	mg/kg	SOLID	-	-																					
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-																		<10.0000		<10.0000	
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																					
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-																					
Terbacil	mg/kg	SOLID	-	-																					
Terbufos	mg/kg	SOLID	-	-																					
Terbufos sulfone*	mg/kg	SOLID	-	-																					
Terbufos sulfoxide*	mg/kg	SOLID	-	-																					
Terbumeton*	mg/kg	SOLID	-	-																					
Terbuthylazine	mg/kg	SOLID	-	-																					
Terbutryn	mg/kg	SOLID	-	-																					
Terrazole	mg/kg	SOLID	-	-																					
Tert-Butylbenzene	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
Tetrachloroethene	mg/kg	SOLID	19	810																		<0.0500		<0.0500	
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190																		<0.0500		<0.0500	
Tetrachlorvinphos*	mg/kg	SOLID	-	-																					
Tetraconazole*	mg/kg	SOLID	-	-																					
Tetradifon*	mg/kg	SOLID	-	-																					
Tetramethrin*	mg/kg	SOLID	-	-																					
Tetrasul*	mg/kg	SOLID	-	-																					
Thiabendazole*	mg/kg	SOLID	-	-																					
Thiacloprid*	mg/kg	SOLID	-	-																					
Thiamethoxam*	mg/kg	SOLID	-	-																					
Thiazafluron*	mg/kg	SOLID	-	-																					
Thidiazuron*	mg/kg	SOLID	-	-																					
Thiobencarb*	mg/kg	SOLID	-	-																					
Thiocyclam*	mg/kg	SOLID	-	-																					
Thiodicarb*	mg/kg	SOLID	-	-																					
Thiofanox*	mg/kg	SOLID	-	-																					
Thiometon*	mg/kg	SOLID	-	-																					
Thiophanate Methyl*	mg/kg	SOLID	-	-																					
Tokuthion	mg/kg	SOLID	-	-																					
Tolclofos-methyl*	mg/kg	SOLID	-	-																					
Toluene	mg/kg	SOLID	56000	87000		<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0070	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0100	<0.0100	<0.0100	<0.0100
Toluene-D8	%	SOLID	-	-																					
Tolylfluanid*	mg/kg	SOLID	-	-																					
Total BTEX	mg/kg	SOLID	-	-																		<0.0400	<0.0400	<0.0400	<0.0400
Total Coliform count	CFU/g	SOLID	-	-																					
Total Organic Carbon	% M/M	SOLID	-	-		0.22	0.86	0.26	1.2	0.38	0.25	0.62	0.34	0.16	0.625	1.03	0.269	0.252	0.82	0.69	0.713				
Total Speciated Phenols	mg/kg	SOLID	-	-																					
Total SVOC TIC*	mg/kg	SOLID	-	-																					
Total VOC TIC*	mg/kg	SOLID	-	-																					
Traidimefon	mg/kg	SOLID	-	-																					
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700																		<0.0500		<0.0500	
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
Triadimenol*	mg/kg	SOLID	-	-																					
Triallate	mg/kg	SOLID	-	-																					
Triazamate*	mg/kg	SOLID	-	-																					
Triazophos	mg/kg	SOLID	-	-																					
Tribenuron methyl*	mg/kg	SOLID	-	-																					
Tribromomethane	mg/kg	SOLID	710	4100																		<0.0500		<0.0500	
Trichloroethene	mg/kg	SOLID	1.2	70																		<0.0500		<0.0500	
Trichlorofluoromethane	mg/kg	SOLID	-	-																		<0.0500		<0.0500	
Tridemorph*	mg/kg	SOLID	-	-																					
Trietazine	mg/kg	SOLID	-	-																					
Trifloxystrobin*	mg/kg	SOLID	-	-																					
Triflumizole*	mg/kg	SOLID	-	-																					
Triflumuron*	mg/kg	SOLID	-	-																					
Trifluralin	mg/kg	SOLID	-	-																					
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																					
Triforine*	mg/kg	SOLID	-	-																					
Triticonazole*	mg/kg	SOLID	-	-																					
Trivalent Chromium	mg/kg	SOLID	8600	33000																		18	19	22	22
Uniconazole*	mg/kg	SOLID	-	-																					
Vamidothion*	mg/kg	SOLID	-	-																					
Vanadium	mg/kg	SOLID	9000	5000		31	28.4	43.1	26	30.6	32.7	29.5	34.3	33	18.4	28.9	25	29.7	22.3	18	30.4	19	20	25	19
Vernolate	mg/kg	SOLID	-	-																					
Vinclozolin*	mg/kg	SOLID	-	-																					
Water Soluble Boron*	mg/kg	SOLID	-	-																					
Xylene	mg/kg	SOLID	-	-		<0.0070	<0.0070	<0.0070	<0.0080	<0.0070	<0.0080	<0.0070	<0.0080	<0.0080	<0.0070	<0.0070	<0.0080	<0.0070	<0.0080	<0.0070	<0.0070				
Xylenols	mg/kg	SOLID	-	-																					
Zinc	mg/kg	SOLID	730000	170000		69.6	64.2	52.8	84.6	68.6	77	79.9	71.8	73.1	47.6	66.7	62.9	70.1	61.4	53.5	81.5	64	68	35	38
Zoxamide*	mg/kg	SOLID	-	-																					

Max of Normalised Results					
					BS161-CP401
					Coleshill No. 3 Embankment
					2.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD2
Quinoxyfen*	mg/kg	SOLID	-	-	
Quizalofop-ethyl*	mg/kg	SOLID	-	-	
Resmethrin*	mg/kg	SOLID	-	-	
S421*	mg/kg	SOLID	-	-	
Salmonella SPP	-	SOLID	-	-	
Salmonella SPP	cfu/25g	SOLID	-	-	
Secbumeton*	mg/kg	SOLID	-	-	
Sec-Butylbenzene	mg/kg	SOLID	-	-	<0.0500
Selenium	mg/kg	SOLID	12000	1800	<3.0000
Silafluofen*	mg/kg	SOLID	-	-	
Simazine	mg/kg	SOLID	-	-	
Simeconazole*	mg/kg	SOLID	-	-	
Spinetoram*	mg/kg	SOLID	-	-	
Spinosad*	mg/kg	SOLID	-	-	
Spirodiclofen*	mg/kg	SOLID	-	-	
Spiromesifen*	mg/kg	SOLID	-	-	
Spirotetramat*	mg/kg	SOLID	-	-	
Spiroxamine*	mg/kg	SOLID	-	-	
Styrene	mg/kg	SOLID	3200	5900	<0.0500
Sulfallate	mg/kg	SOLID	-	-	
Sulfentrazone*	mg/kg	SOLID	-	-	
Sulfotep	mg/kg	SOLID	-	-	
Sulphate	%	SOLID	-	-	
Sulphate	g/l	SOLID	-	-	
Sulphate as SO4	mg/kg	SOLID	-	-	
Sulphur	%	SOLID	-	-	
Sulprofos	mg/kg	SOLID	-	-	
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-	
Tau-Fluvalinate*	mg/kg	SOLID	-	-	
Tebuconazole*	mg/kg	SOLID	-	-	
Tebufenozide*	mg/kg	SOLID	-	-	
Tebufenpyrad*	mg/kg	SOLID	-	-	
Tebupirimiphos*	mg/kg	SOLID	-	-	
Tecnazene	mg/kg	SOLID	-	-	
Teflubenzuron*	mg/kg	SOLID	-	-	
Tefluthrin*	mg/kg	SOLID	-	-	
Tempephos	mg/kg	SOLID	-	-	
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-	<10.0000
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-	
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-	
Terbacil	mg/kg	SOLID	-	-	
Terbufos	mg/kg	SOLID	-	-	
Terbufos sulfone*	mg/kg	SOLID	-	-	
Terbufos sulfoxide*	mg/kg	SOLID	-	-	
Terbumeton*	mg/kg	SOLID	-	-	
Terbuthylazine	mg/kg	SOLID	-	-	
Terbutryn	mg/kg	SOLID	-	-	
Terrazole	mg/kg	SOLID	-	-	
Tert-Butylbenzene	mg/kg	SOLID	-	-	<0.0500
Tetrachloroethene	mg/kg	SOLID	19	810	<0.0500
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190	<0.0500
Tetrachlorvinphos*	mg/kg	SOLID	-	-	
Tetraconazole*	mg/kg	SOLID	-	-	
Tetradifon*	mg/kg	SOLID	-	-	
Tetramethrin*	mg/kg	SOLID	-	-	
Tetrasul*	mg/kg	SOLID	-	-	
Thiabendazole*	mg/kg	SOLID	-	-	
Thiacloprid*	mg/kg	SOLID	-	-	
Thiamethoxam*	mg/kg	SOLID	-	-	
Thiazafluron*	mg/kg	SOLID	-	-	
Thidiazuron*	mg/kg	SOLID	-	-	
Thiobencarb*	mg/kg	SOLID	-	-	
Thiocyclam*	mg/kg	SOLID	-	-	
Thiodicarb*	mg/kg	SOLID	-	-	
Thiofanox*	mg/kg	SOLID	-	-	
Thiometon*	mg/kg	SOLID	-	-	
Thiophanate Methyl*	mg/kg	SOLID	-	-	
Tokuthion	mg/kg	SOLID	-	-	
Tolclofos-methyl*	mg/kg	SOLID	-	-	
Toluene	mg/kg	SOLID	56000	87000	<0.0100
Toluene-D8	%	SOLID	-	-	
Tolylfluanid*	mg/kg	SOLID	-	-	
Total BTEX	mg/kg	SOLID	-	-	<0.0400
Total Coliform count	CFU/g	SOLID	-	-	
Total Organic Carbon	% M/M	SOLID	-	-	
Total Speciated Phenols	mg/kg	SOLID	-	-	
Total SVOC TIC*	mg/kg	SOLID	-	-	
Total VOC TIC*	mg/kg	SOLID	-	-	
Traidimefon	mg/kg	SOLID	-	-	
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700	<0.0500
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-	<0.0500
Triadimenol*	mg/kg	SOLID	-	-	
Triallate	mg/kg	SOLID	-	-	
Triazamate*	mg/kg	SOLID	-	-	
Triazophos	mg/kg	SOLID	-	-	
Tribenuron methyl*	mg/kg	SOLID	-	-	
Tribromomethane	mg/kg	SOLID	710	4100	<0.0500
Trichloroethene	mg/kg	SOLID	1.2	70	<0.0500
Trichlorofluoromethane	mg/kg	SOLID	-	-	<0.0500
Tridemorph*	mg/kg	SOLID	-	-	
Trietazine	mg/kg	SOLID	-	-	
Trifloxystrobin*	mg/kg	SOLID	-	-	
Triflumizole*	mg/kg	SOLID	-	-	
Triflumuron*	mg/kg	SOLID	-	-	
Trifluralin	mg/kg	SOLID	-	-	
Triflusulfuron-methyl*	mg/kg	SOLID	-	-	
Triforine*	mg/kg	SOLID	-	-	
Triticonazole*	mg/kg	SOLID	-	-	
Trivalent Chromium	mg/kg	SOLID	8600	33000	21
Uniconazole*	mg/kg	SOLID	-	-	
Vamidothion*	mg/kg	SOLID	-	-	
Vanadium	mg/kg	SOLID	9000	5000	23
Vernolate	mg/kg	SOLID	-	-	
Vinclozolin*	mg/kg	SOLID	-	-	
Water Soluble Boron*	mg/kg	SOLID	-	-	
Xylene	mg/kg	SOLID	-	-	
Xylenols	mg/kg	SOLID	-	-	
Zinc	mg/kg	SOLID	730000	170000	46
Zoxamide*	mg/kg	SOLID	-	-	

Max of Normalised Results																											
					BS161-CT401	BS162-CR401a	BS162-CR401a	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR402	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR403	BS162-CR413
					Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	River Cole West Viaduct	Coleshill No. 3 Embankment
					0.1	0.35	1	0.3	1	2	4	6.5	9.5	10.5	13.5	16.5	0.1	0.3	1	2	5.5	7.5	10.5	12	15	18.5	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	RTD1	RTD2	RTD2	RTD2	RTD2	SIM	SIM	SIM	SIM	SIM	TOP	RTD	RTD	RTD	SIM	SIM	SIM	SIM	SIM	SIM	TOP
Quinoxyfen*	mg/kg	SOLID	-	-														<0.0100									
Quizalofop-ethyl*	mg/kg	SOLID	-	-														<0.0100									
Resmethrin*	mg/kg	SOLID	-	-														<0.0100									
S421*	mg/kg	SOLID	-	-														<0.0100									
Salmonella SPP	-	SOLID	-	-																							
Salmonella SPP	cfu/25g	SOLID	-	-																							
Secbumeton*	mg/kg	SOLID	-	-														<0.0100									
Sec-Butylbenzene	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
Selenium	mg/kg	SOLID	12000	1800		<3.0000	<3.0000	<3.0000	<3.0000									<3.0000	<3.0000								<3.0000
Silafluofen*	mg/kg	SOLID	-	-														<0.0100									
Simazine	mg/kg	SOLID	-	-														<0.0100									
Simeconazole*	mg/kg	SOLID	-	-														<0.0100									
Spinetoram*	mg/kg	SOLID	-	-														<0.0100									
Spinosad*	mg/kg	SOLID	-	-														<0.0100									
Spirodiclofen*	mg/kg	SOLID	-	-														<0.0100									
Spiromesifen*	mg/kg	SOLID	-	-														<0.0100									
Spirotetramat*	mg/kg	SOLID	-	-														<0.0100									
Spiroxamine*	mg/kg	SOLID	-	-														<0.0100									
Styrene	mg/kg	SOLID	3200	5900		<0.0500	<0.0500																				
Sulfallate	mg/kg	SOLID	-	-														<0.0100									
Sulfentrazone*	mg/kg	SOLID	-	-														<0.0100									
Sulfotep	mg/kg	SOLID	-	-														<0.0100									
Sulphate	%	SOLID	-	-						0.01	0.08	0.15	0.12	0.15	0.13	0.15				0.02	0.13	0.11	0.09	0.25	0.23	0.08	
Sulphate	g/l	SOLID	-	-						0.01	0.01	0.02	0.01	0.15	0.1	0.2				0.03	0.14	0.13	0.02	0.08	0.21	0.16	
Sulphate as SO4	mg/kg	SOLID	-	-																							
Sulphur	%	SOLID	-	-						<0.0100	0.03	0.05	0.04	0.05	0.05	0.05				<0.0100	0.04	0.04	0.03	0.08	0.08	0.03	
Sulprofos	mg/kg	SOLID	-	-														<0.0100									
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																							
Tau-Fluvalinate*	mg/kg	SOLID	-	-														<0.0100									
Tebuconazole*	mg/kg	SOLID	-	-														0.09									
Tebufenozide*	mg/kg	SOLID	-	-														<0.0100									
Tebufenpyrad*	mg/kg	SOLID	-	-														<0.0100									
Tebupirimiphos*	mg/kg	SOLID	-	-														<0.0100									
Tecnazene	mg/kg	SOLID	-	-														<0.0100									
Teflubenzuron*	mg/kg	SOLID	-	-														<0.0100									
Tefluthrin*	mg/kg	SOLID	-	-														<0.0100									
Tempephos	mg/kg	SOLID	-	-														<0.1000									
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-		<10.0000	<10.0000																				
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																							
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-																							
Terbacil	mg/kg	SOLID	-	-														<0.0100									
Terbufos	mg/kg	SOLID	-	-														<0.0100									
Terbufos sulfone*	mg/kg	SOLID	-	-														<0.0100									
Terbufos sulfoxide*	mg/kg	SOLID	-	-														<0.0100									
Terbumeton*	mg/kg	SOLID	-	-														<0.0100									
Terbuthylazine	mg/kg	SOLID	-	-														<0.0100									
Terbutryn	mg/kg	SOLID	-	-														<0.0100									
Terrazole	mg/kg	SOLID	-	-														<0.0100									
Tert-Butylbenzene	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
Tetrachloroethene	mg/kg	SOLID	19	810		<0.0500	<0.0500																				
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190		<0.0500	<0.0500																				
Tetrachlorvinphos*	mg/kg	SOLID	-	-														<0.0100									
Tetraconazole*	mg/kg	SOLID	-	-														<0.0100									
Tetradifon*	mg/kg	SOLID	-	-														<0.0100									
Tetramethrin*	mg/kg	SOLID	-	-														<0.0100									
Tetrasul*	mg/kg	SOLID	-	-														<0.0100									
Thiabendazole*	mg/kg	SOLID	-	-														<0.0100									
Thiacloprid*	mg/kg	SOLID	-	-														<0.0100									
Thiamethoxam*	mg/kg	SOLID	-	-														<0.0100									
Thiazafluron*	mg/kg	SOLID	-	-														<0.0100									
Thidiazuron*	mg/kg	SOLID	-	-														<0.0100									
Thiobencarb*	mg/kg	SOLID	-	-														<0.0100									
Thiocyclam*	mg/kg	SOLID	-	-														<0.0100									
Thiodicarb*	mg/kg	SOLID	-	-														<0.0100									
Thiofanox*	mg/kg	SOLID	-	-														<0.0100									
Thiometon*	mg/kg	SOLID	-	-														<0.0100									
Thiophanate Methyl*	mg/kg	SOLID	-	-														<0.0100									
Tokuthion	mg/kg	SOLID	-	-														<0.0100									
Tolclofos-methyl*	mg/kg	SOLID	-	-														<0.0100									
Toluene	mg/kg	SOLID	56000	87000		<0.0100	<0.0100	<0.0100	<0.0100									<0.0100	<0.0100								<0.0100
Toluene-D8	%	SOLID	-	-																							
Tolylfluanid*	mg/kg	SOLID	-	-														<0.0100									
Total BTEX	mg/kg	SOLID	-	-		<0.0400	<0.0400	<0.0400	<0.0400									<0.0400	<0.0400								<0.0400
Total Coliform count	CFU/g	SOLID	-	-																							
Total Organic Carbon	% M/M	SOLID	-	-																							
Total Speciated Phenols	mg/kg	SOLID	-	-																							
Total SVOC TIC*	mg/kg	SOLID	-	-																							
Total VOC TIC*	mg/kg	SOLID	-	-																							
Traidimefon	mg/kg	SOLID	-	-														<0.0100									
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700		<0.0500	<0.0500																				
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
Triadimenol*	mg/kg	SOLID	-	-														<0.0100									
Triallate	mg/kg	SOLID	-	-														<0.0100									
Triazamate*	mg/kg	SOLID	-	-														<0.0100									
Triazophos	mg/kg	SOLID	-	-														<0.0100									
Tribenuron methyl*	mg/kg	SOLID	-	-														<0.0100									
Tribromomethane	mg/kg	SOLID	710	4100		<0.0500	<0.0500																				
Trichloroethene	mg/kg	SOLID	1.2	70		<0.0500	<0.0500																				
Trichlorofluoromethane	mg/kg	SOLID	-	-		<0.0500	<0.0500																				
Tridemorph*	mg/kg	SOLID	-	-														<0.0100									
Trietazine	mg/kg	SOLID	-	-														<0.0100									
Trifloxystrobin*	mg/kg	SOLID	-	-														<0.0100									
Triflumizole*	mg/kg	SOLID	-	-														<0.0100									
Triflumuron*	mg/kg	SOLID	-	-														<0.0100									
Trifluralin	mg/kg	SOLID	-	-														<0.0100									
Triflusulfuron-methyl*	mg/kg	SOLID	-	-														<0.0100									
Triforine*	mg/kg	SOLID	-	-														<0.0100									
Triticonazole*	mg/kg	SOLID	-	-														<0.0100									
Trivalent Chromium	mg/kg	SOLID	8600	33000		28	18	25	23									22	11								26
Uniconazole*	mg/kg	SOLID	-	-														<0.0100									
Vamidothion*	mg/kg	SOLID	-	-														<0.0100									
Vanadium	mg/kg	SOLID	9000	5000		56	39	35	27									34	21								41
Vernolate	mg/kg	SOLID	-	-														<0.0100									
Vinclozolin*	mg/kg	SOLID	-	-														<0.0100									
Water Soluble Boron*	mg/kg	SOLID	-	-																							
Xylene	mg/kg	SOLID	-	-																							
Xylenols	mg/kg	SOLID	-	-																							
Zinc	mg/kg	SOLID	730000	170000		84	47	91	24									72	18								96
Zoxamide*	mg/kg	SOLID	-	-														<0.0100									

Max of Normalised Results																														
					BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	BS162-CR413	ML154-TP023	ML155-CP019	ML155-CP019	ML155-CP019	ML155-CP024	ML155-CP024	ML155-CP024	ML155-CP044	ML155-CP044	ML155-CP044	ML155-CR001	ML155-CR001	ML155-CR005	ML155-CR022	ML155-CR022	ML155-CR403	ML155-CR403	ML155-CR403
					Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting
					0.1	0.5	1	4	6.5	9.5	10.5	13.5	1	0.1	1	2	0.05	0.6	3	0.05	0.5	1	0.05	1	0	0.5	0.9	0.3	0.5	1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	RTD1	RTD1	RTD1	SIM	SIM	SIM	SIM	TILMP	TOP	TILMP	TILMP	TOP	GFDMP	GFDMP	TOP	TILMP	TILMP	TOP	ALV	MGR	MGR	MGR	MGR	MGR	BCMU
Quinoxyfen*	mg/kg	SOLID	-	-																										
Quizalofop-ethyl*	mg/kg	SOLID	-	-																										
Resmethrin*	mg/kg	SOLID	-	-																										
S421*	mg/kg	SOLID	-	-																										
Salmonella SPP	-	SOLID	-	-																										
Salmonella SPP	cfu/25g	SOLID	-	-																										
Secbumeton*	mg/kg	SOLID	-	-																										
Sec-Butylbenzene	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Selenium	mg/kg	SOLID	12000	1800		<3.0000	<3.0000						<3.0000	<3.0000	<3.0000		<0.5000	<0.5000	<0.5000	<3.0000		<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	
Silafluofen*	mg/kg	SOLID	-	-																										
Simazine	mg/kg	SOLID	-	-																										
Simeconazole*	mg/kg	SOLID	-	-																										
Spinetoram*	mg/kg	SOLID	-	-																										
Spinosad*	mg/kg	SOLID	-	-																										
Spirodiclofen*	mg/kg	SOLID	-	-																										
Spiromesifen*	mg/kg	SOLID	-	-																										
Spirotetramat*	mg/kg	SOLID	-	-																										
Spiroxamine*	mg/kg	SOLID	-	-																										
Styrene	mg/kg	SOLID	3200	5900										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Sulfallate	mg/kg	SOLID	-	-																										
Sulfentrazone*	mg/kg	SOLID	-	-																										
Sulfotep	mg/kg	SOLID	-	-																										
Sulphate	%	SOLID	-	-				0.15	0.15	0.16	0.16	0.12																		
Sulphate	g/l	SOLID	-	-				0.02	0.11	0.14	0.16	0.19				0.05					<0.0100									0.02
Sulphate as SO4	mg/kg	SOLID	-	-																										
Sulphur	%	SOLID	-	-				0.02	0.05	0.05	0.05	0.04																		
Sulprofos	mg/kg	SOLID	-	-																										
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																										
Tau-Fluvalinate*	mg/kg	SOLID	-	-																										
Tebuconazole*	mg/kg	SOLID	-	-																										
Tebufenozide*	mg/kg	SOLID	-	-																										
Tebufenpyrad*	mg/kg	SOLID	-	-																										
Tebupirimiphos*	mg/kg	SOLID	-	-																										
Tecnazene	mg/kg	SOLID	-	-																										
Teflubenzuron*	mg/kg	SOLID	-	-																										
Tefluthrin*	mg/kg	SOLID	-	-																										
Tempephos	mg/kg	SOLID	-	-																										
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-																										
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																										
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-																										
Terbacil	mg/kg	SOLID	-	-																										
Terbufos	mg/kg	SOLID	-	-																										
Terbufos sulfone*	mg/kg	SOLID	-	-																										
Terbufos sulfoxide*	mg/kg	SOLID	-	-																										
Terbumeton*	mg/kg	SOLID	-	-																										
Terbuthylazine	mg/kg	SOLID	-	-																										
Terbutryn	mg/kg	SOLID	-	-																										
Terrazole	mg/kg	SOLID	-	-																										
Tert-Butylbenzene	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Tetrachloroethene	mg/kg	SOLID	19	810										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Tetrachlorvinphos*	mg/kg	SOLID	-	-																										
Tetraconazole*	mg/kg	SOLID	-	-																										
Tetradifon*	mg/kg	SOLID	-	-																										
Tetramethrin*	mg/kg	SOLID	-	-																										
Tetrasul*	mg/kg	SOLID	-	-																										
Thiabendazole*	mg/kg	SOLID	-	-																										
Thiacloprid*	mg/kg	SOLID	-	-																										
Thiamethoxam*	mg/kg	SOLID	-	-																										
Thiazafluron*	mg/kg	SOLID	-	-																										
Thidiazuron*	mg/kg	SOLID	-	-																										
Thiobencarb*	mg/kg	SOLID	-	-																										
Thiocyclam*	mg/kg	SOLID	-	-																										
Thiodicarb*	mg/kg	SOLID	-	-																										
Thiofanox*	mg/kg	SOLID	-	-																										
Thiometon*	mg/kg	SOLID	-	-																										
Thiophanate Methyl*	mg/kg	SOLID	-	-																										
Tokuthion	mg/kg	SOLID	-	-																										
Tolclofos-methyl*	mg/kg	SOLID	-	-																										
Toluene	mg/kg	SOLID	56000	87000		<0.0100	<0.0100						<0.0100	<0.0100	<0.0100		<0.0060	<0.0060	<0.0060	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	
Toluene-D8	%	SOLID	-	-																										
Tolylfluanid*	mg/kg	SOLID	-	-																										
Total BTEX	mg/kg	SOLID	-	-		<0.0400	<0.0400						<0.0400	<0.0400	<0.0400					<0.0400		<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	
Total Coliform count	CFU/g	SOLID	-	-																										
Total Organic Carbon	% M/M	SOLID	-	-													1.2	0.2	0.17											
Total Speciated Phenols	mg/kg	SOLID	-	-																										
Total SVOC TIC*	mg/kg	SOLID	-	-																										
Total VOC TIC*	mg/kg	SOLID	-	-																										
Traidimefon	mg/kg	SOLID	-	-																										
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Triadimenol*	mg/kg	SOLID	-	-																										
Triallate	mg/kg	SOLID	-	-																										
Triazamate*	mg/kg	SOLID	-	-																										
Triazophos	mg/kg	SOLID	-	-																										
Tribenuron methyl*	mg/kg	SOLID	-	-																										
Tribromomethane	mg/kg	SOLID	710	4100										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Trichloroethene	mg/kg	SOLID	1.2	70										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Trichlorofluoromethane	mg/kg	SOLID	-	-										<0.0500	<0.0500					<0.0500			<0.0500	<0.0500						
Tridemorph*	mg/kg	SOLID	-	-																										
Trietazine	mg/kg	SOLID	-	-																										
Trifloxystrobin*	mg/kg	SOLID	-	-																										
Triflumizole*	mg/kg	SOLID	-	-																										
Triflumuron*	mg/kg	SOLID	-	-																										
Trifluralin	mg/kg	SOLID	-	-																										
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																										
Triforine*	mg/kg	SOLID	-	-																										
Triticonazole*	mg/kg	SOLID	-	-																										
Trivalent Chromium	mg/kg	SOLID	8600	33000		18	11						34	19	26					18		17	19	23	16	27	23	7	32	
Uniconazole*	mg/kg	SOLID	-	-																										
Vamidothion*	mg/kg	SOLID	-	-																										
Vanadium	mg/kg	SOLID	9000	5000		32	24						34	20	29		15	13.3	26	19		20	22	27	26	49	26	13	32	
Vernolate	mg/kg	SOLID	-	-																										
Vinclozolin*	mg/kg	SOLID	-	-																										
Water Soluble Boron*	mg/kg	SOLID	-	-																										
Xylene	mg/kg	SOLID	-	-													<0.0070	<0.0070	<0.0070											
Xylenols	mg/kg	SOLID	-	-																										
Zinc	mg/kg	SOLID	730000	170000		44	18						59	56	57		68.5	209.8	89	49		25	61	35	190	83	47	15	71	
Zoxamide*	mg/kg	SOLID	-	-																										

Max of Normalised Results																																		
					ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR404	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-CR405	ML155-RC007	ML155-TP018	ML155-TP018	ML155-TP025	ML155-TP025
					Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting
					2	4.11	5.3	6.83	12.09	13.43	15.42	16.7	18.6	0.05	0.3	1	3	5.24	7.2	9.18	10.6	12	14.35	0.3	0.5	2	9.2	16.06	19.5	1.7	0	0.5	0	0.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	MGR	MGR	MGR	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	GFDMP	GFDMP	GFDMP	BCMU	BCMU	BCMU	MMG	MGR	MGR	TOP	TILMP
Quinoxyfen*	mg/kg	SOLID	-	-																														
Quizalofop-ethyl*	mg/kg	SOLID	-	-																														
Resmethrin*	mg/kg	SOLID	-	-																														
S421*	mg/kg	SOLID	-	-																														
Salmonella SPP	-	SOLID	-	-																														
Salmonella SPP	cfu/25g	SOLID	-	-																														
Secbumeton*	mg/kg	SOLID	-	-																														
Sec-Butylbenzene	mg/kg	SOLID	-	-																														
Selenium	mg/kg	SOLID	12000	1800	<3.0000									<3.0000	<3.0000	<3.0000								<3.0000	<3.0000						<3.0000	<3.0000	<3.0000	<3.0000
Silafluofen*	mg/kg	SOLID	-	-																														
Simazine	mg/kg	SOLID	-	-																														
Simeconazole*	mg/kg	SOLID	-	-																														
Spinetoram*	mg/kg	SOLID	-	-																														
Spinosad*	mg/kg	SOLID	-	-																														
Spirodiclofen*	mg/kg	SOLID	-	-																														
Spiromesifen*	mg/kg	SOLID	-	-																														
Spirotetramat*	mg/kg	SOLID	-	-																														
Spiroxamine*	mg/kg	SOLID	-	-																														
Styrene	mg/kg	SOLID	3200	5900																														
Sulfallate	mg/kg	SOLID	-	-																														
Sulfentrazone*	mg/kg	SOLID	-	-																														
Sulfotep	mg/kg	SOLID	-	-																														
Sulphate	%	SOLID	-	-																														
Sulphate	g/l	SOLID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.01	0.02	0.02				<0.0100	0.03	0.01	0.03	0.03	0.03	0.02			<0.0100	<0.0100	0.02	0.02	0.16				
Sulphate as SO4	mg/kg	SOLID	-	-																														
Sulphur	%	SOLID	-	-																														
Sulprofos	mg/kg	SOLID	-	-																														
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																														
Tau-Fluvalinate*	mg/kg	SOLID	-	-																														
Tebuconazole*	mg/kg	SOLID	-	-																														
Tebufenozide*	mg/kg	SOLID	-	-																														
Tebufenpyrad*	mg/kg	SOLID	-	-																														
Tebupirimiphos*	mg/kg	SOLID	-	-																														
Tecnazene	mg/kg	SOLID	-	-																														
Teflubenzuron*	mg/kg	SOLID	-	-																														
Tefluthrin*	mg/kg	SOLID	-	-																														
Tempephos	mg/kg	SOLID	-	-																														
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-																														
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																														
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-																														
Terbacil	mg/kg	SOLID	-	-																														
Terbufos	mg/kg	SOLID	-	-																														
Terbufos sulfone*	mg/kg	SOLID	-	-																														
Terbufos sulfoxide*	mg/kg	SOLID	-	-																														
Terbumeton*	mg/kg	SOLID	-	-																														
Terbuthylazine	mg/kg	SOLID	-	-																														
Terbutryn	mg/kg	SOLID	-	-																														
Terrazole	mg/kg	SOLID	-	-																														
Tert-Butylbenzene	mg/kg	SOLID	-	-																														
Tetrachloroethene	mg/kg	SOLID	19	810																														
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190																														
Tetrachlorvinphos*	mg/kg	SOLID	-	-																														
Tetraconazole*	mg/kg	SOLID	-	-																														
Tetradifon*	mg/kg	SOLID	-	-																														
Tetramethrin*	mg/kg	SOLID	-	-																														
Tetrasul*	mg/kg	SOLID	-	-																														
Thiabendazole*	mg/kg	SOLID	-	-																														
Thiacloprid*	mg/kg	SOLID	-	-																														
Thiamethoxam*	mg/kg	SOLID	-	-																														
Thiazafluron*	mg/kg	SOLID	-	-																														
Thidiazuron*	mg/kg	SOLID	-	-																														
Thiobencarb*	mg/kg	SOLID	-	-																														
Thiocyclam*	mg/kg	SOLID	-	-																														
Thiodicarb*	mg/kg	SOLID	-	-																														
Thiofanox*	mg/kg	SOLID	-	-																														
Thiometon*	mg/kg	SOLID	-	-																														
Thiophanate Methyl*	mg/kg	SOLID	-	-																														
Tokuthion	mg/kg	SOLID	-	-																														
Tolclofos-methyl*	mg/kg	SOLID	-	-																														
Toluene	mg/kg	SOLID	56000	87000	<0.0100									<0.0100	<0.0100	<0.0100								<0.0100	<0.0100						<0.0100	<0.0100	<0.0100	<0.0100
Toluene-D8	%	SOLID	-	-																														
Tolylfluanid*	mg/kg	SOLID	-	-																														
Total BTEX	mg/kg	SOLID	-	-	<0.0400									<0.0400	<0.0400	<0.0400								<0.0400	<0.0400						<0.0400	<0.0400	<0.0400	<0.0400
Total Coliform count	CFU/g	SOLID	-	-																														
Total Organic Carbon	% M/M	SOLID	-	-																														
Total Speciated Phenols	mg/kg	SOLID	-	-																														
Total SVOC TIC*	mg/kg	SOLID	-	-																														
Total VOC TIC*	mg/kg	SOLID	-	-																														
Traidimefon	mg/kg	SOLID	-	-																														
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700																														
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-																														
Triadimenol*	mg/kg	SOLID	-	-																														
Triallate	mg/kg	SOLID	-	-																														
Triazamate*	mg/kg	SOLID	-	-																														
Triazophos	mg/kg	SOLID	-	-																														
Tribenuron methyl*	mg/kg	SOLID	-	-																														
Tribromomethane	mg/kg	SOLID	710	4100																														
Trichloroethene	mg/kg	SOLID	1.2	70																														
Trichlorofluoromethane	mg/kg	SOLID	-	-																														
Tridemorph*	mg/kg	SOLID	-	-																														
Trietazine	mg/kg	SOLID	-	-																														
Trifloxystrobin*	mg/kg	SOLID	-	-																														
Triflumizole*	mg/kg	SOLID	-	-																														
Triflumuron*	mg/kg	SOLID	-	-																														
Trifluralin	mg/kg	SOLID	-	-																														
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																														
Triforine*	mg/kg	SOLID	-	-																														
Triticonazole*	mg/kg	SOLID	-	-																														
Trivalent Chromium	mg/kg	SOLID	8600	33000	32									27	27	24								9	35						14	14	15	17
Uniconazole*	mg/kg	SOLID	-	-																														
Vamidothion*	mg/kg	SOLID	-	-																														
Vanadium	mg/kg	SOLID	9000	5000	28									28	30	26								11	37						20	20	26	29
Vernolate	mg/kg	SOLID	-	-																														
Vinclozolin*	mg/kg	SOLID	-	-																														
Water Soluble Boron*	mg/kg	SOLID	-	-																														
Xylene	mg/kg	SOLID	-	-																														
Xylenols	mg/kg	SOLID	-	-																														
Zinc	mg/kg	SOLID	730000	170000	78									64	65	57								18	95						130	37	290	400
Zoxamide*	mg/kg	SOLID	-	-																														

Max of Normalised Results																											
					ML155-TP041	ML155-WS001	ML155-WS002	ML155-WS024	ML155-WS042	ML155-WS044	ML155-WS044	ML156-CP008	ML156-CP008	ML156-CP023	ML156-CP028	ML156-CP028	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR003	ML156-CR014	ML156-CR014	ML156-CR020	ML156-CR021	ML156-CR023	ML156-CR025
					Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station
					0	1.67	0.4	0.3	2	0	0.3	0.35	2.35	0.5	1	6	1.5	3	5.5	6.9	9.4	0.5	12.2	0.2	2.25	0.1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	TILMP	TILMP	ALV	TOP	ALV	MGR	MGR	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MMG	GFDUD	MMG	MGR	MMG	TOP	MGR
Quinoxyfen*	mg/kg	SOLID	-	-																							
Quizalofop-ethyl*	mg/kg	SOLID	-	-																							
Resmethrin*	mg/kg	SOLID	-	-																							
S421*	mg/kg	SOLID	-	-																							
Salmonella SPP	-	SOLID	-	-																							
Salmonella SPP	cfu/25g	SOLID	-	-																							
Secbumeton*	mg/kg	SOLID	-	-																							
Sec-Butylbenzene	mg/kg	SOLID	-	-																							
Selenium	mg/kg	SOLID	12000	1800	<3.0000		<3.0000			<3.0000	<3.0000	2.4	1.2	<0.5100	<0.5000				<3.0000			<0.5000	0.9	<0.5000		<0.5000	<0.5000
Silafluofen*	mg/kg	SOLID	-	-																							
Simazine	mg/kg	SOLID	-	-																							
Simeconazole*	mg/kg	SOLID	-	-																							
Spinetoram*	mg/kg	SOLID	-	-																							
Spinosad*	mg/kg	SOLID	-	-																							
Spirodiclofen*	mg/kg	SOLID	-	-																							
Spiromesifen*	mg/kg	SOLID	-	-																							
Spirotetramat*	mg/kg	SOLID	-	-																							
Spiroxamine*	mg/kg	SOLID	-	-																							
Styrene	mg/kg	SOLID	3200	5900																							
Sulfallate	mg/kg	SOLID	-	-																							
Sulfentrazone*	mg/kg	SOLID	-	-																							
Sulfotep	mg/kg	SOLID	-	-																							
Sulphate	%	SOLID	-	-																							
Sulphate	g/l	SOLID	-	-		<0.0100		0.01	<0.0100								0.03	<0.0100		0.01	0.01						
Sulphate as SO4	mg/kg	SOLID	-	-												47									643		
Sulphur	%	SOLID	-	-																							
Sulprofos	mg/kg	SOLID	-	-																							
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																							
Tau-Fluvalinate*	mg/kg	SOLID	-	-																							
Tebuconazole*	mg/kg	SOLID	-	-																							
Tebufenozide*	mg/kg	SOLID	-	-																							
Tebufenpyrad*	mg/kg	SOLID	-	-																							
Tebupirimiphos*	mg/kg	SOLID	-	-																							
Tecnazene	mg/kg	SOLID	-	-																							
Teflubenzuron*	mg/kg	SOLID	-	-																							
Tefluthrin*	mg/kg	SOLID	-	-																							
Tempephos	mg/kg	SOLID	-	-																							
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-																							
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																							
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-																							
Terbacil	mg/kg	SOLID	-	-																							
Terbufos	mg/kg	SOLID	-	-																							
Terbufos sulfone*	mg/kg	SOLID	-	-																							
Terbufos sulfoxide*	mg/kg	SOLID	-	-																							
Terbumeton*	mg/kg	SOLID	-	-																							
Terbuthylazine	mg/kg	SOLID	-	-																							
Terbutryn	mg/kg	SOLID	-	-																							
Terrazole	mg/kg	SOLID	-	-																							
Tert-Butylbenzene	mg/kg	SOLID	-	-																							
Tetrachloroethene	mg/kg	SOLID	19	810																							
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190																							
Tetrachlorvinphos*	mg/kg	SOLID	-	-																							
Tetraconazole*	mg/kg	SOLID	-	-																							
Tetradifon*	mg/kg	SOLID	-	-																							
Tetramethrin*	mg/kg	SOLID	-	-																							
Tetrasul*	mg/kg	SOLID	-	-																							
Thiabendazole*	mg/kg	SOLID	-	-																							
Thiacloprid*	mg/kg	SOLID	-	-																							
Thiamethoxam*	mg/kg	SOLID	-	-																							
Thiazafluron*	mg/kg	SOLID	-	-																							
Thidiazuron*	mg/kg	SOLID	-	-																							
Thiobencarb*	mg/kg	SOLID	-	-																							
Thiocyclam*	mg/kg	SOLID	-	-																							
Thiodicarb*	mg/kg	SOLID	-	-																							
Thiofanox*	mg/kg	SOLID	-	-																							
Thiometon*	mg/kg	SOLID	-	-																							
Thiophanate Methyl*	mg/kg	SOLID	-	-																							
Tokuthion	mg/kg	SOLID	-	-																							
Tolclofos-methyl*	mg/kg	SOLID	-	-																							
Toluene	mg/kg	SOLID	56000	87000	<0.0100		<0.0100			<0.0100	<0.0100	<0.0080	<0.0070	<0.0050	<0.0060				<0.0100			<0.0060	<0.0070	<0.0100		<0.0100	<0.0100
Toluene-D8	%	SOLID	-	-																							
Tolylfluanid*	mg/kg	SOLID	-	-																							
Total BTEX	mg/kg	SOLID	-	-	<0.0400		<0.0400			<0.0400	<0.0400								<0.0400								
Total Coliform count	CFU/g	SOLID	-	-																							
Total Organic Carbon	% M/M	SOLID	-	-								22.6	13.2	0.18	0.23							0.61	0.21				
Total Speciated Phenols	mg/kg	SOLID	-	-																							
Total SVOC TIC*	mg/kg	SOLID	-	-																							
Total VOC TIC*	mg/kg	SOLID	-	-																							
Traidimefon	mg/kg	SOLID	-	-																							
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700																							
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-																							
Triadimenol*	mg/kg	SOLID	-	-																							
Triallate	mg/kg	SOLID	-	-																							
Triazamate*	mg/kg	SOLID	-	-																							
Triazophos	mg/kg	SOLID	-	-																							
Tribenuron methyl*	mg/kg	SOLID	-	-																							
Tribromomethane	mg/kg	SOLID	710	4100																							
Trichloroethene	mg/kg	SOLID	1.2	70																							
Trichlorofluoromethane	mg/kg	SOLID	-	-																							
Tridemorph*	mg/kg	SOLID	-	-																							
Trietazine	mg/kg	SOLID	-	-																							
Trifloxystrobin*	mg/kg	SOLID	-	-																							
Triflumizole*	mg/kg	SOLID	-	-																							
Triflumuron*	mg/kg	SOLID	-	-																							
Trifluralin	mg/kg	SOLID	-	-																							
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																							
Triforine*	mg/kg	SOLID	-	-																							
Triticonazole*	mg/kg	SOLID	-	-																							
Trivalent Chromium	mg/kg	SOLID	8600	33000	4		21			13	4								22					20		16	95
Uniconazole*	mg/kg	SOLID	-	-																							
Vamidothion*	mg/kg	SOLID	-	-																							
Vanadium	mg/kg	SOLID	9000	5000	16		27			16	4	73.4	56.8	8.8	12.5				24			9.9	26.6	23		21	100
Vernolate	mg/kg	SOLID	-	-																							
Vinclozolin*	mg/kg	SOLID	-	-																							
Water Soluble Boron*	mg/kg	SOLID	-	-																							
Xylene	mg/kg	SOLID	-	-								<0.0100	<0.0100	<0.0060	<0.0070							<0.0070	<0.0080	<0.0100		<0.0100	<0.0100
Xylenols	mg/kg	SOLID	-	-																							
Zinc	mg/kg	SOLID	730000	170000	62		90			48	9	408.5	682.8	17.87	24.6				55			44.6	81.3	84		56	59
Zoxamide*	mg/kg	SOLID	-	-																							

Max of Normalised Results																																
					ML156-CR025	ML156-CR027	ML156-CR035	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-CR401	ML156-TP006	ML156-TP008	ML156-TP027	ML156-TP036	ML156-TP036	ML156-TP100	ML156-TP101	ML156-WS025	ML157-CP001	ML157-CP024	ML157-CR010	ML157-CR012	ML157-CR012	ML157-CR012	ML157-CR012	ML157-CR013
					Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting
					0.3	0.2	0.3	0.3	1	3.87	5.06	9.2	10.4	12.7	15.89	19.3	0.3	1.5	1	2.5	4	0.6	0.3	0.3	0.5	1	0.75	0.05	0.1	0.4	1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	GFDMP	GFDMP	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	BCMU	TOP	MMG	GFDUD	MGR	MGR	GFDUD	TOP	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MMG	MGR
Quinoxyfen*	mg/kg	SOLID	-	-																												
Quizalofop-ethyl*	mg/kg	SOLID	-	-																												
Resmethrin*	mg/kg	SOLID	-	-																												
S421*	mg/kg	SOLID	-	-																												
Salmonella SPP	-	SOLID	-	-																												
Salmonella SPP	cfu/25g	SOLID	-	-																												
Secbumeton*	mg/kg	SOLID	-	-																												
Sec-Butylbenzene	mg/kg	SOLID	-	-																												
Selenium	mg/kg	SOLID	12000	1800	<0.5000	<0.5000	<0.5000	<3.0000	<3.0000								<0.5000		<0.5000	1.6	1.5	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000		<1.0000	<1.0000	<1.0000	<1.0000
Silafluofen*	mg/kg	SOLID	-	-																												
Simazine	mg/kg	SOLID	-	-																												
Simeconazole*	mg/kg	SOLID	-	-																												
Spinetoram*	mg/kg	SOLID	-	-																												
Spinosad*	mg/kg	SOLID	-	-																												
Spirodiclofen*	mg/kg	SOLID	-	-																												
Spiromesifen*	mg/kg	SOLID	-	-																												
Spirotetramat*	mg/kg	SOLID	-	-																												
Spiroxamine*	mg/kg	SOLID	-	-																												
Styrene	mg/kg	SOLID	3200	5900																												
Sulfallate	mg/kg	SOLID	-	-																												
Sulfentrazone*	mg/kg	SOLID	-	-																												
Sulfotep	mg/kg	SOLID	-	-																												
Sulphate	%	SOLID	-	-																												
Sulphate	g/l	SOLID	-	-						<0.0100	0.01	0.01	0.02	0.02	0.04	0.22		0.01														
Sulphate as SO4	mg/kg	SOLID	-	-																												
Sulphur	%	SOLID	-	-																												
Sulprofos	mg/kg	SOLID	-	-																												
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																												
Tau-Fluvalinate*	mg/kg	SOLID	-	-																												
Tebuconazole*	mg/kg	SOLID	-	-																												
Tebufenozide*	mg/kg	SOLID	-	-																												
Tebufenpyrad*	mg/kg	SOLID	-	-																												
Tebupirimiphos*	mg/kg	SOLID	-	-																												
Tecnazene	mg/kg	SOLID	-	-																												
Teflubenzuron*	mg/kg	SOLID	-	-																												
Tefluthrin*	mg/kg	SOLID	-	-																												
Tempephos	mg/kg	SOLID	-	-																												
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-																												
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																												
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-																												
Terbacil	mg/kg	SOLID	-	-																												
Terbufos	mg/kg	SOLID	-	-																												
Terbufos sulfone*	mg/kg	SOLID	-	-																												
Terbufos sulfoxide*	mg/kg	SOLID	-	-																												
Terbumeton*	mg/kg	SOLID	-	-																												
Terbuthylazine	mg/kg	SOLID	-	-																												
Terbutryn	mg/kg	SOLID	-	-																												
Terrazole	mg/kg	SOLID	-	-																												
Tert-Butylbenzene	mg/kg	SOLID	-	-																												
Tetrachloroethene	mg/kg	SOLID	19	810																												
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190																												
Tetrachlorvinphos*	mg/kg	SOLID	-	-																												
Tetraconazole*	mg/kg	SOLID	-	-																												
Tetradifon*	mg/kg	SOLID	-	-																												
Tetramethrin*	mg/kg	SOLID	-	-																												
Tetrasul*	mg/kg	SOLID	-	-																												
Thiabendazole*	mg/kg	SOLID	-	-																												
Thiacloprid*	mg/kg	SOLID	-	-																												
Thiamethoxam*	mg/kg	SOLID	-	-																												
Thiazafluron*	mg/kg	SOLID	-	-																												
Thidiazuron*	mg/kg	SOLID	-	-																												
Thiobencarb*	mg/kg	SOLID	-	-																												
Thiocyclam*	mg/kg	SOLID	-	-																												
Thiodicarb*	mg/kg	SOLID	-	-																												
Thiofanox*	mg/kg	SOLID	-	-																												
Thiometon*	mg/kg	SOLID	-	-																												
Thiophanate Methyl*	mg/kg	SOLID	-	-																												
Tokuthion	mg/kg	SOLID	-	-																												
Tolclofos-methyl*	mg/kg	SOLID	-	-																												
Toluene	mg/kg	SOLID	56000	87000	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100								<0.0060		<0.0050	<0.0080	<0.0090	<0.0060	<0.0060	<0.0050	<0.0060	<0.0050	<0.0100		<0.0020	<0.0020	<0.0020	<0.0020
Toluene-D8	%	SOLID	-	-																												
Tolylfluanid*	mg/kg	SOLID	-	-																												
Total BTEX	mg/kg	SOLID	-	-				<0.0400	<0.0400																				<0.0240	<0.0240	<0.0240	<0.0240
Total Coliform count	CFU/g	SOLID	-	-																												
Total Organic Carbon	% M/M	SOLID	-	-													0.67		0.31	17.7	20	0.4	0.97	0.36	0.43	0.3						
Total Speciated Phenols	mg/kg	SOLID	-	-																								<0.0600				
Total SVOC TIC*	mg/kg	SOLID	-	-																												
Total VOC TIC*	mg/kg	SOLID	-	-																												
Traidimefon	mg/kg	SOLID	-	-																												
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700																												
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-																												
Triadimenol*	mg/kg	SOLID	-	-																												
Triallate	mg/kg	SOLID	-	-																												
Triazamate*	mg/kg	SOLID	-	-																												
Triazophos	mg/kg	SOLID	-	-																												
Tribenuron methyl*	mg/kg	SOLID	-	-																												
Tribromomethane	mg/kg	SOLID	710	4100																												
Trichloroethene	mg/kg	SOLID	1.2	70																												
Trichlorofluoromethane	mg/kg	SOLID	-	-																												
Tridemorph*	mg/kg	SOLID	-	-																												
Trietazine	mg/kg	SOLID	-	-																												
Trifloxystrobin*	mg/kg	SOLID	-	-																												
Triflumizole*	mg/kg	SOLID	-	-																												
Triflumuron*	mg/kg	SOLID	-	-																												
Trifluralin	mg/kg	SOLID	-	-																												
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																												
Triforine*	mg/kg	SOLID	-	-																												
Triticonazole*	mg/kg	SOLID	-	-																												
Trivalent Chromium	mg/kg	SOLID	8600	33000	86	100	39	35	23																		50		22.6	10.7	33.1	13.3
Uniconazole*	mg/kg	SOLID	-	-																												
Vamidothion*	mg/kg	SOLID	-	-																												
Vanadium	mg/kg	SOLID	9000	5000	83	49	34	37	24								17.9		13.4	64	54.4	12.3	12.5	13.8	10.7	6	31		22.1	17.4	17.1	32.7
Vernolate	mg/kg	SOLID	-	-																												
Vinclozolin*	mg/kg	SOLID	-	-																												
Water Soluble Boron*	mg/kg	SOLID	-	-																												
Xylene	mg/kg	SOLID	-	-	<0.0100	<0.0100	<0.0100										<0.0070		<0.0060	<0.0100	0.017	<0.0070	<0.0070	<0.0070	<0.0070	<0.0060	<0.0100					
Xylenols	mg/kg	SOLID	-	-																								<0.0150	<0.0150	<0.0150	<0.0150	<0.0150
Zinc	mg/kg	SOLID	730000	170000	140	390	90	97	56								53.3		41.1	1420	1160	30.9	51.6	28.7	25	84.9	28		35.7	47.7	42.5	149
Zoxamide*	mg/kg	SOLID	-	-																												

Max of Normalised Results																																			
					ML157-CR013	ML157-CR014	ML157-CR014	ML157-CR014	ML157-CR015	ML157-CR015	ML157-CR021	ML157-CR021	ML157-CR022	ML157-CR027	ML157-CR027	ML157-CR027	ML157-CT011	ML157-CT013	ML157-CT014	ML157-CT015	ML157-CT017	ML157-CT018	ML157-CT018	ML157-CT019	ML157-CT019	ML157-CT027	ML157-CT027	ML157-CT039	ML157-CT039	ML157-CT039	ML157-TP001	ML157-TP063	ML157-WS036	ML157-WS067	ML157-WS067
					Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment	Packington Embankment	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting
					0.9	0.05	0.6	2.2	0.5	1	0.05	9.5	1	0.05	0.5	0.9	0.3	1	0.7	0.5	0.4	0.1	0.5	0.05	1	0.05	1	0.05	0.2	0.9	1	0.7	0.7	0.05	2.8
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GFSG	MGR	MGR	MMG	MGR	MMG	TOP	MMG	MGR	MGR	MGR	MMG	MMG	MGR	SUPDC	SUPDC	SUPDC	MGR	SUPDC	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	GFDUD	TOP	GFDUD
Quinoxyfen*	mg/kg	SOLID	-	-																															
Quizalofop-ethyl*	mg/kg	SOLID	-	-																															
Resmethrin*	mg/kg	SOLID	-	-																															
S421*	mg/kg	SOLID	-	-																															
Salmonella SPP	-	SOLID	-	-																															
Salmonella SPP	cfu/25g	SOLID	-	-																															
Secbumeton*	mg/kg	SOLID	-	-																															
Sec-Butylbenzene	mg/kg	SOLID	-	-																												<0.0010				
Selenium	mg/kg	SOLID	12000	1800	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<0.5000	<0.5000	<0.5000		<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000		<1.0000	<1.0000	<1.0000		<1.0000	<1.0000	<0.5000	<0.5000	<0.5000	0.6	<0.5000
Silafluofen*	mg/kg	SOLID	-	-																															
Simazine	mg/kg	SOLID	-	-																															
Simeconazole*	mg/kg	SOLID	-	-																															
Spinetoram*	mg/kg	SOLID	-	-																															
Spinosad*	mg/kg	SOLID	-	-																															
Spirodiclofen*	mg/kg	SOLID	-	-																															
Spiromesifen*	mg/kg	SOLID	-	-																															
Spirotetramat*	mg/kg	SOLID	-	-																															
Spiroxamine*	mg/kg	SOLID	-	-																															
Styrene	mg/kg	SOLID	3200	5900																											<0.0010				
Sulfallate	mg/kg	SOLID	-	-																															
Sulfentrazone*	mg/kg	SOLID	-	-																															
Sulfotep	mg/kg	SOLID	-	-																															
Sulphate	%	SOLID	-	-																															
Sulphate	g/l	SOLID	-	-																															
Sulphate as SO4	mg/kg	SOLID	-	-																															
Sulphur	%	SOLID	-	-																															
Sulprofos	mg/kg	SOLID	-	-																															
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																															
Tau-Fluvalinate*	mg/kg	SOLID	-	-																															
Tebuconazole*	mg/kg	SOLID	-	-																															
Tebufenozide*	mg/kg	SOLID	-	-																															
Tebufenpyrad*	mg/kg	SOLID	-	-																															
Tebupirimiphos*	mg/kg	SOLID	-	-																															
Tecnazene	mg/kg	SOLID	-	-																															
Teflubenzuron*	mg/kg	SOLID	-	-																															
Tefluthrin*	mg/kg	SOLID	-	-																															
Tempephos	mg/kg	SOLID	-	-																															
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-																											3.2				
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																															
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-																											<0.0060				
Terbacil	mg/kg	SOLID	-	-																															
Terbufos	mg/kg	SOLID	-	-																															
Terbufos sulfone*	mg/kg	SOLID	-	-																															
Terbufos sulfoxide*	mg/kg	SOLID	-	-																															
Terbumeton*	mg/kg	SOLID	-	-																															
Terbuthylazine	mg/kg	SOLID	-	-																															
Terbutryn	mg/kg	SOLID	-	-																															
Terrazole	mg/kg	SOLID	-	-																															
Tert-Butylbenzene	mg/kg	SOLID	-	-																											<0.0010				
Tetrachloroethene	mg/kg	SOLID	19	810																											<0.0030				
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190																											<0.0010				
Tetrachlorvinphos*	mg/kg	SOLID	-	-																															
Tetraconazole*	mg/kg	SOLID	-	-																															
Tetradifon*	mg/kg	SOLID	-	-																															
Tetramethrin*	mg/kg	SOLID	-	-																															
Tetrasul*	mg/kg	SOLID	-	-																															
Thiabendazole*	mg/kg	SOLID	-	-																															
Thiacloprid*	mg/kg	SOLID	-	-																															
Thiamethoxam*	mg/kg	SOLID	-	-																															
Thiazafluron*	mg/kg	SOLID	-	-																															
Thidiazuron*	mg/kg	SOLID	-	-																															
Thiobencarb*	mg/kg	SOLID	-	-																															
Thiocyclam*	mg/kg	SOLID	-	-																															
Thiodicarb*	mg/kg	SOLID	-	-																															
Thiofanox*	mg/kg	SOLID	-	-																															
Thiometon*	mg/kg	SOLID	-	-																															
Thiophanate Methyl*	mg/kg	SOLID	-	-																															
Tokuthion	mg/kg	SOLID	-	-																															
Tolclofos-methyl*	mg/kg	SOLID	-	-																															
Toluene	mg/kg	SOLID	56000	87000	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0100	<0.0100	<0.0100		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020		<0.0020	<0.0020	<0.0020		<0.0020	<0.0020	<0.0060	<0.0050	<0.0050	<0.0060	<0.0050
Toluene-D8	%	SOLID	-	-																															
Tolylfluanid*	mg/kg	SOLID	-	-																															
Total BTEX	mg/kg	SOLID	-	-	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240					<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240		<0.0240	<0.0240	<0.0240		<0.0240	<0.0240					
Total Coliform count	CFU/g	SOLID	-	-																															
Total Organic Carbon	% M/M	SOLID	-	-																											0.76	0.28	0.16	1.36	0.14
Total Speciated Phenols	mg/kg	SOLID	-	-										<0.0600										<0.0600				<0.0600							
Total SVOC TIC*	mg/kg	SOLID	-	-																															
Total VOC TIC*	mg/kg	SOLID	-	-																															
Traidimefon	mg/kg	SOLID	-	-																															
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700																											<0.0010				
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-																											<0.0010				
Triadimenol*	mg/kg	SOLID	-	-																															
Triallate	mg/kg	SOLID	-	-																															
Triazamate*	mg/kg	SOLID	-	-																															
Triazophos	mg/kg	SOLID	-	-																															
Tribenuron methyl*	mg/kg	SOLID	-	-																															
Tribromomethane	mg/kg	SOLID	710	4100																											<0.0010				
Trichloroethene	mg/kg	SOLID	1.2	70																											<0.0010				
Trichlorofluoromethane	mg/kg	SOLID	-	-																											<0.0010				
Tridemorph*	mg/kg	SOLID	-	-																															
Trietazine	mg/kg	SOLID	-	-																															
Trifloxystrobin*	mg/kg	SOLID	-	-																															
Triflumizole*	mg/kg	SOLID	-	-																															
Triflumuron*	mg/kg	SOLID	-	-																															
Trifluralin	mg/kg	SOLID	-	-																															
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																															
Triforine*	mg/kg	SOLID	-	-																															
Triticonazole*	mg/kg	SOLID	-	-																															
Trivalent Chromium	mg/kg	SOLID	8600	33000	35.3	14.6	16.5	27.1	20.3	16.7	7.7	38	29		13	19.1	16.2	8.68	21.1	12.6	6.27	6.77	12.4		3.81	47.3	10.4		3.51	4.78					
Uniconazole*	mg/kg	SOLID	-	-																															
Vamidothion*	mg/kg	SOLID	-	-																															
Vanadium	mg/kg	SOLID	9000	5000	28.9	34.7	19.1	25.3	21.7	18.1	9.2	28	36		25.7	25.5	58.8	17.4	26.8	20.6	13	33.4	18.5		27.7	34.5	20.7		81.4	36	10.5	7.4	4.9	9.4	3.5
Vernolate	mg/kg	SOLID	-	-																															
Vinclozolin*	mg/kg	SOLID	-	-																															
Water Soluble Boron*	mg/kg	SOLID	-	-							1.3	0.4																							
Xylene	mg/kg	SOLID	-	-							<0.0100	<0.0100	<0.0100																		<0.0070	<0.0060	<0.0060	<0.0070	<0.0060
Xylenols	mg/kg	SOLID	-	-	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150				<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150					
Zinc	mg/kg	SOLID	730000	170000	86.2	80	36.9	71	60.4	66.2	21	71	64		57.5	70.3	94.6	53.5	75.1	33.9	35.5	66.2	39		52.7	311	52.8		77.5	59.1	65.8	21.3	<16.1000	46.5	<16.0000
Zoxamide*	mg/kg	SOLID	-	-																															

Max of Normalised Results																										
					ML158-CP002	ML158-CP002	ML158-CP002	ML158-CP005	ML158-CP005	ML158-CP005	ML158-CP007	ML158-CP007	ML158-CP007	ML158-CP021	ML158-CP021	ML158-CP402	ML158-CP402	ML158-CR003	ML158-CR003	ML158-CR007	ML158-CR007	ML158-TP008	ML158-TP008	ML158-TP008	ML158-WS012	ML158-WS012
					Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Packington Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure
					1.05	3.05	3.65	0.5	1	1.3	1.05	3.05	3.85	0.05	0.4	0.3	0.5	0.05	1.05	0.05	5.05	1.05	2.05	3.05	0.4	1.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	GFDUD	MGR	MGR	GFDUD	MGR	MGR	GFDUD	MGR	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	MGR	GFDUD
Quinoxyfen*	mg/kg	SOLID	-	-																						
Quizalofop-ethyl*	mg/kg	SOLID	-	-																						
Resmethrin*	mg/kg	SOLID	-	-																						
S421*	mg/kg	SOLID	-	-																						
Salmonella SPP	-	SOLID	-	-																						
Salmonella SPP	cfu/25g	SOLID	-	-																						
Secbumeton*	mg/kg	SOLID	-	-																						
Sec-Butylbenzene	mg/kg	SOLID	-	-					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Selenium	mg/kg	SOLID	12000	1800	<1.0000	<10.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<3.0000	<3.0000	1.35	1.22	1.33	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000	<1.0000
Silafluofen*	mg/kg	SOLID	-	-																						
Simazine	mg/kg	SOLID	-	-																						
Simeconazole*	mg/kg	SOLID	-	-																						
Spinetoram*	mg/kg	SOLID	-	-																						
Spinosad*	mg/kg	SOLID	-	-																						
Spirodiclofen*	mg/kg	SOLID	-	-																						
Spiromesifen*	mg/kg	SOLID	-	-																						
Spirotetramat*	mg/kg	SOLID	-	-																						
Spiroxamine*	mg/kg	SOLID	-	-																						
Styrene	mg/kg	SOLID	3200	5900					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Sulfallate	mg/kg	SOLID	-	-																						
Sulfentrazone*	mg/kg	SOLID	-	-																						
Sulfotep	mg/kg	SOLID	-	-																						
Sulphate	%	SOLID	-	-																						
Sulphate	g/l	SOLID	-	-																						
Sulphate as SO4	mg/kg	SOLID	-	-																						
Sulphur	%	SOLID	-	-																						
Sulprofos	mg/kg	SOLID	-	-																						
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-	0.106																					
Tau-Fluvalinate*	mg/kg	SOLID	-	-																						
Tebuconazole*	mg/kg	SOLID	-	-																						
Tebufenozide*	mg/kg	SOLID	-	-																						
Tebufenpyrad*	mg/kg	SOLID	-	-																						
Tebupirimiphos*	mg/kg	SOLID	-	-																						
Tecnazene	mg/kg	SOLID	-	-																						
Teflubenzuron*	mg/kg	SOLID	-	-																						
Tefluthrin*	mg/kg	SOLID	-	-																						
Tempephos	mg/kg	SOLID	-	-																						
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-												<10.0000	<10.0000									
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-					#VALUE!			#VALUE!											#VALUE!			
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-																						
Terbacil	mg/kg	SOLID	-	-																						
Terbufos	mg/kg	SOLID	-	-																						
Terbufos sulfone*	mg/kg	SOLID	-	-																						
Terbufos sulfoxide*	mg/kg	SOLID	-	-																						
Terbumeton*	mg/kg	SOLID	-	-																						
Terbuthylazine	mg/kg	SOLID	-	-																						
Terbutryn	mg/kg	SOLID	-	-																						
Terrazole	mg/kg	SOLID	-	-																						
Tert-Butylbenzene	mg/kg	SOLID	-	-					<0.1400			<0.0140				<0.0500	<0.0500						<0.0140			
Tetrachloroethene	mg/kg	SOLID	19	810					<0.0500			0.00948				<0.0500	<0.0500						<0.0050			
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Tetrachlorvinphos*	mg/kg	SOLID	-	-																						
Tetraconazole*	mg/kg	SOLID	-	-																						
Tetradifon*	mg/kg	SOLID	-	-																						
Tetramethrin*	mg/kg	SOLID	-	-																						
Tetrasul*	mg/kg	SOLID	-	-																						
Thiabendazole*	mg/kg	SOLID	-	-																						
Thiacloprid*	mg/kg	SOLID	-	-																						
Thiamethoxam*	mg/kg	SOLID	-	-																						
Thiazafluron*	mg/kg	SOLID	-	-																						
Thidiazuron*	mg/kg	SOLID	-	-																						
Thiobencarb*	mg/kg	SOLID	-	-																						
Thiocyclam*	mg/kg	SOLID	-	-																						
Thiodicarb*	mg/kg	SOLID	-	-																						
Thiofanox*	mg/kg	SOLID	-	-																						
Thiometon*	mg/kg	SOLID	-	-																						
Thiophanate Methyl*	mg/kg	SOLID	-	-																						
Tokuthion	mg/kg	SOLID	-	-																						
Tolclofos-methyl*	mg/kg	SOLID	-	-																						
Toluene	mg/kg	SOLID	56000	87000	<0.0020	0.0151	0.0116	0.0077	0.0048	0.00236	<0.0020	0.00366	<0.0020	<0.0020	<0.0020	<0.0100	<0.0100	<0.0020	<0.0020	<0.0020	<0.0020	0.0022	<0.0020	<0.0020	<0.0020	<0.0020
Toluene-D8	%	SOLID	-	-					95.3			88.7											88.1			
Tolylfluanid*	mg/kg	SOLID	-	-																						
Total BTEX	mg/kg	SOLID	-	-	0.0314	0.141	0.0928	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0400	<0.0400	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240
Total Coliform count	CFU/g	SOLID	-	-																						
Total Organic Carbon	% M/M	SOLID	-	-																						
Total Speciated Phenols	mg/kg	SOLID	-	-																						
Total SVOC TIC*	mg/kg	SOLID	-	-					392			<0.1000											<0.1000			
Total VOC TIC*	mg/kg	SOLID	-	-					0			0											0			
Traidimefon	mg/kg	SOLID	-	-																						
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Triadimenol*	mg/kg	SOLID	-	-																						
Triallate	mg/kg	SOLID	-	-																						
Triazamate*	mg/kg	SOLID	-	-																						
Triazophos	mg/kg	SOLID	-	-																						
Tribenuron methyl*	mg/kg	SOLID	-	-																						
Tribromomethane	mg/kg	SOLID	710	4100					<0.1000			<0.0100				<0.0500	<0.0500						<0.0100			
Trichloroethene	mg/kg	SOLID	1.2	70					<0.0900			<0.0090				<0.0500	<0.0500						<0.0090			
Trichlorofluoromethane	mg/kg	SOLID	-	-					<0.0600			<0.0060				<0.0500	<0.0500						<0.0060			
Tridemorph*	mg/kg	SOLID	-	-																						
Trietazine	mg/kg	SOLID	-	-																						
Trifloxystrobin*	mg/kg	SOLID	-	-																						
Triflumizole*	mg/kg	SOLID	-	-																						
Triflumuron*	mg/kg	SOLID	-	-																						
Trifluralin	mg/kg	SOLID	-	-																						
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																						
Triforine*	mg/kg	SOLID	-	-																						
Triticonazole*	mg/kg	SOLID	-	-																						
Trivalent Chromium	mg/kg	SOLID	8600	33000												11	10									
Uniconazole*	mg/kg	SOLID	-	-																						
Vamidothion*	mg/kg	SOLID	-	-																						
Vanadium	mg/kg	SOLID	9000	5000	19.7	40.9	25.6	67.4	44.3	18	16.2	19.4	32.5	65.4	15.9	21	16	23.7	22.3	22.2	16.1	24.9	23.9	22.1	17.2	26.1
Vernolate	mg/kg	SOLID	-	-																						
Vinclozolin*	mg/kg	SOLID	-	-																						
Water Soluble Boron*	mg/kg	SOLID	-	-																						
Xylene	mg/kg	SOLID	-	-																						
Xylenols	mg/kg	SOLID	-	-																						
Zinc	mg/kg	SOLID	730000	170000	424	2500	373	133	168	60.3	52.1	50.8	26.4	85.2	40.1	42	19	79.9	43.3	81.7	15.2	148	48.6	27.8	30	33.2
Zoxamide*	mg/kg	SOLID	-	-																						

Max of Normalised Results																										
					ML158-WS013	ML158-WS014	ML158-WS015	ML158-WS016	ML158-WS016	ML159-CP003	ML159-CP003	ML159-CP003	ML159-CP018	ML159-CR003	ML159-CR003	ML159-CR008a	ML159-CR018	ML159-CR018	ML159-CR408	ML159-CR408	ML159-CR408	ML159-CR408	ML159-CR410	ML159-CR410	ML159-TP004	ML159-TP015
					Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	M6 Motorway South Viaduct	M6 Motorway Box Structure	M6 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	M6 Motorway Box Structure	M6 Motorway Box Structure	Pool Wood Embankment	M6 Motorway Box Structure
					1	0.5	0.2	1	3	0.05	1.05	1.2	0	0.05	0.6	1.2	1.6	3.6	0.3	0.5	1	1.5	0.3	1	0.05	0.15
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	TOP	MGR	GFDUD	MGR	MGR	MGR	GFDUD	GFDUD	GFDUD	GFDUD	GFDUD	GFDUD	TOP	MGR
Quinoxyfen*	mg/kg	SOLID	-	-																						
Quizalofop-ethyl*	mg/kg	SOLID	-	-																						
Resmethrin*	mg/kg	SOLID	-	-																						
S421*	mg/kg	SOLID	-	-																						
Salmonella SPP	-	SOLID	-	-																						
Salmonella SPP	cfu/25g	SOLID	-	-																						
Secbumeton*	mg/kg	SOLID	-	-																						
Sec-Butylbenzene	mg/kg	SOLID	-	-														<0.0010								
Selenium	mg/kg	SOLID	12000	1800	<1.0000	<1.0000	<1.0000	1.43	2.11	4.97	2.94	<1.0000	<1.0000	1.55	1.16	<0.5000	<0.5000	<0.5000	<3.0000		<3.0000	<3.0000	<3.0000	<3.0000	<1.0000	<0.5000
Silafluofen*	mg/kg	SOLID	-	-																						
Simazine	mg/kg	SOLID	-	-																						
Simeconazole*	mg/kg	SOLID	-	-																						
Spinetoram*	mg/kg	SOLID	-	-																						
Spinosad*	mg/kg	SOLID	-	-																						
Spirodiclofen*	mg/kg	SOLID	-	-																						
Spiromesifen*	mg/kg	SOLID	-	-																						
Spirotetramat*	mg/kg	SOLID	-	-																						
Spiroxamine*	mg/kg	SOLID	-	-																						
Styrene	mg/kg	SOLID	3200	5900														<0.0010								
Sulfallate	mg/kg	SOLID	-	-																						
Sulfentrazone*	mg/kg	SOLID	-	-																						
Sulfotep	mg/kg	SOLID	-	-																						
Sulphate	%	SOLID	-	-																						
Sulphate	g/l	SOLID	-	-																						
Sulphate as SO4	mg/kg	SOLID	-	-																						
Sulphur	%	SOLID	-	-																						
Sulprofos	mg/kg	SOLID	-	-																						
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																						
Tau-Fluvalinate*	mg/kg	SOLID	-	-																						
Tebuconazole*	mg/kg	SOLID	-	-																						
Tebufenozide*	mg/kg	SOLID	-	-																						
Tebufenpyrad*	mg/kg	SOLID	-	-																						
Tebupirimiphos*	mg/kg	SOLID	-	-																						
Tecnazene	mg/kg	SOLID	-	-																						
Teflubenzuron*	mg/kg	SOLID	-	-																						
Tefluthrin*	mg/kg	SOLID	-	-																						
Tempephos	mg/kg	SOLID	-	-																						
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-														0.6								
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																						
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-														<0.0060								
Terbacil	mg/kg	SOLID	-	-																						
Terbufos	mg/kg	SOLID	-	-																						
Terbufos sulfone*	mg/kg	SOLID	-	-																						
Terbufos sulfoxide*	mg/kg	SOLID	-	-																						
Terbumeton*	mg/kg	SOLID	-	-																						
Terbuthylazine	mg/kg	SOLID	-	-																						
Terbutryn	mg/kg	SOLID	-	-																						
Terrazole	mg/kg	SOLID	-	-																						
Tert-Butylbenzene	mg/kg	SOLID	-	-														<0.0010								
Tetrachloroethene	mg/kg	SOLID	19	810														<0.0030								
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190														<0.0010								
Tetrachlorvinphos*	mg/kg	SOLID	-	-																						
Tetraconazole*	mg/kg	SOLID	-	-																						
Tetradifon*	mg/kg	SOLID	-	-																						
Tetramethrin*	mg/kg	SOLID	-	-																						
Tetrasul*	mg/kg	SOLID	-	-																						
Thiabendazole*	mg/kg	SOLID	-	-																						
Thiacloprid*	mg/kg	SOLID	-	-																						
Thiamethoxam*	mg/kg	SOLID	-	-																						
Thiazafluron*	mg/kg	SOLID	-	-																						
Thidiazuron*	mg/kg	SOLID	-	-																						
Thiobencarb*	mg/kg	SOLID	-	-																						
Thiocyclam*	mg/kg	SOLID	-	-																						
Thiodicarb*	mg/kg	SOLID	-	-																						
Thiofanox*	mg/kg	SOLID	-	-																						
Thiometon*	mg/kg	SOLID	-	-																						
Thiophanate Methyl*	mg/kg	SOLID	-	-																						
Tokuthion	mg/kg	SOLID	-	-																						
Tolclofos-methyl*	mg/kg	SOLID	-	-																						
Toluene	mg/kg	SOLID	56000	87000	<0.0020	<0.0020	<0.0020	<0.0020	0.00232	0.0101	0.00696	<0.0020	<0.0020	<0.0020	<0.0020	<0.0050	<0.0050	<0.0060	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0020	<0.0060
Toluene-D8	%	SOLID	-	-																						
Tolylfluanid*	mg/kg	SOLID	-	-																						
Total BTEX	mg/kg	SOLID	-	-	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240	<0.0240				<0.0400		<0.0400	<0.0400	<0.0400	<0.0400	<0.0240	
Total Coliform count	CFU/g	SOLID	-	-																						
Total Organic Carbon	% M/M	SOLID	-	-												0.36	0.161	0.095								0.91
Total Speciated Phenols	mg/kg	SOLID	-	-																						
Total SVOC TIC*	mg/kg	SOLID	-	-																						
Total VOC TIC*	mg/kg	SOLID	-	-																						
Traidimefon	mg/kg	SOLID	-	-																						
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700														<0.0010								
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-														<0.0010								
Triadimenol*	mg/kg	SOLID	-	-																						
Triallate	mg/kg	SOLID	-	-																						
Triazamate*	mg/kg	SOLID	-	-																						
Triazophos	mg/kg	SOLID	-	-																						
Tribenuron methyl*	mg/kg	SOLID	-	-																						
Tribromomethane	mg/kg	SOLID	710	4100														<0.0010								
Trichloroethene	mg/kg	SOLID	1.2	70														<0.0010								
Trichlorofluoromethane	mg/kg	SOLID	-	-														<0.0010								
Tridemorph*	mg/kg	SOLID	-	-																						
Trietazine	mg/kg	SOLID	-	-																						
Trifloxystrobin*	mg/kg	SOLID	-	-																						
Triflumizole*	mg/kg	SOLID	-	-																						
Triflumuron*	mg/kg	SOLID	-	-																						
Trifluralin	mg/kg	SOLID	-	-																						
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																						
Triforine*	mg/kg	SOLID	-	-																						
Triticonazole*	mg/kg	SOLID	-	-																						
Trivalent Chromium	mg/kg	SOLID	8600	33000															16		12	6	9	9		
Uniconazole*	mg/kg	SOLID	-	-																						
Vamidothion*	mg/kg	SOLID	-	-																						
Vanadium	mg/kg	SOLID	9000	5000	18.7	16.5	26.4	23.8	30.2	83.6	50.6	16.4	18.6	25.3	20.7	15	18.3	17	23		19	10	17	15	22.7	21.2
Vernolate	mg/kg	SOLID	-	-																						
Vinclozolin*	mg/kg	SOLID	-	-																						
Water Soluble Boron*	mg/kg	SOLID	-	-																						
Xylene	mg/kg	SOLID	-	-												<0.0070	<0.0060	<0.0070								<0.0070
Xylenols	mg/kg	SOLID	-	-																						
Zinc	mg/kg	SOLID	730000	170000	36.5	48.9	83.6	51.5	169	551	155	40.9	90.7	68.4	58.8	20.4	24.9	20	73		48	13	51	31	67	45.5
Zoxamide*	mg/kg	SOLID	-	-																						

Max of Normalised Results																									
					ML159-TP015	ML159-WS002	ML159-WS002a	ML160-CP010	ML160-CP041	ML160-CP041	ML160-CR030	ML160-CR033	ML160-CR035	ML160-CR035	ML160-WS003	ML160-WS003	ML161-CP032	ML161-CP032	ML161-CR009	ML161-CR009	ML161-CR021	ML161-TP405	ML161-TP405	ML161-WS002	ML162-CR004
					M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway North Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	Coleshill West Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill West Viaduct	M42 Coleshill Box Structure
					0.45	0.5	1.1	0.5	0.2	0.6	1.5	1.5	0.75	1.1	0.3	1	0.9	1.2	0.2	0.5	0.5	0.05	0.5	0.5	0.6
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GFDUD	MGR	MGR	RTD1	MGR	HEAD	MGR	ALV	MGR	HEAD	MGR	MGR	MGR	MMG	MGR	MGR	MGR	TOP	RTD1	MGR	HEAD
Quinoxyfen*	mg/kg	SOLID	-	-																					
Quizalofop-ethyl*	mg/kg	SOLID	-	-																					
Resmethrin*	mg/kg	SOLID	-	-																					
S421*	mg/kg	SOLID	-	-																					
Salmonella SPP	-	SOLID	-	-																					
Salmonella SPP	cfu/25g	SOLID	-	-																					
Secbumeton*	mg/kg	SOLID	-	-																					
Sec-Butylbenzene	mg/kg	SOLID	-	-																					
Selenium	mg/kg	SOLID	12000	1800	<0.5000	<0.5000	<0.5000		<0.6000	<0.5000	0.5		<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	0.7	<0.5000	<3.0000	<3.0000	0.6	<0.5000
Silafluofen*	mg/kg	SOLID	-	-																					
Simazine	mg/kg	SOLID	-	-																					
Simeconazole*	mg/kg	SOLID	-	-																					
Spinetoram*	mg/kg	SOLID	-	-																					
Spinosad*	mg/kg	SOLID	-	-																					
Spirodiclofen*	mg/kg	SOLID	-	-																					
Spiromesifen*	mg/kg	SOLID	-	-																					
Spirotetramat*	mg/kg	SOLID	-	-																					
Spiroxamine*	mg/kg	SOLID	-	-																					
Styrene	mg/kg	SOLID	3200	5900																					
Sulfallate	mg/kg	SOLID	-	-																					
Sulfentrazone*	mg/kg	SOLID	-	-																					
Sulfotep	mg/kg	SOLID	-	-																					
Sulphate	%	SOLID	-	-																					
Sulphate	g/l	SOLID	-	-																					
Sulphate as SO4	mg/kg	SOLID	-	-																					
Sulphur	%	SOLID	-	-																					
Sulprofos	mg/kg	SOLID	-	-																					
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																					
Tau-Fluvalinate*	mg/kg	SOLID	-	-																					
Tebuconazole*	mg/kg	SOLID	-	-																					
Tebufenozide*	mg/kg	SOLID	-	-																					
Tebufenpyrad*	mg/kg	SOLID	-	-																					
Tebupirimiphos*	mg/kg	SOLID	-	-																					
Tecnazene	mg/kg	SOLID	-	-																					
Teflubenzuron*	mg/kg	SOLID	-	-																					
Tefluthrin*	mg/kg	SOLID	-	-																					
Tempephos	mg/kg	SOLID	-	-																					
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-																					
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																					
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-																					
Terbacil	mg/kg	SOLID	-	-																					
Terbufos	mg/kg	SOLID	-	-																					
Terbufos sulfone*	mg/kg	SOLID	-	-																					
Terbufos sulfoxide*	mg/kg	SOLID	-	-																					
Terbumeton*	mg/kg	SOLID	-	-																					
Terbuthylazine	mg/kg	SOLID	-	-																					
Terbutryn	mg/kg	SOLID	-	-																					
Terrazole	mg/kg	SOLID	-	-																					
Tert-Butylbenzene	mg/kg	SOLID	-	-																					
Tetrachloroethene	mg/kg	SOLID	19	810																					
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190																					
Tetrachlorvinphos*	mg/kg	SOLID	-	-																					
Tetraconazole*	mg/kg	SOLID	-	-																					
Tetradifon*	mg/kg	SOLID	-	-																					
Tetramethrin*	mg/kg	SOLID	-	-																					
Tetrasul*	mg/kg	SOLID	-	-																					
Thiabendazole*	mg/kg	SOLID	-	-																					
Thiacloprid*	mg/kg	SOLID	-	-																					
Thiamethoxam*	mg/kg	SOLID	-	-																					
Thiazafluron*	mg/kg	SOLID	-	-																					
Thidiazuron*	mg/kg	SOLID	-	-																					
Thiobencarb*	mg/kg	SOLID	-	-																					
Thiocyclam*	mg/kg	SOLID	-	-																					
Thiodicarb*	mg/kg	SOLID	-	-																					
Thiofanox*	mg/kg	SOLID	-	-																					
Thiometon*	mg/kg	SOLID	-	-																					
Thiophanate Methyl*	mg/kg	SOLID	-	-																					
Tokuthion	mg/kg	SOLID	-	-																					
Tolclofos-methyl*	mg/kg	SOLID	-	-																					
Toluene	mg/kg	SOLID	56000	87000	<0.0050	<0.0050	<0.0060		<0.0070	<0.0060	<0.0060		<0.0060	<0.0060	<0.0050	<0.0060	<0.0070	<0.0060	<0.0060	<0.0060	<0.0050	<0.0100	<0.0100	<0.0060	<0.0060
Toluene-D8	%	SOLID	-	-																					
Tolylfluanid*	mg/kg	SOLID	-	-																					
Total BTEX	mg/kg	SOLID	-	-																		<0.0400	<0.0400		
Total Coliform count	CFU/g	SOLID	-	-																					
Total Organic Carbon	% M/M	SOLID	-	-	0.13	0.28	0.33		1.453	0.996	0.133		0.427	0.462	0.25	0.15	0.24	0.2	1.55	2.38	0.44			0.43	0.44
Total Speciated Phenols	mg/kg	SOLID	-	-																					
Total SVOC TIC*	mg/kg	SOLID	-	-																					
Total VOC TIC*	mg/kg	SOLID	-	-																					
Traidimefon	mg/kg	SOLID	-	-																					
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700																					
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-																					
Triadimenol*	mg/kg	SOLID	-	-																					
Triallate	mg/kg	SOLID	-	-																					
Triazamate*	mg/kg	SOLID	-	-																					
Triazophos	mg/kg	SOLID	-	-																					
Tribenuron methyl*	mg/kg	SOLID	-	-																					
Tribromomethane	mg/kg	SOLID	710	4100																					
Trichloroethene	mg/kg	SOLID	1.2	70																					
Trichlorofluoromethane	mg/kg	SOLID	-	-																					
Tridemorph*	mg/kg	SOLID	-	-																					
Trietazine	mg/kg	SOLID	-	-																					
Trifloxystrobin*	mg/kg	SOLID	-	-																					
Triflumizole*	mg/kg	SOLID	-	-																					
Triflumuron*	mg/kg	SOLID	-	-																					
Trifluralin	mg/kg	SOLID	-	-																					
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																					
Triforine*	mg/kg	SOLID	-	-																					
Triticonazole*	mg/kg	SOLID	-	-																					
Trivalent Chromium	mg/kg	SOLID	8600	33000																		18	20		
Uniconazole*	mg/kg	SOLID	-	-																					
Vamidothion*	mg/kg	SOLID	-	-																					
Vanadium	mg/kg	SOLID	9000	5000	15.4	13.5	15.9		34	28.8	28.7		15.8	14.2	19	23.4	34.2	29.8	18	18.7	17.6	22	25	20.7	21
Vernolate	mg/kg	SOLID	-	-																					
Vinclozolin*	mg/kg	SOLID	-	-																					
Water Soluble Boron*	mg/kg	SOLID	-	-																					
Xylene	mg/kg	SOLID	-	-	<0.0060	<0.0070	<0.0070		<0.0080	<0.0080	<0.0070		<0.0070	<0.0070	<0.0060	<0.0080	<0.0080	<0.0080	<0.0070	<0.0070	<0.0060			<0.0080	<0.0070
Xylenols	mg/kg	SOLID	-	-																					
Zinc	mg/kg	SOLID	730000	170000	20.7	17.6	23.9		56.8	50.3	69.7		28.4	25.5	40	68.5	68.4	60.3	57.3	74.2	37	170	70	40.7	40.9
Zoxamide*	mg/kg	SOLID	-	-																					

Max of Normalised Results																												
					ML162-CR024	ML162-CR024	ML162-CR024	ML162-CR026	ML162-CR026	ML162-CR026	ML162-CR028	ML162-CR401	ML162-CR401	ML162-CR402	ML162-CR402	ML162-CR402	ML162-CR403	ML162-CR403	ML162-CR404	ML162-CR404	ML162-TP402	ML162-TP402	ML163-CP035	ML163-CP038	ML163-CP401	ML163-CP401	ML163-CP401	ML163-CR007
					M42 Coleshill North Viaduct	M42 Coleshill North Viaduct	M42 Coleshill North Viaduct	Gilson Embankment	Gilson Embankment	Gilson Embankment	M42 Coleshill North Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Gilson Embankment	Gilson Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Gilson Cutting	Gilson Cutting	Gilson Cutting	Gilson Embankment
					0.05	0.5	2.1	21.8	22.3	24.8	2.3	0.3	1	0.3	1	3	0.3	1	0.3	1	0.3	1	1	0.5	0.05	0.5	2	0.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	TOP	ALV	ALV	MMG	MMG	MMG	ALV	ALV	ALV	MGR	MGR	MGR	GFDMP	GFDMP	RTD2	RTD2	TOP	ALV	ALV	RTD1	TOP	GFDUD	GFDUD	GFDUD
Quinoxyfen*	mg/kg	SOLID	-	-															<0.0100									
Quizalofop-ethyl*	mg/kg	SOLID	-	-															<0.0100									
Resmethrin*	mg/kg	SOLID	-	-															<0.0100									
S421*	mg/kg	SOLID	-	-															<0.0100									
Salmonella SPP	-	SOLID	-	-													#VALUE!	#VALUE!										
Salmonella SPP	cfu/25g	SOLID	-	-																								
Secbumeton*	mg/kg	SOLID	-	-															<0.0100									
Sec-Butylbenzene	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
Selenium	mg/kg	SOLID	12000	1800	<3.0000	<3.0000	<3.0000					<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	<0.5000	<0.5000	<3.0000	<3.0000	<3.0000	<3.0000
Silafluofen*	mg/kg	SOLID	-	-															<0.0100									
Simazine	mg/kg	SOLID	-	-															<0.0100									
Simeconazole*	mg/kg	SOLID	-	-															<0.0100									
Spinetoram*	mg/kg	SOLID	-	-															<0.0100									
Spinosad*	mg/kg	SOLID	-	-															<0.0100									
Spirodiclofen*	mg/kg	SOLID	-	-															<0.0100									
Spiromesifen*	mg/kg	SOLID	-	-															<0.0100									
Spirotetramat*	mg/kg	SOLID	-	-															<0.0100									
Spiroxamine*	mg/kg	SOLID	-	-															<0.0100									
Styrene	mg/kg	SOLID	3200	5900																				<0.0010		<0.0500		
Sulfallate	mg/kg	SOLID	-	-															<0.0100									
Sulfentrazone*	mg/kg	SOLID	-	-															<0.0100									
Sulfotep	mg/kg	SOLID	-	-															<0.0100									
Sulphate	%	SOLID	-	-				0.06	0.11	0.07	0.03																	
Sulphate	g/l	SOLID	-	-				0.02	0.02	0.02	0.03																	
Sulphate as SO4	mg/kg	SOLID	-	-																								
Sulphur	%	SOLID	-	-				0.02	0.04	0.03	0.01																	
Sulprofos	mg/kg	SOLID	-	-															<0.0100									
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																								
Tau-Fluvalinate*	mg/kg	SOLID	-	-															<0.0100									
Tebuconazole*	mg/kg	SOLID	-	-															<0.0100									
Tebufenozide*	mg/kg	SOLID	-	-															<0.0100									
Tebufenpyrad*	mg/kg	SOLID	-	-															<0.0100									
Tebupirimiphos*	mg/kg	SOLID	-	-															<0.0100									
Tecnazene	mg/kg	SOLID	-	-															<0.0100									
Teflubenzuron*	mg/kg	SOLID	-	-															<0.0100									
Tefluthrin*	mg/kg	SOLID	-	-															<0.0100									
Tempephos	mg/kg	SOLID	-	-															<0.1000									
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-																						<10.0000		
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																								
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-																				<0.0050				
Terbacil	mg/kg	SOLID	-	-															<0.0100									
Terbufos	mg/kg	SOLID	-	-															<0.0100									
Terbufos sulfone*	mg/kg	SOLID	-	-															<0.0100									
Terbufos sulfoxide*	mg/kg	SOLID	-	-															<0.0100									
Terbumeton*	mg/kg	SOLID	-	-															<0.0100									
Terbuthylazine	mg/kg	SOLID	-	-															<0.0100									
Terbutryn	mg/kg	SOLID	-	-															<0.0100									
Terrazole	mg/kg	SOLID	-	-															<0.0100									
Tert-Butylbenzene	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
Tetrachloroethene	mg/kg	SOLID	19	810																				<0.0030		<0.0500		
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190																				<0.0010		<0.0500		
Tetrachlorvinphos*	mg/kg	SOLID	-	-															<0.0100									
Tetraconazole*	mg/kg	SOLID	-	-															<0.0100									
Tetradifon*	mg/kg	SOLID	-	-															<0.0100									
Tetramethrin*	mg/kg	SOLID	-	-															<0.0100									
Tetrasul*	mg/kg	SOLID	-	-															<0.0100									
Thiabendazole*	mg/kg	SOLID	-	-															<0.0100									
Thiacloprid*	mg/kg	SOLID	-	-															<0.0100									
Thiamethoxam*	mg/kg	SOLID	-	-															<0.0100									
Thiazafluron*	mg/kg	SOLID	-	-															<0.0100									
Thidiazuron*	mg/kg	SOLID	-	-															<0.0100									
Thiobencarb*	mg/kg	SOLID	-	-															<0.0100									
Thiocyclam*	mg/kg	SOLID	-	-															<0.0100									
Thiodicarb*	mg/kg	SOLID	-	-															<0.0100									
Thiofanox*	mg/kg	SOLID	-	-															<0.0100									
Thiometon*	mg/kg	SOLID	-	-															<0.0100									
Thiophanate Methyl*	mg/kg	SOLID	-	-															<0.0100									
Tokuthion	mg/kg	SOLID	-	-															<0.0100									
Tolclofos-methyl*	mg/kg	SOLID	-	-															<0.0100									
Toluene	mg/kg	SOLID	56000	87000	<0.0100	<0.0100	<0.0100					<0.0100	<0.0100	<0.0200	<0.0200	<0.0200	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0050	<0.0070	<0.0100	<0.0100	<0.0100	<0.0100
Toluene-D8	%	SOLID	-	-																								
Tolylfluanid*	mg/kg	SOLID	-	-															<0.0100									
Total BTEX	mg/kg	SOLID	-	-	<0.0400	<0.0400	<0.0400					<0.0400	<0.0400	<0.0800	<0.0800	<0.0800	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400			<0.0400	<0.0400	<0.0400	<0.0400
Total Coliform count	CFU/g	SOLID	-	-													#VALUE!	240										
Total Organic Carbon	% M/M	SOLID	-	-																			0.4	0.37				
Total Speciated Phenols	mg/kg	SOLID	-	-																								
Total SVOC TIC*	mg/kg	SOLID	-	-																								
Total VOC TIC*	mg/kg	SOLID	-	-																								
Traidimefon	mg/kg	SOLID	-	-															<0.0100									
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700																				<0.0010		<0.0500		
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
Triadimenol*	mg/kg	SOLID	-	-															<0.0100									
Triallate	mg/kg	SOLID	-	-															<0.0100									
Triazamate*	mg/kg	SOLID	-	-															<0.0100									
Triazophos	mg/kg	SOLID	-	-															<0.0100									
Tribenuron methyl*	mg/kg	SOLID	-	-															<0.0100									
Tribromomethane	mg/kg	SOLID	710	4100																				<0.0010		<0.0500		
Trichloroethene	mg/kg	SOLID	1.2	70																				<0.0010		<0.0500		
Trichlorofluoromethane	mg/kg	SOLID	-	-																				<0.0010		<0.0500		
Tridemorph*	mg/kg	SOLID	-	-															<0.0100									
Trietazine	mg/kg	SOLID	-	-															<0.0100									
Trifloxystrobin*	mg/kg	SOLID	-	-															<0.0100									
Triflumizole*	mg/kg	SOLID	-	-															<0.0100									
Triflumuron*	mg/kg	SOLID	-	-															<0.0100									
Trifluralin	mg/kg	SOLID	-	-															<0.0100									
Triflusulfuron-methyl*	mg/kg	SOLID	-	-															<0.0100									
Triforine*	mg/kg	SOLID	-	-															<0.0100									
Triticonazole*	mg/kg	SOLID	-	-															<0.0100									
Trivalent Chromium	mg/kg	SOLID	8600	33000	19	27	42					25	38	10	15	98	26	19	25	16	16	15			15	13	18	14
Uniconazole*	mg/kg	SOLID	-	-															<0.0100									
Vamidothion*	mg/kg	SOLID	-	-															<0.0100									
Vanadium	mg/kg	SOLID	9000	5000	30	22	23					27	59	41	55	53	27	21	44	28	23	23	16.9	14.3	19	19	21	15
Vernolate	mg/kg	SOLID	-	-															<0.0100									
Vinclozolin*	mg/kg	SOLID	-	-															<0.0100									
Water Soluble Boron*	mg/kg	SOLID	-	-																								
Xylene	mg/kg	SOLID	-	-																			<0.0060	<0.0070				
Xylenols	mg/kg	SOLID	-	-																								
Zinc	mg/kg	SOLID	730000	170000	78	50	45					68	86	56	62	310	87	57	78	36	52	26	30.5	20.7	230	97	40	53
Zoxamide*	mg/kg	SOLID	-	-															<0.0100									

Max of Normalised Results																											
					ML163-CR007	ML163-CR007	ML163-CR008	ML163-CR008	ML163-CR008	ML163-CR008	ML163-CR010	ML163-CR010	ML163-CR010	ML163-CR016	ML163-CR016	ML163-CR020	ML163-CR020	ML163-CR020	ML163-CR021a	ML163-CR021a	ML163-CR021a	ML163-CR401	ML163-CR401	ML163-CR401	ML163-TP009	ML163-TP020	ML163-TP021
					Gilson Embankment	Gilson Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Gilson Embankment	Gilson Embankment	Gilson Embankment	Gilson Cutting	Lichfield Road Embankment	Lichfield Road Embankment
					1	2	0.05	0.6	1.2	1.5	0.4	1.5	2	0.5	1	0.3	0.5	0.9	0.4	0.9	1.5	0.05	0.5	1	3.5	1	0.05
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	GLLD	GLLD	MGR	MGR	MGR	RTD1	MGR	RTD1	RTD1	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	ALV	TOP	ALV	ALV	MMG	GLLD	MGR
Quinoxyfen*	mg/kg	SOLID	-	-																							
Quizalofop-ethyl*	mg/kg	SOLID	-	-																							
Resmethrin*	mg/kg	SOLID	-	-																							
S421*	mg/kg	SOLID	-	-																							
Salmonella SPP	-	SOLID	-	-																							
Salmonella SPP	cfu/25g	SOLID	-	-																							
Secbumeton*	mg/kg	SOLID	-	-																							
Sec-Butylbenzene	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
Selenium	mg/kg	SOLID	12000	1800	<3.0000	<3.0000	0.6	<0.5000	<0.5000	<0.5000	0.6		<0.5000	0.8	<0.5000		<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<3.0000	<3.0000	<3.0000		<0.5000	<0.5000
Silafluofen*	mg/kg	SOLID	-	-																							
Simazine	mg/kg	SOLID	-	-																							
Simeconazole*	mg/kg	SOLID	-	-																							
Spinetoram*	mg/kg	SOLID	-	-																							
Spinosad*	mg/kg	SOLID	-	-																							
Spirodiclofen*	mg/kg	SOLID	-	-																							
Spiromesifen*	mg/kg	SOLID	-	-																							
Spirotetramat*	mg/kg	SOLID	-	-																							
Spiroxamine*	mg/kg	SOLID	-	-																							
Styrene	mg/kg	SOLID	3200	5900													<0.0010									<0.0010	<0.0010
Sulfallate	mg/kg	SOLID	-	-																							
Sulfentrazone*	mg/kg	SOLID	-	-																							
Sulfotep	mg/kg	SOLID	-	-																							
Sulphate	%	SOLID	-	-																					<0.0100		
Sulphate	g/l	SOLID	-	-																					0.02		
Sulphate as SO4	mg/kg	SOLID	-	-																							
Sulphur	%	SOLID	-	-																					<0.0100		
Sulprofos	mg/kg	SOLID	-	-																							
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																							
Tau-Fluvalinate*	mg/kg	SOLID	-	-																							
Tebuconazole*	mg/kg	SOLID	-	-																							
Tebufencozide*	mg/kg	SOLID	-	-																							
Tebufenpyrad*	mg/kg	SOLID	-	-																							
Tebupirimiphos*	mg/kg	SOLID	-	-																							
Tecnazene	mg/kg	SOLID	-	-																							
Teflubenzuron*	mg/kg	SOLID	-	-																							
Tefluthrin*	mg/kg	SOLID	-	-																							
Tempephos	mg/kg	SOLID	-	-																							
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-													<34.0000										
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																							
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-													0.117									<0.0060	<0.0060
Terbacil	mg/kg	SOLID	-	-																							
Terbufos	mg/kg	SOLID	-	-																							
Terbufos sulfone*	mg/kg	SOLID	-	-																							
Terbufos sulfoxide*	mg/kg	SOLID	-	-																							
Terbumeton*	mg/kg	SOLID	-	-																							
Terbuthylazine	mg/kg	SOLID	-	-																							
Terbutryn	mg/kg	SOLID	-	-																							
Terrazole	mg/kg	SOLID	-	-																							
Tert-Butylbenzene	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
Tetrachloroethene	mg/kg	SOLID	19	810													<0.0030									<0.0030	<0.0040
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190													<0.0010									<0.0010	<0.0010
Tetrachlorvinphos*	mg/kg	SOLID	-	-																							
Tetraconazole*	mg/kg	SOLID	-	-																							
Tetradifon*	mg/kg	SOLID	-	-																							
Tetramethrin*	mg/kg	SOLID	-	-																							
Tetrasul*	mg/kg	SOLID	-	-																							
Thiabendazole*	mg/kg	SOLID	-	-																							
Thiacloprid*	mg/kg	SOLID	-	-																							
Thiamethoxam*	mg/kg	SOLID	-	-																							
Thiazafluron*	mg/kg	SOLID	-	-																							
Thidiazuron*	mg/kg	SOLID	-	-																							
Thiobencarb*	mg/kg	SOLID	-	-																							
Thiocyclam*	mg/kg	SOLID	-	-																							
Thiodicarb*	mg/kg	SOLID	-	-																							
Thiofanox*	mg/kg	SOLID	-	-																							
Thiometon*	mg/kg	SOLID	-	-																							
Thiophanate Methyl*	mg/kg	SOLID	-	-																							
Tokuthion	mg/kg	SOLID	-	-																							
Tolclofos-methyl*	mg/kg	SOLID	-	-																							
Toluene	mg/kg	SOLID	56000	87000	<0.0100	<0.0100	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060		<0.0060	<0.0060	<0.0060		<0.0060	<0.0060	<0.0060	<0.0060	<0.0050	<0.0100	<0.0100	<0.0100		<0.0060	<0.0060
Toluene-D8	%	SOLID	-	-																							
Tolylfluanid*	mg/kg	SOLID	-	-																							
Total BTEX	mg/kg	SOLID	-	-	<0.0400	<0.0400																<0.0400	<0.0400	<0.0400			
Total Coliform count	CFU/g	SOLID	-	-																							
Total Organic Carbon	% M/M	SOLID	-	-			1.66	0.4	1.25	0.2	0.94		0.14	0.72	0.24		1.75	0.34	0.41	1.79	0.24					0.08	1.5
Total Speciated Phenols	mg/kg	SOLID	-	-																							
Total SVOC TIC*	mg/kg	SOLID	-	-																							
Total VOC TIC*	mg/kg	SOLID	-	-																							
Traidimefon	mg/kg	SOLID	-	-																							
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700													<0.0010									<0.0010	<0.0010
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
Triadimenol*	mg/kg	SOLID	-	-																							
Triallate	mg/kg	SOLID	-	-																							
Triazamate*	mg/kg	SOLID	-	-																							
Triazophos	mg/kg	SOLID	-	-																							
Tribenuron methyl*	mg/kg	SOLID	-	-																							
Tribromomethane	mg/kg	SOLID	710	4100													<0.0010									<0.0010	<0.0010
Trichloroethene	mg/kg	SOLID	1.2	70													<0.0010									<0.0010	<0.0010
Trichlorofluoromethane	mg/kg	SOLID	-	-													<0.0010									<0.0010	<0.0010
Tridemorph*	mg/kg	SOLID	-	-																							
Trietazine	mg/kg	SOLID	-	-																							
Trifloxystrobin*	mg/kg	SOLID	-	-																							
Triflumizole*	mg/kg	SOLID	-	-																							
Triflumuron*	mg/kg	SOLID	-	-																							
Trifluralin	mg/kg	SOLID	-	-																							
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																							
Triforine*	mg/kg	SOLID	-	-																							
Triticonazole*	mg/kg	SOLID	-	-																							
Trivalent Chromium	mg/kg	SOLID	8600	33000	28	19																16	30	40			
Uniconazole*	mg/kg	SOLID	-	-																							
Vamidothion*	mg/kg	SOLID	-	-																							
Vanadium	mg/kg	SOLID	9000	5000	27	19	21.8	14.6	20.4	16	20.8		21.5	17.7	15.3		51.1	12.5	40.6	20.3	18.7	20	15	39		12	15.1
Vernolate	mg/kg	SOLID	-	-																							
Vinclozolin*	mg/kg	SOLID	-	-																							
Water Soluble Boron*	mg/kg	SOLID	-	-																							
Xylene	mg/kg	SOLID	-	-			<0.0070	<0.0070	<0.0070	<0.0070	<0.0070		<0.0070	<0.0070	<0.0070		<0.0070	<0.0070	<0.0070	<0.0070	<0.0070					<0.0070	<0.0070
Xylenols	mg/kg	SOLID	-	-																							
Zinc	mg/kg	SOLID	730000	170000	80	39	74.3	25.2	29.4	20.7	47.4		17.1	57.8	16.7		61.6	<16.0000	102	73.8	22.5	59	31	84		<16.0000	69.3
Zoxamide*	mg/kg	SOLID	-	-																							

Max of Normalised Results																									
					ML163-TP021	ML164-CP003	ML164-CP003	ML164-CP003	ML164-CP004	ML164-CP004	ML164-CP004	ML164-CP010	ML164-CP010	ML164-CP021	ML164-CP021	ML164-CP021	ML164-CP023	ML164-CP023	ML164-CP036	ML164-CP036	ML164-CP036	ML164-CR009	ML164-CR009	ML164-CR009	ML164-CR011
					Lichfield Road Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watton House Embankment	Watton House Embankment	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct
					0.5	0.9	2	3.5	1	3	4	0.5	1	0.5	1	3	0.05	1.5	1	3	5	0.05	0.4	1.5	0.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	MGR	TILMP	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	ALV	MGR	MGR	MGR	MGR
Quinoxyfen*	mg/kg	SOLID	-	-																					
Quizalofop-ethyl*	mg/kg	SOLID	-	-																					
Resmethrin*	mg/kg	SOLID	-	-																					
S421*	mg/kg	SOLID	-	-																					
Salmonella SPP	-	SOLID	-	-																					
Salmonella SPP	cfu/25g	SOLID	-	-					#VALUE!																
Secbumeton*	mg/kg	SOLID	-	-																					
Sec-Butylbenzene	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
Selenium	mg/kg	SOLID	12000	1800	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	0.5	<0.5100	<0.5000		<0.5000	0.6	<0.5000	0.9	1.1	2	0.8	0.6	0.5	0.7
Silafluofen*	mg/kg	SOLID	-	-																					
Simazine	mg/kg	SOLID	-	-																					
Simeconazole*	mg/kg	SOLID	-	-																					
Spinetoram*	mg/kg	SOLID	-	-																					
Spinosad*	mg/kg	SOLID	-	-																					
Spirodiclofen*	mg/kg	SOLID	-	-																					
Spiromesifen*	mg/kg	SOLID	-	-																					
Spirotetramat*	mg/kg	SOLID	-	-																					
Spiroxamine*	mg/kg	SOLID	-	-																					
Styrene	mg/kg	SOLID	3200	5900	<0.0010		<0.0010			<0.0010										<0.0010					
Sulfallate	mg/kg	SOLID	-	-																					
Sulfentrazone*	mg/kg	SOLID	-	-																					
Sulfotep	mg/kg	SOLID	-	-																					
Sulphate	%	SOLID	-	-																					
Sulphate	g/l	SOLID	-	-																					
Sulphate as SO4	mg/kg	SOLID	-	-																					
Sulphur	%	SOLID	-	-																					
Sulprofos	mg/kg	SOLID	-	-																					
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																					
Tau-Fluvalinate*	mg/kg	SOLID	-	-																					
Tebuconazole*	mg/kg	SOLID	-	-																					
Tebufenozide*	mg/kg	SOLID	-	-																					
Tebufenpyrad*	mg/kg	SOLID	-	-																					
Tebupirimiphos*	mg/kg	SOLID	-	-																					
Tecnazene	mg/kg	SOLID	-	-																					
Teflubenzuron*	mg/kg	SOLID	-	-																					
Tefluthrin*	mg/kg	SOLID	-	-																					
Tempephos	mg/kg	SOLID	-	-																					
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-			2.4			0.9										<1.7000					
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																					
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-	<0.0050		<0.0060			<0.0060										<0.0060					
Terbacil	mg/kg	SOLID	-	-																					
Terbufos	mg/kg	SOLID	-	-																					
Terbufos sulfone*	mg/kg	SOLID	-	-																					
Terbufos sulfoxide*	mg/kg	SOLID	-	-																					
Terbumeton*	mg/kg	SOLID	-	-																					
Terbuthylazine	mg/kg	SOLID	-	-																					
Terbutryn	mg/kg	SOLID	-	-																					
Terrazole	mg/kg	SOLID	-	-																					
Tert-Butylbenzene	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
Tetrachloroethene	mg/kg	SOLID	19	810	<0.0030		<0.0040			<0.0040										0.007					
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190	<0.0010		<0.0010			<0.0010										<0.0010					
Tetrachlorvinphos*	mg/kg	SOLID	-	-																					
Tetraconazole*	mg/kg	SOLID	-	-																					
Tetradifon*	mg/kg	SOLID	-	-																					
Tetramethrin*	mg/kg	SOLID	-	-																					
Tetrasul*	mg/kg	SOLID	-	-																					
Thiabendazole*	mg/kg	SOLID	-	-																					
Thiacloprid*	mg/kg	SOLID	-	-																					
Thiamethoxam*	mg/kg	SOLID	-	-																					
Thiazafluron*	mg/kg	SOLID	-	-																					
Thidiazuron*	mg/kg	SOLID	-	-																					
Thiobencarb*	mg/kg	SOLID	-	-																					
Thiocyclam*	mg/kg	SOLID	-	-																					
Thiodicarb*	mg/kg	SOLID	-	-																					
Thiofanox*	mg/kg	SOLID	-	-																					
Thiometon*	mg/kg	SOLID	-	-																					
Thiophanate Methyl*	mg/kg	SOLID	-	-																					
Tokuthion	mg/kg	SOLID	-	-																					
Tolclofos-methyl*	mg/kg	SOLID	-	-																					
Toluene	mg/kg	SOLID	56000	87000	<0.0070	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0050	<0.0050	<0.0060		<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
Toluene-D8	%	SOLID	-	-																					
Tolylfluanid*	mg/kg	SOLID	-	-																					
Total BTEX	mg/kg	SOLID	-	-																					
Total Coliform count	CFU/g	SOLID	-	-					4590																
Total Organic Carbon	% M/M	SOLID	-	-	0.38	0.78	0.82	0.12	1.01	1.3	0.81	2.55	2.029	0.55		0.28	2.15	0.17	2.27	1.83	0.52	3.57	2.24	2.75	1.36
Total Speciated Phenols	mg/kg	SOLID	-	-																					
Total SVOC TIC*	mg/kg	SOLID	-	-																					
Total VOC TIC*	mg/kg	SOLID	-	-																					
Traidimefon	mg/kg	SOLID	-	-																					
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700	<0.0010		<0.0010			<0.0010										<0.0010					
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
Triadimenol*	mg/kg	SOLID	-	-																					
Triallate	mg/kg	SOLID	-	-																					
Triazamate*	mg/kg	SOLID	-	-																					
Triazophos	mg/kg	SOLID	-	-																					
Tribenuron methyl*	mg/kg	SOLID	-	-																					
Tribromomethane	mg/kg	SOLID	710	4100	<0.0010		<0.0010			<0.0010										<0.0010					
Trichloroethene	mg/kg	SOLID	1.2	70	<0.0010		<0.0010			<0.0010										<0.0010					
Trichlorofluoromethane	mg/kg	SOLID	-	-	<0.0010		<0.0010			<0.0010										<0.0010					
Tridemorph*	mg/kg	SOLID	-	-																					
Trietazine	mg/kg	SOLID	-	-																					
Trifloxystrobin*	mg/kg	SOLID	-	-																					
Triflumizole*	mg/kg	SOLID	-	-																					
Triflumuron*	mg/kg	SOLID	-	-																					
Trifluralin	mg/kg	SOLID	-	-																					
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																					
Triforine*	mg/kg	SOLID	-	-																					
Triticonazole*	mg/kg	SOLID	-	-																					
Trivalent Chromium	mg/kg	SOLID	8600	33000																					
Uniconazole*	mg/kg	SOLID	-	-																					
Vamidothion*	mg/kg	SOLID	-	-																					
Vanadium	mg/kg	SOLID	9000	5000	16.9	24.4	33.2	35	23.2	35.3	23.1	30.6	20.2	17.3		19.2	19.5	27	40.9	28.1	78.4	49.3	34	37.9	32.7
Vernolate	mg/kg	SOLID	-	-																					
Vinclozolin*	mg/kg	SOLID	-	-																					
Water Soluble Boron*	mg/kg	SOLID	-	-																					
Xylene	mg/kg	SOLID	-	-	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070		<0.0070	<0.0070	<0.0070	<0.0070		<0.0080	<0.0070	<0.0070	<0.0070	<0.0070
Xylenols	mg/kg	SOLID	-	-																					
Zinc	mg/kg	SOLID	730000	170000	21.7	70.9	76	70	111.7	119.9	57.9	114.8	68.01	48.1		52.6	72.4	25.5	177.1	65.2	114.2	434.2	164	168	144.8
Zoxamide*	mg/kg	SOLID	-	-																					

Max of Normalised Results																									
					ML164-CR011	ML164-CR011	ML164-CR013	ML164-CR013	ML164-CR013	ML164-CR029	ML164-CR029	ML164-CR029	ML164-CR030	ML164-CR032	ML164-CR032	ML164-CR044	ML164-CR044	ML164-CR044	ML164-CR044	ML164-CR045	ML164-CR045	ML164-CR045	ML164-CR046a	ML164-CR046a	ML164-CR046a
					Watten House West Viaduct	Watten House West Viaduct	Watton House Embankment	Watton House Embankment	Watton House Embankment	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct
					0.75	1.1	0.2	1	4	0.35	3.2	4	0.9	0.5	1.2	0.5	1	2	2.5	0.8	1.2	3	0.8	1.2	2.3
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	RTD1	MGR	MGR	ALV	MGR	MGR	TILMP	RTD1	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	MGR
Quinoxyfen*	mg/kg	SOLID	-	-																					
Quizalofop-ethyl*	mg/kg	SOLID	-	-																					
Resmethrin*	mg/kg	SOLID	-	-																					
S421*	mg/kg	SOLID	-	-																					
Salmonella SPP	-	SOLID	-	-																					
Salmonella SPP	cfu/25g	SOLID	-	-																					
Secbumeton*	mg/kg	SOLID	-	-																					
Sec-Butylbenzene	mg/kg	SOLID	-	-																					
Selenium	mg/kg	SOLID	12000	1800	<0.5000	<0.5000	0.9	<0.5000	<0.6000	<0.5000	<0.5100	<0.5000	<0.5000	0.5	<0.5000	0.9		1		1	<0.5000	0.8	0.6	0.6	<0.5000
Silafluofen*	mg/kg	SOLID	-	-																					
Simazine	mg/kg	SOLID	-	-																					
Simeconazole*	mg/kg	SOLID	-	-																					
Spinetoram*	mg/kg	SOLID	-	-																					
Spinosad*	mg/kg	SOLID	-	-																					
Spirodiclofen*	mg/kg	SOLID	-	-																					
Spiromesifen*	mg/kg	SOLID	-	-																					
Spirotetramat*	mg/kg	SOLID	-	-																					
Spiroxamine*	mg/kg	SOLID	-	-																					
Styrene	mg/kg	SOLID	3200	5900																					
Sulfallate	mg/kg	SOLID	-	-																					
Sulfentrazone*	mg/kg	SOLID	-	-																					
Sulfotep	mg/kg	SOLID	-	-																					
Sulphate	%	SOLID	-	-																					
Sulphate	g/l	SOLID	-	-																					
Sulphate as SO4	mg/kg	SOLID	-	-																					
Sulphur	%	SOLID	-	-																					
Sulprofos	mg/kg	SOLID	-	-																					
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																					
Tau-Fluvalinate*	mg/kg	SOLID	-	-																					
Tebuconazole*	mg/kg	SOLID	-	-																					
Tebufenozide*	mg/kg	SOLID	-	-																					
Tebufenpyrad*	mg/kg	SOLID	-	-																					
Tebupirimiphos*	mg/kg	SOLID	-	-																					
Tecnazene	mg/kg	SOLID	-	-																					
Teflubenzuron*	mg/kg	SOLID	-	-																					
Tefluthrin*	mg/kg	SOLID	-	-																					
Tempephos	mg/kg	SOLID	-	-																					
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-																					
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																					
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-																					
Terbacil	mg/kg	SOLID	-	-																					
Terbufos	mg/kg	SOLID	-	-																					
Terbufos sulfone*	mg/kg	SOLID	-	-																					
Terbufos sulfoxide*	mg/kg	SOLID	-	-																					
Terbumeton*	mg/kg	SOLID	-	-																					
Terbuthylazine	mg/kg	SOLID	-	-																					
Terbutryn	mg/kg	SOLID	-	-																					
Terrazole	mg/kg	SOLID	-	-																					
Tert-Butylbenzene	mg/kg	SOLID	-	-																					
Tetrachloroethene	mg/kg	SOLID	19	810																					
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190																					
Tetrachlorvinphos*	mg/kg	SOLID	-	-																					
Tetraconazole*	mg/kg	SOLID	-	-																					
Tetradifon*	mg/kg	SOLID	-	-																					
Tetramethrin*	mg/kg	SOLID	-	-																					
Tetrasul*	mg/kg	SOLID	-	-																					
Thiabendazole*	mg/kg	SOLID	-	-																					
Thiacloprid*	mg/kg	SOLID	-	-																					
Thiamethoxam*	mg/kg	SOLID	-	-																					
Thiazafluron*	mg/kg	SOLID	-	-																					
Thidiazuron*	mg/kg	SOLID	-	-																					
Thiobencarb*	mg/kg	SOLID	-	-																					
Thiocyclam*	mg/kg	SOLID	-	-																					
Thiodicarb*	mg/kg	SOLID	-	-																					
Thiofanox*	mg/kg	SOLID	-	-																					
Thiometon*	mg/kg	SOLID	-	-																					
Thiophanate Methyl*	mg/kg	SOLID	-	-																					
Tokuthion	mg/kg	SOLID	-	-																					
Tolclofos-methyl*	mg/kg	SOLID	-	-																					
Toluene	mg/kg	SOLID	56000	87000	<0.0060	<0.0060	<0.0060	<0.0060	<0.0070	<0.0060	<0.0060	<0.0060	<0.0050	<0.0060	<0.0060	<0.0060		<0.0070		<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
Toluene-D8	%	SOLID	-	-																					
Tolylfluanid*	mg/kg	SOLID	-	-																					
Total BTEX	mg/kg	SOLID	-	-																					
Total Coliform count	CFU/g	SOLID	-	-																					
Total Organic Carbon	% M/M	SOLID	-	-	1.01	0.27	11.9	0.88	2.3	0.76	0.267	0.11	0.17	3.56	0.31	1.76		1.94		0.84	0.16	0.19	1.08	1.47	0.29
Total Speciated Phenols	mg/kg	SOLID	-	-																					
Total SVOC TIC*	mg/kg	SOLID	-	-																					
Total VOC TIC*	mg/kg	SOLID	-	-																					
Traidimefon	mg/kg	SOLID	-	-																					
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700																					
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-																					
Triadimenol*	mg/kg	SOLID	-	-																					
Triallate	mg/kg	SOLID	-	-																					
Triazamate*	mg/kg	SOLID	-	-																					
Triazophos	mg/kg	SOLID	-	-																					
Tribenuron methyl*	mg/kg	SOLID	-	-																					
Tribromomethane	mg/kg	SOLID	710	4100																					
Trichloroethene	mg/kg	SOLID	1.2	70																					
Trichlorofluoromethane	mg/kg	SOLID	-	-																					
Tridemorph*	mg/kg	SOLID	-	-																					
Trietazine	mg/kg	SOLID	-	-																					
Trifloxystrobin*	mg/kg	SOLID	-	-																					
Triflumizole*	mg/kg	SOLID	-	-																					
Triflumuron*	mg/kg	SOLID	-	-																					
Trifluralin	mg/kg	SOLID	-	-																					
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																					
Triforine*	mg/kg	SOLID	-	-																					
Triticonazole*	mg/kg	SOLID	-	-																					
Trivalent Chromium	mg/kg	SOLID	8600	33000																					
Uniconazole*	mg/kg	SOLID	-	-																					
Vamidothion*	mg/kg	SOLID	-	-																					
Vanadium	mg/kg	SOLID	9000	5000	17.2	15.5	50.6	31.4	67.4	31.7	21	29	14.1	22	24	34.5		63.7		37	44.5	21.5	35.8	32.9	18
Vernolate	mg/kg	SOLID	-	-																					
Vinclozolin*	mg/kg	SOLID	-	-																					
Water Soluble Boron*	mg/kg	SOLID	-	-																					
Xylene	mg/kg	SOLID	-	-	<0.0070	<0.0070	<0.0070	0.033	<0.0090	<0.0070	<0.0070	<0.0070	<0.0060	<0.0070	<0.0070	<0.0070		<0.0080		<0.0070	<0.0070	<0.0070	0.037	0.026	<0.0070
Xylenols	mg/kg	SOLID	-	-																					
Zinc	mg/kg	SOLID	730000	170000	86.1	36.2	155	109.8	425	73.2	56	65.9	18.4	100.8	25.2	180.4		267.5		87.9	70.6	44	155.1	82.9	51
Zoxamide*	mg/kg	SOLID	-	-																					

Max of Normalised Results																						
					ML164-CR404	ML164-CR404	ML164-CR404	ML164-TP011	ML164-TP011	ML164-TP015	ML164-TP015	ML164-TP015	ML164-TP015	NC120-CR401	NC120-CR401	NC137-CT401	NC137-CT401	NC145-CR401	NC145-CR401	ND000-CR001	ND000-CR001	ND000-CR020
					Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)
					0.05	0.5	7.2	0.7	2.5	0.05	0.35	1.1	1.7	0.3	1	0.5	1	0.1	0.5	0.5	2	0.4
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	RTD1	MGR	RTD1	GLLD	GLLD	RTD2	RTD2	RTD2	RTD2	TOP	GFDUD	MGR	MGR	MGR
Quinoxyfen*	mg/kg	SOLID	-	-																		
Quizalofop-ethyl*	mg/kg	SOLID	-	-																		
Resmethrin*	mg/kg	SOLID	-	-																		
S421*	mg/kg	SOLID	-	-																		
Salmonella SPP	-	SOLID	-	-										#VALUE!	#VALUE!							
Salmonella SPP	cfu/25g	SOLID	-	-																		
Secbumeton*	mg/kg	SOLID	-	-																		
Sec-Butylbenzene	mg/kg	SOLID	-	-																		
Selenium	mg/kg	SOLID	12000	1800	<3.0000	<3.0000	<3.0000	1.9	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	<3.0000	0.8	0.5	1
Silafluofen*	mg/kg	SOLID	-	-																		
Simazine	mg/kg	SOLID	-	-																		
Simeconazole*	mg/kg	SOLID	-	-																		
Spinetoram*	mg/kg	SOLID	-	-																		
Spinosad*	mg/kg	SOLID	-	-																		
Spirodiclofen*	mg/kg	SOLID	-	-																		
Spiromesifen*	mg/kg	SOLID	-	-																		
Spirotetramat*	mg/kg	SOLID	-	-																		
Spiroxamine*	mg/kg	SOLID	-	-																		
Styrene	mg/kg	SOLID	3200	5900																		
Sulfallate	mg/kg	SOLID	-	-																		
Sulfentrazone*	mg/kg	SOLID	-	-																		
Sulfotep	mg/kg	SOLID	-	-																		
Sulphate	%	SOLID	-	-																		
Sulphate	g/l	SOLID	-	-																		
Sulphate as SO4	mg/kg	SOLID	-	-																		
Sulphur	%	SOLID	-	-																		
Sulprofos	mg/kg	SOLID	-	-																		
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																		
Tau-Fluvalinate*	mg/kg	SOLID	-	-																		
Tebuconazole*	mg/kg	SOLID	-	-																		
Tebufenozide*	mg/kg	SOLID	-	-																		
Tebufenpyrad*	mg/kg	SOLID	-	-																		
Tebupirimiphos*	mg/kg	SOLID	-	-																		
Tecnazene	mg/kg	SOLID	-	-																		
Teflubenzuron*	mg/kg	SOLID	-	-																		
Tefluthrin*	mg/kg	SOLID	-	-																		
Tempephos	mg/kg	SOLID	-	-																		
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-																		
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																		
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-																		
Terbacil	mg/kg	SOLID	-	-																		
Terbufos	mg/kg	SOLID	-	-																		
Terbufos sulfone*	mg/kg	SOLID	-	-																		
Terbufos sulfoxide*	mg/kg	SOLID	-	-																		
Terbumeton*	mg/kg	SOLID	-	-																		
Terbuthylazine	mg/kg	SOLID	-	-																		
Terbutryn	mg/kg	SOLID	-	-																		
Terrazole	mg/kg	SOLID	-	-																		
Tert-Butylbenzene	mg/kg	SOLID	-	-																		
Tetrachloroethene	mg/kg	SOLID	19	810																		
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190																		
Tetrachlorvinphos*	mg/kg	SOLID	-	-																		
Tetraconazole*	mg/kg	SOLID	-	-																		
Tetradifon*	mg/kg	SOLID	-	-																		
Tetramethrin*	mg/kg	SOLID	-	-																		
Tetrasul*	mg/kg	SOLID	-	-																		
Thiabendazole*	mg/kg	SOLID	-	-																		
Thiacloprid*	mg/kg	SOLID	-	-																		
Thiamethoxam*	mg/kg	SOLID	-	-																		
Thiazafluron*	mg/kg	SOLID	-	-																		
Thidiazuron*	mg/kg	SOLID	-	-																		
Thiobencarb*	mg/kg	SOLID	-	-																		
Thiocyclam*	mg/kg	SOLID	-	-																		
Thiodicarb*	mg/kg	SOLID	-	-																		
Thiofanox*	mg/kg	SOLID	-	-																		
Thiometon*	mg/kg	SOLID	-	-																		
Thiophanate Methyl*	mg/kg	SOLID	-	-																		
Tokuthion	mg/kg	SOLID	-	-																		
Tolclofos-methyl*	mg/kg	SOLID	-	-																		
Toluene	mg/kg	SOLID	56000	87000	<0.0100	<0.0100	<0.0100	<0.0060	<0.0060	<0.0060	<0.0050	<0.0060	<0.0060	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0050	<0.0060	<0.0060
Toluene-D8	%	SOLID	-	-																		
Tolylfluanid*	mg/kg	SOLID	-	-																		
Total BTEX	mg/kg	SOLID	-	-	<0.0400	<0.0400	<0.0400							<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400			
Total Coliform count	CFU/g	SOLID	-	-										670	750							
Total Organic Carbon	% M/M	SOLID	-	-				20.5	0.34	1.58	0.32	0.1	0.06							0.63	1.27	1.79
Total Speciated Phenols	mg/kg	SOLID	-	-																		
Total SVOC TIC*	mg/kg	SOLID	-	-																		
Total VOC TIC*	mg/kg	SOLID	-	-																		
Traidimefon	mg/kg	SOLID	-	-																		
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700																		
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-																		
Triadimenol*	mg/kg	SOLID	-	-																		
Triallate	mg/kg	SOLID	-	-																		
Triazamate*	mg/kg	SOLID	-	-																		
Triazophos	mg/kg	SOLID	-	-																		
Tribenuron methyl*	mg/kg	SOLID	-	-																		
Tribromomethane	mg/kg	SOLID	710	4100																		
Trichloroethene	mg/kg	SOLID	1.2	70																		
Trichlorofluoromethane	mg/kg	SOLID	-	-																		
Tridemorph*	mg/kg	SOLID	-	-																		
Trietazine	mg/kg	SOLID	-	-																		
Trifloxystrobin*	mg/kg	SOLID	-	-																		
Triflumizole*	mg/kg	SOLID	-	-																		
Triflumuron*	mg/kg	SOLID	-	-																		
Trifluralin	mg/kg	SOLID	-	-																		
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																		
Triforine*	mg/kg	SOLID	-	-																		
Triticonazole*	mg/kg	SOLID	-	-																		
Trivalent Chromium	mg/kg	SOLID	8600	33000	68	43	37							17	18	9	10	16	16			
Uniconazole*	mg/kg	SOLID	-	-																		
Vamidothion*	mg/kg	SOLID	-	-																		
Vanadium	mg/kg	SOLID	9000	5000	47	41	45	136.7	64.5	15.7	12.1	13.2	22.7	31	30	15	25	25	24	25.6	30.3	34.5
Vernolate	mg/kg	SOLID	-	-																		
Vinclozolin*	mg/kg	SOLID	-	-																		
Water Soluble Boron*	mg/kg	SOLID	-	-																		
Xylene	mg/kg	SOLID	-	-				<0.0080	<0.0070	<0.0070	<0.0060	<0.0070	<0.0070							<0.0060	<0.0070	<0.0070
Xylenols	mg/kg	SOLID	-	-																		
Zinc	mg/kg	SOLID	730000	170000	200	300	79	2180	156.8	55.4	20.2	19.4	40.3	94	66	37	21	100	57	67.4	108.2	201.4
Zoxamide*	mg/kg	SOLID	-	-																		

Max of Normalised Results																	
					ND000-CR020	ND000-CR020	ND000-CR020	ND000-TP035	ND000-TP035	ND001-CP002	ND001-CP002	ND001-CP043	ND001-CP043	ND001-CP049	ND001-CP049	ND001-CR001	ND001-CR002
					Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Chattle Hill Box Structure	Chattle Hill Box Structure	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton No. 3 Viaduct
					1	4	5	0.4	0.8	0.5	1	0.5	2	0.4	0.6	0.5	0.5
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	MGR	MGR	MGR	MGR	RTD1	MGR	ALV	RTD1	RTD1	MGR	MGR	MGR	MGR
Quinoxyfen*	mg/kg	SOLID	-	-													
Quizalofop-ethyl*	mg/kg	SOLID	-	-													
Resmethrin*	mg/kg	SOLID	-	-													
S421*	mg/kg	SOLID	-	-													
Salmonella SPP	-	SOLID	-	-													
Salmonella SPP	cfu/25g	SOLID	-	-													
Secbumeton*	mg/kg	SOLID	-	-													
Sec-Butylbenzene	mg/kg	SOLID	-	-													<0.0010
Selenium	mg/kg	SOLID	12000	1800	0.6	0.62	0.8	0.7	1.2	0.8	0.6	<0.5000	<0.5000	0.8	1.6	0.7	<0.5000
Silafluofen*	mg/kg	SOLID	-	-													
Simazine	mg/kg	SOLID	-	-													
Simeconazole*	mg/kg	SOLID	-	-													
Spinetoram*	mg/kg	SOLID	-	-													
Spinosad*	mg/kg	SOLID	-	-													
Spirodiclofen*	mg/kg	SOLID	-	-													
Spiromesifen*	mg/kg	SOLID	-	-													
Spirotetramat*	mg/kg	SOLID	-	-													
Spiroxamine*	mg/kg	SOLID	-	-													
Styrene	mg/kg	SOLID	3200	5900													<0.0010
Sulfallate	mg/kg	SOLID	-	-													
Sulfentrazone*	mg/kg	SOLID	-	-													
Sulfotep	mg/kg	SOLID	-	-													
Sulphate	%	SOLID	-	-													
Sulphate	g/l	SOLID	-	-													
Sulphate as SO4	mg/kg	SOLID	-	-													
Sulphur	%	SOLID	-	-													
Sulprofos	mg/kg	SOLID	-	-													
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-													
Tau-Fluvalinate*	mg/kg	SOLID	-	-													
Tebuconazole*	mg/kg	SOLID	-	-													
Tebufenozide*	mg/kg	SOLID	-	-													
Tebufenpyrad*	mg/kg	SOLID	-	-													
Tebupirimiphos*	mg/kg	SOLID	-	-													
Tecnazene	mg/kg	SOLID	-	-													
Teflubenzuron*	mg/kg	SOLID	-	-													
Tefluthrin*	mg/kg	SOLID	-	-													
Tempephos	mg/kg	SOLID	-	-													
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-													
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-													
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-													<0.0060
Terbacil	mg/kg	SOLID	-	-													
Terbufos	mg/kg	SOLID	-	-													
Terbufos sulfone*	mg/kg	SOLID	-	-													
Terbufos sulfoxide*	mg/kg	SOLID	-	-													
Terbumeton*	mg/kg	SOLID	-	-													
Terbuthylazine	mg/kg	SOLID	-	-													
Terbutryn	mg/kg	SOLID	-	-													
Terrazole	mg/kg	SOLID	-	-													
Tert-Butylbenzene	mg/kg	SOLID	-	-													<0.0010
Tetrachloroethene	mg/kg	SOLID	19	810													0.01
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190													<0.0010
Tetrachlorvinphos*	mg/kg	SOLID	-	-													
Tetraconazole*	mg/kg	SOLID	-	-													
Tetradifon*	mg/kg	SOLID	-	-													
Tetramethrin*	mg/kg	SOLID	-	-													
Tetrasul*	mg/kg	SOLID	-	-													
Thiabendazole*	mg/kg	SOLID	-	-													
Thiacloprid*	mg/kg	SOLID	-	-													
Thiamethoxam*	mg/kg	SOLID	-	-													
Thiazafluron*	mg/kg	SOLID	-	-													
Thidiazuron*	mg/kg	SOLID	-	-													
Thiobencarb*	mg/kg	SOLID	-	-													
Thiocyclam*	mg/kg	SOLID	-	-													
Thiodicarb*	mg/kg	SOLID	-	-													
Thiofanox*	mg/kg	SOLID	-	-													
Thiometon*	mg/kg	SOLID	-	-													
Thiophanate Methyl*	mg/kg	SOLID	-	-													
Tokuthion	mg/kg	SOLID	-	-													
Tolclofos-methyl*	mg/kg	SOLID	-	-													
Toluene	mg/kg	SOLID	56000	87000	<0.0060	<0.0060	<0.0060	<0.0050	<0.0050	<0.0060	<0.0060	<0.0060	<0.0050	<0.0050	<0.0050	<0.0060	<0.0060
Toluene-D8	%	SOLID	-	-													
Tolylfluanid*	mg/kg	SOLID	-	-													
Total BTEX	mg/kg	SOLID	-	-													
Total Coliform count	CFU/g	SOLID	-	-													
Total Organic Carbon	% M/M	SOLID	-	-	2.18	0.134	0.43	3.79	1.49	1.26	0.16	0.11	0.77	2.89	8.3	1.63	1.13
Total Speciated Phenols	mg/kg	SOLID	-	-													
Total SVOC TIC*	mg/kg	SOLID	-	-													
Total VOC TIC*	mg/kg	SOLID	-	-													
Traidimefon	mg/kg	SOLID	-	-													
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700													<0.0010
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-													<0.0010
Triadimenol*	mg/kg	SOLID	-	-													
Triallate	mg/kg	SOLID	-	-													
Triazamate*	mg/kg	SOLID	-	-													
Triazophos	mg/kg	SOLID	-	-													
Tribenuron methyl*	mg/kg	SOLID	-	-													
Tribromomethane	mg/kg	SOLID	710	4100													<0.0010
Trichloroethene	mg/kg	SOLID	1.2	70													<0.0010
Trichlorofluoromethane	mg/kg	SOLID	-	-													<0.0010
Tridemorph*	mg/kg	SOLID	-	-													
Trietazine	mg/kg	SOLID	-	-													
Trifloxystrobin*	mg/kg	SOLID	-	-													
Triflumizole*	mg/kg	SOLID	-	-													
Triflumuron*	mg/kg	SOLID	-	-													
Trifluralin	mg/kg	SOLID	-	-													
Triflusulfuron-methyl*	mg/kg	SOLID	-	-													
Triforine*	mg/kg	SOLID	-	-													
Triticonazole*	mg/kg	SOLID	-	-													
Trivalent Chromium	mg/kg	SOLID	8600	33000													
Uniconazole*	mg/kg	SOLID	-	-													
Vamidothion*	mg/kg	SOLID	-	-													
Vanadium	mg/kg	SOLID	9000	5000	18	18.9	19	15.8	19.5	21.3	40.1	14.8	12.8	37.5	102.3	41	19
Vernolate	mg/kg	SOLID	-	-													
Vinclozolin*	mg/kg	SOLID	-	-													
Water Soluble Boron*	mg/kg	SOLID	-	-													
Xylene	mg/kg	SOLID	-	-	<0.0070	<0.0070	<0.0070	<0.0060	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0060	<0.0070	<0.0070	<0.0070
Xylenols	mg/kg	SOLID	-	-													
Zinc	mg/kg	SOLID	730000	170000	175.9	44.22	49.5	49.4	110.4	59	19.4	21.1	17	135.6	316.3	100	53.8
Zoxamide*	mg/kg	SOLID	-	-													

Max of Normalised Results																									
					ND001-CR002	ND001-CR005	ND001-CR011	ND001-CR011	ND001-CR013	ND001-CR013	ND001-CR014	ND001-CR014	ND001-CR014	ND001-CR017	ND001-CR017	ND001-CR022	ND001-CR031	ND001-CR040	ND001-CR041	ND001-CR042	ND001-CR043	ND001-TP002	ND001-TP002	ND001-WS002	ND001-WS003
					Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct
					1.5	0.6	0.05	1.2	0.5	2	0.05	1.1	1.7	0.7	1.2	0.1	0.05	1.4	0.2	0.5	1	0.05	0.3	0.1	0.1
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	TOP	RTD1	MGR	GFDUD	MGR	MGR	RTD1	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	MGR	MGR
Quinoxyfen*	mg/kg	SOLID	-	-																					
Quizalofop-ethyl*	mg/kg	SOLID	-	-																					
Resmethrin*	mg/kg	SOLID	-	-																					
S421*	mg/kg	SOLID	-	-																					
Salmonella SPP	-	SOLID	-	-																					
Salmonella SPP	cfu/25g	SOLID	-	-																					
Secbumeton*	mg/kg	SOLID	-	-																					
Sec-Butylbenzene	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
Selenium	mg/kg	SOLID	12000	1800	<0.5000		0.5	<0.5000	1	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	0.5	<0.5000	<0.5000	<0.5000	<0.5000	<0.5000	0.6	<0.5000	0.7	<0.5000
Silafluofen*	mg/kg	SOLID	-	-																					
Simazine	mg/kg	SOLID	-	-																					
Simeconazole*	mg/kg	SOLID	-	-																					
Spinetoram*	mg/kg	SOLID	-	-																					
Spinosad*	mg/kg	SOLID	-	-																					
Spirodiclofen*	mg/kg	SOLID	-	-																					
Spiromesifen*	mg/kg	SOLID	-	-																					
Spirotetramat*	mg/kg	SOLID	-	-																					
Spiroxamine*	mg/kg	SOLID	-	-																					
Styrene	mg/kg	SOLID	3200	5900	<0.0010																			<0.0010	<0.0010
Sulfallate	mg/kg	SOLID	-	-																					
Sulfentrazone*	mg/kg	SOLID	-	-																					
Sulfotep	mg/kg	SOLID	-	-																					
Sulphate	%	SOLID	-	-																					
Sulphate	g/l	SOLID	-	-																					
Sulphate as SO4	mg/kg	SOLID	-	-																					
Sulphur	%	SOLID	-	-																					
Sulprofos	mg/kg	SOLID	-	-																					
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-																					
Tau-Fluvalinate*	mg/kg	SOLID	-	-																					
Tebuconazole*	mg/kg	SOLID	-	-																					
Tebufenozide*	mg/kg	SOLID	-	-																					
Tebufenpyrad*	mg/kg	SOLID	-	-																					
Tebupirimiphos*	mg/kg	SOLID	-	-																					
Tecnazene	mg/kg	SOLID	-	-																					
Teflubenzuron*	mg/kg	SOLID	-	-																					
Tefluthrin*	mg/kg	SOLID	-	-																					
Tempephos	mg/kg	SOLID	-	-																					
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-																					
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-																					
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-	<0.0060																			<0.0060	<0.0060
Terbacil	mg/kg	SOLID	-	-																					
Terbufos	mg/kg	SOLID	-	-																					
Terbufos sulfone*	mg/kg	SOLID	-	-																					
Terbufos sulfoxide*	mg/kg	SOLID	-	-																					
Terbumeton*	mg/kg	SOLID	-	-																					
Terbuthylazine	mg/kg	SOLID	-	-																					
Terbutryn	mg/kg	SOLID	-	-																					
Terrazole	mg/kg	SOLID	-	-																					
Tert-Butylbenzene	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
Tetrachloroethene	mg/kg	SOLID	19	810	0.006																			<0.0040	<0.0040
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190	<0.0010																			<0.0010	<0.0010
Tetrachlorvinphos*	mg/kg	SOLID	-	-																					
Tetraconazole*	mg/kg	SOLID	-	-																					
Tetradifon*	mg/kg	SOLID	-	-																					
Tetramethrin*	mg/kg	SOLID	-	-																					
Tetrasul*	mg/kg	SOLID	-	-																					
Thiabendazole*	mg/kg	SOLID	-	-																					
Thiacloprid*	mg/kg	SOLID	-	-																					
Thiamethoxam*	mg/kg	SOLID	-	-																					
Thiazafluron*	mg/kg	SOLID	-	-																					
Thidiazuron*	mg/kg	SOLID	-	-																					
Thiobencarb*	mg/kg	SOLID	-	-																					
Thiocyclam*	mg/kg	SOLID	-	-																					
Thiodicarb*	mg/kg	SOLID	-	-																					
Thiofanox*	mg/kg	SOLID	-	-																					
Thiometon*	mg/kg	SOLID	-	-																					
Thiophanate Methyl*	mg/kg	SOLID	-	-																					
Tokuthion	mg/kg	SOLID	-	-																					
Tolclofos-methyl*	mg/kg	SOLID	-	-																					
Toluene	mg/kg	SOLID	56000	87000	<0.0070		<0.0060	<0.0050	<0.0060	<0.0050	<0.0050	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0050	<0.0060	<0.0060	<0.0060	<0.0050	<0.0060	<0.0060
Toluene-D8	%	SOLID	-	-																					
Tolylfluanid*	mg/kg	SOLID	-	-																					
Total BTEX	mg/kg	SOLID	-	-																					
Total Coliform count	CFU/g	SOLID	-	-																					
Total Organic Carbon	% M/M	SOLID	-	-	0.44		2.62	0.16	2.09	0.13	3.24	0.49	0.14	0.76	0.49	2.939	1.65	0.11	0.29	0.92	0.13	2.79	0.48	2.56	2.47
Total Speciated Phenols	mg/kg	SOLID	-	-																					
Total SVOC TIC*	mg/kg	SOLID	-	-																					
Total VOC TIC*	mg/kg	SOLID	-	-																					
Traidimefon	mg/kg	SOLID	-	-																					
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700	<0.0010																			<0.0010	<0.0010
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
Triadimenol*	mg/kg	SOLID	-	-																					
Triallate	mg/kg	SOLID	-	-																					
Triazamate*	mg/kg	SOLID	-	-																					
Triazophos	mg/kg	SOLID	-	-																					
Tribenuron methyl*	mg/kg	SOLID	-	-																					
Tribromomethane	mg/kg	SOLID	710	4100	<0.0010																			<0.0010	<0.0010
Trichloroethene	mg/kg	SOLID	1.2	70	<0.0010																			<0.0010	<0.0010
Trichlorofluoromethane	mg/kg	SOLID	-	-	<0.0010																			<0.0010	<0.0010
Tridemorph*	mg/kg	SOLID	-	-																					
Trietazine	mg/kg	SOLID	-	-																					
Trifloxystrobin*	mg/kg	SOLID	-	-																					
Triflumizole*	mg/kg	SOLID	-	-																					
Triflumuron*	mg/kg	SOLID	-	-																					
Trifluralin	mg/kg	SOLID	-	-																					
Triflusulfuron-methyl*	mg/kg	SOLID	-	-																					
Triforine*	mg/kg	SOLID	-	-																					
Triticonazole*	mg/kg	SOLID	-	-																					
Trivalent Chromium	mg/kg	SOLID	8600	33000																					
Uniconazole*	mg/kg	SOLID	-	-																					
Vamidothion*	mg/kg	SOLID	-	-																					
Vanadium	mg/kg	SOLID	9000	5000	15		18.8	14.4	23.2	15.3	48	25.2	15.1	12.6	21.5	24.5	31	22	17.8	32.9	16.1	33.1	25.5	25.3	12.9
Vernolate	mg/kg	SOLID	-	-																					
Vinclozolin*	mg/kg	SOLID	-	-																					
Water Soluble Boron*	mg/kg	SOLID	-	-																					
Xylene	mg/kg	SOLID	-	-	<0.0070		<0.0070	<0.0060	<0.0070	<0.0060	<0.0060	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070	<0.0070
Xylenols	mg/kg	SOLID	-	-																					
Zinc	mg/kg	SOLID	730000	170000	46		53.5	19.2	228	21	55.5	34.9	23.6	23.6	16.4	83.3	109.7	28.3	23.4	456.9	17	91.2	35	60.8	45.9
Zoxamide*	mg/kg	SOLID	-	-																					

Max of Normalised Results								
					ND001-WS003	ND002-CP019	ND002-CR013	ND003-CR004
					Water Orton No. 3 Viaduct	Marsh Lane Embankment	Marsh Lane Embankment	Marsh Lane Embankment
					1.1	1.5	0.2	0.6
Determinant Name	Units	Normalised Matrix	Commercial 1% SOM	PoS Park 1% SOM	RTD1	MGR	MGR	MGR
Quinoxyfen*	mg/kg	SOLID	-	-				
Quizalofop-ethyl*	mg/kg	SOLID	-	-				
Resmethrin*	mg/kg	SOLID	-	-				
S421*	mg/kg	SOLID	-	-				
Salmonella SPP	-	SOLID	-	-				
Salmonella SPP	cfu/25g	SOLID	-	-				
Secbumeton*	mg/kg	SOLID	-	-				
Sec-Butylbenzene	mg/kg	SOLID	-	-	<0.0010			
Selenium	mg/kg	SOLID	12000	1800	<0.5000	<0.6000	<0.5000	<0.6000
Silafluofen*	mg/kg	SOLID	-	-				
Simazine	mg/kg	SOLID	-	-				
Simeconazole*	mg/kg	SOLID	-	-				
Spinetoram*	mg/kg	SOLID	-	-				
Spinosad*	mg/kg	SOLID	-	-				
Spirodiclofen*	mg/kg	SOLID	-	-				
Spiromesifen*	mg/kg	SOLID	-	-				
Spirotetramat*	mg/kg	SOLID	-	-				
Spiroxamine*	mg/kg	SOLID	-	-				
Styrene	mg/kg	SOLID	3200	5900	<0.0010			
Sulfallate	mg/kg	SOLID	-	-				
Sulfentrazone*	mg/kg	SOLID	-	-				
Sulfotep	mg/kg	SOLID	-	-				
Sulphate	%	SOLID	-	-				
Sulphate	g/l	SOLID	-	-				
Sulphate as SO4	mg/kg	SOLID	-	-				
Sulphur	%	SOLID	-	-				
Sulprofos	mg/kg	SOLID	-	-				
Sum of detected WHO 12 PCBs*	mg/kg	SOLID	-	-				
Tau-Fluvalinate*	mg/kg	SOLID	-	-				
Tebuconazole*	mg/kg	SOLID	-	-				
Tebufenozide*	mg/kg	SOLID	-	-				
Tebufenpyrad*	mg/kg	SOLID	-	-				
Tebupirimiphos*	mg/kg	SOLID	-	-				
Tecnazene	mg/kg	SOLID	-	-				
Teflubenzuron*	mg/kg	SOLID	-	-				
Tefluthrin*	mg/kg	SOLID	-	-				
Tempephos	mg/kg	SOLID	-	-				
Tentatively Identified Compounds - SVOC	mg/kg	SOLID	-	-				
Tentatively Identified Compounds - SVOC	N/A	SOLID	-	-				
Tentatively Identified Compounds - VOC	mg/kg	SOLID	-	-	<0.0050			
Terbacil	mg/kg	SOLID	-	-				
Terbufos	mg/kg	SOLID	-	-				
Terbufos sulfone*	mg/kg	SOLID	-	-				
Terbufos sulfoxide*	mg/kg	SOLID	-	-				
Terbumeton*	mg/kg	SOLID	-	-				
Terbuthylazine	mg/kg	SOLID	-	-				
Terbutryn	mg/kg	SOLID	-	-				
Terrazole	mg/kg	SOLID	-	-				
Tert-Butylbenzene	mg/kg	SOLID	-	-	<0.0010			
Tetrachloroethene	mg/kg	SOLID	19	810	<0.0030			
Tetrachloromethane (Carbon Tetra Chloride)	mg/kg	SOLID	2.9	190	<0.0010			
Tetrachlorvinphos*	mg/kg	SOLID	-	-				
Tetraconazole*	mg/kg	SOLID	-	-				
Tetradifon*	mg/kg	SOLID	-	-				
Tetramethrin*	mg/kg	SOLID	-	-				
Tetrasul*	mg/kg	SOLID	-	-				
Thiabendazole*	mg/kg	SOLID	-	-				
Thiacloprid*	mg/kg	SOLID	-	-				
Thiamethoxam*	mg/kg	SOLID	-	-				
Thiazafluron*	mg/kg	SOLID	-	-				
Thidiazuron*	mg/kg	SOLID	-	-				
Thiobencarb*	mg/kg	SOLID	-	-				
Thiocyclam*	mg/kg	SOLID	-	-				
Thiodicarb*	mg/kg	SOLID	-	-				
Thiofanox*	mg/kg	SOLID	-	-				
Thiometon*	mg/kg	SOLID	-	-				
Thiophanate Methyl*	mg/kg	SOLID	-	-				
Tokuthion	mg/kg	SOLID	-	-				
Tolclofos-methyl*	mg/kg	SOLID	-	-				
Toluene	mg/kg	SOLID	56000	87000	<0.0050	<0.0080	<0.0070	<0.0060
Toluene-D8	%	SOLID	-	-				
Tolylfluanid*	mg/kg	SOLID	-	-				
Total BTEX	mg/kg	SOLID	-	-				
Total Coliform count	CFU/g	SOLID	-	-				
Total Organic Carbon	% M/M	SOLID	-	-	0.28	1.83	3.077	0.84
Total Speciated Phenols	mg/kg	SOLID	-	-				
Total SVOC TIC*	mg/kg	SOLID	-	-				
Total VOC TIC*	mg/kg	SOLID	-	-				
Traidimefon	mg/kg	SOLID	-	-				
trans-1,2-Dichloroethene	mg/kg	SOLID	21	1700	<0.0010			
trans-1,3-Dichloropropene	mg/kg	SOLID	-	-	<0.0010			
Triadimenol*	mg/kg	SOLID	-	-				
Triallate	mg/kg	SOLID	-	-				
Triazamate*	mg/kg	SOLID	-	-				
Triazophos	mg/kg	SOLID	-	-				
Tribenuron methyl*	mg/kg	SOLID	-	-				
Tribromomethane	mg/kg	SOLID	710	4100	<0.0010			
Trichloroethene	mg/kg	SOLID	1.2	70	<0.0010			
Trichlorofluoromethane	mg/kg	SOLID	-	-	<0.0010			
Tridemorph*	mg/kg	SOLID	-	-				
Trietazine	mg/kg	SOLID	-	-				
Trifloxystrobin*	mg/kg	SOLID	-	-				
Triflumizole*	mg/kg	SOLID	-	-				
Triflumuron*	mg/kg	SOLID	-	-				
Trifluralin	mg/kg	SOLID	-	-				
Triflusulfuron-methyl*	mg/kg	SOLID	-	-				
Triforine*	mg/kg	SOLID	-	-				
Triticonazole*	mg/kg	SOLID	-	-				
Trivalent Chromium	mg/kg	SOLID	8600	33000				
Uniconazole*	mg/kg	SOLID	-	-				
Vamidothion*	mg/kg	SOLID	-	-				
Vanadium	mg/kg	SOLID	9000	5000	14.6	53.6	33	33
Vernolate	mg/kg	SOLID	-	-				
Vinclozolin*	mg/kg	SOLID	-	-				
Water Soluble Boron*	mg/kg	SOLID	-	-				
Xylene	mg/kg	SOLID	-	-	<0.0070	<0.0100	<0.0080	<0.0080
Xylenols	mg/kg	SOLID	-	-				
Zinc	mg/kg	SOLID	730000	170000	18.4	311	115.1	67.5
Zoxamide*	mg/kg	SOLID	-	-				

Chemical Test Results (Leachate)

A summary of leachate test results and GSC used in the risk assessment can be found in the table below. Where contaminant concentrations exceed the GSC these are highlighted in red. The original test certificates are presented in the GI Contractors Factual Report, where available.

Max of Normalised Results					Location ID	Asset	Sample Depth	Geology Code													
					BD161-CR008	BD161-CR008	BD161-CR010	BD161-TP002	BD161-TP008	BD161-TP035	BD161-WS003	BD161-WS003	BD162-CP044	BD162-CR003	BD162-CR020	BD162-CR020	BD162-TP003	BD163-CP043	BD163-CP043	BD163-CP043	BD163-CR006
					Coleshill West Viaduct	Coleshill West Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Green Lane Embankment	Green Lane Embankment	Green Lane Embankment	Green Lane Embankment	Coleshill No. 3 Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Green Lane Embankment
					0.5	2	0.5	0.15	0.15	0.1	0.2	1.1	0.7	0.5	0.5	1	0.65	1	3	5	0.8
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	TILMP	MGR	TILMP	MGR	MGR	MGR	MGR	MGR
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2																	
Arsenic	mg/l	LEACHATE	0.01	0.05	0.002	0.001	<0.0010	0.003	0.002	0.002	0.01	0.019	0.003	0.001	0.001	<0.0010	0.003	<0.0010	0.002	0.003	<0.0010
Barium	mg/l	LEACHATE	1	-	0.16	0.14	0.1	0.11	0.2	0.22	0.19	0.38	0.26	0.09	0.45	0.1	0.25	0.08	0.14	0.07	0.02
Beryllium	mg/l	LEACHATE	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Boron	mg/l	LEACHATE	1	2	0.55	0.3	0.04	0.08	0.2	0.34	0.14	0.18	0.14	0.08	0.21	0.14	0.1	0.06	0.07	0.06	0.16
Boron*	mg/l	LEACHATE	-	-																	
Cadmium	mg/l	LEACHATE	0.005	0.00015	0.0003	<0.0001	<0.0001	0.0001	<0.0001	0.0008	<0.0001	0.0003	0.0002	<0.0001	0.0002	0.0004	0.0003	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/l	LEACHATE	0.05	0.005	<0.0010	<0.0010	<0.0010	<0.0010	0.001	0.002	0.002	0.006	0.002	0.002	0.006	<0.0010	0.003	0.001	<0.0010	<0.0010	<0.0010
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	<0.0030	<0.0030	<0.0030	0.003	0.007	<0.0030	<0.0030	<0.0030	<0.0030	0	0.007	0.005	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0020	<0.0060	<0.0100	0	<0.0100	<0.0100	<0.0030	<0.0100	<0.0100	<0.0100	<0.0010
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-																	
Copper	mg/l	LEACHATE	2	0.03	0.012	0.007	0.01	0.011	0.023	0.039	0.034	0.087	0.057	0.006	0.03	0.01	0.017	0.002	0.002	0.002	0.002
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0200	<0.0200	<0.0200	0.02	<0.0200	0.02	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-																	
Lead	mg/l	LEACHATE	0.01	0.008575	0.006	<0.0010	0.009	0.004	0.034	0.067	0.004	0.064	0.055	0.016	0.053	0.004	0.026	0.002	0.001	0.003	<0.0010
Mercury	mg/l	LEACHATE	0.001	0.00007	<0.0000	<0.0000	0	0.0001	0	0	0.0001	0.0014	0	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Nickel	mg/l	LEACHATE	0.02	0.02	0.003	0.002	0.002	0.002	0.004	0.009	0.001	0.008	0.007	0.002	0.006	0.001	0.006	<0.0010	0.002	0.002	<0.0010
pH	pH Units	LEACHATE	-	-	7.5	7.4	7.4	7.6	6.7	7.5	7.8	7.5	7.6	7	6.8	6.8	7.2	7.7	7.8	7.4	8.5
pH	-	LEACHATE	-	-																	
Selenium	mg/l	LEACHATE	0.01	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate as SO4	mg/l	LEACHATE	250	400																	
Temperature (lab)	degC	LEACHATE	-	-																	
Trivalent Chromium	mg/l	LEACHATE	-	-																	
Vanadium	mg/l	LEACHATE	-	0.02	0.002	0.003	0.001	0.09	0.002	0.003	0.022	0.044	0.006	0.005	0.008	0.001	0.006	0.001	0.002	0.002	0.001
Zinc	mg/l	LEACHATE	5	0.03	0.091	0.039	0.044	0.055	0.182	0.176	0.056	0.254	0.392	0.064	0.343	0.089	0.091	0.015	0.057	0.031	0.002

Max of Normalised Results										
					BD163-CR014	BD163-CR014	BD163-CR014	BD163-CR022	BD163-CR022	BD163-CR022
					Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment
					0.5	2	4	7	9	12.8
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	MGR	MGR	MGR	MGR	MGR	MGR
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2						
Arsenic	mg/l	LEACHATE	0.01	0.05	0.002	0.004	0.001	0.004	0.004	0.004
Barium	mg/l	LEACHATE	1	-	0.22	0.19	0.19	0.19	0.13	0.15
Beryllium	mg/l	LEACHATE	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Boron	mg/l	LEACHATE	1	2	0.11	0.1	0.08	0.14	0.08	0.05
Boron*	mg/l	LEACHATE	-	-						
Cadmium	mg/l	LEACHATE	0.005	0.00015	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/l	LEACHATE	0.05	0.005	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	0.008	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-						
Copper	mg/l	LEACHATE	2	0.03	0.023	0.005	0.005	0.008	0.004	0.007
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0200	<0.0200	<0.0200	0.38	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-						
Lead	mg/l	LEACHATE	0.01	0.008575	0.011	0.002	0.092	0.003	<0.0010	<0.0010
Mercury	mg/l	LEACHATE	0.001	0.00007	0.0001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Nickel	mg/l	LEACHATE	0.02	0.02	0.002	0.002	0.001	0.003	0.003	0.002
pH	pH Units	LEACHATE	-	-	7.9	7.8	7.7	7.8	7.8	7.6
pH	-	LEACHATE	-	-						
Selenium	mg/l	LEACHATE	0.01	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate as SO4	mg/l	LEACHATE	250	400						
Temperature (lab)	degC	LEACHATE	-	-						
Trivalent Chromium	mg/l	LEACHATE	-	-						
Vanadium	mg/l	LEACHATE	-	0.02	0.004	0.005	0.004	0.003	0.005	0.007
Zinc	mg/l	LEACHATE	5	0.03	0.162	0.138	0.151	0.08	0.081	0.08

Max of Normalised Results							
	BD163-TP013	BD163-TP013a	BD163-TP016	BD163-TP016	BD163-WS001	BD163-WS001	BD164-CR011
	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Attleboro Farm Embankment	Green Lane Embankment	Green Lane Embankment	Water Orton Cutting
	0.8	1.5	0.6	2.3	0.2	0.5	0.7
Determinant Name	MGR	MGR	MGR	MGR	MGR	MGR	MGR
Ammoniacal Nitrogen as N							
Arsenic	0.002	0.002	0.001	0.002	<0.0010	0.002	<0.0010
Barium	0.13	0.13	0.14	0.15	0.12	0.23	0.11
Beryllium	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Boron	0.07	0.1	0.07	0.06	0.06	0.12	0.07
Boron*							
Cadmium	<0.0001	0.0012	<0.0001	<0.0001	<0.0001	<0.0001	0.0009
Chromium	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.002	<0.0010
Chromium - Hexavalent	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.012	<0.0030
Chromium (III) Oxide	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0100
Conductivity- Electrical 20deg							
Copper	0.012	0.006	0.003	0.012	0.006	0.012	0.005
Cyanide	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*							
Lead	0.003	0.006	<0.0010	0.001	<0.0010	0.011	0.085
Mercury	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0	<0.0000
Nickel	0.001	0.002	<0.0010	0.003	0.001	0.002	0.002
pH	7.7	7.6	7.7	7.8	7.5	7	7.4
pH							
Selenium	<0.0010	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate as SO4							
Temperature (lab)							
Trivalent Chromium							
Vanadium	0.002	0.004	0.002	0.004	<0.0010	0.006	0.002
Zinc	0.051	0.068	0.052	0.064	0.047	0.098	0.15

Max of Normalised Results									
	ML154-TP023	ML155-CP019	ML155-CP019	ML155-CP024	ML155-CP024	ML155-CP024	ML155-CP044	ML155-CP044	ML155-CR001
	Diddington Lane Embankment	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting
	1	0.1	1	0.05	0.6	3	0.05	1	0.05
Determinant Name	TILMP	TOP	TILMP	TOP	GFDMP	GFDMP	TOP	TILMP	TOP
Ammoniacal Nitrogen as N									
Arsenic	<0.0002	0.0022	0.0019	0.009	0.002	<0.0010	0.0015	<0.0002	0.0012
Barium	0.005	0.009	0.02	0.32	0.14	0.05	0.003	<0.0010	0.004
Beryllium	<0.0001	<0.0001	<0.0001	<0.0100	<0.0100	<0.0100	<0.0001	<0.0001	<0.0001
Boron	0.078	0.02	0.04	0.24	0.03	<0.0100	0.01	0.01	0.04
Boron*									
Cadmium	<0.0000	<0.0000	<0.0000	0.0006	0.0002	<0.0001	0.00003	<0.0000	0.00003
Chromium	<0.0010	<0.0010	<0.0010	0.006	0.003	<0.0010	<0.0010	<0.0010	<0.0010
Chromium - Hexavalent	<0.0030	<0.0030	<0.0030	<0.0100	<0.0100	<0.0100	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide				<0.0100	<0.0100	<0.0100			
Conductivity- Electrical 20deg									
Copper	0.0009	0.002	0.0012	0.091	0.01	0.003	0.0064	0.0006	0.0051
Cyanide	<0.0500	<0.0500	<0.0500	<0.0200	0.02	0.02	<0.0500	<0.0500	<0.0500
Leachate 2:1 Sample Prep (BS12457)*									
Lead	<0.0003	<0.0003	<0.0003	0.402	0.031	<0.0010	<0.0003	<0.0003	0.0003
Mercury	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	0.001	<0.0010	<0.0010	0.008	0.002	0.002	0.002	<0.0010	0.001
pH				7.9	7.7	7.3			
pH	6.6	9.4	8.4				6.6	6.3	6.7
Selenium	<0.0005	<0.0005	<0.0005	0.002	<0.0010	<0.0010	<0.0005	<0.0005	<0.0005
Sulphate as SO4									
Temperature (lab)									
Trivalent Chromium	<0.0030	<0.0030	<0.0030				<0.0030	<0.0030	<0.0030
Vanadium	<0.0020	<0.0020	<0.0020	0.018	0.005	<0.0010	<0.0020	<0.0020	<0.0020
Zinc	0.004	<0.0020	0.004	0.348	0.04	0.007	0.003	<0.0020	0.002

Max of Normalised Results																
					ML155-CR001	ML155-CR005	ML155-CR022	ML155-CR022	ML155-TP018	ML155-TP018	ML155-TP025	ML155-TP025	ML155-TP041	ML155-WS002	ML155-WS044	ML155-WS044
					Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting
					1	0	0.5	0.9	0	0.5	0	0.3	0	0.4	0	0.3
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	ALV	MGR	MGR	MGR	MGR	MGR	TOP	TILMP	TOP	TILMP	TOP	ALV
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2												
Arsenic	mg/l	LEACHATE	0.01	0.05	<0.0002	0.0048	0.0014	<0.0002	0.0007	0.0002	0.0045	0.003	0.0024	0.0009	0.0011	0.0002
Barium	mg/l	LEACHATE	1	-	0.002	0.018	0.037	0.006	0.002	<0.0010	0.072	0.045	0.008	0.003	0.015	0.002
Beryllium	mg/l	LEACHATE	-	-	<0.0001	0.00017	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00008	<0.0001
Boron	mg/l	LEACHATE	1	2	0.03	0.02	0.17	0.11	0.043	0.041	0.065	0.058	0.97	0.06	0.035	0.042
Boron*	mg/l	LEACHATE	-	-												
Cadmium	mg/l	LEACHATE	0.005	0.00015	<0.0000	0.00003	<0.0000	<0.0000	<0.0000	0.00004	0.00005	0.00003	0.0001	0.00002	0.00011	<0.0000
Chromium	mg/l	LEACHATE	0.05	0.005	0.001	0.001	<0.0010	<0.0010	<0.0010	0.002	<0.0010	0.006	0.001	<0.0010	<0.0010	<0.0010
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047												
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-												
Copper	mg/l	LEACHATE	2	0.03	0.0044	0.0084	<0.0005	<0.0005	0.01	0.0029	0.035	0.033	0.0099	0.011	0.0068	0.0018
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-												
Lead	mg/l	LEACHATE	0.01	0.008575	0.0005	0.002	<0.0003	<0.0003	0.0018	<0.0003	0.0023	0.0024	0.0052	0.0018	0.0012	0.0008
Mercury	mg/l	LEACHATE	0.001	0.00007	<0.0001	<0.0001	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	0.00009	<0.0001	<0.0001	0.00008	0.00006
Nickel	mg/l	LEACHATE	0.02	0.02	<0.0010	0.002	<0.0010	<0.0010	<0.0010	<0.0010	0.002	0.001	0.002	<0.0010	0.003	<0.0010
pH	pH Units	LEACHATE	-	-												
pH	-	LEACHATE	-	-	6.3	6.8	7.7	7.1	6.9	6.8	7.9	8	6.8	6.8	6.4	6.6
Selenium	mg/l	LEACHATE	0.01	-	<0.0005	0.0015	0.0005	<0.0005	<0.0005	<0.0005	0.0006	0.0006	<0.0005	<0.0005	0.0008	<0.0005
Sulphate as SO4	mg/l	LEACHATE	250	400												
Temperature (lab)	degC	LEACHATE	-	-												
Trivalent Chromium	mg/l	LEACHATE	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.006	<0.0030	<0.0030	<0.0030	<0.0030
Vanadium	mg/l	LEACHATE	-	0.02	<0.0020	0.011	0.002	<0.0020	<0.0020	<0.0020	0.004	0.003	0.004	<0.0020	<0.0020	<0.0020
Zinc	mg/l	LEACHATE	5	0.03	0.01	0.012	<0.0020	0.004	<0.0020	0.005	0.014	0.004	0.019	0.004	0.021	<0.0020

Max of Normalised Results											
	ML156-CP008	ML156-CP008	ML156-CP023	ML156-CP028	ML156-CP028	ML156-CR003	ML156-CR014	ML156-CR014	ML156-CR020	ML156-CR021	ML156-CR025
	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Embankment	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station
	0.35	2.35	0.5	1	6	5.5	0.5	12.2	0.2	2.25	0.05
Determinant Name	MGR	MGR	GFDUD	GFDUD	GFDUD	MGR	GFDUD	MMG	MGR	MMG	MGR
Ammoniacal Nitrogen as N											
Arsenic	0.003	0.005	0.003	0.006		0.0003	0.005	<0.0010	0.0066		0.00045
Barium	0.17	0.2	0.12	0.42		0.006	0.18	0.29	0.018		0.008
Beryllium	<0.0100	<0.0100	<0.0100	<0.0100		<0.0001	<0.0100	<0.0100	0.0001		<0.0001
Boron	0.84	0.83	0.09	0.02		0.02	<0.0100	0.03	<0.0120		
Boron*											<0.0120
Cadmium	0.0001	<0.0001	0.0007	0.0009		<0.0000	0.0002	<0.0001	<0.0000		<0.0000
Chromium	<0.0010	<0.0010	0.003	0.015		<0.0010	0.004	<0.0010			
Chromium - Hexavalent	<0.0100	<0.0100	<0.0100	0.04		<0.0030	<0.0100	<0.0100	<0.0030		<0.0030
Chromium (III) Oxide	<0.0100	<0.0100	<0.0100	<0.0100			<0.0100	<0.0100			
Conductivity- Electrical 20deg											
Copper	0.009	0.008	0.026	0.037		0.0011	0.023	0.005	0.0058		0.0008
Cyanide	0.02	<0.0200	<0.0200	<0.0200		<0.0500	<0.0200	0.02	<0.0400		<0.0400
Leachate 2:1 Sample Prep (BS12457)*									#VALUE!		#VALUE!
Lead	0.008	0.006	0.024	0.168		<0.0003	0.044	0.001	0.0035		0.00021
Mercury	<0.0001	<0.0001	<0.0001	0.0002		<0.0001	<0.0001	<0.0001	<0.0000		0.00001
Nickel	0.009	0.032	0.003	0.011		<0.0010	0.003	<0.0010	0.0018		<0.0005
pH	7.5	7.3	7.1	8			7.1	7.7	6.6		7.6
pH						7.5					
Selenium	0.002	0.001	<0.0010	0.001		<0.0005	<0.0010	<0.0010	0.00071		0.0024
Sulphate as SO4					26					67	
Temperature (lab)											
Trivalent Chromium						<0.0030			0.011		0.0084
Vanadium	0.002	0.002	0.007	0.024		<0.0020	0.012	0.001	0.0078		0.0007
Zinc	0.018	0.033	0.097	0.244		<0.0020	0.101	0.055	0.011		<0.0013

Max of Normalised Results									
					ML156-CR025	ML156-CR027	ML156-CR035	ML156-TP006	ML156-TP027
					Birmingham Interchange Station	Birmingham Interchange Station	Birmingham Interchange Station	Diddington Cutting	Bickenhill Embankment
					0.3	0.2	0.3	0.3	1
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	MGR	MGR	MGR	TOP	GFDUD
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2					
Arsenic	mg/l	LEACHATE	0.01	0.05	0.002	0.00099	0.0026	0.002	0.002
Barium	mg/l	LEACHATE	1	-	0.01	0.047	0.029	0.18	0.06
Beryllium	mg/l	LEACHATE	-	-	<0.0001	<0.0001	<0.0001	<0.0100	<0.0100
Boron	mg/l	LEACHATE	1	2				0.07	0.21
Boron*	mg/l	LEACHATE	-	-	<0.0120	0.032	0.062		
Cadmium	mg/l	LEACHATE	0.005	0.00015	<0.0000	0.00003	<0.0000	0.0002	<0.0001
Chromium	mg/l	LEACHATE	0.05	0.005				0.002	<0.0010
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	<0.0030	<0.0030	<0.0030	<0.0100	<0.0100
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047				<0.0100	<0.0100
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-					
Copper	mg/l	LEACHATE	2	0.03	0.0009	0.0028	0.0007	0.022	0.004
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0400	<0.0400	<0.0400	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-	#VALUE!	#VALUE!	#VALUE!		
Lead	mg/l	LEACHATE	0.01	0.008575	0.00088	0.00011	0.00026	0.019	0.005
Mercury	mg/l	LEACHATE	0.001	0.00007	0.00001	0.00001	<0.0000	<0.0001	<0.0001
Nickel	mg/l	LEACHATE	0.02	0.02	<0.0005	0.0024	0.0007	0.003	0.008
pH	pH Units	LEACHATE	-	-	7.9	7.7	8.1	7.6	7.7
pH	-	LEACHATE	-	-					
Selenium	mg/l	LEACHATE	0.01	-	0.0018	0.0011	0.00082	<0.0010	<0.0010
Sulphate as SO4	mg/l	LEACHATE	250	400					
Temperature (lab)	degC	LEACHATE	-	-					
Trivalent Chromium	mg/l	LEACHATE	-	-	0.0088	0.015	0.0083		
Vanadium	mg/l	LEACHATE	-	0.02	0.0029	0.0009	0.002	0.009	<0.0010
Zinc	mg/l	LEACHATE	5	0.03	<0.0013	0.005	<0.0013	0.073	0.008

Max of Normalised Results										
	ML156-TP036	ML156-TP036	ML156-TP100	ML156-TP101	ML156-WS025	ML157-CP001	ML157-CP024	ML157-CR010	ML157-CR012	ML157-CR012
	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting
	2.5	4	0.6	0.3	0.3	0.5	1	0.75	0.1	0.4
Determinant Name	MGR	MGR	GFDUD	TOP	GFDUD	GFDUD	GFDUD	MGR	MGR	MGR
Ammoniacal Nitrogen as N										
Arsenic	0.007	0.009	0.007	0.023	0.009	0.002	0.009	0.0022	0.00236	0.00284
Barium	0.29	0.26	0.9	0.4	0.14	0.06	0.45	0.022	0.0481	0.0223
Beryllium	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0001	<0.0001	<0.0001
Boron	0.92	1.55	0.03	0.03	0.01	<0.0100	0.2		0.155	0.142
Boron*								<0.0120		
Cadmium	0.0002	0.0001	0.0011	0.0023	0.0002	<0.0001	0.0011	<0.0000	<0.0001	<0.0001
Chromium	<0.0010	0.002	0.012	0.016	0.004	0.002	0.009		0.00104	<0.0010
Chromium - Hexavalent	<0.0100	<0.0100	0.06	0.02	0.03	<0.0100	<0.0100	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100			
Conductivity- Electrical 20deg									336	249
Copper	0.01	0.024	0.146	0.109	0.022	0.01	0.078	0.0028	0.00549	0.016
Cyanide	0.02	0.02	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0400	<0.0500	<0.0500
Leachate 2:1 Sample Prep (BS12457)*								#VALUE!		
Lead	0.006	0.007	0.15	0.218	0.029	0.006	0.303	<0.0001	0.000399	0.000274
Mercury	<0.0001	<0.0001	<0.0001	0.0008	<0.0001	<0.0001	<0.0001	<0.0000	<0.0000	0.0000175
Nickel	0.026	0.023	0.019	0.012	0.003	0.003	0.009	0.0008	0.00122	0.00234
pH	7.6	7.7	7.8	8	7.5	7.6	7	9.6	8.41	8.09
pH										
Selenium	<0.0010	<0.0010	0.005	0.001	<0.0010	<0.0010	0.001	0.00056	0.00104	0.00189
Sulphate as SO4										
Temperature (lab)									18.5	18
Trivalent Chromium								0.01	<0.0030	<0.0030
Vanadium	<0.0010	0.001	0.028	0.05	0.012	0.003	0.021	0.0055	0.00793	0.00873
Zinc	0.05	0.046	0.296	0.699	0.097	0.019	0.396	<0.0013	0.00985	0.00554

Max of Normalised Results											
	ML157-CR012	ML157-CR013	ML157-CR013	ML157-CR014	ML157-CR014	ML157-CR014	ML157-CR015	ML157-CR015	ML157-CR021	ML157-CR021	ML157-CR022
	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment	Packington Embankment	Bickenhill Cutting
	1	0.05	0.9	0.05	0.6	2.2	0.5	1	0.05	9.5	1
Determinant Name	MMG	MGR	GFSG	MGR	MGR	MMG	MGR	MMG	TOP	MMG	MGR
Ammoniacal Nitrogen as N											
Arsenic	<0.0005	0.00841	<0.0005	0.0127	<0.0005	0.000735	0.00278	0.00187	0.00024	0.00038	0.00089
Barium	0.0103	0.046	0.0314	0.0546	0.00885	0.00677	0.0428	0.0137	0.01	0.0068	0.0091
Beryllium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001
Boron	0.129	0.0492	0.0506	0.0265	0.191	0.113	0.034	0.0174	<0.0120	0.018	<0.0120
Boron*											
Cadmium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0000	<0.0000	<0.0000
Chromium	<0.0010	0.00125	<0.0010	<0.0010	0.00111	<0.0010	<0.0010	<0.0010			
Chromium - Hexavalent	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide											
Conductivity- Electrical 20deg	266	256	3780	251	56.1	133	215	238			
Copper	0.00409	0.00435	0.00719	0.0103	0.0026	0.00444	0.00267	0.000529	0.0006	<0.0004	0.0032
Cyanide	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0400	<0.0400	<0.0400
Leachate 2:1 Sample Prep (BS12457)*									#VALUE!	#VALUE!	#VALUE!
Lead	<0.0002	0.000918	0.00138	0.000325	0.000444	0.000211	<0.0002	<0.0002	0.00057	0.00017	0.0013
Mercury	<0.0000	<0.0000	0.000214	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Nickel	0.00122	0.00124	0.00178	0.003	0.00187	0.00143	0.000907	<0.0004	0.0007	0.0016	0.0017
pH	7.85	8.77	8.85	8.42	8.41	8.26	8.55	8.48	7.4	7	6.7
pH											
Selenium	<0.0005	0.000528	0.00201	0.000654	<0.0005	0.000559	0.000618	<0.0005	0.00039	0.00028	0.00044
Sulphate as SO4											
Temperature (lab)	15.7	18.8	18.1	19	18.3	18.9	19.7	19.6			
Trivalent Chromium	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.011	0.011	0.011
Vanadium	<0.0010	0.017	<0.0010	0.0085	0.00208	0.00451	0.0027	0.00555	0.0013	0.0012	0.0068
Zinc	0.00585	0.00485	0.00343	0.00188	0.0105	0.00238	<0.0010	<0.0010	0.0019	<0.0013	0.0048

Max of Normalised Results														
					ML157-CR027	ML157-CR027	ML157-CT011	ML157-CT013	ML157-CT014	ML157-CT015	ML157-CT017	ML157-CT018	ML157-CT018	ML157-CT019
					Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting
					0.5	0.9	0.3	1	0.7	0.5	0.4	0.1	0.5	1
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	MGR	MMG	MMG	MGR	SUPDC	SUPDC	SUPDC	MGR	SUPDC	MGR
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2										
Arsenic	mg/l	LEACHATE	0.01	0.05	0.00208	0.00116	0.00104	0.00242	0.000888	<0.0005	0.0019	0.00747	<0.0005	0.0261
Barium	mg/l	LEACHATE	1	-	0.0238	0.0112	0.0199	0.04	0.0131	0.00779	1.2	0.0285	0.0102	0.0212
Beryllium	mg/l	LEACHATE	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Boron	mg/l	LEACHATE	1	2	0.0411	0.0243	0.0222	0.129	0.055	0.105	0.0618	0.237	0.139	0.0814
Boron*	mg/l	LEACHATE	-	-										
Cadmium	mg/l	LEACHATE	0.005	0.00015	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/l	LEACHATE	0.05	0.005	<0.0010	<0.0010	<0.0010	<0.0010	0.00129	0.00151	0.00124	<0.0010	<0.0010	0.00516
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.00303	<0.0030	<0.0030	0.00468
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047										
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-	354	256	614	650	78.7	120	123	1390	394	782
Copper	mg/l	LEACHATE	2	0.03	0.0118	0.00279	0.000666	0.0147	0.00252	0.00216	0.00413	0.00732	0.00166	0.0085
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-										
Lead	mg/l	LEACHATE	0.01	0.008575	<0.0002	<0.0002	<0.0002	0.000698	0.000721	0.00214	0.000854	<0.0002	0.000422	0.00422
Mercury	mg/l	LEACHATE	0.001	0.00007	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.0000714	0.0000248	<0.0000	<0.0000	0.0000385
Nickel	mg/l	LEACHATE	0.02	0.02	0.00221	0.00268	<0.0004	0.0019	0.0012	0.00114	0.000815	0.00256	0.00188	0.0015
pH	pH Units	LEACHATE	-	-	8.67	8.49	8.23	8.45	8.52	8.47	8.31	8.41	8.35	9.35
pH	-	LEACHATE	-	-										
Selenium	mg/l	LEACHATE	0.01	-	0.000998	0.000737	<0.0005	0.000763	<0.0005	<0.0005	0.000513	0.00209	0.000921	<0.0005
Sulphate as SO4	mg/l	LEACHATE	250	400										
Temperature (lab)	degC	LEACHATE	-	-	19	18.3	17.6	19.3	19.1	16.8	18.8	19.8	19.6	19.6
Trivalent Chromium	mg/l	LEACHATE	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Vanadium	mg/l	LEACHATE	-	0.02	0.00461	0.00464	0.0028	0.006	0.00263	0.00184	0.00414	0.016	<0.0010	0.0518
Zinc	mg/l	LEACHATE	5	0.03	0.00197	0.00179	0.00188	0.0415	0.00458	0.00436	0.00518	0.00137	<0.0010	0.00642

	ML157-CT027	ML157-CT027	ML157-CT039	ML157-CT039	ML157-TP001	ML157-TP063	ML157-WS036	ML157-WS067	ML157-WS067	ML158-CP002
	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment
	0.05	1	0.2	0.9	1	0.7	0.7	0.05	2.8	1.05
Determinant Name	MGR	MGR	MGR	MGR	MGR	GFDUD	GFDUD	TOP	GFDUD	MGR
Ammoniacal Nitrogen as N										
Arsenic	0.00759	0.000501	0.00932	0.0122	0.021	0.015	0.005	0.01	0.001	0.0155
Barium	0.083	0.0194	0.00493	0.00886	0.29	0.27	0.2	0.27	0.08	0.0718
Beryllium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0001
Boron	0.0421	0.0396	0.0191	0.0148	0.25	0.06	0.15	0.04	<0.0100	0.333
Boron*										
Cadmium	0.000106	<0.0001	<0.0001	<0.0001	0.0011	0.0004	0.0002	0.0005	0.0002	0.00117
Chromium	0.00316	<0.0010	<0.0010	<0.0010	0.005	0.013	0.004	0.004	0.004	0.00244
Chromium - Hexavalent	<0.0030	<0.0030	0.00846	<0.0030	<0.0100	<0.0100	0.02	<0.0100	0.01	<0.0030
Chromium (III) Oxide					<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	
Conductivity- Electrical 20deg	297	138	207	117						430
Copper	0.0314	0.0036	0.00364	<0.0003	0.059	0.062	0.033	0.057	0.007	0.0352
Cyanide	<0.0500	<0.0500	<0.0500	<0.0500	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0500
Leachate 2:1 Sample Prep (BS12457)*										
Lead	0.00163	<0.0002	0.000519	<0.0002	0.136	0.044	0.054	0.047	0.015	0.00129
Mercury	0.0000191	<0.0000	<0.0000	<0.0000	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0000
Nickel	0.00148	<0.0004	<0.0004	<0.0004	0.005	0.012	0.005	0.004	0.002	0.103
pH	8.34	8.75	9.7	8.85	7.2	8.2	7.5	7.4	6.2	7.97
pH										
Selenium	0.00182	<0.0005	<0.0005	<0.0005	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.00162
Sulphate as SO4										
Temperature (lab)	18.4	17.5	18.8	18.6						15.5
Trivalent Chromium	0.316	<0.0030	<0.0030	<0.0030						<0.0030
Vanadium	0.00584	<0.0010	0.0585	0.0347	0.029	0.024	0.009	0.014	0.006	0.0025
Zinc	0.00617	<0.0010	0.00182	<0.0010	0.21	0.234	0.145	0.201	0.022	0.233

	ML158-CP002	ML158-CP002	ML158-CP005	ML158-CP005	ML158-CP005	ML158-CP007	ML158-CP007
	Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure
	3.05	3.65	0.5	1	1.3	1.05	3.05
Determinant Name	MGR	GFDUD	MGR	MGR	GFDUD	MGR	MGR
Ammoniacal Nitrogen as N							
Arsenic	0.0661	0.0174	0.00358	0.0151	0.00391	0.00171	0.0179
Barium	0.0373	0.0704	0.0474	0.0489	0.0401	0.0169	0.051
Beryllium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Boron	0.978	0.282	0.109	0.307	0.09	0.0778	0.357
Boron*							
Cadmium	0.000811	0.0003	0.000114	0.000196	<0.0001	0.0000888	<0.0001
Chromium	0.00739	0.00218	<0.0012	0.00409	<0.0012	0.00246	0.00174
Chromium - Hexavalent	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide							
Conductivity- Electrical 20deg	867	458	343	803	520	91.2	468
Copper	0.112	0.038	0.00657	0.0315	0.0119	0.0256	0.0157
Cyanide	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	0.051
Leachate 2:1 Sample Prep (BS12457)*							
Lead	0.00468	0.00199	0.0027	0.00254	0.0012	0.00357	0.00113
Mercury	0.0000255	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Nickel	0.121	0.0372	0.00388	0.0235	0.00485	0.0064	0.00557
pH	8	8.16	8.4	8.74	8.19	7.03	8.48
pH							
Selenium	0.00213	<0.0008	<0.0008	0.00143	0.00134	0.00106	0.00211
Sulphate as SO4							
Temperature (lab)	15.5	17.9	20.1	20	18.6	19.8	17.8
Trivalent Chromium	0.739	<0.0030	<0.0030	0.409	<0.0030	<0.0030	<0.0030
Vanadium	0.00836	0.004	0.00553	0.0112	0.00172	0.00411	0.0123
Zinc	0.242	0.0391	0.00538	0.00986	0.00537	0.0121	0.00512

Max of Normalised Results																									
					ML158-CP007	ML158-CP021	ML158-CP021	ML158-CR003	ML158-CR003	ML158-CR007	ML158-CR007	ML158-TP008	ML158-TP008	ML158-TP008	ML158-WS012	ML158-WS013	ML158-WS014	ML158-WS015	ML158-WS016	ML158-WS016	ML159-CP003	ML159-CP003	ML159-CP003	ML159-CP018	ML159-CR003
					M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	M42 Motorway Box Structure	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Packington Embankment	Packington Embankment	Packington Embankment	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment
					3.85	0.05	0.4	0.05	1.05	0.05	5.05	1.05	2.05	3.05	0.4	1	0.5	0.2	1	3	0.05	1.05	1.2	0	0.05
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	GFDUD	MGR	GFDUD	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	MGR	MGR	MGR	MGR	MGR	MGR	MGR	MGR	GFDUD	TOP	MGR
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2																					
Arsenic	mg/l	LEACHATE	0.01	0.05	0.000694	0.000915	<0.0005	0.00108	0.000841	0.00085	0.002	0.00421	0.0024	0.000678	0.0011	0.00123	0.00055	0.00105	0.00106	0.0264	0.000838	0.000552	0.000831	0.0046	0.0012
Barium	mg/l	LEACHATE	1	-	0.0149	0.0167	0.0105	0.0221	0.0263	0.066	0.0398	0.0464	0.0379	0.00781	0.0829	0.0199	0.0195	0.0439	0.0367	0.0483	0.222	0.0651	0.0186	0.0263	0.186
Beryllium	mg/l	LEACHATE	-	-	0.000197	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Boron	mg/l	LEACHATE	1	2	0.0183	0.0772	0.0587	0.0233	0.0379	0.0238	0.0969	0.4	0.0679	0.0461	0.0128	0.0151	0.0212	0.0218	0.0873	2.92	0.0697	0.225	0.0387	0.12	0.015
Boron*	mg/l	LEACHATE	-	-																					
Cadmium	mg/l	LEACHATE	0.005	0.00015	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.000117	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.000218	0.0001	0.000161	0.00012	0.000431	<0.0001
Chromium	mg/l	LEACHATE	0.05	0.005	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	0.00194	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	0.00452	<0.0012	<0.0012	0.0169	<0.0012
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.00482	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047																					
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-	103	110	97.2	97	237	377	173	410	264	82.4	217	212	146	180	331	553	527	170	63.5	359	306
Copper	mg/l	LEACHATE	2	0.03	<0.0009	0.00648	0.00236	0.00748	0.00701	0.00361	0.00105	0.00736	0.0231	0.00193	0.00464	0.00429	0.00788	0.0109	0.00486	0.0166	0.032	0.0059	0.00368	0.134	0.00815
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-																					
Lead	mg/l	LEACHATE	0.01	0.008575	0.00267	0.00229	0.000856	0.00128	0.000363	0.000249	0.00112	0.000797	0.000245	<0.0001	0.000269	0.00028	<0.0001	0.00164	0.000271	0.000279	0.00107	0.00124	0.000586	0.00776	0.000849
Mercury	mg/l	LEACHATE	0.001	0.00007	<0.0000	0.0000234	<0.0000	0.0000154	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Nickel	mg/l	LEACHATE	0.02	0.02	0.00276	0.00129	0.000758	0.00197	0.0011	0.00146	0.00149	0.00205	0.00119	<0.0004	0.000767	0.00067	0.000573	0.0176	0.00176	0.00346	0.0186	0.166	0.00199	0.02	0.00315
pH	pH Units	LEACHATE	-	-	6.18	7.57	7.6	7.99	8.49	8.42	8.16	8.34	8.31	7.66	8.33	8.35	8.23	7.96	8.74	9.37	8.35	7.75	6.58	8.21	8.22
pH	-	LEACHATE	-	-																					
Selenium	mg/l	LEACHATE	0.01	-	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.000837	<0.0008	0.00147	0.00114	<0.0008	<0.0008	0.00115	<0.0008	0.00112	<0.0008	0.00376	<0.0008	<0.0008	<0.0008	0.00223	0.0013
Sulphate as SO4	mg/l	LEACHATE	250	400																					
Temperature (lab)	degC	LEACHATE	-	-	17.6	20.1	18.5	16	15.5	19.9	19.9	20.1	20	20.3	19.4	18.1	18.8	18.2	14.6	17.4	19.9	19.1	19.9	19.3	17.1
Trivalent Chromium	mg/l	LEACHATE	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.169	<0.0030
Vanadium	mg/l	LEACHATE	-	0.02	<0.0013	0.00202	<0.0013	0.00282	<0.0013	<0.0013	<0.0013	0.00489	0.00411	<0.0013	0.00148	<0.0013	<0.0013	<0.0013	0.00166	0.0849	<0.0013	<0.0013	0.00137	0.014	0.0019
Zinc	mg/l	LEACHATE	5	0.03	0.0174	0.00831	0.00276	0.00696	0.00146	0.00185	0.00208	0.00206	0.00159	<0.0013	0.0016	0.00133	<0.0013	0.00336	0.00218	<0.0013	0.022	0.017	0.0155	0.0277	0.00358

Max of Normalised Results																							
					ML159-CR003	ML159-CR008a	ML159-CR018	ML159-CR018	ML159-TP004	ML159-TP015	ML159-TP015	ML159-WS002	ML159-WS002a	ML160-CP041	ML160-CP041	ML160-CR030	ML160-CR035	ML160-CR035	ML160-WS003	ML160-WS003	ML161-CP032	ML161-CP032	ML161-CR009
					Pool Wood Embankment	M6 Motorway South Viaduct	M6 Motorway Box Structure	M6 Motorway Box Structure	Pool Wood Embankment	M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway Box Structure	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	M6 Motorway South Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment
					0.6	1.2	1.6	3.6	0.05	0.15	0.45	0.5	1.1	0.2	0.6	1.5	0.75	1.1	0.3	1	0.9	1.2	0.2
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	GFDUD	MGR	MGR	MGR	TOP	MGR	GFDUD	MGR	MGR	MGR	HEAD	MGR	MGR	HEAD	MGR	MGR	MGR	MMG	MGR
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2																			
Arsenic	mg/l	LEACHATE	0.01	0.05	0.00201	0.002	0.008	0.001	0.0023	0.006	0.002	0.002	0.001	0.004	0.001	0.002	0.002	0.002	0.002	0.002	<0.0010	<0.0010	0.003
Barium	mg/l	LEACHATE	1	-	0.0149	0.1	0.08	0.09	0.0384	0.51	0.17	0.11	0.12	0.25	0.22	0.16	0.19	0.32	0.09	0.09	0.06	0.04	0.24
Beryllium	mg/l	LEACHATE	-	-	<0.0001	<0.0100	<0.0100	<0.0100	<0.0001	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Boron	mg/l	LEACHATE	1	2	0.0308	0.05	0.1	0.1	0.052	0.14	0.05	0.12	0.14	0.21	0.18	0.06	0.14	0.22	0.06	0.08	0.07	0.16	0.09
Boron*	mg/l	LEACHATE	-	-																			
Cadmium	mg/l	LEACHATE	0.005	0.00015	<0.0001	<0.0001	<0.0001	0.0001	0.0000984	0.0013	0.0001	<0.0001	0.0009	0.0017	0.0007	0.0001	0.0002	0.0006	<0.0001	<0.0001	<0.0001	<0.0001	0.0004
Chromium	mg/l	LEACHATE	0.05	0.005	<0.0012	0.002	0.009	<0.0010	0.00164	0.004	0.001	0.001	<0.0010	0.002	0.001	<0.0010	0.003	0.005	0.001	<0.0010	<0.0010	<0.0010	<0.0010
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	<0.0030	0.004	0.004	<0.0030	<0.0030	<0.0030	0.053	<0.0030	<0.0030	<0.0030	0.005	0.003	0.067	0.106	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047		<0.0020	<0.0100	<0.0100		<0.0040		<0.0010	<0.0010	<0.0100	<0.0100	<0.0100	0	0	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-	134				87.4														
Copper	mg/l	LEACHATE	2	0.03	0.00595	0.02	0.016	0.006	0.0138	0.044	0.009	0.009	0.009	0.034	0.035	0.004	0.024	0.031	0.005	0.004	0.003	0.007	0.032
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0500	<0.0200	<0.0200	<0.0200	<0.0500	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-																			
Lead	mg/l	LEACHATE	0.01	0.008575	0.00119	0.008	<0.0010	0.012	0.00188	0.116	0.012	0.003	0.004	0.035	0.023	0.002	0.031	0.04	<0.0010	<0.0010	<0.0010	<0.0010	0.007
Mercury	mg/l	LEACHATE	0.001	0.00007	0.0000339	0	<0.0000	<0.0000	0.0000144	0	0	0	0	0	0	<0.0000	0	0.0001	<0.0000	<0.0000	0	0	0
Nickel	mg/l	LEACHATE	0.02	0.02	0.00154	0.003	0.005	0.003	0.00568	0.009	0.002	0.002	0.002	0.005	0.003	0.003	0.004	0.005	<0.0010	<0.0010	<0.0010	0.003	0.009
pH	pH Units	LEACHATE	-	-	7.96	7.4	10.8	8	7.36	6.9	7	7.3	7.4	6.6	6.9	8.4	6.7	6.8	7.7	7.7	8	7.4	8
pH	-	LEACHATE	-	-																			
Selenium	mg/l	LEACHATE	0.01	-	<0.0008	<0.0010	0.005	<0.0010	<0.0008	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001
Sulphate as SO4	mg/l	LEACHATE	250	400																			
Temperature (lab)	degC	LEACHATE	-	-	11.5				19.8														
Trivalent Chromium	mg/l	LEACHATE	-	-	<0.0030				<0.0030														
Vanadium	mg/l	LEACHATE	-	0.02	0.00586	0.003	0.095	<0.0010	0.00354	0.03	0.007	0.003	0.001	0.014	0.005	0.004	0.011	0.013	0.002	0.003	0.002	0.002	0.002
Zinc	mg/l	LEACHATE	5	0.03	0.00316	0.055	0.006	0.039	0.0129	0.283	0.054	0.061	0.056	0.27	0.13	0.038	0.107	0.175	0.024	0.035	0.04	0.012	0.168

Max of Normalised Results																								
					ML161-CR009	ML161-CR021	ML161-WS002	ML162-CR004	ML162-CR024	ML162-CR024	ML162-CR024	ML162-CR403	ML162-CR403	ML163-CP035	ML163-CP038	ML163-CR007	ML163-CR007	ML163-CR007	ML163-CR008	ML163-CR008	ML163-CR008	ML163-CR008	ML163-CR010	ML163-CR010
					Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	Coleshill West Viaduct	M42 Coleshill Box Structure	M42 Coleshill North Viaduct	M42 Coleshill North Viaduct	M42 Coleshill North Viaduct	M42 Coleshill Box Structure	M42 Coleshill Box Structure	Lichfield Road Embankment	Lichfield Road Embankment	Gilson Embankment	Gilson Embankment	Gilson Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment
					0.5	0.5	0.5	0.6	0.05	0.5	2.1	0.3	1	1	0.5	0.5	1	2	0.05	0.6	1.2	1.5	0.4	2
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	MGR	MGR	MGR	HEAD	TOP	ALV	ALV	GFDMP	GFDMP	ALV	RTD1	GFDUD	GLLD	GLLD	MGR	MGR	MGR	RTD1	MGR	RTD1
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2								2	2											
Arsenic	mg/l	LEACHATE	0.01	0.05	0.004	0.012	0.001	0.001	0.0014	0.0005	0.0005			0.001	0.001	0.0054	0.003	0.0022	0.002	0.001	0.006	0.001	0.002	<0.0010
Barium	mg/l	LEACHATE	1	-	0.24	0.16	0.21	0.16	0.008	0.021	0.03			0.29	0.2	0.004	0.006	0.004	0.16	0.15	<0.0100	0.13	0.19	0.16
Beryllium	mg/l	LEACHATE	-	-	<0.0100	<0.0100	<0.0100	<0.0100	0.00009	<0.0001	<0.0001			<0.0100	<0.0100	<0.0001	<0.0001	<0.0001	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Boron	mg/l	LEACHATE	1	2	0.05	0.11	0.28	0.06	0.02	0.04	0.03			0.15	0.07	0.08	0.1	0.09	0.12	0.09	<0.0100	0.07	0.17	0.07
Boron*	mg/l	LEACHATE	-	-																				
Cadmium	mg/l	LEACHATE	0.005	0.00015	0.0003	0.0002	<0.0001	<0.0001	0.00017	<0.0000	0.00002			0.0001	0.0001	<0.0000	<0.0000	<0.0000	0.0001	<0.0001	0.0002	0.0001	0.0002	<0.0001
Chromium	mg/l	LEACHATE	0.05	0.005	<0.0010	0.003	0.001	<0.0010	0.002	0.001	0.001			0.002	<0.0010	0.002	0.001	0.001	<0.0010	<0.0010	0.002	<0.0010	<0.0010	<0.0010
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	<0.0030	<0.0030	0.004	<0.0030	<0.0030	<0.0030	<0.0030			<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047	<0.0010	<0.0030	<0.0010	<0.0100						<0.0020	<0.0010				<0.0010	<0.0010	0.0002	<0.0010	<0.0010	<0.0010
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-																				
Copper	mg/l	LEACHATE	2	0.03	0.029	0.026	0.035	0.007	0.017	0.0016	0.003			0.013	0.012	0.0061	0.006	0.0059	0.027	0.014	0.022	0.01	0.023	0.003
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0200	<0.0200	<0.0200	<0.0200	<0.0500	<0.0500	<0.0500			<0.0200	<0.0200	<0.0500	<0.0500	<0.0500	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-																				
Lead	mg/l	LEACHATE	0.01	0.008575	0.002	0.056	0.007	0.004	0.0031	<0.0003	<0.0003			0.019	0.006	0.0005	<0.0003	<0.0003	0.008	0.007	0.025	0.015	0.008	0.003
Mercury	mg/l	LEACHATE	0.001	0.00007	0	0	<0.0000	<0.0000	<0.0001	<0.0001	<0.0001			<0.0000	<0.0000	<0.0001	<0.0001	<0.0001	0	0	0	<0.0000	0	<0.0000
Nickel	mg/l	LEACHATE	0.02	0.02	0.013	0.005	0.003	0.001	0.004	<0.0010	0.001			0.003	0.002	0.001	0.001	0.003	0.003	0.002	0.003	0.001	0.002	0.001
pH	pH Units	LEACHATE	-	-	7.7	7.6	6.5	7.4	6.4	7.07	7.6			8.7	7.8	7.48	7.55	7.41	7.5	7.4	7.2	7.3	7.9	7.5
pH	-	LEACHATE	-	-																				
Selenium	mg/l	LEACHATE	0.01	-	0.001	<0.0010	<0.0010	<0.0010	<0.0005	<0.0005	<0.0005			<0.0010	<0.0010	0.0006	0.0006	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate as SO4	mg/l	LEACHATE	250	400																				
Temperature (lab)	degC	LEACHATE	-	-																				
Trivalent Chromium	mg/l	LEACHATE	-	-					<0.0030	<0.0030	<0.0030					<0.0030	<0.0030	<0.0030						
Vanadium	mg/l	LEACHATE	-	0.02	0.002	0.02	0.004	0.002	0.003	<0.0020	<0.0020			0.012	0.002	0.006	0.004	0.004	0.002	0.002	0.012	0.004	0.002	0.002
Zinc	mg/l	LEACHATE	5	0.03	0.122	0.105	0.141	0.14	0.045	0.003	0.003			0.102	0.067	0.005	0.004	0.002	0.072	0.056	0.069	0.088	0.061	0.05

Max of Normalised Results														
					ML163-CR016	ML163-CR016	ML163-CR020	ML163-CR020	ML163-CR021a	ML163-CR021a	ML163-CR021a	ML163-TP020	ML163-TP021	ML163-TP021
					Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment	Lichfield Road Embankment
					0.5	1	0.5	0.9	0.4	0.9	1.5	1	0.05	0.5
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	MGR	RTD1	MGR	RTD1	MGR	MGR	ALV	GLLD	MGR	RTD1
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2										
Arsenic	mg/l	LEACHATE	0.01	0.05	0.002	0.003	0.005	0.024	0.01	0.005	0.001	0.002	0.009	0.002
Barium	mg/l	LEACHATE	1	-	0.17	0.21	0.08	0.08	0.11	0.2	0.14	0.63	0.37	0.39
Beryllium	mg/l	LEACHATE	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Boron	mg/l	LEACHATE	1	2	0.08	0.07	0.03	0.1	0.07	0.16	0.06	0.38	0.17	0.19
Boron*	mg/l	LEACHATE	-	-										
Cadmium	mg/l	LEACHATE	0.005	0.00015	0.0001	<0.0001	<0.0001	0.0001	0.0001	0.0001	<0.0001	0.0004	0.0005	0.0003
Chromium	mg/l	LEACHATE	0.05	0.005	<0.0010	0.001	0.012	0.008	0.003	<0.0010	<0.0010	0.005	0.003	0.005
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.009	0.143	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047	<0.0010	<0.0010	<0.0120	<0.0080				<0.0010	0.0003	0.0005
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-										
Copper	mg/l	LEACHATE	2	0.03	0.012	0.009	0.083	0.026	0.025	0.022	0.007	0.025	0.081	0.018
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0200	<0.0200	0.07	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-										
Lead	mg/l	LEACHATE	0.01	0.008575	0.006	0.007	0.002	0.004	0.014	0.01	0.002	0.053	0.095	0.136
Mercury	mg/l	LEACHATE	0.001	0.00007	0.0003	0	<0.0000	0	0	0.0001	0	<0.0000	0.0001	0
Nickel	mg/l	LEACHATE	0.02	0.02	0.003	0.003	0.013	0.007	0.002	0.003	0.001	0.005	0.01	0.006
pH	pH Units	LEACHATE	-	-	7.4	7.4	11.5	8.4	8.2	7.7	7.7	7.9	7.2	7.2
pH	-	LEACHATE	-	-										
Selenium	mg/l	LEACHATE	0.01	-	<0.0010	<0.0010	0.002	0.005	0.002	0.001	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate as SO4	mg/l	LEACHATE	250	400										
Temperature (lab)	degC	LEACHATE	-	-										
Trivalent Chromium	mg/l	LEACHATE	-	-										
Vanadium	mg/l	LEACHATE	-	0.02	0.001	0.005	0.062	0.42	0.01	0.006	0.001	0.008	0.015	0.014
Zinc	mg/l	LEACHATE	5	0.03	0.108	0.128	0.018	0.012	0.026	0.095	0.059	0.378	0.35	0.234

Max of Normalised Results										
	ML164-CP003	ML164-CP003	ML164-CP003	ML164-CP004	ML164-CP004	ML164-CP004	ML164-CP010	ML164-CP010	ML164-CP021	ML164-CP021
	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watton House Embankment	Watton House Embankment	Chattle Hill Box Structure	Chattle Hill Box Structure
	0.9	2	3.5	1	3	4	0.5	1	0.5	3
Determinant Name	MGR	MGR	TILMP	MGR	MGR	MGR	MGR	MGR	MGR	MGR
Ammoniacal Nitrogen as N				1.3				<0.0100		0.09
Arsenic	0.023	0.007	0.01	0.012	0.008	0.005	<0.0010	0.002	0.027	0.004
Barium	0.06	0.07	0.07	0.1	0.07	0.24	0.11	0.16	0.09	0.12
Beryllium	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Boron	0.11	0.09	0.04	0.14	0.09	0.08	0.09	0.09	0.06	0.06
Boron*										
Cadmium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	0.008	0.006	<0.0010	0.025	0.012	0.004	<0.0010	0.001	0.013	0.001
Chromium - Hexavalent	0.005	<0.0030	<0.0030	0.023	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.004
Chromium (III) Oxide	0.0003	<0.0060	<0.0010	0.0002	0.0012	0.0004	<0.0010	<0.0010	0.0013	<0.0010
Conductivity- Electrical 20deg										
Copper	0.021	0.041	0.005	0.076	0.075	0.022	0.016	0.01	0.342	0.01
Cyanide	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.03	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*										
Lead	<0.0010	0.001	0.002	0.002	0.004	<0.0010	0.002	0.003	0.004	0.005
Mercury	0	0	0	<0.0001	0	0	0.0001	0	0	0
Nickel	0.004	0.008	0.001	0.009	0.016	0.009	0.001	0.002	0.037	0.003
pH	9.1	9.2	7.8	10.3	9	8.7	7.3	7.5	9	8.1
pH										
Selenium	0.009	0.008	<0.0010	0.01	0.007	0.003	<0.0010	<0.0010	0.006	0.001
Sulphate as SO4										
Temperature (lab)										
Trivalent Chromium										
Vanadium	0.187	0.225	0.019	0.307	0.291	0.212	<0.0010	0.001	0.088	0.005
Zinc	0.007	0.008	0.009	0.012	0.008	0.007	0.041	0.025	0.009	0.073

Max of Normalised Results														
					ML164-CP023	ML164-CP023	ML164-CP036	ML164-CP036	ML164-CP036	ML164-CR009	ML164-CR009	ML164-CR009	ML164-CR011	ML164-CR011
					Chattle Hill Box Structure	Chattle Hill Box Structure	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct
					0.05	1.5	1	3	5	0.05	0.4	1.5	0.3	0.75
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	MGR	RTD1	MGR	MGR	ALV	MGR	MGR	MGR	MGR	MGR
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2										
Arsenic	mg/l	LEACHATE	0.01	0.05	0.006	0.002	0.002	0.001	<0.0010	0.005	0.003	0.003	0.003	0.004
Barium	mg/l	LEACHATE	1	-	0.27	0.16	0.16	0.14	0.1	0.21	0.13	0.14	0.19	0.16
Beryllium	mg/l	LEACHATE	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Boron	mg/l	LEACHATE	1	2	0.21	0.07	0.09	0.17	0.07	0.28	0.11	0.16	0.07	0.09
Boron*	mg/l	LEACHATE	-	-										
Cadmium	mg/l	LEACHATE	0.005	0.00015	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	<0.0001	<0.0001	<0.0001	0.0002
Chromium	mg/l	LEACHATE	0.05	0.005	0.002	0.001	<0.0010	<0.0010	<0.0010	0.002	<0.0010	0.002	<0.0010	0.002
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	<0.0030	<0.0030	<0.0030	0.005	<0.0030	0.004	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0020	<0.0010	<0.0020
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-										
Copper	mg/l	LEACHATE	2	0.03	0.069	0.006	0.008	0.009	0.001	0.15	0.026	0.014	0.024	0.032
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-										
Lead	mg/l	LEACHATE	0.01	0.008575	0.056	0.001	<0.0010	0.002	<0.0010	0.015	0.002	0.002	0.007	0.017
Mercury	mg/l	LEACHATE	0.001	0.00007	0.0001	<0.0000	0.00002	0.00001	0.000005	0.1	0	0	0	0.0002
Nickel	mg/l	LEACHATE	0.02	0.02	0.008	0.002	0.001	0.002	<0.0010	0.018	0.002	0.001	0.001	0.002
pH	pH Units	LEACHATE	-	-	7.1	7.3	8.16	8.11	7.94	7.4	7.4	7.4	7.2	7.3
pH	-	LEACHATE	-	-										
Selenium	mg/l	LEACHATE	0.01	-	<0.0010	<0.0010	<0.0010	0.001	<0.0010	0.002	0.001	0.001	<0.0010	<0.0010
Sulphate as SO4	mg/l	LEACHATE	250	400										
Temperature (lab)	degC	LEACHATE	-	-										
Trivalent Chromium	mg/l	LEACHATE	-	-										
Vanadium	mg/l	LEACHATE	-	0.02	0.008	0.005	<0.0010	<0.0010	<0.0010	0.002	0.002	0.002	0.004	0.005
Zinc	mg/l	LEACHATE	5	0.03	0.228	0.04	0.028	0.035	0.059	0.074	0.032	0.033	0.062	0.062

Max of Normalised Results										
	ML164-CR011	ML164-CR013	ML164-CR013	ML164-CR013	ML164-CR029	ML164-CR029	ML164-CR029	ML164-CR030	ML164-CR032	ML164-CR044
	Watten House West Viaduct	Watton House Embankment	Watton House Embankment	Watton House Embankment	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Watton House Embankment
	1.1	0.2	1	4	0.35	3.2	4	0.9	0.5	0.5
Determinant Name	RTD1	MGR	MGR	ALV	MGR	MGR	TILMP	RTD1	MGR	MGR
Ammoniacal Nitrogen as N										<0.0100
Arsenic	0.002	0.02	0.004	0.045	0.004	0.006	0.019	0.001	0.003	0.002
Barium	0.04	0.09	0.42	0.73	0.08	0.09	0.07	0.21	0.22	0.14
Beryllium	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Boron	0.16	0.12	0.26	0.33	0.04	0.06	0.03	0.08	0.11	0.08
Boron*										
Cadmium	<0.0001	0.0002	0.0002	0.0037	<0.0001	<0.0001	<0.0001	0.0002	0.0002	<0.0001
Chromium	0.001	0.044	<0.0010	0.014	0.04	0.003	<0.0010	0.001	0.001	<0.0010
Chromium - Hexavalent	0.004	0.04	<0.0030	<0.0030	0.022	<0.0030	<0.0030	0.018	<0.0030	<0.0030
Chromium (III) Oxide	<0.0010	0.004	<0.0010	<0.0140	0.002	<0.0030	<0.0010		<0.0010	<0.0010
Conductivity- Electrical 20deg										
Copper	0.009	0.105	0.012	0.219	0.067	0.004	0.005	0.013	0.033	0.01
Cyanide	<0.0200	0.35	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*										
Lead	0.003	0.001	0.002	0.231	<0.0010	<0.0010	0.002	0.01	0.017	0.001
Mercury	0.0001	0.0001	<0.0000	0.00002	0	0	0	<0.0000	0	0
Nickel	0.002	0.003	0.003	0.019	0.005	<0.0010	<0.0010	0.001	0.003	0.001
pH	7.2	7.6	7.8	7.4	10.6	8.3	7.8	7.5	7.6	7.5
pH										
Selenium	<0.0010	0.01	0.001	0.004	0.002	0.001	<0.0010	<0.0010	0.002	<0.0010
Sulphate as SO4										
Temperature (lab)										
Trivalent Chromium										
Vanadium	0.002	0.012	0.001	0.038	0.024	0.017	0.011	0.003	0.004	0.002
Zinc	0.014	0.013	0.135	0.721	0.011	0.005	0.014	0.063	0.067	0.023

Max of Normalised Results																					
					ML164-CR044	ML164-CR045	ML164-CR045	ML164-CR045	ML164-CR046a	ML164-CR046a	ML164-CR046a	ML164-TP011	ML164-TP011	ML164-TP015	ML164-TP015	ML164-TP015	ML164-TP015	NC120-CR401	NC120-CR401	ND000-CR001	ND000-CR001
					Watton House Embankment	Watton House Embankment	Watton House Embankment	Watton House Embankment	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Watten House West Viaduct	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)
					2	0.8	1.2	3	0.8	1.2	2.3	0.7	2.5	0.05	0.35	1.1	1.7	0.3	1	0.5	2
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	MGR	MGR	MGR	RTD1	MGR	MGR	MGR	MGR	RTD1	MGR	RTD1	GLLD	GLLD	RTD2	RTD2	MGR	MGR
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2														3.1	2.7		
Arsenic	mg/l	LEACHATE	0.01	0.05	0.027	0.011	0.01	0.002	0.004	0.008	0.003	0.002	<0.0010	0.001	0.002	0.002	0.002			0.006	0.003
Barium	mg/l	LEACHATE	1	-	0.09	0.14	0.15	0.16	0.1	0.1	0.83	0.1	0.11	0.23	0.23	0.54	0.4			0.22	0.2
Beryllium	mg/l	LEACHATE	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100			<0.0100	<0.0100
Boron	mg/l	LEACHATE	1	2	0.39	0.07	0.09	0.11	0.02	0.21	<0.0100	0.18	0.09	0.06	0.08	0.13	0.12			0.13	0.09
Boron*	mg/l	LEACHATE	-	-																	
Cadmium	mg/l	LEACHATE	0.005	0.00015	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0003	0.0002	0.0001	0.0002	0.0003	0.0002			<0.0001	<0.0001
Chromium	mg/l	LEACHATE	0.05	0.005	0.008	0.007	0.002	<0.0010	0.009	<0.0010	0.007	0.002	<0.0010	<0.0010	<0.0010	0.002	<0.0010			0.002	0.004
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	0.005	0.006	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.006	<0.0030	<0.0030			<0.0030	0.005
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047	0.003	0.001	<0.0020	<0.0010	<0.0090	<0.0010	<0.0070	<0.0020	<0.0010	<0.0010	<0.0010	0.0002	<0.0010			<0.0020	<0.0010
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-																	
Copper	mg/l	LEACHATE	2	0.03	0.024	0.019	0.004	0.009	0.024	0.006	0.029	0.014	0.006	0.022	0.034	0.034	0.016			0.025	0.012
Cyanide	mg/l	LEACHATE	0.05	0.001	0.05	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.03	<0.0200			<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-																	
Lead	mg/l	LEACHATE	0.01	0.008575	0.001	0.004	0.002	0.031	0.003	0.001	0.019	<0.0010	<0.0010	0.012	0.042	0.025	0.026			0.002	0.003
Mercury	mg/l	LEACHATE	0.001	0.00007	0.0003	0	0	0	0	0	0	0.00005	0.00002	0	0.0001	0	<0.0000			0.00002	0.000073
Nickel	mg/l	LEACHATE	0.02	0.02	0.002	0.002	<0.0010	0.002	0.013	0.002	0.038	0.005	0.003	0.002	0.004	0.004	0.003			0.003	0.001
pH	pH Units	LEACHATE	-	-	8.8	7.4	7.2	7.3	11.1	8.3	11.9	8.6	8	7.5	7.1	6.9	6.8			7.8	7.6
pH	-	LEACHATE	-	-																	
Selenium	mg/l	LEACHATE	0.01	-	0.002	0.001	<0.0010	<0.0010	0.003	0.001	<0.0010	0.003	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010			0.001	<0.0010
Sulphate as SO4	mg/l	LEACHATE	250	400																	
Temperature (lab)	degC	LEACHATE	-	-																	
Trivalent Chromium	mg/l	LEACHATE	-	-																	
Vanadium	mg/l	LEACHATE	-	0.02	0.018	0.011	0.038	<0.0010	0.034	0.022	0.002	0.002	0.002	<0.0010	0.005	0.026	0.015			0.005	0.003
Zinc	mg/l	LEACHATE	5	0.03	0.009	0.039	0.029	0.098	0.012	0.015	0.034	0.023	0.04	0.079	0.1	0.099	0.118			0.071	0.039

Max of Normalised Results															
					ND000-CR020	ND000-CR020	ND000-CR020	ND000-CR020	ND000-TP035	ND000-TP035	ND001-CP002	ND001-CP002	ND001-CP043	ND001-CP043	ND001-CP049
					Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Chattle Hill Box Structure
					0.4	1	4	5	0.4	0.8	0.5	1	0.5	2	0.4
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	MGR	MGR	MGR	MGR	MGR	RTD1	MGR	ALV	RTD1	RTD1	MGR
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2											
Arsenic	mg/l	LEACHATE	0.01	0.05	0.004	0.035	0.003	0.004	0.002	0.002	0.008	0.005	0.003	0.016	0.003
Barium	mg/l	LEACHATE	1	-	0.15	0.1	0.17	0.22	0.15	0.18	0.25	0.12	0.08	0.06	0.25
Beryllium	mg/l	LEACHATE	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Boron	mg/l	LEACHATE	1	2	0.07	0.1	0.55	0.17	0.08	0.08	0.07	0.07	0.04	0.08	0.16
Boron*	mg/l	LEACHATE	-	-											
Cadmium	mg/l	LEACHATE	0.005	0.00015	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0005	0.0002	<0.0001	<0.0001	<0.0001	0.0002
Chromium	mg/l	LEACHATE	0.05	0.005	0.002	0.002	0.001	<0.0010	<0.0010	<0.0010	0.003	<0.0010	0.078	0.018	0.001
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	<0.0030	<0.0030	<0.0030	<0.0030	0.005	<0.0030	<0.0030	0.003	0.078	0.019	<0.0030
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047	<0.0020	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0030	<0.0010	<0.0010	<0.0010	<0.0010
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-											
Copper	mg/l	LEACHATE	2	0.03	0.03	0.3	0.005	0.006	0.032	0.073	0.036	0.008	0.044	0.015	0.085
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0200	<0.0200	<0.0200	<0.0200	0.03	0.02	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-											
Lead	mg/l	LEACHATE	0.01	0.008575	0.008	<0.0010	0.004	0.003	0.003	0.003	0.027	0.009	0.265	<0.0010	0.004
Mercury	mg/l	LEACHATE	0.001	0.00007	0.0001	0.0001	0	0	0.000078	0.000091	0.0003	0	<0.0000	<0.0000	0
Nickel	mg/l	LEACHATE	0.02	0.02	0.003	0.003	0.002	0.002	0.002	0.007	0.003	0.003	0.003	0.001	0.007
pH	pH Units	LEACHATE	-	-	7.9	9.4	8.2	7.6	7.77	7.7	7.7	7.6	11.5	10.6	7.8
pH	-	LEACHATE	-	-											
Selenium	mg/l	LEACHATE	0.01	-	0.002	0.01	<0.0010	<0.0010	<0.0010	<0.0010	0.001	<0.0010	0.001	0.002	0.001
Sulphate as SO4	mg/l	LEACHATE	250	400											
Temperature (lab)	degC	LEACHATE	-	-											
Trivalent Chromium	mg/l	LEACHATE	-	-											
Vanadium	mg/l	LEACHATE	-	0.02	0.003	0.025	0.003	<0.0010	0.002	<0.0010	0.009	0.028	0.017	0.04	0.007
Zinc	mg/l	LEACHATE	5	0.03	0.051	0.012	0.028	0.069	0.051	0.121	0.057	0.03	0.022	0.009	0.156

Max of Normalised Results																							
					ND001-CP049	ND001-CR001	ND001-CR002	ND001-CR002	ND001-CR011	ND001-CR011	ND001-CR013	ND001-CR013	ND001-CR014	ND001-CR014	ND001-CR014	ND001-CR017	ND001-CR017	ND001-CR022	ND001-CR031	ND001-CR040	ND001-CR041	ND001-CR042	ND001-CR043
					Chattle Hill Box Structure	Water Orton Viaducts 1, 2, 3 (Formerly Watton Lane Emb)	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct
					0.6	0.5	0.5	1.5	0.05	1.2	0.5	2	0.05	1.1	1.7	0.7	1.2	0.1	0.05	1.4	0.2	0.5	1
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	MGR	MGR	MGR	RTD1	TOP	RTD1	MGR	GFDUD	MGR	MGR	RTD1	MGR	RTD1	MGR	MGR	RTD1	MGR	MGR	RTD1
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2															<0.0100				
Arsenic	mg/l	LEACHATE	0.01	0.05	0.006	0.003	0.013	0.006	0.002	0.002	0.004	0.002	0.008	0.004	0.001	0.006	0.005	0.012	0.002	0.001	0.001	0.002	0.011
Barium	mg/l	LEACHATE	1	-	0.13	0.14	0.09	0.14	0.37	0.16	0.22	0.12	0.07	0.12	0.11	0.2	0.25	0.25	0.16	0.14	0.07	0.1	0.08
Beryllium	mg/l	LEACHATE	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Boron	mg/l	LEACHATE	1	2	0.16	0.06	0.06	0.08	0.1	0.09	0.17	0.08	0.11	0.08	0.06	0.08	0.14	0.12	0.05	0.06	0.03	0.03	0.09
Boron*	mg/l	LEACHATE	-	-																			
Cadmium	mg/l	LEACHATE	0.005	0.00015	0.0007	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0009	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0003	0.0004	0.0007	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/l	LEACHATE	0.05	0.005	0.004	<0.0010	0.003	0.002	<0.0010	0.002	0.003	0.003	0.002	0.002	<0.0010	0.001	0.001	0.006	0.001	<0.0010	0.002	0.107	0.014
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.004	<0.0030	<0.0030	<0.0030	0.186	<0.0030	<0.0030	<0.0030	<0.0030	0.106	0.013
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047	<0.0040	<0.0010	<0.0030	<0.0020	<0.0010	<0.0020	<0.0030	<0.0030	<0.0020	<0.0020	<0.0010	<0.0010	0	<0.0100	<0.0010		<0.0020		
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-																			
Copper	mg/l	LEACHATE	2	0.03	0.065	0.011	0.039	0.018	0.024	0.015	0.1	0.01	0.013	0.026	0.011	0.03	0.037	0.11	0.019	0.003	0.012	0.047	0.022
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-																			
Lead	mg/l	LEACHATE	0.01	0.008575	0.014	0.013	<0.0010	0.056	0.005	0.128	0.069	0.004	0.002	0.005	0.001	0.019	0.063	0.068	0.013	<0.0010	0.001	<0.0010	0.029
Mercury	mg/l	LEACHATE	0.001	0.00007	0.0001	0.00008	0	0	<0.0000	<0.0000	0	<0.0000	<0.0001	<0.0001	<0.0001	0	<0.0000	<0.0000	0	<0.0000	0	0.2	0
Nickel	mg/l	LEACHATE	0.02	0.02	0.005	0.002	0.003	0.003	0.002	0.002	0.01	0.002	0.001	0.009	0.004	0.005	0.01	0.007	0.003	<0.0010	0.002	0.003	0.002
pH	pH Units	LEACHATE	-	-	7.8	8.24	9.2	6.9	8.2	7.9	7.1	7.2	8.6	7.6	7.5	7.7	7	7.8	8	7.4	7.4	11.6	10.2
pH	-	LEACHATE	-	-																			
Selenium	mg/l	LEACHATE	0.01	-	0.003	<0.0010	0.003	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	0.001	<0.0010	<0.0010	0.001	0.002	<0.0010	<0.0010	<0.0010	0.002	0.003
Sulphate as SO4	mg/l	LEACHATE	250	400																			
Temperature (lab)	degC	LEACHATE	-	-																			
Trivalent Chromium	mg/l	LEACHATE	-	-																			
Vanadium	mg/l	LEACHATE	-	0.02	0.029	0.002	0.016	0.006	0.002	0.006	0.009	0.006	0.032	0.012	0.003	0.005	0.004	0.012	0.004	0.001	0.002	0.019	0.046
Zinc	mg/l	LEACHATE	5	0.03	0.062	0.028	0.004	0.059	0.129	0.047	0.445	0.027	0.011	0.047	0.031	0.121	0.199	0.146	0.097	0.043	0.051	0.027	0.016

Max of Normalised Results												
					ND001-TP002	ND001-TP002	ND001-WS002	ND001-WS003	ND001-WS003	ND002-CP019	ND002-CR013	ND003-CR004
					Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct	Marsh Lane Embankment	Marsh Lane Embankment	Marsh Lane Embankment
					0.05	0.3	0.1	0.1	1.1	1.5	0.2	0.6
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	MGR	MGR	MGR	MGR	RTD1	MGR	MGR	MGR
Ammoniacal Nitrogen as N	mg/l	LEACHATE	0.38	0.2								
Arsenic	mg/l	LEACHATE	0.01	0.05	0.004	0.003	0.002	0.003	0.001	0.007	0.004	0.006
Barium	mg/l	LEACHATE	1	-	0.89	0.5	0.22	0.25	0.14	0.24	0.21	0.32
Beryllium	mg/l	LEACHATE	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Boron	mg/l	LEACHATE	1	2	0.24	0.22	0.14	0.06	0.04	1.07	0.33	0.05
Boron*	mg/l	LEACHATE	-	-								
Cadmium	mg/l	LEACHATE	0.005	0.00015	0.0007	0.0002	<0.0001	0.0008	<0.0001	<0.0001	0.0002	0.0003
Chromium	mg/l	LEACHATE	0.05	0.005	0.002	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.001	0.01
Chromium - Hexavalent	mg/l	LEACHATE	-	0.0034	<0.0030	0.005	<0.0030	<0.0030	<0.0030	<0.0100	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LEACHATE	-	0.0047			<0.0010	<0.0010	<0.0010	<0.0100	<0.0100	<0.0100
Conductivity- Electrical 20deg	uS/cm	LEACHATE	-	-								
Copper	mg/l	LEACHATE	2	0.03	0.101	0.026	0.012	0.033	0.013	0.022	0.042	0.034
Cyanide	mg/l	LEACHATE	0.05	0.001	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Leachate 2:1 Sample Prep (BS12457)*	---	LEACHATE	-	-								
Lead	mg/l	LEACHATE	0.01	0.008575	0.043	0.038	0.003	0.013	0.002	0.003	0.011	0.045
Mercury	mg/l	LEACHATE	0.001	0.00007	0	0	<0.0000	0	<0.0000	0	0	0.0002
Nickel	mg/l	LEACHATE	0.02	0.02	0.009	0.003	0.003	0.006	0.002	0.002	0.007	0.009
pH	pH Units	LEACHATE	-	-	8.6	8	7.9	7.5	7.5	8.2	7.2	7.9
pH	-	LEACHATE	-	-								
Selenium	mg/l	LEACHATE	0.01	-	<0.0010	<0.0010	0.002	<0.0010	<0.0010	<0.0010	0.003	<0.0010
Sulphate as SO4	mg/l	LEACHATE	250	400								
Temperature (lab)	degC	LEACHATE	-	-								
Trivalent Chromium	mg/l	LEACHATE	-	-								
Vanadium	mg/l	LEACHATE	-	0.02	0.008	0.006	0.003	0.002	<0.0010	0.003	0.001	0.03
Zinc	mg/l	LEACHATE	5	0.03	0.377	0.104	0.073	0.202	0.067	0.101	0.129	0.216

Chemical Test Results (Leachate 10:1)

A summary of leachate test results and GSC used in the risk assessment can be found in the table below. Where contaminant concentrations exceed the GSC these are highlighted in red. The original test certificates are presented in the GI Contractors Factual Report, where available.

Max of Normalised Results					Location ID	Asset	Sample Depth	Geology Code													
					ML155-CR403	ML155-CR403	ML155-CR403	ML155-CR404	ML155-CR404	ML155-CR404	ML156-CR401	ML156-CR401	ML157-CR021	ML157-CR021	ML162-CR402	ML162-CR402	ML162-CR402	ML162-CR403	ML162-CR403	ML162-CR404	ML164-CR404
					Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Diddington Cutting	Packington Embankment	Packington Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	Coleshill No. 3 Embankment	Watton House Embankment
					0.3	0.5	2	0.05	0.3	1	0.3	1	0.05	9.5	0.3	1	3	0.3	1	1	7.2
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	MGR	MGR	BCMU	MGR	MGR	MGR	GFDMP	GFDMP	TOP	MMG	MGR	MGR	MGR	GFDMP	GFDMP	RTD2	MGR
Acenaphthene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	0.00002
Acenaphthylene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0000
Anthracene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0000
Arsenic	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.0008	0.0004	0.002	0.0011	0.001	0.0032	0.0004	<0.0002	<0.0002	0.00023	0.0021	0.0011	0.014	0.002	0.0006	0.0005	
Barium	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.004	0.003	0.001	0.003	0.005	0.061	0.004	0.003	0.0025	0.0022	0.027	0.053	0.048	0.008	0.004	0.004	
Benzene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0010
Benzo (g,h,i) perylene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0000
Benzo(a)anthracene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0000
Benzo(a)pyrene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	0.00003
Benzo(b)fluoranthene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0000
Benzo(k)fluoranthene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0000
Beryllium	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.00006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Boron	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.03	0.04	0.03	0.01	<0.0100	0.01	0.03	0.01	<0.0120	<0.0120	<0.0100	<0.0100	0.05	0.08	0.03	<0.0100	
Cadmium	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.00003	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.00006	0.00002	<0.0000	<0.0000	
Chromium	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.002	0.002	0.001	<0.0010	0.001	<0.0010	0.002	0.001			0.001	0.001	0.003	0.002	<0.0010	<0.0010	
Chromium - Hexavalent	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	
Chrysene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0000
Copper	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.0019	0.0006	<0.0005	<0.0005	<0.0005	0.0018	0.0049	0.0006	0.0005	<0.0004	0.0028	0.0049	0.0031	0.003	0.0016	0.0007	
Cyanide	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0400	<0.0400	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
Dibenz-a-h-anthracene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0000
EPH >C10-35	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0100
Ethylbenzene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0010
Fluoranthene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0000
Fluorene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	0.00002
GRO >C5-10	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0100
Indeno(1,2,3-cd)pyrene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0000
Leachate 10:1 Sample Prep (BS12457)*	---	CEN_10_1_1STAGE_MGL	-	-									#VALUE!	#VALUE!							
Lead	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.0004	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.0006	<0.0003	0.0002	0.00016	<0.0003	<0.0003	0.0011	0.0006	0.0003	<0.0003	
m,p xylenes	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0010
Mercury	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0000	<0.0000	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Napthalene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	0.00002
Nickel	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.002	<0.0010	<0.0005	<0.0005	<0.0010	<0.0010	0.006	0.002	<0.0010	<0.0010	
O-Xylene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0010
PAH,Total	mg/l	CEN_10_1_1STAGE_MGL	-	-																	0.00012
pH	pH Units	CEN_10_1_1STAGE_MGL	-	-	7.57	7.68	7.9	8.13	8.09	8.05	7.62	6.43	7.5	7.6	8.12	7.95	8.27	7.69	7.61	7.61	
Phenanthrene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	0.00003
Phenol	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0008
Pyrene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0000
Selenium	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0003	<0.0003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Toluene	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0010
Total Petroleum Hydrocarbons (C35-C44)*	mg/l	CEN_10_1_1STAGE_MGL	-	-																	<0.0100
Trivalent Chromium	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.013	0.011	<0.0030	<0.0030	0.003	<0.0030	<0.0030	<0.0030	
Vanadium	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0020	<0.0020	0.004	0.007	0.005	0.011	<0.0020	<0.0020	<0.0006	0.001	0.003	<0.0020	0.008	0.003	<0.0020	<0.0020	
Zinc	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.006	0.004	0.002	0.003	0.002	0.004	0.007	0.005	<0.0013	<0.0013	0.002	0.003	0.005	0.008	0.005	0.003	

Max of Normalised Results						
					NC120-CR401	NC120-CR401
					Water Orton No. 3 Viaduct	Water Orton No. 3 Viaduct
					0.3	1
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	RTD2	RTD2
Acenaphthene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Acenaphthylene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Anthracene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Arsenic	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.0011	0.0007
Barium	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.052	0.017
Benzene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Benzo (g,h,i) perylene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Benzo(a)anthracene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Benzo(a)pyrene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Benzo(b)fluoranthene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Benzo(k)fluoranthene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Beryllium	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0001	0.00005
Boron	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.01	0.03
Cadmium	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.00007	0.00003
Chromium	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.001	0.001
Chromium - Hexavalent	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0030	<0.0030
Chrysene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Copper	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.0085	0.0043
Cyanide	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0500	<0.0500
Dibenz-a-h-anthracene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
EPH >C10-35	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Ethylbenzene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Fluoranthene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Fluorene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
GRO >C5-10	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Indeno(1,2,3-cd)pyrene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Leachate 10:1 Sample Prep (BS12457)*	---	CEN_10_1_1STAGE_MGL	-	-		
Lead	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.0008	<0.0003
m,p xylenes	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Mercury	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0001	<0.0001
Napthalene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Nickel	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.003	0.002
O-Xylene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
PAH,Total	mg/l	CEN_10_1_1STAGE_MGL	-	-		
pH	pH Units	CEN_10_1_1STAGE_MGL	-	-	8.67	8.02
Phenanthrene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Phenol	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Pyrene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Selenium	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.0006	<0.0005
Toluene	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Total Petroleum Hydrocarbons (C35-C44)*	mg/l	CEN_10_1_1STAGE_MGL	-	-		
Trivalent Chromium	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0030	<0.0030
Vanadium	mg/l	CEN_10_1_1STAGE_MGL	-	-	<0.0020	<0.0020
Zinc	mg/l	CEN_10_1_1STAGE_MGL	-	-	0.009	0.003

Chemical Test Results (Waters)

A summary of water test results and GSC used in the risk assessment can be found below. Where contaminant concentrations exceed the GSC these are highlighted in red. The original test certificates are presented in the GI Contractors Factual Report, where available.

Max of Normalised Results					Location ID	Asset	Sample Depth														
					BD160-SW001	BD161-CR008	BD161-CR008	BD161-CR010	BD162-SW001	BD163-CR017	BD164-CR003	BD164-CR003	ML155-CR003	ML155-SW001	ML155-SW002	ML156-CP008	ML156-CR012	ML156-SW001	ML156-SW002	ML156-SW003	ML156-SW004
					Coleshill West Viaduct	Coleshill West Viaduct	Coleshill West Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	M42 - M6 Motorway Link West Viaduct	Water Orton Cutting	Water Orton Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Lane Embankment	Bickenhill Embankment	Birmingham Interchange Station	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	0	2	31.78	6.95	0	27.7	4.24	7.75	2.41	0.2	0.2	0	0	0	0	0	0
1,1,1,2-Tetrachloroethane	mg/l	LIQUID	-	0.14	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,1-Trichloroethane	mg/l	LIQUID	0.003	0.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/l	LIQUID	-	0.14	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/l	LIQUID	-	0.4	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Biphenyl	mg/l	LIQUID	-	0.025		<0.0030	<0.0020														
1,1-Dichloroethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010				
1,1-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,3 Trichlorobenzene	mg/l	LIQUID	-	0.0004	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2,3-Trichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,4-Trichlorobenzene	mg/l	LIQUID	-	0.0004	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2,4-Trimethylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dibromo-3-Chloropropane	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dibromoethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dichloroethane	mg/l	LIQUID	0.003	0.01	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3,5 Trichlorobenzene	mg/l	LIQUID	-	0.0004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010						
1,3-Dichlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2-(2,4-Dichlorophenoxy)propionic Acid	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
2,2-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2,3,4,6-Tetrachlorophenol	mg/l	LIQUID	-	-																	
2,3,5,6-Tetrachlorophenol	mg/l	LIQUID	-	-																	
2,4,5-Trichlorophenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/l	LIQUID	-	-																	
2,4,6-Trichlorophenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
2,4-Dichlorophenol	mg/l	LIQUID	-	0.0042		<0.0280	<0.0240														
2,4-Dichlorophenoxy Acetic Acid (D)	mg/l	LIQUID	0.0001	0.0003																	
2,4-Dimethylphenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
2,4-Dinitrophenol	mg/l	LIQUID	-	-		<0.0140	<0.0120														
2,4-Dinitrotoluene	mg/l	LIQUID	-	-		<0.0070	<0.0060														
2,6-Dinitrotoluene	mg/l	LIQUID	-	-		<0.0070	<0.0060														
2-Chloronaphthalene	mg/l	LIQUID	-	-		<0.0030	<0.0020														
2-Chlorophenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
2-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2-Methyl-4,6-Dinitrophenol	mg/l	LIQUID	-	-		<0.0700	<0.0600														
2-Methylnaphthalene	mg/l	LIQUID	-	-		<0.0030	<0.0020														
2-Methylphenol	mg/l	LIQUID	-	-		<0.0070	<0.0060														
2-Nitroaniline	mg/l	LIQUID	-	-		<0.0070	<0.0060														
2-Nitrophenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
3,3'-Dichlorobenzidine	mg/l	LIQUID	-	-		#VALUE!	#VALUE!														
3/4 Methylphenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
3-Nitroaniline	mg/l	LIQUID	-	-		<0.0070	<0.0060														
4,4-DDE	mg/l	LIQUID	-	-																	
4,4-DDE*	mg/l	LIQUID	-	-																	
4-Bromophenyl Phenyl Ether	mg/l	LIQUID	-	-		<0.0070	<0.0060														
4-Chloro Phenyl Ether	mg/l	LIQUID	-	-		<0.0070	<0.0060														
4-Chloro-3-Methylphenol	mg/l	LIQUID	-	-		<0.0070	<0.0060														
4-Chloroaniline	mg/l	LIQUID	-	-		<0.0070	<0.0060														
4-Chlorophenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
4-Chlorophenyl Phenyl Ether	mg/l	LIQUID	-	-																	
4-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
4-Isopropyltoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
4-Methylphenol	mg/l	LIQUID	-	-																	
4-Nitroaniline	mg/l	LIQUID	-	-		<0.0070	<0.0060														
4-Nitrophenol	mg/l	LIQUID	-	-		<0.0700	<0.0600														
Acenaphthene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	0.000022		<0.0000	<0.0000	<0.0000	0.00001	0.000051	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Acenaphthylene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	<0.0000		<0.0000	<0.0000	0.00002	0.00001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Acidity as calcium carbonate	mg/l	LIQUID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!				#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
Aldrin	mg/l	LIQUID	0.00003	0.00001																	
Aliphatics & Aromatics >C5-35	mg/l	LIQUID	-	-																	
Aliphatics >C10-12	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.021		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aliphatics >C12-16	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.013		<0.0100	<0.0100	<0.0100	0.02	<0.0100	<0.0100				
Aliphatics >C12-35	mg/l	LIQUID	-	-																	
Aliphatics >C16-21	mg/l	LIQUID	0.01	-									<0.0100	<0.0100	0.02						
Aliphatics >C16-C35	mg/l	LIQUID	-	-	0.026	0.029	0.03	0.086	0.015	0.612		0.067				0.000019	0.000019				
Aliphatics >C21-35	mg/l	LIQUID	0.01	-									<0.0100	<0.0100	0.02						
Aliphatics >C35-44	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.019		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aliphatics >C5-12	mg/l	LIQUID	-	-																	
Aliphatics >C5-6	mg/l	LIQUID	0.01	-	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000		<0.1000	<0.0100	<0.0100	<0.0100	<0.1000	<0.1000				
Aliphatics >C6-8	mg/l	LIQUID	0.01	-									<0.0100	<0.0100	<0.0100						
Aliphatics >C8-10	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aliphatics >C8-C44*	mg/l	LIQUID	-	-	0.035	0.031	0.033	0.097	0.023	0.666		0.07				0.000027	0.000023				
Alkalinity	mg/l	LIQUID	-	-	152	130	128	354	127	489	390	317				332	95	182	186	178	169
Alkalinity-Carbonate as CaCO3	mg/l	LIQUID	-	-									110	190	150						
alpha-Hexachlorocyclohexane	mg/l	LIQUID	0.0001	0.00002																	
Ammoniacal Nitrogen as N	mg/l	LIQUID	0.38	0.2	0.12	0.03	0.02	0.04	0.06	10.7	<0.0100	0.01	0.15	<0.0500	0.2	0.21	0.02	0.12	0.11	0.02	0.02
Aniline	mg/l	LIQUID	-	-																	
Anthracene	mg/l	LIQUID	-	0.0001	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	<0.0000		<0.0000	<0.0000	0.00001	0.00001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Aromatics >C10-12	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aromatics >C12-16	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100		<0.0100	<0.0100	<0.0100	0.01	<0.0100	<0.0100				
Aromatics >C12-35	mg/l	LIQUID	-	-																	
Aromatics >C16-21	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.041		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aromatics >C21-35	mg/l	LIQUID	0.01	-	0.011	0.011	0.01	0.043	<0.0100	0.245		0.011	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aromatics >C35-44	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.016		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aromatics >C5-35	mg/l	LIQUID	-	-																	
Aromatics >C5-7	mg/l	LIQUID	0.01	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050				<0.0050	<0.0050				
Aromatics >C6-7	mg/l	LIQUID	-	-									<0.0100	<0.0100	<0.0100						
Aromatics >C7-8	mg/l	LIQUID	0.01	-									<0.0100	<0.0100	<0.0100						
Aromatics >C8-10	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aromatics >C8-C44*	mg/l	LIQUID	-	-	0.02	0.017	0.015	0.057	0.011	0.31		0.013				<0.0100	0.000012				
Arsenic	mg/l	LIQUID	0.01	0.05	0.003	0.003	0.004	0.006	0.003	0.07	0.002	0.002	0.0003	0.004	0.003	<0.0010	0.006	0.000003	0.000003	0.000003	0.000003
Atrazine	mg/l	LIQUID	0.0001	0.0006									<0.0001	<0.0001	<0.0001						
Azinphos-ethyl	mg/l	LIQUID	-	-																	
Azinphos-methyl	mg/l	LIQUID	-	-																	
Azobenzene	mg/l	LIQUID	-	-																	
Barium	mg/l	LIQUID	1	-	0.06	0.06	0.06	0.37	0.06	0.36	0.28	0.25	0.052	0.14	0.11	0.16	0.26	0.11	0.11	0.1	0.1
Benzene	mg/l	LIQUID	0.001	0.01	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.000023	<0.0000	<0.0000		<0.0000	<0.0000	<0.0000	0.00003	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.000011
Benzo(a)anthracene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.000033	<0.0000	<0.0000		<0.0000	0.00001	0.00001	0.00002	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Benzo(a)pyrene	mg/l	LIQUID	0.00001	0.00000017	<0.0000	<0.0030	<0.0020	0.000017	<0.0000	<0.0000		<0.0000	0.00001	<0.0000	0.00003	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Benzo(b)fluoranthene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.000032	<0.0000	<0.0000		<0.0000	0.00001	0.00001	0.00003	<0.0000	<0.0000	<0.0000	<0.0000	0.000011	0.000016
Benzo(k)fluoranthene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.000012	<0.0000	<0.0000		<0.0000	<0.0000	<0.0000	0.00003	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Benzoic Acid	mg/l	LIQUID	-	-		<0.1400	<0.1200														
Benzyl Alcohol	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Beryllium	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0001	0.00005	<0.0001	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
beta-Hexachlorocyclohexane	mg/l	LIQUID	0.0001	0.00002																	
Bis(2-chloroethoxy)methane	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Bis(2-chloroethyl)ether	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Bis(2-chloroisopropyl)ether	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Bis(2-ethylhexyl)adipate	mg/l	LIQUID	-	-																	
Bis(2-ethylhexyl)phthalate	mg/l	LIQUID	-	0.0013		<0.0070	<0.0060														
Boron	mg/l	LIQUID	1	2	0.21	0.1	0.08	0.17	0.12	0.1	0.17	0.11	0.06	0.06	0.06	0.02	0.04	0.05	0.05	0.03	0.03
Boron*	mg/l	LIQUID	-	-																	
Bromide	mg/l	LIQUID	-	-																	
Bromobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromochloromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromodichloromethane	mg/l	LIQUID	0.1	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Butylbenzylphthalate	mg/l	LIQUID	-	0.0075		<0.0070	<0.0060														
Butyric Acid (4-(2,4-dichlorophenoxy)-Butanoic acid (DB))	mg/l	LIQUID	-	-																	
Cadmium	mg/l	LIQUID	0.005	0.00015	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.00041	0.00018	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/l	LIQUID	250	-	66	18	18	66	58	45	73	72				78	43	84	83	83	81
Carbazole	mg/l	LIQUID	-	-																	
Carbendazim	mg/l	LIQUID	0.0001	0.00015									<0.0010	<0.0010	<0.0010						
Carbetamide	mg/l	LIQUID	-	-									<0.0010	<0.0010	<0.0010						
Carbon Disulphide	mg/l	LIQUID	-	-																	
Carbophenothion	mg/l	LIQUID	-	-																	
Chlordane - alpha	mg/l	LIQUID	-	-																	
Chlorfenvinphos	mg/l	LIQUID	0.0001	0.0001																	
Chloridazon*	mg/l	LIQUID	-	-																	
Chloride	mg/l	LIQUID	250	250	32	8	8	15	33	33	24	21				34	22	200	203	213	221
Chlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloroethene	mg/l	LIQUID	0.0005	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	mg/l	LIQUID	0.1	0.0025	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloropropham	mg/l	LIQUID	-	-																	
Chlorothalonil	mg/l	LIQUID	0.0001	0.000035																	
Chlorpyriphos	mg/l	LIQUID	0.0001	0.00003																	
Chlorpyriphos-methyl*	mg/l	LIQUID	-	-																	
Chlortoluron	mg/l	LIQUID	-	-																	
Chromium	mg/l	LIQUID	0.05	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001	0.23	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium - Hexavalent	mg/l	LIQUID	-	0.0034	<0.0030	<0.0030	<0.0030	0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.004	<0.0030	<0.0100	<0.0100	<0.0100	<0.0100
Chromium (III) Oxide	mg/l	LIQUID	-	0.0047	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010				<0.0010	<0.0010	<0.0100	<0.0100	<0.0100	<0.0100
Chrysene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.000015	<0.0000	<0.0000		<0.0000	0.00001	<0.0000	0.00002	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.000012
cis-1,2-Dichloroethene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis1,3-Dichloropropene	mg/l	LIQUID	-	-																	
cis-1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Conductivity- Electrical 20deg	uS/cm	LIQUID	-	-									600	850	930						
Conductivity- Electrical 20deg	mS/cm	LIQUID	-	-																	
Conductivity- Electrical 25deg*	uS/cm	LIQUID	-	-	610	260	265	750	545	1030	830	818									
Conductivity- Electrical 25deg*	µS/cm	LIQUID	-	-												855	554	1270	1190	1290	1210
Copper	mg/l	LIQUID	2	0.03	0.002	0.004	0.004	0.002	0.003	<0.0010	0.001	0.003	0.0018	0.014	0.0096	<0.0010	<0.0010	0.000002	0.000003	0.000002	0.000003
Coronene	mg/l	LIQUID	-	-		<0.0700	<0.0600														
Cyanazine	mg/l	LIQUID	-	-									<0.0010	<0.0010	<0.0010						
Cyanide	mg/l	LIQUID	0.05	0.001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0500	<0.0500	<0.0500	0.02	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Cyanide Free	mg/l	LIQUID	-	-									<0.0500	<0.0500	<0.0500						

Max of Normalised Results																								
					ML156-SW005	ML156-SW006	ML156-SW007	ML156-SW008	ML156-SW009	ML157-CP001	ML157-CP010	ML157-SW001	ML157-SW002	ML158-CP002	ML158-CP007	ML158-CP020	ML158-CP021	ML158-CR018	ML159-CR019	ML159-SW001	ML160-SW002	ML161-CR021	ML162-CR004a	ML162-SW001
					Birmingham Interchange Station	Birmingham Interchange Station	Bickenhill Cutting	Birmingham Interchange Station	Birmingham Interchange Station	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Coleshill No. 1 Embankment	Coleshill No. 3 Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	0	0	0	0	0	0	0	0	0	0.24	6.35	2.83	3.77	3.3	7.72	0	0	28.74	26.29	0
1,1,1,2-Tetrachloroethane	mg/l	LIQUID	-	0.14	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
1,1,1-Trichloroethane	mg/l	LIQUID	0.003	0.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/l	LIQUID	-	0.14	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/l	LIQUID	-	0.4	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Biphenyl	mg/l	LIQUID	-	0.025																				
1,1-Dichloroethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
1,2,3 Trichlorobenzene	mg/l	LIQUID	-	0.0004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050	<0.0050	
1,2,3-Trichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0010	<0.0010	<0.0010	<0.0010
1,2,4-Trichlorobenzene	mg/l	LIQUID	-	0.0004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050	<0.0050	
1,2,4-Trimethylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dibromo-3-Chloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0050	<0.0050	<0.0050	
1,2-Dibromoethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050	<0.0050	<0.0010
1,2-Dichloroethane	mg/l	LIQUID	0.003	0.01	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010
1,3,5 Trichlorobenzene	mg/l	LIQUID	-	0.0004						<0.0010	<0.0010	<0.0010	<0.0010								<0.0010	<0.0010	<0.0010	
1,3,5-Trimethylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichlorobenzene	mg/l	LIQUID	-	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00012	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
2-(2,4-Dichlorophenoxy)propionic Acid	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
2,2-Dichloropropane	mg/l	LIQUID	-	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010								<0.0010	<0.0010	<0.0010	<0.0010
2,3,4,6-Tetrachlorophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025															
2,3,5,6-Tetrachlorophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025															
2,4,5-Trichlorophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
2,4,6-Trichlorophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
2,4-Dichlorophenol	mg/l	LIQUID	-	0.0042	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
2,4-Dichlorophenoxy Acetic Acid (D)	mg/l	LIQUID	0.0001	0.0003										<0.0000	0.000168	<0.0000	0.000106	0.000073	<0.0000	<0.0000				
2,4-Dimethylphenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
2,4-Dinitrophenol	mg/l	LIQUID	-	-																				
2,4-Dinitrotoluene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
2,6-Dinitrotoluene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
2-Chloronaphthalene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
2-Chlorophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
2-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
2-Methyl-4,6-Dinitrophenol	mg/l	LIQUID	-	-																				
2-Methylnaphthalene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
2-Methylphenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
2-Nitroaniline	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
2-Nitrophenol	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
3,3'-Dichlorobenzidine	mg/l	LIQUID	-	-																				
3/4 Methylphenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025															
3-Nitroaniline	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
4,4-DDE	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
4,4-DDE*	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
4-Bromophenyl Phenyl Ether	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
4-Chloro Phenyl Ether	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
4-Chloro-3-Methylphenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
4-Chloroaniline	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
4-Chlorophenol	mg/l	LIQUID	-	-																				
4-Chlorophenyl Phenyl Ether	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025															
4-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
4-Isopropyltoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
4-Methylphenol	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
4-Nitroaniline	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
4-Nitrophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Acenaphthene	mg/l	LIQUID	-	-	<0.0000	0.00062	<0.0000	<0.0000	<0.0000	<0.0000	0.000013	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	0.000952	<0.0000	0.00001
Acenaphthylene	mg/l	LIQUID	-	-	<0.0000	0.0011	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	0.000061	<0.0000	0.00001
Acidity as calcium carbonate	mg/l	LIQUID	-	-						2	#VALUE!	#VALUE!	#VALUE!								#VALUE!	#VALUE!	#VALUE!	
Aldrin	mg/l	LIQUID	0.00003	0.00001										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Aliphatics & Aromatics >C5-35	mg/l	LIQUID	-	-	<0.0100	0.11	<0.0100	<0.0100	<0.0100					1.47	1.51	0.827	0.033	0.031	0.137	<0.0100				
Aliphatics >C10-12	mg/l	LIQUID	0.01	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100			<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C12-16	mg/l	LIQUID	0.01	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100			0.014	0.062	0.052	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C12-35	mg/l	LIQUID	-	-										0.789	1.18	0.67	0.019	0.028	0.137	<0.0100				
Aliphatics >C16-21	mg/l	LIQUID	0.01	-	<0.0010	0.0067	<0.0010	<0.0010	<0.0010					0.11	0.023	0.013	<0.0100	<0.0100	<0.0100	<0.0100				<0.0100
Aliphatics >C16-C35	mg/l	LIQUID	-	-						<0.0100	<0.0100										0.038	0.051	0.037	
Aliphatics >C21-35	mg/l	LIQUID	0.01	-	<0.0010	0.058	<0.0010	<0.0010	<0.0010					0.665	1.09	0.605	0.019	0.028	0.137	<0.0100				0.02
Aliphatics >C35-44	mg/l	LIQUID	-	-						<0.0100	<0.0100										<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C5-12	mg/l	LIQUID	-	-	<0.0100	0.065	<0.0100	<0.0100	<0.0100															
Aliphatics >C5-6	mg/l	LIQUID	0.01	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.1000	<0.1000			<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.1000	<0.1000	<0.1000	<0.0100
Aliphatics >C6-8	mg/l	LIQUID	0.01	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				<0.0100
Aliphatics >C8-10	mg/l	LIQUID	0.01	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0100	<0.0100			<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C8-C44*	mg/l	LIQUID	-	-						<0.0100	<0.0100										0.05	0.064	0.044	
Alkalinity	mg/l	LIQUID	-	-						2610	165	39	70								47	3370	237	
Alkalinity-Carbonate as CaCO3	mg/l	LIQUID	-	-																				190
alpha-Hexachlorocyclohexane	mg/l	LIQUID	0.0001	0.00002										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Ammoniacal Nitrogen as N	mg/l	LIQUID	0.38	0.2	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	0.1	0.02	<0.0100	0.02	0.78	1.85	<0.2000	0.674	<0.2000	<0.2000	0.562	0.04	0.08	0.08	0.13
Aniline	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025															
Anthracene	mg/l	LIQUID	-	0.0001	<0.0000	0.00096	0.00005	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	0.000029	<0.0000	0.00001
Aromatics >C10-12	mg/l	LIQUID	0.01	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100			<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.026	<0.0100	<0.0100
Aromatics >C12-16	mg/l	LIQUID	0.01	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100			<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aromatics >C12-35	mg/l	LIQUID	-	-										0.682	0.332	0.154	<0.0100	<0.0100	<0.0100	<0.0100				
Aromatics >C16-21	mg/l	LIQUID	0.01	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100			0.088	0.036	0.013	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aromatics >C21-35	mg/l	LIQUID	0.01	-	<0.0010	0.048	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100			0.594	0.296	0.141	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.015	<0.0100
Aromatics >C35-44	mg/l	LIQUID	0.01	-						<0.0100	<0.0100										<0.0100	<0.0100	<0.0100	<0.0100
Aromatics >C5-35	mg/l	LIQUID	-	-	<0.0100	0.048	<0.0100	<0.0100	<0.0100															
Aromatics >C5-7	mg/l	LIQUID	0.01	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050										<0.0050	<0.0050	<0.0050	
Aromatics >C6-7	mg/l	LIQUID	-	-										<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				<0.0100
Aromatics >C7-8	mg/l	LIQUID	0.01	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				<0.0100
Aromatics >C8-10	mg/l	LIQUID	0.01	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0100	<0.0100			<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aromatics >C8-C44*	mg/l	LIQUID	-	-						0.000011	<0.0100										<0.0100	0.04	0.019	
Arsenic	mg/l	LIQUID	0.01	0.05	0.0047	0.003	0.004	0.0041	0.004	0.001	<0.0010	<0.0010	<0.0010	0.00169	0.00134	0.00175	0.0117	0.00184	0.00894	0.000888	0.001	0.001	0.005	0.0025
Atrazine	mg/l	LIQUID	0.0001	0.0006										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
Azinphos-ethyl	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Azinphos-methyl	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Azobenzene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Barium	mg/l	LIQUID	1	-	0.19	0.21	0.085	0.075	0.08	0.33	0.12	0.09	0.13	0.121	0.101	0.198	0.992	0.0521	0.474	0.0178	0.03	0.08	0.11	0.075
Benzene	mg/l	LIQUID	0.001	0.01	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/l	LIQUID	-	-	<0.0000	0.01	0.00043	<0.0000	0.00012	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	0.00002	<0.0000	<0.0000	0.00001
Benzo(a)anthracene	mg/l	LIQUID	-	-	<0.0000	0.0056	0.00034	<0.0000	0.00006	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	<0.0000	<0.0000	0.00001
Benzo(a)pyrene	mg/l	LIQUID	0.00001	0.00000017	<0.0000	0.0081	0.00054	<0.0000	0.0001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	0.000017	<0.0000	<0.0000	0.00001
Benzo(b)fluoranthene	mg/l	LIQUID	-	-	<0.0000	0.013	0.001	<0.0000	0.00016	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	0.000019	<0.0000	<0.0000	0.00001
Benzo(k)fluoranthene	mg/l	LIQUID	-	-	<0.0000	0.0073	0.00031	<0.0000	0.00007	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	<0.0000	<0.0000	0.00001
Benzoic Acid	mg/l	LIQUID	-	-																				
Benzyl Alcohol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025															
Beryllium	mg/l	LIQUID	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0100	<0.0100	<0.0100	<0.0100	<0.0001	<0.0001	0.00072	0.0185	0.0002	0.00407	<0.0001	<0.0100	<0.0100	<0.0100	<0.0001
beta-Hexachlorocyclohexane	mg/l	LIQUID	0.0001	0.00002										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Bis(2-chloroethoxy)methane	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Bis(2-chloroethyl)ether	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Bis(2-chloroisopropyl)ether	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025															
Bis(2-ethylhexyl)adipate	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025															
Bis(2-ethylhexyl)phthalate	mg/l	LIQUID	-	0.0013	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0020	<0.0020	<0.0080	<0.0020	0.00575	<0.0080	<0.0020				
Boron	mg/l	LIQUID	1	2	0.096	0.099				0.19	0.11	<0.0100	0.15	0.0813	0.197	0.038	0.242	0.0859	<0.0300	0.0539	<0.1000	0.43	0.16	0.18
Boron*	mg/l	LIQUID	-	-			0.054	0.051	0.057															
Bromide	mg/l	LIQUID	-	-																<0.0600				
Bromobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Bromochloromethane	mg/l	LIQUID	-	-	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010
Bromodichloromethane	mg/l	LIQUID	0.1	-	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050								<0.0050	<0.0050	<0.0050	<0.0010
Butylbenzylphthalate	mg/l	LIQUID	-	0.0075	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Butyric Acid (4-(2,4-dichlorophenoxy)-Butanoic acid (DB))	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Cadmium	mg/l	LIQUID	0.005	0.00015	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.0006	<0.0001	0.0000001	0.0000002	0.00025	0.000402	0.0000977	0.00321	0.000196	0.000533	<0.0001	<0.0001	<0.0001	<0.0001	0.00003
Calcium	mg/l	LIQUID	250	-	83	80	56	58	64	117	106	44	71	94.9	286	105	880	47.2	50.6	20.2	16	549	199	82
Carbazole	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Carbendazim	mg/l	LIQUID	0.0001	0.00015										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Carbetamide	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Carbon Disulphide	mg/l	LIQUID	-	-																				<0.0200
Carbophenothion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Chlordane - alpha	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Chlorfenvinphos	mg/l	LIQUID	0.0001	0.0001										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Chloridazon*	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Chloride	mg/l	LIQUID	250	250	220	220	210	200	210	26	20	24	35	18	20.4	14.9	186	198	37.7	35.9	92	39	20	
Chlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0050	<0.0050	<0.0050	<0.0010
Chloroethene	mg/l	LIQUID	0.0005	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	mg/l	LIQUID	0.1	0.0025	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	0.00014	<0.0001	0.00025	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Chloromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010								<0.0010	<0.0010	<0.0010	<0.0010
Chloropropham	mg/l	LIQUID	-	-										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
Chlorothalonil	mg/l	LIQUID	0.0001	0.000035										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Chlorpyriphos	mg/l	LIQUID	0.0001	0.00003										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Chlorpyriphos-methyl*	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Chlortoluron	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Chromium	mg/l	LIQUID	0.05	0.005						<0.0010	<0.0010	0.000002	0.000001	0.0057	0.0041	0.00562	0.0169	<0.0012	0.045	<0.0012	<0.0010	<0.0010	<0.0010	<0.0010
Chromium - Hexavalent	mg/l	LIQUID	-	0.0034	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0100	<0.0100	<0.0030	<0.0030	<0.0030	0.00321	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LIQUID	-	0.0047						<0.0010	<0.0010	<0.0100	<0.0100								<0.0010	<0.0010	<0.0010	
Chrysene	mg/l	LIQUID	-	-	<0.0000	0.01	0.00048	<0.0000	0.0001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	<0.0000	<0.0000	0.00001
cis-1,2-Dichloroethene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
cis1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010															
cis-1,3-Dichloropropene	mg/l	LIQUID	-	-						<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Conductivity- Electrical 20deg	uS/cm	LIQUID	-	-	1060	1070	941	958	984															800
Conductivity- Electrical 20deg	mS/cm	LIQUID	-	-										0.569	1.23	0.555	1.27	0.896	0.502	0.27				
Conductivity- Electrical 25deg*	uS/cm	LIQUID	-	-																	448	3520	1310	
Conductivity- Electrical 25deg*	µS/cm	LIQUID	-	-						750	557	354	517											
Copper	mg/l	LIQUID	2	0.03	0.0051	0.0034	0.0039	0.0044	0.0036	0.009	0.008	0.000006	0.000006	0.0511	0.0053	0.0092	0.21	0.00761	0.0708	<0.0009	0.007	<0.0010	0.003	0.0042
Coronene	mg/l	LIQUID	-	-																				
Cyanazine	mg/l	LIQUID	-	-																				
Cyanide	mg/l	LIQUID	0.05	0.001	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0200	<0.0200	<0.0200	<0.0200	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	0.00003	<0.0000	<0.0000	<0.0500
Cyanide Free	mg/l	LIQUID	-	-	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200					<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500				<0.0500

Max of Normalised Results						
					ML162-SW002	ML163-CR021a
					M42 Coleshill North Viaduct	Lichfield Road Embankment
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	0	3.87
1,1,1,2-Tetrachloroethane	mg/l	LIQUID	-	0.14	<0.0010	<0.0010
1,1,1-Trichloroethane	mg/l	LIQUID	0.003	0.1	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/l	LIQUID	-	0.14	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/l	LIQUID	-	0.4	<0.0010	<0.0010
1,1-Biphenyl	mg/l	LIQUID	-	0.025		
1,1-Dichloroethane	mg/l	LIQUID	-	-	<0.0010	<0.0010
1,1-Dichloroethene	mg/l	LIQUID	-	-	0.003	<0.0010
1,1-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010
1,2,3 Trichlorobenzene	mg/l	LIQUID	-	0.0004		<0.0050
1,2,3-Trichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010
1,2,4-Trichlorobenzene	mg/l	LIQUID	-	0.0004		<0.0050
1,2,4-Trimethylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010
1,2-Dibromo-3-Chloropropane	mg/l	LIQUID	-	-		<0.0050
1,2-Dibromoethane	mg/l	LIQUID	-	-	<0.0010	<0.0010
1,2-Dichlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0050
1,2-Dichloroethane	mg/l	LIQUID	0.003	0.01	<0.0010	<0.0010
1,2-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010
1,3,5 Trichlorobenzene	mg/l	LIQUID	-	0.0004		<0.0010
1,3,5-Trimethylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010
1,3-Dichlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010
1,3-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010
2-(2,4-Dichlorophenoxy)propionic Acid	mg/l	LIQUID	-	-		
2,2-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010
2,3,4,6-Tetrachlorophenol	mg/l	LIQUID	-	-		
2,3,5,6-Tetrachlorophenol	mg/l	LIQUID	-	-		
2,4,5-Trichlorophenol	mg/l	LIQUID	-	-		
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/l	LIQUID	-	-		
2,4,6-Trichlorophenol	mg/l	LIQUID	-	-		
2,4-Dichlorophenol	mg/l	LIQUID	-	0.0042		
2,4-Dichlorophenoxy Acetic Acid (D)	mg/l	LIQUID	0.0001	0.0003		
2,4-Dimethylphenol	mg/l	LIQUID	-	-		
2,4-Dinitrophenol	mg/l	LIQUID	-	-		
2,4-Dinitrotoluene	mg/l	LIQUID	-	-		
2,6-Dinitrotoluene	mg/l	LIQUID	-	-		
2-Chloronaphthalene	mg/l	LIQUID	-	-		
2-Chlorophenol	mg/l	LIQUID	-	-		
2-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010
2-Methyl-4,6-Dinitrophenol	mg/l	LIQUID	-	-		
2-Methylnaphthalene	mg/l	LIQUID	-	-		
2-Methylphenol	mg/l	LIQUID	-	-		
2-Nitroaniline	mg/l	LIQUID	-	-		
2-Nitrophenol	mg/l	LIQUID	-	-		
3,3'-Dichlorobenzidine	mg/l	LIQUID	-	-		
3/4 Methylphenol	mg/l	LIQUID	-	-		
3-Nitroaniline	mg/l	LIQUID	-	-		
4,4-DDE	mg/l	LIQUID	-	-		
4,4-DDE*	mg/l	LIQUID	-	-		
4-Bromophenyl Phenyl Ether	mg/l	LIQUID	-	-		
4-Chloro Phenyl Ether	mg/l	LIQUID	-	-		
4-Chloro-3-Methylphenol	mg/l	LIQUID	-	-		
4-Chloroaniline	mg/l	LIQUID	-	-		
4-Chlorophenol	mg/l	LIQUID	-	-		
4-Chlorophenyl Phenyl Ether	mg/l	LIQUID	-	-		
4-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010
4-Isopropyltoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010
4-Methylphenol	mg/l	LIQUID	-	-		
4-Nitroaniline	mg/l	LIQUID	-	-		
4-Nitrophenol	mg/l	LIQUID	-	-		
Acenaphthene	mg/l	LIQUID	-	-	0.0001	<0.0000
Acenaphthylene	mg/l	LIQUID	-	-	<0.0001	<0.0000
Acidity as calcium carbonate	mg/l	LIQUID	-	-		#VALUE!
Aldrin	mg/l	LIQUID	0.00003	0.00001		
Aliphatics & Aromatics >C5-35	mg/l	LIQUID	-	-		
Aliphatics >C10-12	mg/l	LIQUID	0.01	-	<0.0100	<0.0100
Aliphatics >C12-16	mg/l	LIQUID	0.01	-	<0.0100	<0.0100
Aliphatics >C12-35	mg/l	LIQUID	-	-		
Aliphatics >C16-21	mg/l	LIQUID	0.01	-	0.02	
Aliphatics >C16-C35	mg/l	LIQUID	-	-		0.023
Aliphatics >C21-35	mg/l	LIQUID	0.01	-	0.02	
Aliphatics >C35-44	mg/l	LIQUID	-	-	<0.0100	<0.0100
Aliphatics >C5-12	mg/l	LIQUID	-	-		
Aliphatics >C5-6	mg/l	LIQUID	0.01	-	<0.0100	<0.1000
Aliphatics >C6-8	mg/l	LIQUID	0.01	-	<0.0100	
Aliphatics >C8-10	mg/l	LIQUID	0.01	-	<0.0100	<0.0100
Aliphatics >C8-C44*	mg/l	LIQUID	-	-		0.031
Alkalinity	mg/l	LIQUID	-	-		362
Alkalinity-Carbonate as CaCO3	mg/l	LIQUID	-	-	120	
alpha-Hexachlorocyclohexane	mg/l	LIQUID	0.0001	0.00002		
Ammoniacal Nitrogen as N	mg/l	LIQUID	0.38	0.2	0.45	0.11
Aniline	mg/l	LIQUID	-	-		
Anthracene	mg/l	LIQUID	-	0.0001	0.0001	<0.0000
Aromatics >C10-12	mg/l	LIQUID	0.01	-	<0.0100	<0.0100
Aromatics >C12-16	mg/l	LIQUID	0.01	-	<0.0100	<0.0100
Aromatics >C12-35	mg/l	LIQUID	-	-		
Aromatics >C16-21	mg/l	LIQUID	0.01	-	<0.0100	<0.0100
Aromatics >C21-35	mg/l	LIQUID	0.01	-	<0.0100	0.012
Aromatics >C35-44	mg/l	LIQUID	0.01	-	<0.0100	<0.0100
Aromatics >C5-35	mg/l	LIQUID	-	-		
Aromatics >C5-7	mg/l	LIQUID	0.01	-		<0.0050
Aromatics >C6-7	mg/l	LIQUID	-	-	<0.0100	
Aromatics >C7-8	mg/l	LIQUID	0.01	-	<0.0100	
Aromatics >C8-10	mg/l	LIQUID	0.01	-	<0.0100	<0.0100
Aromatics >C8-C44*	mg/l	LIQUID	-	-		0.02
Arsenic	mg/l	LIQUID	0.01	0.05	0.0017	0.001
Atrazine	mg/l	LIQUID	0.0001	0.0006		
Azinphos-ethyl	mg/l	LIQUID	-	-		
Azinphos-methyl	mg/l	LIQUID	-	-		
Azobenzene	mg/l	LIQUID	-	-		
Barium	mg/l	LIQUID	1	-	0.1	0.06
Benzene	mg/l	LIQUID	0.001	0.01	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/l	LIQUID	-	-	<0.0001	<0.0000
Benzo(a)anthracene	mg/l	LIQUID	-	-	0.0001	<0.0000
Benzo(a)pyrene	mg/l	LIQUID	0.00001	0.00000017	<0.0001	<0.0000
Benzo(b)fluoranthene	mg/l	LIQUID	-	-	<0.0001	<0.0000
Benzo(k)fluoranthene	mg/l	LIQUID	-	-	<0.0001	<0.0000
Benzoic Acid	mg/l	LIQUID	-	-		
Benzyl Alcohol	mg/l	LIQUID	-	-		
Beryllium	mg/l	LIQUID	-	-	<0.0001	<0.0100
beta-Hexachlorocyclohexane	mg/l	LIQUID	0.0001	0.00002		
Bis(2-chloroethoxy)methane	mg/l	LIQUID	-	-		
Bis(2-chloroethyl)ether	mg/l	LIQUID	-	-		
Bis(2-chloroisopropyl)ether	mg/l	LIQUID	-	-		
Bis(2-ethylhexyl)adipate	mg/l	LIQUID	-	-		
Bis(2-ethylhexyl)phthalate	mg/l	LIQUID	-	0.0013		
Boron	mg/l	LIQUID	1	2	0.1	0.18
Boron*	mg/l	LIQUID	-	-		
Bromide	mg/l	LIQUID	-	-		
Bromobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010
Bromochloromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010
Bromodichloromethane	mg/l	LIQUID	0.1	-	<0.0010	<0.0010
Bromomethane	mg/l	LIQUID	-	-	<0.0010	<0.0050
Butylbenzylphthalate	mg/l	LIQUID	-	0.0075		
Butyric Acid (4-(2,4-dichlorophenoxy)-Butanoic acid (DB))	mg/l	LIQUID	-	-		
Cadmium	mg/l	LIQUID	0.005	0.00015	0.00007	<0.0001
Calcium	mg/l	LIQUID	250	-	57	441
Carbazole	mg/l	LIQUID	-	-		
Carbendazim	mg/l	LIQUID	0.0001	0.00015		
Carbetamide	mg/l	LIQUID	-	-		
Carbon Disulphide	mg/l	LIQUID	-	-	<0.0200	
Carbophenothion	mg/l	LIQUID	-	-		
Chlordane - alpha	mg/l	LIQUID	-	-		
Chlorfenvinphos	mg/l	LIQUID	0.0001	0.0001		
Chloridazon*	mg/l	LIQUID	-	-		
Chloride	mg/l	LIQUID	250	250		23
Chlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010
Chloroethane	mg/l	LIQUID	-	-	<0.0010	<0.0050
Chloroethene	mg/l	LIQUID	0.0005	-	<0.0010	<0.0010
Chloroform	mg/l	LIQUID	0.1	0.0025	<0.0010	<0.0010
Chloromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010
Chloropropham	mg/l	LIQUID	-	-		
Chlorothalonil	mg/l	LIQUID	0.0001	0.000035		
Chlorpyriphos	mg/l	LIQUID	0.0001	0.00003		
Chlorpyriphos-methyl*	mg/l	LIQUID	-	-		
Chlortoluron	mg/l	LIQUID	-	-		
Chromium	mg/l	LIQUID	0.05	0.005	<0.0010	<0.0010
Chromium - Hexavalent	mg/l	LIQUID	-	0.0034	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LIQUID	-	0.0047		<0.0010
Chrysene	mg/l	LIQUID	-	-	0.0001	<0.0000
cis-1,2-Dichloroethene	mg/l	LIQUID	-	-	<0.0010	<0.0010
cis1,3-Dichloropropene	mg/l	LIQUID	-	-		
cis-1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010
Conductivity- Electrical 20deg	uS/cm	LIQUID	-	-	550	
Conductivity- Electrical 20deg	mS/cm	LIQUID	-	-		
Conductivity- Electrical 25deg*	uS/cm	LIQUID	-	-		3630
Conductivity- Electrical 25deg*	µS/cm	LIQUID	-	-		
Copper	mg/l	LIQUID	2	0.03	0.0032	0.002
Coronene	mg/l	LIQUID	-	-		
Cyanazine	mg/l	LIQUID	-	-		
Cyanide	mg/l	LIQUID	0.05	0.001	<0.0500	<0.0000
Cyanide Free	mg/l	LIQUID	-	-	<0.0500	

Max of Normalised Results										
					ML164-CP036	ML164-CR009	ML164-CR029	ML164-CR046a	ND001-CP049	ND001-CR002
					Watton House Embankment	Watten House West Viaduct	Chattle Hill Box Structure	Watten House West Viaduct	Chattle Hill Box Structure	Water Orton No. 3 Viaduct
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	8.2	22.7	24.32	2.81	1.94	4.25
1,1,1,2-Tetrachloroethane	mg/l	LIQUID	-	0.14	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,1-Trichloroethane	mg/l	LIQUID	0.003	0.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/l	LIQUID	-	0.14	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/l	LIQUID	-	0.4	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Biphenyl	mg/l	LIQUID	-	0.025						
1,1-Dichloroethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	0.003	<0.0010	<0.0010
1,1-Dichloroethene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010
1,1-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,3 Trichlorobenzene	mg/l	LIQUID	-	0.0004	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2,3-Trichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,4-Trichlorobenzene	mg/l	LIQUID	-	0.0004	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2,4-Trimethylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	0.012	<0.0010	<0.0010
1,2-Dibromo-3-Chloropropane	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dibromoethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dichloroethane	mg/l	LIQUID	0.003	0.01	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3,5 Trichlorobenzene	mg/l	LIQUID	-	0.0004	<0.0010	<0.0010	<0.0010	0.003	<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0030	<0.0010	<0.0010
1,3-Dichlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2-(2,4-Dichlorophenoxy)propionic Acid	mg/l	LIQUID	-	-						
2,2-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2,3,4,6-Tetrachlorophenol	mg/l	LIQUID	-	-						
2,3,5,6-Tetrachlorophenol	mg/l	LIQUID	-	-						
2,4,5-Trichlorophenol	mg/l	LIQUID	-	-						
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/l	LIQUID	-	-						
2,4,6-Trichlorophenol	mg/l	LIQUID	-	-						
2,4-Dichlorophenol	mg/l	LIQUID	-	0.0042						
2,4-Dichlorophenoxy Acetic Acid (D)	mg/l	LIQUID	0.0001	0.0003						
2,4-Dimethylphenol	mg/l	LIQUID	-	-						
2,4-Dinitrophenol	mg/l	LIQUID	-	-						
2,4-Dinitrotoluene	mg/l	LIQUID	-	-						
2,6-Dinitrotoluene	mg/l	LIQUID	-	-						
2-Chloronaphthalene	mg/l	LIQUID	-	-						
2-Chlorophenol	mg/l	LIQUID	-	-						
2-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2-Methyl-4,6-Dinitrophenol	mg/l	LIQUID	-	-						
2-Methylnaphthalene	mg/l	LIQUID	-	-						
2-Methylphenol	mg/l	LIQUID	-	-						
2-Nitroaniline	mg/l	LIQUID	-	-						
2-Nitrophenol	mg/l	LIQUID	-	-						
3,3'-Dichlorobenzidine	mg/l	LIQUID	-	-						
3/4 Methylphenol	mg/l	LIQUID	-	-						
3-Nitroaniline	mg/l	LIQUID	-	-						
4,4-DDE	mg/l	LIQUID	-	-						
4,4-DDE*	mg/l	LIQUID	-	-						
4-Bromophenyl Phenyl Ether	mg/l	LIQUID	-	-						
4-Chloro Phenyl Ether	mg/l	LIQUID	-	-						
4-Chloro-3-Methylphenol	mg/l	LIQUID	-	-						
4-Chloroaniline	mg/l	LIQUID	-	-						
4-Chlorophenol	mg/l	LIQUID	-	-						
4-Chlorophenyl Phenyl Ether	mg/l	LIQUID	-	-						
4-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
4-Isopropyltoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
4-Methylphenol	mg/l	LIQUID	-	-						
4-Nitroaniline	mg/l	LIQUID	-	-						
4-Nitrophenol	mg/l	LIQUID	-	-						
Acenaphthene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	0.0806	<0.0000	<0.0000
Acenaphthylene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	0.00462	<0.0000	<0.0000
Acidity as calcium carbonate	mg/l	LIQUID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
Aldrin	mg/l	LIQUID	0.00003	0.00001						
Aliphatics & Aromatics >C5-35	mg/l	LIQUID	-	-						
Aliphatics >C10-12	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C12-16	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C12-35	mg/l	LIQUID	-	-						
Aliphatics >C16-21	mg/l	LIQUID	0.01	-						
Aliphatics >C16-C35	mg/l	LIQUID	-	-	<0.0100	0.301	0.1	0.023	0.022	0.035
Aliphatics >C21-35	mg/l	LIQUID	0.01	-						
Aliphatics >C35-44	mg/l	LIQUID	-	-	<0.0100	0.017	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C5-12	mg/l	LIQUID	-	-						
Aliphatics >C5-6	mg/l	LIQUID	0.01	-	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000
Aliphatics >C6-8	mg/l	LIQUID	0.01	-						
Aliphatics >C8-10	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C8-C44*	mg/l	LIQUID	-	-	0.017	0.324	0.112	0.027	0.026	0.041
Alkalinity	mg/l	LIQUID	-	-	126	93	87	242	2070	478
Alkalinity-Carbonate as CaCO3	mg/l	LIQUID	-	-						
alpha-Hexachlorocyclohexane	mg/l	LIQUID	0.0001	0.00002						
Ammoniacal Nitrogen as N	mg/l	LIQUID	0.38	0.2	0.18	0.6	0.5	3.4	<0.0100	0.14
Aniline	mg/l	LIQUID	-	-						
Anthracene	mg/l	LIQUID	-	0.0001	<0.0000	<0.0000	<0.0000	0.00174	<0.0000	<0.0000
Aromatics >C10-12	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	0.709	<0.0100	<0.0100
Aromatics >C12-16	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	1.39	<0.0100	<0.0100
Aromatics >C12-35	mg/l	LIQUID	-	-						
Aromatics >C16-21	mg/l	LIQUID	0.01	-	<0.0100	0.015	<0.0100	0.123	0.018	0.022
Aromatics >C21-35	mg/l	LIQUID	0.01	-	<0.0100	0.156	0.053	0.052	<0.0100	<0.0100
Aromatics >C35-44	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aromatics >C5-35	mg/l	LIQUID	-	-						
Aromatics >C5-7	mg/l	LIQUID	0.01	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aromatics >C6-7	mg/l	LIQUID	-	-						
Aromatics >C7-8	mg/l	LIQUID	0.01	-						
Aromatics >C8-10	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	0.066	<0.0100	<0.0100
Aromatics >C8-C44*	mg/l	LIQUID	-	-	<0.0100	0.183	0.064	2.34	0.023	0.025
Arsenic	mg/l	LIQUID	0.01	0.05	<0.0010	0.001	<0.0010	0.01	0.005	0.001
Atrazine	mg/l	LIQUID	0.0001	0.0006						
Azinphos-ethyl	mg/l	LIQUID	-	-						
Azinphos-methyl	mg/l	LIQUID	-	-						
Azobenzene	mg/l	LIQUID	-	-						
Barium	mg/l	LIQUID	1	-	0.18	0.03	0.04	0.06	0.07	0.05
Benzene	mg/l	LIQUID	0.001	0.01	<0.0010	<0.0010	<0.0010	0.002	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Benzo(a)anthracene	mg/l	LIQUID	-	-	<0.0000	0.000016	0.000016	0.000038	<0.0000	<0.0000
Benzo(a)pyrene	mg/l	LIQUID	0.00001	0.00000017	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Benzo(b)fluoranthene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	0.000012	<0.0000	<0.0000
Benzo(k)fluoranthene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Benzoic Acid	mg/l	LIQUID	-	-						
Benzyl Alcohol	mg/l	LIQUID	-	-						
Beryllium	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
beta-Hexachlorocyclohexane	mg/l	LIQUID	0.0001	0.00002						
Bis(2-chloroethoxy)methane	mg/l	LIQUID	-	-						
Bis(2-chloroethyl)ether	mg/l	LIQUID	-	-						
Bis(2-chloroisopropyl)ether	mg/l	LIQUID	-	-						
Bis(2-ethylhexyl)adipate	mg/l	LIQUID	-	-						
Bis(2-ethylhexyl)phthalate	mg/l	LIQUID	-	0.0013						
Boron	mg/l	LIQUID	1	2	0.29	0.91	0.7	0.08	0.26	0.36
Boron*	mg/l	LIQUID	-	-						
Bromide	mg/l	LIQUID	-	-						
Bromobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromochloromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromodichloromethane	mg/l	LIQUID	0.1	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Butylbenzylphthalate	mg/l	LIQUID	-	0.0075						
Butyric Acid (4-(2,4-dichlorophenoxy)-Butanoic acid (DB))	mg/l	LIQUID	-	-						
Cadmium	mg/l	LIQUID	0.005	0.00015	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/l	LIQUID	250	-	141	490	510	42	85	534
Carbazole	mg/l	LIQUID	-	-						
Carbendazim	mg/l	LIQUID	0.0001	0.00015						
Carbetamide	mg/l	LIQUID	-	-						
Carbon Disulphide	mg/l	LIQUID	-	-						
Carbophenothion	mg/l	LIQUID	-	-						
Chlordane - alpha	mg/l	LIQUID	-	-						
Chlorfenvinphos	mg/l	LIQUID	0.0001	0.0001						
Chloridazon*	mg/l	LIQUID	-	-						
Chloride	mg/l	LIQUID	250	250	166	127	205	45	212	74
Chlorobenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloroethene	mg/l	LIQUID	0.0005	-	<0.0010	0.003	0.003	0.008	<0.0010	<0.0010
Chloroform	mg/l	LIQUID	0.1	0.0025	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010
Chloromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloropropham	mg/l	LIQUID	-	-						
Chlorothalonil	mg/l	LIQUID	0.0001	0.000035						
Chlorpyriphos	mg/l	LIQUID	0.0001	0.00003						
Chlorpyriphos-methyl*	mg/l	LIQUID	-	-						
Chlortoluron	mg/l	LIQUID	-	-						
Chromium	mg/l	LIQUID	0.05	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium - Hexavalent	mg/l	LIQUID	-	0.0034	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LIQUID	-	0.0047	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chrysene	mg/l	LIQUID	-	-	<0.0000	0.000014	<0.0000	0.000021	<0.0000	<0.0000
cis-1,2-Dichloroethene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	0.044	<0.0010	<0.0010
cis1,3-Dichloropropene	mg/l	LIQUID	-	-						
cis-1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Conductivity- Electrical 20deg	uS/cm	LIQUID	-	-						
Conductivity- Electrical 20deg	mS/cm	LIQUID	-	-						
Conductivity- Electrical 25deg*	uS/cm	LIQUID	-	-	1230	4180	5290	1050	1860	3640
Conductivity- Electrical 25deg*	µS/cm	LIQUID	-	-						
Copper	mg/l	LIQUID	2	0.03	<0.0010	0.000001	<0.0010	0.002	<0.0010	<0.0010
Coronene	mg/l	LIQUID	-	-						
Cyanazine	mg/l	LIQUID	-	-						
Cyanide	mg/l	LIQUID	0.05	0.001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Cyanide Free	mg/l	LIQUID	-	-						

Max of Normalised Results					Location ID	Asset	Sample Depth														
					BD160-SW001	BD161-CR008	BD161-CR008	BD161-CR010	BD162-SW001	BD163-CR017	BD164-CR003	BD164-CR003	ML155-CR003	ML155-SW001	ML155-SW002	ML156-CP008	ML156-CR012	ML156-SW001	ML156-SW002	ML156-SW003	ML156-SW004
					Coleshill West Viaduct	Coleshill West Viaduct	Coleshill West Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	M42 - M6 Motorway Link West Viaduct	Water Orton Cutting	Water Orton Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Lane Embankment	Bickenhill Embankment	Birmingham Interchange Station	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	0	2	31.78	6.95	0	27.7	4.24	7.75	2.41	0.2	0.2	0	0	0	0	0	0
Cyanide Free as CN	mg/l	LIQUID	-	-	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200				<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Cypermethrin	mg/l	LIQUID	0.0001	0.00000008									<0.0001	<0.0001	<0.0001						
Diazinon	mg/l	LIQUID	0.0001	0.00001									<0.0001	<0.0001	<0.0001						
Dibenz-a-h-anthracene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	<0.0000		<0.0000	<0.0000	<0.0000	0.00001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Dibenzofuran	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Dibromochloromethane	mg/l	LIQUID	0.1	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dibromomethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dichlorodifluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dichloromethane	mg/l	LIQUID	-	0.02									<0.0500	<0.0500	<0.0500						
Dichlorvos	mg/l	LIQUID	0.0001	0.0000006																	
Dieldrin	mg/l	LIQUID	0.00003	0.00001																	
Diethylphthalate	mg/l	LIQUID	-	0.2		<0.0070	<0.0060														
Dimethoate	mg/l	LIQUID	0.0001	0.00048																	
Dimethylphthalate	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Di-N-Butyl Phthalate	mg/l	LIQUID	-	0.008		<0.0070	<0.0060														
Di-N-Octyl Phthalate	mg/l	LIQUID	-	-		<0.0030	<0.0020														
Diphenyl ether	mg/l	LIQUID	-	-		<0.0030	<0.0020														
Diphenylamine	mg/l	LIQUID	-	-																	
Dissolved Oxygen Unfixed	mg/l	LIQUID	-	-	5.8	6.4	6.6	6.2	5.2	0.5	8.9	5.6				2.4	6	10.2	10.3	10.5	10.3
Disulfoton	mg/l	LIQUID	-	-																	
Diuron	mg/l	LIQUID	0.0001	0.0002																	
Endosulfan I	mg/l	LIQUID	0.0001	0.000005																	
Endosulfan II	mg/l	LIQUID	0.0001	0.000005																	
Endosulfan Sulfate	mg/l	LIQUID	-	-																	
Endrin	mg/l	LIQUID	0.0001	0.00001																	
EPH >C10-12	mg/l	LIQUID	0.01	-												<0.0100	<0.0100				
EPH >C10-40	mg/l	LIQUID	0.01	-																	
EPH >C12-16	mg/l	LIQUID	0.01	-												0.031	<0.0100				
EPH >C16-21	mg/l	LIQUID	0.01	-												0.022	<0.0100				
EPH >C21-35	mg/l	LIQUID	0.01	-												0.022	0.045				
EPH >C8-40	mg/l	LIQUID	0.01	-	0.08	0.06	0.07	0.04	0.06	1.09	0.03	0.06				0.09	0.06	0.04	0.04	0.05	0.06
EPH/TPH >C6-8	mg/l	LIQUID	0.01	-	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000		<0.1000				<0.1000	<0.1000				
Ethion	mg/l	LIQUID	-	-																	
Ethylbenzene	mg/l	LIQUID	-	0.02	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ethylparathion	mg/l	LIQUID	-	-																	
Etrimphos	mg/l	LIQUID	-	-																	
Fenitrothion	mg/l	LIQUID	-	-																	
Fenthion	mg/l	LIQUID	-	-																	
Fluoranthene	mg/l	LIQUID	-	0.0000063	0.000011	<0.0030	<0.0020	0.000016	<0.0000	<0.0000		<0.0000	0.00002	0.00001	0.00005	<0.0000	<0.0000	<0.0000	<0.0000	0.000014	0.000019
Fluorene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	0.000034		<0.0000	<0.0000	<0.0000	0.00001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Fluroxypyr*	mg/l	LIQUID	-	-																	
gamma-hexachlorocyclohexane	mg/l	LIQUID	0.0001	0.00002																	
Glyphosate	mg/l	LIQUID	0.0001	0.196																	
GRO >C5-10	mg/l	LIQUID	-	-	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000		<0.1000				<0.1000	<0.1000				
GRO >C5-12	mg/l	LIQUID	-	-																	
GRO >C7-8	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050				<0.0050	<0.0050				
GRO >C8-10	mg/l	LIQUID	-	-												<0.0100	<0.0100				
GRO Surrogate % recovery	%	LIQUID	-	-																	
Hardness,Calcium as CaCO3	mg/l	LIQUID	-	-																	
Hardness,Total as CaCO3	mg/l	LIQUID	-	-	264	78	78	437	235	413	438	439				487	272	362	368	351	342
Heptachlor	mg/l	LIQUID	0.00003	2E-10																	
Heptachlor Epoxide	mg/l	LIQUID	0.00003	2E-10																	
Heptanoic Acid	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Hexachlorobenzene (HCB)	mg/l	LIQUID	-	0.00001																	
Hexachlorobutadiene (HCBD)	mg/l	LIQUID	-	0.0001	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorocyclopentadiene	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Hexachloroethane	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Indeno(1,2,3-cd)pyrene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.00002	<0.0000	<0.0000		<0.0000	<0.0000	<0.0000	0.00003	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.000011
Iron	mg/l	LIQUID	0.2	1	0.58			55.2	0.64	7.57	57.6	27	0.04	0.11	0.08			0.19	0.28	0.21	0.1
Isodrin	mg/l	LIQUID	0.0001	0.00001																	
Isophorone	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Isopropylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Isoproturon	mg/l	LIQUID	0.0001	0.0003																	
Lead	mg/l	LIQUID	0.01	0.008575	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0003	0.0051	0.0005	<0.0010	<0.0010	<0.0010	0.000001	<0.0010	<0.0010
Linuron	mg/l	LIQUID	0.0001	0.0005																	
m,p xylenes	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	mg/l	LIQUID	50	-	24	8	8	66	22	73	62	63				71	40	37	39	35	34
Malathion	mg/l	LIQUID	-	-																	
Manganese	mg/l	LIQUID	0.05	0.41	0.069			1.077	0.088	0.333	0.926	0.412	0.31	0.003	0.001			0.000018	0.000023	0.00002	0.00001
MCPA	mg/l	LIQUID	-	-																	
M-Dinitrobenzene	mg/l	LIQUID	-	-																	
Mecoprop	mg/l	LIQUID	0.0001	0.018									<0.0001	<0.0001	<0.0001						
Mecoprop (MCPP) (2-(4-chloro-2-methylphenoxy)	mg/l	LIQUID	-	-																	
Mercury	mg/l	LIQUID	0.001	0.00007	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0001	0.00008	0.00006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Methabenzthiazuron	mg/l	LIQUID	-	-																	
Methiocarb	mg/l	LIQUID	0.0001	0.00001																	
Methoxychlor	mg/l	LIQUID	-	-																	
Methyl tert-butyl ether (MTBE)	mg/l	LIQUID	-	-									<0.0010	<0.0010	<0.0010						
Methyl tert-pentyl ether	mg/l	LIQUID	-	-									<0.0010	<0.0010	<0.0010						
Methylparathion	mg/l	LIQUID	-	-																	
Methylphenols	mg/l	LIQUID	-	0.1														<0.0005	<0.0005	<0.0005	<0.0005
Mevinphos	mg/l	LIQUID	-	-																	
Monlinuran	mg/l	LIQUID	-	-																	
Monuron	mg/l	LIQUID	-	-																	
Naphthalene1-methyl-	mg/l	LIQUID	-	-		<0.0030	<0.0020														
Napthalene	mg/l	LIQUID	-	0.002	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	0.000234		<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
n-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel	mg/l	LIQUID	0.02	0.02	0.002	0.001	0.001	0.003	0.002	0.005	<0.0010	0.002	0.003	0.011	0.003	0.004	<0.0010	0.000002	0.000002	0.000002	0.000002
Nitrate as N	mg/l	LIQUID	11	-	2.2	<0.2000	<0.2000	0.3	2.1	<0.2000	22.9	19.2	4.3	6.5	8.7	4	30.2	3.8	4	3.1	3.1
Nitrate as NO3	mg/l	LIQUID	-	-																	
Nitrite as N	mg/l	LIQUID	0.15	-	0.04	<0.0100	<0.0100	<0.0100	0.03	<0.0100	<0.0100	0.09	<0.1000	<0.1000	<0.1000	1.06	0.01	0.02	0.02	0.01	0.01
Nitrobenzene	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Nitrogen	mg/l	LIQUID	-	-																	
N-Nitroso-Di-N-Propylamine	mg/l	LIQUID	-	-		<0.0070	<0.0060														
N-Nitrosodiphenylamine*	mg/l	LIQUID	-	-		<0.0070	<0.0060														
n-propylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
o,p - DDE	mg/l	LIQUID	-	-																	
o,p - DDT	mg/l	LIQUID	-	-																	
o,p - TDE	mg/l	LIQUID	-	-																	
o,p-Methoxychlor*	mg/l	LIQUID	-	-																	
Ortho Phosphate as PO4	mg/l	LIQUID	-	-																	
Orthophosphate*	mg/l	LIQUID	-	-																	
Oxygen (Dissolved)	mg/l	LIQUID	-	-									7.9	8.7	7.9						
O-Xylene	mg/l	LIQUID	-	0.03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
p,p - DDT	mg/l	LIQUID	0.0001	0.00001																	
PAH,Total	mg/l	LIQUID	-	-	<0.0002			<0.0003	<0.0002	<0.0005		<0.0002	0.00008	0.00009	0.00038	<0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
P-Dinitrobenzene	mg/l	LIQUID	-	-																	
Pendimethalin	mg/l	LIQUID	0.0001	0.0003																	
Pentachloronitrobenzene	mg/l	LIQUID	-	-																	
Pentachlorophenol (PCP)	mg/l	LIQUID	0.0001	0.0004		<0.0700	<0.0600														
Permethrin	mg/l	LIQUID	0.0001	0.000001									<0.0001	<0.0001	<0.0001						
Permethrin II*	mg/l	LIQUID	-	-																	
pH	pH Units	LIQUID	-	-	7.8	7.7	7.7	8.2	7.8	7.7	7.9	8				7.7	7.6	7.6	7.8	7.7	7.7
Phenanthrene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	0.000066		<0.0000	<0.0000	0.00002	0.00004	0.000023	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Phenol	mg/l	LIQUID	0.0005	0.0077		<0.0280	<0.0240											<0.0005	<0.0005	<0.0005	<0.0005
Phenol	mg/l	LIQUID	-	-																	
Phenol (Monohydric)	mg/l	LIQUID	-	-																	
Phenol Index	mg/l	LIQUID	-	-	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500				<0.0500	<0.0500				
Phenoxy Acetic acid herbicide: MCPA*	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
Phosalone	mg/l	LIQUID	-	-																	
Phosphate	mg/l	LIQUID	-	-	0.15	0.01	0.01	0.24	0.15	0.62	0.12	0.06				0.02	0.05	0.02	0.02	<0.0100	<0.0100
Phosphorous	mg/l	LIQUID	-	-																	
Phosphorus as P	mg/l	LIQUID	-	-	0.3	<0.1000	1.12	2.6	0.2	1.2	1.9	0.9				15.7	0.2	<0.1000	<0.1000	<0.1000	<0.1000
Phosphorus, Total Inorganic	mg/l	LIQUID	-	-																	
Pirimiphos-methyl	mg/l	LIQUID	-	-																	
Potassium	mg/l	LIQUID	12	-	5	8	8	1	5	14	1	2				4	2	3	4	3	3
Prometryne	mg/l	LIQUID	-	-																	
Propazine	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
Propetamphos	mg/l	LIQUID	-	-																	
Propham	mg/l	LIQUID	-	-																	
Pyrene	mg/l	LIQUID	-	-	0.000014	<0.0030	<0.0020	0.000021	<0.0000	<0.0000		<0.0000	0.00002	0.00001	0.00005	<0.0000	<0.0000	<0.0000	0.000012	0.000016	0.000022
Sec-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Selenium	mg/l	LIQUID	0.01	-	<0.0010	<0.0010	<0.0010	0.005	<0.0010	0.002	0.001	0.003	0.0055	0.0006	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silvex	mg/l	LIQUID	-	-																	
Simazine	mg/l	LIQUID	0.0001	0.001									<0.0001	<0.0001	0.0002						
Sodium	mg/l	LIQUID	200	-	22	23	23	24	22	100	22	27				12	14	104	107	111	118
Solids, Suspended	mg/l	LIQUID	-	-	31	5430	5500	44700	55	972	11200	3870	35000	<10.0000	60	570000	23700	6	26	12	13
Styrene	mg/l	LIQUID	-	0.05	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate	mg/l	LIQUID	-	-																	
Sulphate as SO4	mg/l	LIQUID	250	400	87	17	17	38	74	65	29	24				70	34	90	92	96	98
Tecnazene	mg/l	LIQUID	-	-																	
Telodrin	mg/l	LIQUID	-	-																	
Tentatively Identified Compounds - VOC	mg/l	LIQUID	-	-	<0.0050			<0.0050	<0.0050	0.02		<0.0050				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Terbutryn	mg/l	LIQUID	0.0001	0.000065									<0.0001	<0.0001	<0.0001						
Tert-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethene	mg/l	LIQUID	0.01	0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Tetrachloromethane (Carbon Tetra Chloride)	mg/l	LIQUID	0.003	0.012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene	mg/l	LIQUID	-	0.074	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Alkalinity as CaCO3	mg/l	LIQUID	-	-																	
Total BTEX	mg/l	LIQUID	-	-									<0.0040	<0.0040	<0.0040						
Total dissolved solids	mg/l	LIQUID	-	-	430	140	150	487	380	711	560	493	190	490	520	0.665	0.459	0.76	0.76	0.8	0.79
Total hardness	mg/l	LIQUID	-	-																	
Total Nitrogen	mg/l	LIQUID	-	-	3	2	3	14	3	18	97	21				79	48	4	5	4	3
Total Organic Carbon	mg/l	LIQUID	-	-	5.4	7.1	8.5	42.7	5.4	46.3	1.9	10.1	28	55	47	0	2.1	5.7	5.7	5.8	5.9
Total suspended solids	mg/l	LIQUID	-	-																	
Traidimefon	mg/l	LIQUID	-	-																	
trans - Chlordane	mg/l	LIQUID	-	-																	
trans-1,2-Dichloroethene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Triallate	mg/l	LIQUID	-	-																	
Triazophos	mg/l	LIQUID	-	-																	

Max of Normalised Results					ML156-SW005	ML156-SW006	ML156-SW007	ML156-SW008	ML156-SW009	ML157-CP001	ML157-CP010	ML157-SW001	ML157-SW002	ML158-CP002	ML158-CP007	ML158-CP020	ML158-CP021	ML158-CR018	ML159-CR019	ML159-SW001	ML160-SW002	ML161-CR021	ML162-CR004a	ML162-SW001
					Birmingham Interchange Station	Birmingham Interchange Station	Bickenhill Cutting	Birmingham Interchange Station	Birmingham Interchange Station	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Coleshill No. 1 Embankment	Coleshill No. 3 Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	0	0	0	0	0	0	0	0	0	0.24	6.35	2.83	3.77	3.3	7.72	0	0	28.74	26.29	0
Cyanide Free as CN	mg/l	LIQUID	-	-						<0.0200	<0.0200	<0.0200	<0.0200								<0.0200	<0.0200	<0.0200	
Cypermethrin	mg/l	LIQUID	0.0001	0.00000008																				
Diazinon	mg/l	LIQUID	0.0001	0.00001										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Dibenz-a-h-anthracene	mg/l	LIQUID	-	-	<0.0000	0.0016	0.00006	<0.0000	0.00002	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	<0.0000	<0.0000	<0.0000
Dibenzofuran	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Dibromochloromethane	mg/l	LIQUID	0.1	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Dibromomethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Dichlorodifluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010								<0.0010	<0.0010	<0.0010	<0.0010
Dichloromethane	mg/l	LIQUID	-	0.02																				<0.0500
Dichlorvos	mg/l	LIQUID	0.0001	0.0000006										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Dieldrin	mg/l	LIQUID	0.00003	0.00001										<0.0000	<0.0000	0.000075	<0.0000	<0.0000	<0.0000	<0.0000				
Diethylphthalate	mg/l	LIQUID	-	0.2	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Dimethoate	mg/l	LIQUID	0.0001	0.00048										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Dimethylphthalate	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Di-N-Butyl Phthalate	mg/l	LIQUID	-	0.008	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Di-N-Octyl Phthalate	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0050	<0.0050	<0.0200	<0.0050	<0.0050	<0.0200	<0.0050				
Diphenyl ether	mg/l	LIQUID	-	-																				
Diphenylamine	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025															
Dissolved Oxygen Unfixed	mg/l	LIQUID	-	-						3.5	4.9	9.1	10.5								5.9	1.7	5.8	
Disulfoton	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Diuron	mg/l	LIQUID	0.0001	0.0002										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Endosulfan I	mg/l	LIQUID	0.0001	0.000005										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Endosulfan II	mg/l	LIQUID	0.0001	0.000005										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Endosulfan Sulfate	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Endrin	mg/l	LIQUID	0.0001	0.00001										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
EPH >C10-12	mg/l	LIQUID	0.01	-						<0.0100	<0.0100													
EPH >C10-40	mg/l	LIQUID	0.01	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100					1.72	2.08	1.22	0.224	0.143	0.309	<0.0460				
EPH >C12-16	mg/l	LIQUID	0.01	-						<0.0100	<0.0100													
EPH >C16-21	mg/l	LIQUID	0.01	-						<0.0100	<0.0100													
EPH >C21-35	mg/l	LIQUID	0.01	-						<0.0100	<0.0100													
EPH >C8-40	mg/l	LIQUID	0.01	-						0.01	0.02	0.03	0.03								0.14	0.04	0.02	
EPH/TPH >C6-8	mg/l	LIQUID	0.01	-						<0.1000	<0.1000										<0.1000	<0.1000	<0.1000	
Ethion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Ethylbenzene	mg/l	LIQUID	-	0.02	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Ethylparathion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Etrimphos	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Fenitrothion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Fenthion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Fluoranthene	mg/l	LIQUID	-	0.0000063	<0.0000	0.013	0.00062	0.00014	0.00011	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	0.000016	<0.0000	<0.0000	0.00002
Fluorene	mg/l	LIQUID	-	-	<0.0000	0.00075	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	0.000487	<0.0000	0.00001
Fluroxypyr*	mg/l	LIQUID	-	-										<0.0000	0.000172	<0.0000	0.000162	<0.0000	<0.0000	<0.0000				
gamma-hexachlorocyclohexane	mg/l	LIQUID	0.0001	0.00002										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Glyphosate	mg/l	LIQUID	0.0001	0.196										<0.0020	<0.0020	<0.0002	<0.0020	<0.0002	<0.0002	<0.0002				
GRO >C5-10	mg/l	LIQUID	-	-						<0.1000	<0.1000										<0.1000	<0.1000	<0.1000	
GRO >C5-12	mg/l	LIQUID	-	-										<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500				
GRO >C7-8	mg/l	LIQUID	-	-						<0.0050	<0.0050										<0.0050	<0.0050	<0.0050	
GRO >C8-10	mg/l	LIQUID	-	-						<0.0100	<0.0100													
GRO Surrogate % recovery	%	LIQUID	-	-										104	93	104	94	107	104	100				
Hardness,Calcium as CaCO3	mg/l	LIQUID	-	-																				320
Hardness,Total as CaC03	mg/l	LIQUID	-	-						383	306	139	218	686	1540	1590	1120	204	423	82.2	48	1990	736	
Heptachlor	mg/l	LIQUID	0.00003	2E-10										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Heptachlor Epoxide	mg/l	LIQUID	0.00003	2E-10										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Heptanoic Acid	mg/l	LIQUID	-	-																				
Hexachlorobenzene (HCB)	mg/l	LIQUID	-	0.00001	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Hexachlorobutadiene (HCBD)	mg/l	LIQUID	-	0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050	<0.0050	
Hexachlorocyclopentadiene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Hexachloroethane	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Indeno(1,2,3-cd)pyrene	mg/l	LIQUID	-	-	<0.0000	0.0053	0.00041	<0.0000	0.00009	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	0.000018	<0.0000	<0.0000	0.00001
Iron	mg/l	LIQUID	0.2	1	0.16	10	0.17	0.14	0.17			1.74	0.16	51.6	239	301	136	8.29	178	0.925	20.2	0	11.2	
Isodrin	mg/l	LIQUID	0.0001	0.00001										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Isophorone	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Isopropylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Isoproturon	mg/l	LIQUID	0.0001	0.0003										0.000511	0.000506	0.000502	0.000501	0.000501	0.000492	0.000515				
Lead	mg/l	LIQUID	0.01	0.008575	0.00022	0.00024	0.0011	0.0012	0.0014	0.005	<0.0010	<0.0010	<0.0010	0.00039	0.000516	0.0136	0.113	0.00526	0.0618	0.000282	<0.0010	<0.0010	0.006	<0.0003
Linuron	mg/l	LIQUID	0.0001	0.0005										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
m,p xylenes	mg/l	LIQUID	-	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	mg/l	LIQUID	50	-	35	40	22	24	26	22	10	7	10	8.27	31.4	5.74	112	13.8	34.6	7.09	2	151	58	29
Malathion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Manganese	mg/l	LIQUID	0.05	0.41	0.032	1.4	0.016	0.019	0.025			0.000054	0.000087	1.59	29.8	10.2	8.87	0.272	3.12		0.619	0	0.364	
MCPA	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
M-Dinitrobenzene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025															
Mecoprop	mg/l	LIQUID	0.0001	0.018																				
Mecoprop (MCPP) (2-(4-chloro-2-methylphenoxy)	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Mercury	mg/l	LIQUID	0.001	0.00007	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0001	<0.0001	<0.0001	<0.0001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0001
Methabenzthiazuran	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Methiocarb	mg/l	LIQUID	0.0001	0.00001										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
Methoxychlor	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Methyl tert-butyl ether (MTBE)	mg/l	LIQUID	-	-										<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030				<0.0010
Methyl tert-pentyl ether	mg/l	LIQUID	-	-																				<0.0010
Methylparathion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Methylphenols	mg/l	LIQUID	-	0.1								<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				
Mevinphos	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Monlinuran	mg/l	LIQUID	-	-										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
Monuron	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Naphthalene1-methyl-	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025															
Napthalene	mg/l	LIQUID	-	0.002	<0.0000	0.00085	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.00033	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0000	0.0096	0.000022	<0.0000
n-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	
Nickel	mg/l	LIQUID	0.02	0.02	0.0012	0.0013	<0.0005	0.0013	<0.0005	0.003	0.002	0.000003	0.000004	0.00568	0.0109	0.00209	0.0811	0.00492	0.0466	0.000562	0.001	0.004	0.003	0.003
Nitrate as N	mg/l	LIQUID	11	-						27	15.9	18.2	22	4.65	4.65	35.1	18	3.22	27.2	0.449	0.3	4	3.8	3.3
Nitrate as NO3	mg/l	LIQUID	-	-	9.2	11	9.8	5.2	5.6															
Nitrite as N	mg/l	LIQUID	0.15	-	<0.0350	<0.0350	<0.0350	<0.0350	<0.0350	0.12	0.01	<0.0100	0.01	0.0265	0.0648	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0100	<0.0100	0.39	0.1
Nitrobenzene	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Nitrogen	mg/l	LIQUID	-	-	17	67	7	3.8	3.5					5.51	6	35.1	19.6	2.98	26.8	2				<10.0000
N-Nitroso-Di-N-Propylamine	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
N-Nitrosodiphenylamine*	mg/l	LIQUID	-	-																				
n-propylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
o,p - DDE	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
o,p - DDT	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
o,p - TDE	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
o,p-Methoxychlor*	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Ortho Phosphate as PO4	mg/l	LIQUID	-	-										<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.0219	0.0509				
Orthophosphate*	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100															
Oxygen (Dissolved)	mg/l	LIQUID	-	-	11.3	4.5	11	10.9	10.8					4.9	5.13	7.3	5.88	6.99	8.34	8.75				10
O-Xylene	mg/l	LIQUID	-	0.03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010
p,p - DDT	mg/l	LIQUID	0.0001	0.00001										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
PAH,Total	mg/l	LIQUID	-	-	<0.0000	0.1	0.005	0.00028	0.00095	<0.0002	<0.0002	<0.0002	<0.0002								<0.0002	<0.0114	<0.0002	0.00017
P-Dinitrobenzene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025															
Pendimethalin	mg/l	LIQUID	0.0001	0.0003										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Pentachloronitrobenzene	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Pentachlorophenol (PCP)	mg/l	LIQUID	0.0001	0.0004	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010				
Permethrin	mg/l	LIQUID	0.0001	0.000001										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Permethrin II*	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
pH	pH Units	LIQUID	-	-	7.5	7.4	8	8.2	7.6	7	7.2	6.3	7.1	7.69	6.96	7.45	7.27	6.45	6.76	7.8	7.1	7.6	8	
Phenanthrene	mg/l	LIQUID	-	-	<0.0000	0.0084	0.00013	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	0.000112	<0.0000	0.00001
Phenol	mg/l	LIQUID	0.0005	0.0077	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				
Phenol	mg/l	LIQUID	-	-																				<0.0005
Phenol (Monohydric)	mg/l	LIQUID	-	-										<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				
Phenol Index	mg/l	LIQUID	-	-						<0.0500	<0.0500										<0.0500	<0.0500	<0.0500	
Phenoxy Acetic acid herbicide: MCPA*	mg/l	LIQUID	-	-																				
Phosalone	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Phosphate	mg/l	LIQUID	-	-						0.09	<0.0100	<0.0100	<0.0100								0.19	<0.0100	0.02	<0.5000
Phosphorous	mg/l	LIQUID	-	-	0.036	1.5	0.05	0.045	0.031															
Phosphorus as P	mg/l	LIQUID	-	-						6.6	5.6	0.3	<0.1000	1.77	3.43	12.5	1.91	0.267	3.23	0.175	2.7	0	0.4	
Phosphorus, Total Inorganic	mg/l	LIQUID	-	-																				<1.0000
Pirimiphos-methyl	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Potassium	mg/l	LIQUID	12	-	3.9	3.7	2.8	2.7	2.8	5	3	4	4	3.47	7.55	13.4	31	5.83	3.41	23.4	3	26	3	4
Prometryne	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Propazine	mg/l	LIQUID	-	-										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
Propetamphos	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Propham	mg/l	LIQUID	-	-										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				
Pyrene	mg/l	LIQUID	-	-	<0.0000	0.014	0.00065	0.00013	0.00013	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	0.000019	<0.0000	<0.0000	0.00003
Sec-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Selenium	mg/l	LIQUID	0.01	-	0.0012	0.00078	0.00078	0.00071	0.00074	<0.0010	<0.0010	<0.0010	<0.0010	0.00391	0.00107	<0.0008	<0.0089	0.00131	<0.0049	<0.0008	<0.0010	0.002	0.002	0.0006
Silvex	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Simazine	mg/l	LIQUID	0.0001	0.001										0.000488	0.000489	0.000483	0.000479	0.000482	0.000476	0.00048				
Sodium	mg/l	LIQUID	200	-	110	130	120	140	130	25	12	7	13	24.5	27	4.73	111	122	16.2	16.1	68	388	51	34
Solids, Suspended	mg/l	LIQUID	-	-	11	7400	120	16	29	220000	349000	155	11								2270	326000	1610	<10.0000
Styrene	mg/l	LIQUID	-	0.05	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate	mg/l	LIQUID	-	-										150	392	35.7	94.1	118	55.6	<2.0000				
Sulphate as SO4	mg/l	LIQUID	250	400	83	88	82	78	93	44	30	22	38								12	2170	449	
Tecnazene	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Telodrin	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Tentatively Identified Compounds - VOC	mg/l	LIQUID	-	-						<0.0050	<0.0050	<0.0050	<0.0050								<0.0050	<0.0050	<0.0050	
Terbutryn	mg/l	LIQUID	0.0001	0.000065										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Tert-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethene	mg/l	LIQUID	0.01	0.01	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050	<0.0050	<0.0010
Tetrachloromethane (Carbon Tetra Chloride)	mg/l	LIQUID	0.003	0.012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Toluene	mg/l	LIQUID	-	0.074	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010
Total Alkalinity as CaCO3	mg/l	LIQUID	-	-	150	190	120	110	120					305	1120	1600	455	55	65	95				
Total BTEX	mg/l	LIQUID	-	-										<0.0280	<0.0280	<0.0280	<0.0280	<0.0280	<0.0280	<0.0280				<0.0040
Total dissolved solids	mg/l	LIQUID	-	-	710	740	640	660	660	0.634	0.516	0.32	0.45	446	1020	441	980	706	393	223	220	30700	1070	510
Total hardness	mg/l	LIQUID	-	-	352	362	231	245	267															
Total Nitrogen	mg/l	LIQUID	-	-						135	81	22	24								20	39	6	
Total Organic Carbon	mg/l	LIQUID	-	-	7.1	19	8.8	8.7	8.1	0	15	17	15	22.2	12.6	<3.0000	<3.0000	<3.0000	<3.0000	15.7	7.1	157	6.5	50
Total suspended solids	mg/l	LIQUID	-	-										1410	23000	34500	6490	282	8510	5.5				
Traidimefon	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
trans - Chlordane	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
trans-1,2-Dichloroethene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010
Triallate	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Triazophos	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				

Max of Normalised Results						
					ML162-SW002	ML163-CR021a
					M42 Coleshill North Viaduct	Lichfield Road Embankment
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	0	3.87
Cyanide Free as CN	mg/l	LIQUID	-	-		<0.0200
Cypermethrin	mg/l	LIQUID	0.0001	0.00000008		
Diazinon	mg/l	LIQUID	0.0001	0.00001		
Dibenz-a-h-anthracene	mg/l	LIQUID	-	-	<0.0001	<0.0000
Dibenzofuran	mg/l	LIQUID	-	-		
Dibromochloromethane	mg/l	LIQUID	0.1	-	<0.0010	<0.0010
Dibromomethane	mg/l	LIQUID	-	-	<0.0010	<0.0010
Dichlorodifluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010
Dichloromethane	mg/l	LIQUID	-	0.02	<0.0500	
Dichlorvos	mg/l	LIQUID	0.0001	0.0000006		
Dieldrin	mg/l	LIQUID	0.00003	0.00001		
Diethylphthalate	mg/l	LIQUID	-	0.2		
Dimethoate	mg/l	LIQUID	0.0001	0.00048		
Dimethylphthalate	mg/l	LIQUID	-	-		
Di-N-Butyl Phthalate	mg/l	LIQUID	-	0.008		
Di-N-Octyl Phthalate	mg/l	LIQUID	-	-		
Diphenyl ether	mg/l	LIQUID	-	-		
Diphenylamine	mg/l	LIQUID	-	-		
Dissolved Oxygen Unfixed	mg/l	LIQUID	-	-		4.8
Disulfoton	mg/l	LIQUID	-	-		
Diuron	mg/l	LIQUID	0.0001	0.0002		
Endosulfan I	mg/l	LIQUID	0.0001	0.000005		
Endosulfan II	mg/l	LIQUID	0.0001	0.000005		
Endosulfan Sulfate	mg/l	LIQUID	-	-		
Endrin	mg/l	LIQUID	0.0001	0.00001		
EPH >C10-12	mg/l	LIQUID	0.01	-		
EPH >C10-40	mg/l	LIQUID	0.01	-		
EPH >C12-16	mg/l	LIQUID	0.01	-		
EPH >C16-21	mg/l	LIQUID	0.01	-		
EPH >C21-35	mg/l	LIQUID	0.01	-		
EPH >C8-40	mg/l	LIQUID	0.01	-		0.03
EPH/TPH >C6-8	mg/l	LIQUID	0.01	-		<0.1000
Ethion	mg/l	LIQUID	-	-		
Ethylbenzene	mg/l	LIQUID	-	0.02	<0.0010	<0.0010
Ethylparathion	mg/l	LIQUID	-	-		
Etrimphos	mg/l	LIQUID	-	-		
Fenitrothion	mg/l	LIQUID	-	-		
Fenthion	mg/l	LIQUID	-	-		
Fluoranthene	mg/l	LIQUID	-	0.0000063	0.0001	<0.0000
Fluorene	mg/l	LIQUID	-	-	0.0001	<0.0000
Fluroxypyr*	mg/l	LIQUID	-	-		
gamma-hexachlorocyclohexane	mg/l	LIQUID	0.0001	0.00002		
Glyphosate	mg/l	LIQUID	0.0001	0.196		
GRO >C5-10	mg/l	LIQUID	-	-		<0.1000
GRO >C5-12	mg/l	LIQUID	-	-		
GRO >C7-8	mg/l	LIQUID	-	-		<0.0050
GRO >C8-10	mg/l	LIQUID	-	-		
GRO Surrogate % recovery	%	LIQUID	-	-		
Hardness,Calcium as CaCO3	mg/l	LIQUID	-	-	230	
Hardness,Total as CaC03	mg/l	LIQUID	-	-		1450
Heptachlor	mg/l	LIQUID	0.00003	2E-10		
Heptachlor Epoxide	mg/l	LIQUID	0.00003	2E-10		
Heptanoic Acid	mg/l	LIQUID	-	-		
Hexachlorobenzene (HCB)	mg/l	LIQUID	-	0.00001		
Hexachlorobutadiene (HCBD)	mg/l	LIQUID	-	0.0001		<0.0050
Hexachlorocyclopentadiene	mg/l	LIQUID	-	-		
Hexachloroethane	mg/l	LIQUID	-	-		
Indeno(1,2,3-cd)pyrene	mg/l	LIQUID	-	-	<0.0001	<0.0000
Iron	mg/l	LIQUID	0.2	1		132
Isodrin	mg/l	LIQUID	0.0001	0.00001		
Isophorone	mg/l	LIQUID	-	-		
Isopropylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010
Isoproturon	mg/l	LIQUID	0.0001	0.0003		
Lead	mg/l	LIQUID	0.01	0.008575	0.0008	<0.0010
Linuron	mg/l	LIQUID	0.0001	0.0005		
m,p xylenes	mg/l	LIQUID	-	-	<0.0010	<0.0010
Magnesium	mg/l	LIQUID	50	-	21	85
Malathion	mg/l	LIQUID	-	-		
Manganese	mg/l	LIQUID	0.05	0.41		2.769
MCPA	mg/l	LIQUID	-	-		
M-Dinitrobenzene	mg/l	LIQUID	-	-		
Mecoprop	mg/l	LIQUID	0.0001	0.018		
Mecoprop (MCPP) (2-(4-chloro-2-methylphenoxy)	mg/l	LIQUID	-	-		
Mercury	mg/l	LIQUID	0.001	0.00007	<0.0001	<0.0000
Methabenzthiazuran	mg/l	LIQUID	-	-		
Methiocarb	mg/l	LIQUID	0.0001	0.00001		
Methoxychlor	mg/l	LIQUID	-	-		
Methyl tert-butyl ether (MTBE)	mg/l	LIQUID	-	-	<0.0010	
Methyl tert-pentyl ether	mg/l	LIQUID	-	-	<0.0010	
Methylparathion	mg/l	LIQUID	-	-		
Methylphenols	mg/l	LIQUID	-	0.1		
Mevinphos	mg/l	LIQUID	-	-		
Monlinuran	mg/l	LIQUID	-	-		
Monuron	mg/l	LIQUID	-	-		
Naphthalene1-methyl-	mg/l	LIQUID	-	-		
Napthalene	mg/l	LIQUID	-	0.002	0.0006	0.000036
n-Butylbenzene	mg/l	LIQUID	-	-		<0.0010
Nickel	mg/l	LIQUID	0.02	0.02	0.003	0.008
Nitrate as N	mg/l	LIQUID	11	-	<0.5000	<0.2000
Nitrate as NO3	mg/l	LIQUID	-	-		
Nitrite as N	mg/l	LIQUID	0.15	-	<0.1000	<0.0100
Nitrobenzene	mg/l	LIQUID	-	-		
Nitrogen	mg/l	LIQUID	-	-	<10.0000	
N-Nitroso-Di-N-Propylamine	mg/l	LIQUID	-	-		
N-Nitrosodiphenylamine*	mg/l	LIQUID	-	-		
n-propylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010
o,p - DDE	mg/l	LIQUID	-	-		
o,p - DDT	mg/l	LIQUID	-	-		
o,p - TDE	mg/l	LIQUID	-	-		
o,p-Methoxychlor*	mg/l	LIQUID	-	-		
Ortho Phosphate as PO4	mg/l	LIQUID	-	-		
Orthophosphate*	mg/l	LIQUID	-	-		
Oxygen (Dissolved)	mg/l	LIQUID	-	-	3.4	
O-Xylene	mg/l	LIQUID	-	0.03	<0.0010	<0.0010
p,p - DDT	mg/l	LIQUID	0.0001	0.00001		
PAH,Total	mg/l	LIQUID	-	-	0.0024	<0.0002
P-Dinitrobenzene	mg/l	LIQUID	-	-		
Pendimethalin	mg/l	LIQUID	0.0001	0.0003		
Pentachloronitrobenzene	mg/l	LIQUID	-	-		
Pentachlorophenol (PCP)	mg/l	LIQUID	0.0001	0.0004		
Permethrin	mg/l	LIQUID	0.0001	0.000001		
Permethrin II*	mg/l	LIQUID	-	-		
pH	pH Units	LIQUID	-	-		7.4
Phenanthrene	mg/l	LIQUID	-	-	0.0011	<0.0000
Phenol	mg/l	LIQUID	0.0005	0.0077		
Phenol	mg/l	LIQUID	-	-	0.06	
Phenol (Monohydric)	mg/l	LIQUID	-	-		
Phenol Index	mg/l	LIQUID	-	-		<0.0500
Phenoxy Acetic acid herbicide: MCPA*	mg/l	LIQUID	-	-		
Phosalone	mg/l	LIQUID	-	-		
Phosphate	mg/l	LIQUID	-	-	1.3	<0.0100
Phosphorous	mg/l	LIQUID	-	-		
Phosphorus as P	mg/l	LIQUID	-	-		4.4
Phosphorus, Total Inorganic	mg/l	LIQUID	-	-	2	
Pirimiphos-methyl	mg/l	LIQUID	-	-		
Potassium	mg/l	LIQUID	12	-	9	11
Prometryne	mg/l	LIQUID	-	-		
Propazine	mg/l	LIQUID	-	-		
Propetamphos	mg/l	LIQUID	-	-		
Propham	mg/l	LIQUID	-	-		
Pyrene	mg/l	LIQUID	-	-	0.0001	0.000013
Sec-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010
Selenium	mg/l	LIQUID	0.01	-	<0.0005	0.002
Silvex	mg/l	LIQUID	-	-		
Simazine	mg/l	LIQUID	0.0001	0.001		
Sodium	mg/l	LIQUID	200	-	15	375
Solids, Suspended	mg/l	LIQUID	-	-	19	111000
Styrene	mg/l	LIQUID	-	0.05	<0.0010	<0.0010
Sulphate	mg/l	LIQUID	-	-		
Sulphate as SO4	mg/l	LIQUID	250	400		1720
Tecnazene	mg/l	LIQUID	-	-		
Telodrin	mg/l	LIQUID	-	-		
Tentatively Identified Compounds - VOC	mg/l	LIQUID	-	-		<0.0050
Terbutryn	mg/l	LIQUID	0.0001	0.000065		
Tert-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010
Tetrachloroethene	mg/l	LIQUID	0.01	0.01	<0.0010	<0.0050
Tetrachloromethane (Carbon Tetra Chloride)	mg/l	LIQUID	0.003	0.012	<0.0010	<0.0010
Toluene	mg/l	LIQUID	-	0.074	<0.0010	<0.0010
Total Alkalinity as CaCO3	mg/l	LIQUID	-	-		
Total BTEX	mg/l	LIQUID	-	-	<0.0040	
Total dissolved solids	mg/l	LIQUID	-	-	430	3320
Total hardness	mg/l	LIQUID	-	-		
Total Nitrogen	mg/l	LIQUID	-	-		24
Total Organic Carbon	mg/l	LIQUID	-	-	68	30.8
Total suspended solids	mg/l	LIQUID	-	-		
Traidimefon	mg/l	LIQUID	-	-		
trans - Chlordane	mg/l	LIQUID	-	-		
trans-1,2-Dichloroethene	mg/l	LIQUID	-	-	<0.0010	<0.0010
trans-1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010
Triallate	mg/l	LIQUID	-	-		
Triazophos	mg/l	LIQUID	-	-		

Max of Normalised Results										
					ML164-CP036	ML164-CR009	ML164-CR029	ML164-CR046a	ND001-CP049	ND001-CR002
					Watton House Embankment	Watten House West Viaduct	Chattle Hill Box Structure	Watten House West Viaduct	Chattle Hill Box Structure	Water Orton No. 3 Viaduct
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	8.2	22.7	24.32	2.81	1.94	4.25
Cyanide Free as CN	mg/l	LIQUID	-	-	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Cypermethrin	mg/l	LIQUID	0.0001	0.00000008						
Diazinon	mg/l	LIQUID	0.0001	0.00001						
Dibenz-a-h-anthracene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Dibenzofuran	mg/l	LIQUID	-	-						
Dibromochloromethane	mg/l	LIQUID	0.1	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dibromomethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dichlorodifluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dichloromethane	mg/l	LIQUID	-	0.02						
Dichlorvos	mg/l	LIQUID	0.0001	0.0000006						
Dieldrin	mg/l	LIQUID	0.00003	0.00001						
Diethylphthalate	mg/l	LIQUID	-	0.2						
Dimethoate	mg/l	LIQUID	0.0001	0.00048						
Dimethylphthalate	mg/l	LIQUID	-	-						
Di-N-Butyl Phthalate	mg/l	LIQUID	-	0.008						
Di-N-Octyl Phthalate	mg/l	LIQUID	-	-						
Diphenyl ether	mg/l	LIQUID	-	-						
Diphenylamine	mg/l	LIQUID	-	-						
Dissolved Oxygen Unfixed	mg/l	LIQUID	-	-	5.1	6.6	7.7	1.2	2.1	4.8
Disulfoton	mg/l	LIQUID	-	-						
Diuron	mg/l	LIQUID	0.0001	0.0002						
Endosulfan I	mg/l	LIQUID	0.0001	0.000005						
Endosulfan II	mg/l	LIQUID	0.0001	0.000005						
Endosulfan Sulfate	mg/l	LIQUID	-	-						
Endrin	mg/l	LIQUID	0.0001	0.00001						
EPH >C10-12	mg/l	LIQUID	0.01	-						
EPH >C10-40	mg/l	LIQUID	0.01	-						
EPH >C12-16	mg/l	LIQUID	0.01	-						
EPH >C16-21	mg/l	LIQUID	0.01	-						
EPH >C21-35	mg/l	LIQUID	0.01	-						
EPH >C8-40	mg/l	LIQUID	0.01	-	0.02	0.56	0.07	3.78	0.03	0.11
EPH/TPH >C6-8	mg/l	LIQUID	0.01	-	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000
Ethion	mg/l	LIQUID	-	-						
Ethylbenzene	mg/l	LIQUID	-	0.02	<0.0010	<0.0010	<0.0010	0.004	<0.0010	<0.0010
Ethylparathion	mg/l	LIQUID	-	-						
Etrimphos	mg/l	LIQUID	-	-						
Fenitrothion	mg/l	LIQUID	-	-						
Fenthion	mg/l	LIQUID	-	-						
Fluoranthene	mg/l	LIQUID	-	0.0000063	<0.0000	0.000012	<0.0000	0.00039	<0.0000	<0.0000
Fluorene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	0.0411	<0.0000	<0.0000
Fluroxypyr*	mg/l	LIQUID	-	-						
gamma-hexachlorocyclohexane	mg/l	LIQUID	0.0001	0.00002						
Glyphosate	mg/l	LIQUID	0.0001	0.196						
GRO >C5-10	mg/l	LIQUID	-	-	<0.1000	<0.1000	<0.1000	0.11	<0.1000	<0.1000
GRO >C5-12	mg/l	LIQUID	-	-						
GRO >C7-8	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
GRO >C8-10	mg/l	LIQUID	-	-						
GRO Surrogate % recovery	%	LIQUID	-	-						
Hardness,Calcium as CaCO3	mg/l	LIQUID	-	-						
Hardness,Total as CaC03	mg/l	LIQUID	-	-	476	1400	1460	<109.0000	566	1630
Heptachlor	mg/l	LIQUID	0.00003	2E-10						
Heptachlor Epoxide	mg/l	LIQUID	0.00003	2E-10						
Heptanoic Acid	mg/l	LIQUID	-	-						
Hexachlorobenzene (HCB)	mg/l	LIQUID	-	0.00001						
Hexachlorobutadiene (HCBD)	mg/l	LIQUID	-	0.0001	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorocyclopentadiene	mg/l	LIQUID	-	-						
Hexachloroethane	mg/l	LIQUID	-	-						
Indeno(1,2,3-cd)pyrene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Iron	mg/l	LIQUID	0.2	1	40.3	12	208	12.6	236	233
Isodrin	mg/l	LIQUID	0.0001	0.00001						
Isophorone	mg/l	LIQUID	-	-						
Isopropylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Isoproturon	mg/l	LIQUID	0.0001	0.0003						
Lead	mg/l	LIQUID	0.01	0.008575	<0.0010	0.005	<0.0010	<0.0010	<0.0010	<0.0010
Linuron	mg/l	LIQUID	0.0001	0.0005						
m,p xylenes	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	0.008	<0.0010	<0.0010
Magnesium	mg/l	LIQUID	50	-	30	44	45	<1.0000	86	73
Malathion	mg/l	LIQUID	-	-						
Manganese	mg/l	LIQUID	0.05	0.41	2.857	0.526	3.689	0.342	3.062	4.93
MCPA	mg/l	LIQUID	-	-						
M-Dinitrobenzene	mg/l	LIQUID	-	-						
Mecoprop	mg/l	LIQUID	0.0001	0.018						
Mecoprop (MCPP) (2-(4-chloro-2-methylphenoxy)	mg/l	LIQUID	-	-						
Mercury	mg/l	LIQUID	0.001	0.00007	<0.0000	<0.0000	<0.0000	0	<0.0000	<0.0000
Methabenzthiazuran	mg/l	LIQUID	-	-						
Methiocarb	mg/l	LIQUID	0.0001	0.00001						
Methoxychlor	mg/l	LIQUID	-	-						
Methyl tert-butyl ether (MTBE)	mg/l	LIQUID	-	-						
Methyl tert-pentyl ether	mg/l	LIQUID	-	-						
Methylparathion	mg/l	LIQUID	-	-						
Methylphenols	mg/l	LIQUID	-	0.1						
Mevinphos	mg/l	LIQUID	-	-						
Monlinuran	mg/l	LIQUID	-	-						
Monuron	mg/l	LIQUID	-	-						
Naphthalene1-methyl-	mg/l	LIQUID	-	-						
Napthalene	mg/l	LIQUID	-	0.002	<0.0000	<0.0000	<0.0000	0.804	0.000031	0.000025
n-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel	mg/l	LIQUID	0.02	0.02	0.002	0.009	0.001	0.045	0.002	0.007
Nitrate as N	mg/l	LIQUID	11	-	<0.2000	<0.2000	<0.2000	<0.2000	0.3	<0.2000
Nitrate as NO3	mg/l	LIQUID	-	-						
Nitrite as N	mg/l	LIQUID	0.15	-	<0.0100	0.02	0.02	0.02	<0.0100	0.04
Nitrobenzene	mg/l	LIQUID	-	-						
Nitrogen	mg/l	LIQUID	-	-						
N-Nitroso-Di-N-Propylamine	mg/l	LIQUID	-	-						
N-Nitrosodiphenylamine*	mg/l	LIQUID	-	-						
n-propylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010
o,p - DDE	mg/l	LIQUID	-	-						
o,p - DDT	mg/l	LIQUID	-	-						
o,p - TDE	mg/l	LIQUID	-	-						
o,p-Methoxychlor*	mg/l	LIQUID	-	-						
Ortho Phosphate as PO4	mg/l	LIQUID	-	-						
Orthophosphate*	mg/l	LIQUID	-	-						
Oxygen (Dissolved)	mg/l	LIQUID	-	-						
O-Xylene	mg/l	LIQUID	-	0.03	<0.0010	<0.0010	<0.0010	0.008	<0.0010	<0.0010
p,p - DDT	mg/l	LIQUID	0.0001	0.00001						
PAH,Total	mg/l	LIQUID	-	-	<0.0002	<0.0002	<0.0002	0.941172	<0.0002	<0.0002
P-Dinitrobenzene	mg/l	LIQUID	-	-						
Pendimethalin	mg/l	LIQUID	0.0001	0.0003						
Pentachloronitrobenzene	mg/l	LIQUID	-	-						
Pentachlorophenol (PCP)	mg/l	LIQUID	0.0001	0.0004						
Permethrin	mg/l	LIQUID	0.0001	0.000001						
Permethrin II*	mg/l	LIQUID	-	-						
pH	pH Units	LIQUID	-	-	7	7.1	7.7	11.3	7.6	7.5
Phenanthrene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	0.0084	<0.0000	<0.0000
Phenol	mg/l	LIQUID	0.0005	0.0077						
Phenol	mg/l	LIQUID	-	-						
Phenol (Monohydric)	mg/l	LIQUID	-	-						
Phenol Index	mg/l	LIQUID	-	-	<0.0500	<0.0500	<0.0500	1.21	<0.0500	<0.0500
Phenoxy Acetic acid herbicide: MCPA*	mg/l	LIQUID	-	-						
Phosalone	mg/l	LIQUID	-	-						
Phosphate	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Phosphorous	mg/l	LIQUID	-	-						
Phosphorus as P	mg/l	LIQUID	-	-	0.8	0.6	9	0.4	12.6	11.7
Phosphorus, Total Inorganic	mg/l	LIQUID	-	-						
Pirimiphos-methyl	mg/l	LIQUID	-	-						
Potassium	mg/l	LIQUID	12	-	2	44	37	51	6	16
Prometryne	mg/l	LIQUID	-	-						
Propazine	mg/l	LIQUID	-	-						
Propetamphos	mg/l	LIQUID	-	-						
Propham	mg/l	LIQUID	-	-						
Pyrene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	0.000201	<0.0000	0.000026
Sec-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Selenium	mg/l	LIQUID	0.01	-	<0.0010	0.004	<0.0010	0.005	0.003	0.008
Silvex	mg/l	LIQUID	-	-						
Simazine	mg/l	LIQUID	0.0001	0.001						
Sodium	mg/l	LIQUID	200	-	90	444	795	176	223	307
Solids, Suspended	mg/l	LIQUID	-	-	9220	785	55300	3240	53600	294000
Styrene	mg/l	LIQUID	-	0.05	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate	mg/l	LIQUID	-	-						
Sulphate as SO4	mg/l	LIQUID	250	400	246	2100	2850	151	274	1580
Tecnazene	mg/l	LIQUID	-	-						
Telodrin	mg/l	LIQUID	-	-						
Tentatively Identified Compounds - VOC	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	1.208	<0.0050	<0.0050
Terbutryn	mg/l	LIQUID	0.0001	0.000065						
Tert-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethene	mg/l	LIQUID	0.01	0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Tetrachloromethane (Carbon Tetra Chloride)	mg/l	LIQUID	0.003	0.012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene	mg/l	LIQUID	-	0.074	<0.0010	<0.0010	<0.0010	0.006	<0.0010	<0.0010
Total Alkalinity as CaCO3	mg/l	LIQUID	-	-						
Total BTEX	mg/l	LIQUID	-	-						
Total dissolved solids	mg/l	LIQUID	-	-	897	3630	4570	638	1150	3300
Total hardness	mg/l	LIQUID	-	-						
Total Nitrogen	mg/l	LIQUID	-	-	3	5	32	12	39	24
Total Organic Carbon	mg/l	LIQUID	-	-	9.65	7.68	14.4	35.6	26	30.7
Total suspended solids	mg/l	LIQUID	-	-						
Traidimefon	mg/l	LIQUID	-	-						
trans - Chlordane	mg/l	LIQUID	-	-						
trans-1,2-Dichloroethene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Triallate	mg/l	LIQUID	-	-						
Triazophos	mg/l	LIQUID	-	-						

Max of Normalised Results					Location ID	Asset	Sample Depth														
					BD160-SW001	BD161-CR008	BD161-CR008	BD161-CR010	BD162-SW001	BD163-CR017	BD164-CR003	BD164-CR003	ML155-CR003	ML155-SW001	ML155-SW002	ML156-CP008	ML156-CR012	ML156-SW001	ML156-SW002	ML156-SW003	ML156-SW004
					Coleshill West Viaduct	Coleshill West Viaduct	Coleshill West Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	M42 - M6 Motorway Link West Viaduct	Water Orton Cutting	Water Orton Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Lane Embankment	Bickenhill Embankment	Birmingham Interchange Station	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	0	2	31.78	6.95	0	27.7	4.24	7.75	2.41	0.2	0.2	0	0	0	0	0	0
Tribromomethane	mg/l	LIQUID	0.1	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichloroethene	mg/l	LIQUID	0.01	0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Trichlorofluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Triclopyr	mg/l	LIQUID	-	-																	
Trietazine	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
Trifluralin	mg/l	LIQUID	0.0001	0.00003																	
Trimethylphenol	mg/l	LIQUID	-	-														<0.0005	<0.0005	<0.0005	<0.0005
Trivalent Chromium	mg/l	LIQUID	-	-									<0.0030	0.23	<0.0030						
Vanadium	mg/l	LIQUID	-	0.02	0.003	0.013	0.013	0.02	0.003	0.003	0.006	0.005	<0.0020	0.004	0.004	0.001	0.005	0.000005	0.000004	0.000004	0.000004
Xylene	mg/l	LIQUID	-	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020				<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Xylenols	mg/l	LIQUID	-	-														<0.0005	<0.0005	<0.0005	<0.0005
Zinc	mg/l	LIQUID	5	0.03	0.016	0.003	0.007	0.029	0.011	0.01	0.028	0.024	0.007	0.02	0.008	0.002	0.003	0.000009	0.00001	0.000008	0.000008

Max of Normalised Results																								
					ML156-SW005	ML156-SW006	ML156-SW007	ML156-SW008	ML156-SW009	ML157-CP001	ML157-CP010	ML157-SW001	ML157-SW002	ML158-CP002	ML158-CP007	ML158-CP020	ML158-CP021	ML158-CR018	ML159-CR019	ML159-SW001	ML160-SW002	ML161-CR021	ML162-CR004a	ML162-SW001
					Birmingham Interchange Station	Birmingham Interchange Station	Bickenhill Cutting	Birmingham Interchange Station	Birmingham Interchange Station	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Coleshill No. 1 Embankment	Coleshill No. 3 Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	0	0	0	0	0	0	0	0	0	0.24	6.35	2.83	3.77	3.3	7.72	0	0	28.74	26.29	0
Tribromomethane	mg/l	LIQUID	0.1	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Trichloroethene	mg/l	LIQUID	0.01	0.01	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050	<0.0050	<0.0010
Trichlorofluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010
Triclopyr	mg/l	LIQUID	-	-										<0.0000	0.000042	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Trietazine	mg/l	LIQUID	-	-																				
Trifluralin	mg/l	LIQUID	0.0001	0.00003										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000				
Trimethylphenol	mg/l	LIQUID	-	-								<0.0005	<0.0005											
Trivalent Chromium	mg/l	LIQUID	-	-	0.011	0.0083	0.0085	0.009	0.0096					0.0057	0.0041	0.00562	0.0137	<0.0030	0.045	<0.0030				<0.0030
Vanadium	mg/l	LIQUID	-	0.02	0.0067	0.0053	0.0081	0.0092	0.009	0.001	0.004	0.000003	0.000002	<0.0013	<0.0013	0.00406	0.0171	0.00283	0.0463	<0.0013	0.002	0.001	0.002	0.003
Xylene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
Xylenols	mg/l	LIQUID	-	-								<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				
Zinc	mg/l	LIQUID	5	0.03	0.048	0.054	0.014	0.017	0.02	0.046	0.034	0.000017	0.000022	0.0395	0.0467	0.0591	0.721	0.0839	0.118	0.00464	0.024	<0.0020	0.022	0.016

Max of Normalised Results						
					ML162-SW002	ML163-CR021a
					M42 Coleshill North Viaduct	Lichfield Road Embankment
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	0	3.87
Tribromomethane	mg/l	LIQUID	0.1	-	<0.0010	<0.0010
Trichloroethene	mg/l	LIQUID	0.01	0.01	<0.0010	<0.0050
Trichlorofluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010
Triclopyr	mg/l	LIQUID	-	-		
Trietazine	mg/l	LIQUID	-	-		
Trifluralin	mg/l	LIQUID	0.0001	0.00003		
Trimethylphenol	mg/l	LIQUID	-	-		
Trivalent Chromium	mg/l	LIQUID	-	-	<0.0030	
Vanadium	mg/l	LIQUID	-	0.02	<0.0020	0.001
Xylene	mg/l	LIQUID	-	-		<0.0020
Xylenols	mg/l	LIQUID	-	-		
Zinc	mg/l	LIQUID	5	0.03	0.009	0.004

Max of Normalised Results										
					ML164-CP036	ML164-CR009	ML164-CR029	ML164-CR046a	ND001-CP049	ND001-CR002
					Watton House Embankment	Watten House West Viaduct	Chattle Hill Box Structure	Watten House West Viaduct	Chattle Hill Box Structure	Water Orton No. 3 Viaduct
Determinant Name	Units	Normalised Matrix	UK DW Standards	Environmental Quality Standards (Annual Average, Surface Freshwaters)	8.2	22.7	24.32	2.81	1.94	4.25
Tribromomethane	mg/l	LIQUID	0.1	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichloroethene	mg/l	LIQUID	0.01	0.01	<0.0050	<0.0050	<0.0050	0.007	<0.0050	<0.0050
Trichlorofluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Triclopyr	mg/l	LIQUID	-	-						
Trietazine	mg/l	LIQUID	-	-						
Trifluralin	mg/l	LIQUID	0.0001	0.00003						
Trimethylphenol	mg/l	LIQUID	-	-						
Trivalent Chromium	mg/l	LIQUID	-	-						
Vanadium	mg/l	LIQUID	-	0.02	<0.0010	<0.0010	<0.0010	0.082	0.001	<0.0010
Xylene	mg/l	LIQUID	-	-	<0.0020	<0.0020	<0.0020	0.02	<0.0020	<0.0020
Xylenols	mg/l	LIQUID	-	-						
Zinc	mg/l	LIQUID	5	0.03	0.033	5.484	0.007	0.003	0.036	<0.0020

Chemical Test Results (Soil – TPH Human Health Hazard Index)

A summary of the calculated TPH hazard index is shown below, which was used in the risk assessment.

Max of Normalised Results												
						ML158-CP002	ML158-CP002	ML158-CP005	ML162-CR402	ML162-CR402	ML162-CR402	ML163-CR020
						1.05	3.05	1	0.3	1	3	0.5
						MGR	MGR	MGR	MGR	MGR	MGR	MGR
Determinant Name	Type	Count	Units	PoS Park 1% SOM	Commercial 1% SOM	Packington Embankment	Packington Embankment	Packington Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill Box Structure	Lichfield Road Embankment
Aliphatics & Aromatics >C5-40	TPH Unspec	66	mg/kg	-	-				1000	780	570	
Aliphatics & Aromatics >C5-44	TPH Unspec	10	mg/kg	-	-	1170	5240	1740				
Aliphatics >C10-12	TPH Spec	8	mg/kg	21000	9700	0.678	3.51	0.29	<10	<10	<10	<4
Aliphatics >C12-16	TPH Spec	11	mg/kg	25000	59000	54.6	253	21.3	<10	<10	<10	9.13
Aliphatics >C12-44	TPH Spec	10	mg/kg	-	-	709	3120	635	-	-	-	-
Aliphatics >C16-21	TPH Spec	17	mg/kg	-	-	126	529	67.1	<10	<10	<10	-
Aliphatics >C16-C35	TPH Spec	11	mg/kg	-	-	-	-	-	-	-	-	465
Aliphatics >C21-35	TPH Spec	20	mg/kg	-	-	471	2010	350	47	<10	17	-
Aliphatics >C35-44	TPH Spec	25	mg/kg	450000	1600000	57.1	327	196	85	50	13	277
Aliphatics >C5-6	TPH Spec	4	mg/kg	95000	3200	<0.01	0.0329	0.018	<0.2	<0.2	<0.2	<0.2
Aliphatics >C6-8	TPH Spec	6	mg/kg	150000	7800	0.0242	0.221	0.0504	<0.2	<0.2	<0.2	-
Aliphatics >C8-10	TPH Spec	8	mg/kg	14000	2000	0.352	2.14	0.164	<0.2	<0.2	<0.2	<4
Aliphatics >C8-C44*	TPH Spec	9	mg/kg	-	-	-	-	-	-	-	-	752
Aromatics >C10-12	TPH Spec	6	mg/kg	9200	16000	0.453	2.34	0.194	<10	<10	<10	<4
Aromatics >C12-16	TPH Spec	15	mg/kg	10000	36000	31.8	95.2	10	<10	<10	<10	7.28
Aromatics >C12-44	TPH Spec	10	mg/kg	-	-	462	2110	1100	-	-	-	-
Aromatics >C16-21	TPH Spec	25	mg/kg	7600	28000	94.5	346	88.4	18	<10	<10	50.5
Aromatics >C21-35	TPH Spec	31	mg/kg	7800	28000	282	1400	606	29	36	22	615
Aromatics >C35-44	TPH Spec	17	mg/kg	7800	28000	54.1	267	397	<10	<10	<10	503
Aromatics >C40-44	TPH Spec	10	mg/kg	-	-	18.6	90.6	172	-	-	-	-
Aromatics >C5-7	TPH Spec	0	mg/kg	76000	26000	-	-	-	-	-	-	<0.01
Aromatics >C6-7	TPH Spec	0	mg/kg	-	-	<0.01	<0.01	<0.01	<0.2	<0.2	<0.2	-
Aromatics >C7-8	TPH Spec	2	mg/kg	87000	56000	<0.01	0.0151	<0.01	<0.2	<0.2	<0.2	-
Aromatics >C8-10	TPH Spec	7	mg/kg	7200	3500	0.266	1.55	0.115	<0.2	<0.2	<0.2	<4
Aromatics >C8-C44*	TPH Spec	11	mg/kg	-	-	-	-	-	-	-	-	1180
EPH >C10-40	TPH Spec	5	mg/kg	-	-							
EPH >C8-40	TPH Unspec	163	mg/kg	-	-							2480
Total TPH						1170	5240	1740	1000	780	570	2480
Hazard Quotient PoS(park)												
Aliphatics >C10-12	TPH Spec	8	mg/kg	21000	9700	3.22857E-05	0.000167143	1.38095E-05				
Aliphatics >C12-16	TPH Spec	11	mg/kg	25000	59000	0.002184	0.01012	0.000852				0.0003652
Aliphatics >C12-44	TPH Spec	10	mg/kg	-	-							
Aliphatics >C16-21	TPH Spec	17	mg/kg	-	-							
Aliphatics >C16-C35	TPH Spec	11	mg/kg	-	-							
Aliphatics >C21-35	TPH Spec	20	mg/kg	-	-							
Aliphatics >C35-44	TPH Spec	25	mg/kg	450000	1600000	0.000126889	0.000726667	0.000435556	0.000188889	0.000111111	2.88889E-05	0.000615556
Aliphatics >C5-6	TPH Spec	4	mg/kg	95000	3200		3.46316E-07	1.89474E-07				
Aliphatics >C6-8	TPH Spec	6	mg/kg	150000	7800	1.61333E-07	1.47333E-06	0.000000336				
Aliphatics >C8-10	TPH Spec	8	mg/kg	14000	2000	2.51429E-05	0.000152857	1.17143E-05				
Aliphatics >C8-C44*	TPH Spec	9	mg/kg	-	-							
Aromatics >C10-12	TPH Spec	6	mg/kg	9200	16000	4.92391E-05	0.000254348	2.1087E-05				
Aromatics >C12-16	TPH Spec	15	mg/kg	10000	36000	0.00318	0.00952	0.001				0.000728
Aromatics >C12-44	TPH Spec	10	mg/kg	-	-							
Aromatics >C16-21	TPH Spec	25	mg/kg	7600	28000	0.012434211	0.045526316	0.011631579	0.002368421			0.006644737
Aromatics >C21-35	TPH Spec	31	mg/kg	7800	28000	0.036153846	0.179487179	0.077692308	0.003717949	0.004615385	0.002820513	0.078846154
Aromatics >C35-44	TPH Spec	17	mg/kg	7800	28000	0.006935897	0.034230769	0.050897436				0.064487179
Aromatics >C40-44	TPH Spec	10	mg/kg	-	-							
Aromatics >C5-7	TPH Spec	0	mg/kg	76000	26000							
Aromatics >C6-7	TPH Spec	0	mg/kg	-	-							
Aromatics >C7-8	TPH Spec	2	mg/kg	87000	56000		1.73563E-07					
Aromatics >C8-10	TPH Spec	7	mg/kg	7200	3500	3.69444E-05	0.000215278	1.59722E-05				
Hazard Indices						0.061158616	0.28040255	0.142571987	0.006275259	0.004726496	0.002849402	0.151686826
Hazard Quotient Commercial												
Aliphatics >C10-12	TPH Spec	8	mg/kg	21000	9700	6.98969E-05	0.000361856	2.98969E-05				
Aliphatics >C12-16	TPH Spec	11	mg/kg	25000	59000	0.000925424	0.004288136	0.000361017				0.000154746
Aliphatics >C12-44	TPH Spec	10	mg/kg	-	-							
Aliphatics >C16-21	TPH Spec	17	mg/kg	-	-							
Aliphatics >C16-C35	TPH Spec	11	mg/kg	-	-							

Aliphatics >C21-35	TPH Spec	20	mg/kg	-	-							
Aliphatics >C35-44	TPH Spec	25	mg/kg	450000	1600000	3.56875E-05	0.000204375	0.0001225	0.000053125	0.00003125	0.000008125	0.000173125
Aliphatics >C5-6	TPH Spec	4	mg/kg	95000	3200		1.02813E-05	0.000005625				
Aliphatics >C6-8	TPH Spec	6	mg/kg	150000	7800	3.10256E-06	2.83333E-05	6.46154E-06				
Aliphatics >C8-10	TPH Spec	8	mg/kg	14000	2000	0.000176	0.00107	0.000082				
Aliphatics >C8-C44*	TPH Spec	9	mg/kg	-	-							
Aromatics >C10-12	TPH Spec	6	mg/kg	9200	16000	2.83125E-05	0.00014625	0.000012125				
Aromatics >C12-16	TPH Spec	15	mg/kg	10000	36000	0.000883333	0.002644444	0.000277778				0.000202222
Aromatics >C12-44	TPH Spec	10	mg/kg	-	-							
Aromatics >C16-21	TPH Spec	25	mg/kg	7600	28000	0.003375	0.012357143	0.003157143	0.000642857			0.001803571
Aromatics >C21-35	TPH Spec	31	mg/kg	7800	28000	0.010071429	0.05	0.021642857	0.001035714	0.001285714	0.000785714	0.021964286
Aromatics >C35-44	TPH Spec	17	mg/kg	7800	28000	0.001932143	0.009535714	0.014178571				0.017964286
Aromatics >C40-44	TPH Spec	10	mg/kg	-	-							
Aromatics >C5-7	TPH Spec	0	mg/kg	76000	26000							
Aromatics >C6-7	TPH Spec	0	mg/kg	-	-							
Aromatics >C7-8	TPH Spec	2	mg/kg	87000	56000		2.69643E-07					
Aromatics >C8-10	TPH Spec	7	mg/kg	7200	3500	0.000076	0.000442857	3.28571E-05				
Hazard Indices						0.017576328	0.081089659	0.039908832	0.001731696	0.001316964	0.000793839	0.042262236

ML164-CR029	ML164-TP015	ND001-CP049
3.2	0.05	0.6
MGR	MGR	MGR
Chattle Hill Box Structure	Chattle Hill Box Structure	Chattle Hill Box Structure
<5	<4	<4
<5	28.8	5.13
-	-	-
-	-	-
92	263	127
-	-	-
6.98	19.6	27.8
3.82	<0.2	<0.2
-	-	-
<5	<4	<4
107.7	314	161
<5	<4	<4
22.7	61.4	10
-	-	-
13.5	557	58
337	1920	280
100.7	209	57
-	-	-
<0.01	<0.01	<0.01
-	-	-
-	-	-
5.28	<4	<4
484	2750	409
5840	5350	987
5840	5350	987
	0.001152	0.0002052
1.55111E-05	4.35556E-05	6.17778E-05
4.02105E-05		
0.00227	0.00614	0.001
0.001776316	0.073289474	0.007631579
0.043205128	0.246153846	0.035897436
0.012910256	0.026794872	0.007307692
0.000733333		
0.060950755	0.353573747	0.052103685
	0.000488136	8.69492E-05

4.3625E-06	0.00001225	0.000017375
0.00119375		
0.000630556	0.001705556	0.000277778
0.000482143	0.019892857	0.002071429
0.012035714	0.068571429	0.01
0.003596429	0.007464286	0.002035714
0.001508571		
0.019451525	0.098134513	0.014489245

Groundwater Vapour Results

The groundwater test results and the GAC used in the risk assessment can be found below. Where contaminant concentrations exceed the GAC these are highlighted in red. The original test certificates are presented in the GI Contractors Factual Report.

Max of Normalised Results					Location ID	Asset	Sample Depth														
					BD160-SW001	BD161-CR008	BD161-CR008	BD161-CR010	BD162-SW001	BD163-CR017	BD164-CR003	BD164-CR003	ML155-CR003	ML155-SW001	ML155-SW002	ML156-CP008	ML156-CR012	ML156-SW001	ML156-SW002	ML156-SW003	ML156-SW004
					Coleshill West Viaduct	Coleshill West Viaduct	Coleshill West Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	M42 - M6 Motorway Link West Viaduct	Water Orton Cutting	Water Orton Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Lane Embankment	Bickenhill Embankment	Birmingham Interchange Station	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station
Determinant Name	Units	Normalised Matrix	GACgwvap (Comm)	GACgwvap (Resi)	0	2	31.78	6.95	0	27.7	4.24	7.75	2.41	0.2	0.2	0	0	0	0	0	0
1,1,1,2-Tetrachloroethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,1-Trichloroethane	mg/l	LIQUID	290	3	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/l	LIQUID	150	1.6	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/l	LIQUID	49	0.52	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Biphenyl	mg/l	LIQUID	1300	15		<0.0030	<0.0020														
1,1-Dichloroethane	mg/l	LIQUID	260	2.7	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethene	mg/l	LIQUID	16	0.16	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010				
1,1-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,3 Trichlorobenzene	mg/l	LIQUID	3.1	0.035	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2,3-Trichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,4-Trichlorobenzene	mg/l	LIQUID	7.2	0.068	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2,4-Trimethylbenzene	mg/l	LIQUID	2.2	0.024	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dibromo-3-Chloropropane	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dibromoethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene	mg/l	LIQUID	220	2	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dichloroethane	mg/l	LIQUID	0.85	0.0089	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloropropane	mg/l	LIQUID	2.6	0.022	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3,5 Trichlorobenzene	mg/l	LIQUID	0.66	0.0074	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010						
1,3-Dichlorobenzene	mg/l	LIQUID	2.8	0.031	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/l	LIQUID	460	5	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2-(2,4-Dichlorophenoxy)propionic Acid	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
2,2-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2,3,4,6-Tetrachlorophenol	mg/l	LIQUID	-	-																	
2,3,5,6-Tetrachlorophenol	mg/l	LIQUID	-	-																	
2,4,5-Trichlorophenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/l	LIQUID	-	-																	
2,4,6-Trichlorophenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
2,4-Dichlorophenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
2,4-Dichlorophenoxy Acetic Acid (D)	mg/l	LIQUID	-	-																	
2,4-Dimethylphenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
2,4-Dinitrophenol	mg/l	LIQUID	-	-		<0.0140	<0.0120														
2,4-Dinitrotoluene	mg/l	LIQUID	-	-		<0.0070	<0.0060														
2,6-Dinitrotoluene	mg/l	LIQUID	-	-		<0.0070	<0.0060														
2-Chloronaphthalene	mg/l	LIQUID	14	0.16		<0.0030	<0.0020														
2-Chlorophenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
2-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2-Methyl-4,6-Dinitrophenol	mg/l	LIQUID	-	-		<0.0700	<0.0600														
2-Methylnaphthalene	mg/l	LIQUID	-	-		<0.0030	<0.0020														
2-Methylphenol	mg/l	LIQUID	-	-		<0.0070	<0.0060														
2-Nitroaniline	mg/l	LIQUID	-	-		<0.0070	<0.0060														
2-Nitrophenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
3,3'-Dichlorobenzidine	mg/l	LIQUID	-	-		#VALUE!	#VALUE!														
3/4 Methylphenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
3-Nitroaniline	mg/l	LIQUID	-	-		<0.0070	<0.0060														
4,4-DDE	mg/l	LIQUID	-	-																	
4,4-DDE*	mg/l	LIQUID	-	-																	
4-Bromophenyl Phenyl Ether	mg/l	LIQUID	-	-		<0.0070	<0.0060														
4-Chloro Phenyl Ether	mg/l	LIQUID	-	-		<0.0070	<0.0060														
4-Chloro-3-Methylphenol	mg/l	LIQUID	-	-		<0.0070	<0.0060														
4-Chloroaniline	mg/l	LIQUID	-	-		<0.0070	<0.0060														
4-Chlorophenol	mg/l	LIQUID	-	-		<0.0280	<0.0240														
4-Chlorophenyl Phenyl Ether	mg/l	LIQUID	-	-																	
4-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
4-Isopropyltoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
4-Methylphenol	mg/l	LIQUID	-	-																	
4-Nitroaniline	mg/l	LIQUID	-	-		<0.0070	<0.0060														
4-Nitrophenol	mg/l	LIQUID	-	-		<0.0700	<0.0600														
Acenaphthene	mg/l	LIQUID	15000	170	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	0.000022		<0.0000	<0.0000	<0.0000	0.00001	0.000051	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Acenaphthylene	mg/l	LIQUID	20000	220	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	<0.0000		<0.0000	<0.0000	0.00002	0.00001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Acidity as calcium carbonate	mg/l	LIQUID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!				#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
Aldrin	mg/l	LIQUID	3.7	0.047																	
Aliphatics & Aromatics >C5-35	mg/l	LIQUID	-	-																	
Aliphatics >C10-12	mg/l	LIQUID	3.6	0.037	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.021		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aliphatics >C12-16	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.013		<0.0100	<0.0100	<0.0100	0.02	<0.0100	<0.0100				
Aliphatics >C12-35	mg/l	LIQUID	-	-																	
Aliphatics >C16-21	mg/l	LIQUID	-	-									<0.0100	<0.0100	0.02						
Aliphatics >C16-C35	mg/l	LIQUID	-	-	0.026	0.029	0.03	0.086	0.015	0.612		0.067				0.000019	0.000019				
Aliphatics >C21-35	mg/l	LIQUID	-	-									<0.0100	<0.0100	0.02						
Aliphatics >C35-44	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.019		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aliphatics >C5-12	mg/l	LIQUID	-	-																	
Aliphatics >C5-6	mg/l	LIQUID	190	1.9	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000		<0.1000	<0.0100	<0.0100	<0.0100	<0.1000	<0.1000				
Aliphatics >C6-8	mg/l	LIQUID	150	1.5									<0.0100	<0.0100	<0.0100						
Aliphatics >C8-10	mg/l	LIQUID	5.7	0.057	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aliphatics >C8-C44*	mg/l	LIQUID	-	-	0.035	0.031	0.033	0.097	0.023	0.666		0.07				0.000027	0.000023				
Alkalinity	mg/l	LIQUID	-	-	152	130	128	354	127	489	390	317				332	95	182	186	178	169
Alkalinity-Carbonate as CaCO3	mg/l	LIQUID	-	-									110	190	150						
alpha-Hexachlorocyclohexane	mg/l	LIQUID	-	-																	
Ammoniacal Nitrogen as N	mg/l	LIQUID	-	-	0.12	0.03	0.02	0.04	0.06	10.7	<0.0100	0.01	0.15	<0.0500	0.2	0.21	0.02	0.12	0.11	0.02	0.02
Aniline	mg/l	LIQUID	-	-																	
Anthracene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	<0.0000		<0.0000	<0.0000	0.00001	0.00001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Aromatics >C10-12	mg/l	LIQUID	660	6.8	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aromatics >C12-16	mg/l	LIQUID	3700	39	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100		<0.0100	<0.0100	<0.0100	0.01	<0.0100	<0.0100				
Aromatics >C12-35	mg/l	LIQUID	-	-																	
Aromatics >C16-21	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.041		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aromatics >C21-35	mg/l	LIQUID	-	-	0.011	0.011	0.01	0.043	<0.0100	0.245		0.011	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aromatics >C35-44	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.016		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aromatics >C5-35	mg/l	LIQUID	-	-																	
Aromatics >C5-7	mg/l	LIQUID	20000	210	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050				<0.0050	<0.0050				
Aromatics >C6-7	mg/l	LIQUID	-	-									<0.0100	<0.0100	<0.0100						
Aromatics >C7-8	mg/l	LIQUID	21000	220									<0.0100	<0.0100	<0.0100						
Aromatics >C8-10	mg/l	LIQUID	190	1.9	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				
Aromatics >C8-C44*	mg/l	LIQUID	-	-	0.02	0.017	0.015	0.057	0.011	0.31		0.013				<0.0100	0.000012				
Arsenic	mg/l	LIQUID	-	-	0.003	0.003	0.004	0.006	0.003	0.07	0.002	0.002	0.0003	0.004	0.003	<0.0010	0.006	0.000003	0.000003	0.000003	0.000003
Atrazine	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
Azinphos-ethyl	mg/l	LIQUID	-	-																	
Azinphos-methyl	mg/l	LIQUID	-	-																	
Azobenzene	mg/l	LIQUID	-	-																	
Barium	mg/l	LIQUID	-	-	0.06	0.06	0.06	0.37	0.06	0.36	0.28	0.25	0.052	0.14	0.11	0.16	0.26	0.11	0.11	0.1	0.1
Benzene	mg/l	LIQUID	20	0.21	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.000023	<0.0000	<0.0000		<0.0000	<0.0000	<0.0000	0.00003	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.000011
Benzo(a)anthracene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.000033	<0.0000	<0.0000		<0.0000	0.00001	0.00001	0.00002	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Benzo(a)pyrene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.000017	<0.0000	<0.0000		<0.0000	0.00001	<0.0000	0.00003	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Benzo(b)fluoranthene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.000032	<0.0000	<0.0000		<0.0000	0.00001	0.00001	0.00003	<0.0000	<0.0000	<0.0000	<0.0000	0.000011	0.000016
Benzo(k)fluoranthene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.000012	<0.0000	<0.0000		<0.0000	<0.0000	<0.0000	0.00003	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Benzoic Acid	mg/l	LIQUID	-	-		<0.1400	<0.1200														
Benzyl Alcohol	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Beryllium	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0001	0.00005	<0.0001	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
beta-Hexachlorocyclohexane	mg/l	LIQUID	-	-																	
Bis(2-chloroethoxy)methane	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Bis(2-chloroethyl)ether	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Bis(2-chloroisopropyl)ether	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Bis(2-ethylhexyl)adipate	mg/l	LIQUID	-	-																	
Bis(2-ethylhexyl)phthalate	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Boron	mg/l	LIQUID	-	-	0.21	0.1	0.08	0.17	0.12	0.1	0.17	0.11	0.06	0.06	0.06	0.02	0.04	0.05	0.05	0.03	0.03
Boron*	mg/l	LIQUID	-	-																	
Bromide	mg/l	LIQUID	-	-																	
Bromobenzene	mg/l	LIQUID	20	0.22	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromochloromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromodichloromethane	mg/l	LIQUID	1.6	0.017	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Butylbenzylphthalate	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Butyric Acid (4-(2,4-dichlorophenoxy)-Butanoic acid (DB))	mg/l	LIQUID	-	-																	
Cadmium	mg/l	LIQUID	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.00041	0.00018	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/l	LIQUID	-	-	66	18	18	66	58	45	73	72				78	43	84	83	83	81
Carbazole	mg/l	LIQUID	-	-																	
Carbendazim	mg/l	LIQUID	-	-									<0.0010	<0.0010	<0.0010						
Carbetamide	mg/l	LIQUID	-	-									<0.0010	<0.0010	<0.0010						
Carbon Disulphide	mg/l	LIQUID	5.6	0.056																	
Carbophenothion	mg/l	LIQUID	-	-																	
Chlordane - alpha	mg/l	LIQUID	-	-																	
Chlorfenvinphos	mg/l	LIQUID	-	-																	
Chloridazon*	mg/l	LIQUID	-	-																	
Chloride	mg/l	LIQUID	-	-	32	8	8	15	33	33	24	21				34	22	200	203	213	221
Chlorobenzene	mg/l	LIQUID	15	0.098	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane	mg/l	LIQUID	1000	10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloroethene	mg/l	LIQUID	0.063	0.00062	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	mg/l	LIQUID	85	0.79	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloromethane	mg/l	LIQUID	1.4	0.014	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloropropham	mg/l	LIQUID	-	-																	
Chlorothalonil	mg/l	LIQUID	-	-																	
Chlorpyriphos	mg/l	LIQUID	-	-																	
Chlorpyriphos-methyl*	mg/l	LIQUID	-	-																	
Chlortoluron	mg/l	LIQUID	-	-																	
Chromium	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001	0.23	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium - Hexavalent	mg/l	LIQUID	-	-	<0.0030	<0.0030	<0.0030	0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.004	<0.0030	<0.0100	<0.0100	<0.0100	<0.0100
Chromium (III) Oxide	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010				<0.0010	<0.0010	<0.0100	<0.0100	<0.0100	<0.0100
Chrysene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.000015	<0.0000	<0.0000		<0.0000	0.00001	<0.0000	0.00002	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.000012
cis-1,2-Dichloroethene	mg/l	LIQUID	13	0.13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis1,3-Dichloropropene	mg/l	LIQUID	-	-																	
cis-1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Conductivity- Electrical 20deg	uS/cm	LIQUID	-	-									600	850	930						
Conductivity- Electrical 20deg	mS/cm	LIQUID	-	-																	
Conductivity- Electrical 25deg*	uS/cm	LIQUID	-	-	610	260	265	750	545	1030	830	818									
Conductivity- Electrical 25deg*	µS/cm	LIQUID	-	-												855	554	1270	1190	1290	1210
Copper	mg/l	LIQUID	-	-	0.002	0.004	0.004	0.002	0.003	<0.0010	0.001	0.003	0.0018	0.014	0.0096	<0.0010	<0.0010	0.000002	0.000003	0.000002	0.000003
Coronene	mg/l	LIQUID	-	-		<0.0700	<0.0600														
Cyanazine	mg/l	LIQUID	-	-									<0.0010	<0.0010	<0.0010						
Cyanide	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0500	<0.0500	<0.0500	0.02	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Cyanide Free	mg/l	LIQUID	-	-									<0.0500	<0.0500	<0.0500						

Max of Normalised Results					ML156-SW005	ML156-SW006	ML156-SW007	ML156-SW008	ML156-SW009	ML157-CP001	ML157-CP010	ML157-SW001	ML157-SW002	ML158-CP002	ML158-CP007	ML158-CP020	ML158-CP021	ML158-CR018	ML159-CR019	ML159-SW001	ML160-SW002	ML161-CR021	ML162-CR004a	ML162-SW001	ML162-SW002	ML163-CR021a
					Birmingham Interchange Station	Birmingham Interchange Station	Bickenhill Cutting	Birmingham Interchange Station	Birmingham Interchange Station	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Coleshill No. 1 Embankment	Coleshill No. 3 Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill North Viaduct	Lichfield Road Embankment
Determinant Name	Units	Normalised Matrix	GACgwvap (Comm)	GACgwvap (Resi)	0	0	0	0	0	0	0	0	0	0.24	6.35	2.83	3.77	3.3	7.72	0	0	28.74	26.29	0	0	3.87
1,1,1,2-Tetrachloroethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,1-Trichloroethane	mg/l	LIQUID	290	3	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/l	LIQUID	150	1.6	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/l	LIQUID	49	0.52	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Biphenyl	mg/l	LIQUID	1300	15																						
1,1-Dichloroethane	mg/l	LIQUID	260	2.7	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Dichloroethene	mg/l	LIQUID	16	0.16	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	0.003	<0.0010
1,1-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,3 Trichlorobenzene	mg/l	LIQUID	3.1	0.035	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050	<0.0050			<0.0050
1,2,3-Trichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,4-Trichlorobenzene	mg/l	LIQUID	7.2	0.068	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050	<0.0050			<0.0050
1,2,4-Trimethylbenzene	mg/l	LIQUID	2.2	0.024	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dibromo-3-Chloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0050	<0.0050	<0.0050			<0.0050
1,2-Dibromoethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene	mg/l	LIQUID	220	2	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	<0.0050
1,2-Dichloroethane	mg/l	LIQUID	0.85	0.0089	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloropropane	mg/l	LIQUID	2.6	0.022	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3,5 Trichlorobenzene	mg/l	LIQUID	0.66	0.0074						<0.0010	<0.0010	<0.0010	<0.0010								<0.0010	<0.0010	<0.0010			<0.0010
1,3,5-Trimethylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichlorobenzene	mg/l	LIQUID	2.8	0.031	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/l	LIQUID	460	5	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00012	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2-(2,4-Dichlorophenoxy)propionic Acid	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
2,2-Dichloropropane	mg/l	LIQUID	-	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010								<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2,3,4,6-Tetrachlorophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025																	
2,3,5,6-Tetrachlorophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025																	
2,4,5-Trichlorophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
2,4,6-Trichlorophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
2,4-Dichlorophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
2,4-Dichlorophenoxy Acetic Acid (D)	mg/l	LIQUID	-	-										<0.0000	0.000168	<0.0000	0.000106	0.000073	<0.0000	<0.0000						
2,4-Dimethylphenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
2,4-Dinitrophenol	mg/l	LIQUID	-	-																						
2,4-Dinitrotoluene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
2,6-Dinitrotoluene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
2-Chloronaphthalene	mg/l	LIQUID	14	0.16	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
2-Chlorophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
2-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2-Methyl-4,6-Dinitrophenol	mg/l	LIQUID	-	-																						
2-Methylnaphthalene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
2-Methylphenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
2-Nitroaniline	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
2-Nitrophenol	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
3,3'-Dichlorobenzidine	mg/l	LIQUID	-	-																						
3/4 Methylphenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025																	
3-Nitroaniline	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
4,4-DDE	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
4,4-DDE*	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
4-Bromophenyl Phenyl Ether	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
4-Chloro Phenyl Ether	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
4-Chloro-3-Methylphenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
4-Chloroaniline	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
4-Chlorophenol	mg/l	LIQUID	-	-																						
4-Chlorophenyl Phenyl Ether	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025																	
4-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
4-Isopropyltoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
4-Methylphenol	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
4-Nitroaniline	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
4-Nitrophenol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Acenaphthene	mg/l	LIQUID	15000	170	<0.0000	0.00062	<0.0000	<0.0000	<0.0000	<0.0000	0.000013	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	0.000952	<0.0000	0.00001	0.0001	<0.0000
Acenaphthylene	mg/l	LIQUID	20000	220	<0.0000	0.0011	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	0.000061	<0.0000	0.00001	<0.0001	<0.0000
Acidity as calcium carbonate	mg/l	LIQUID	-	-						2	#VALUE!	#VALUE!	#VALUE!								#VALUE!	#VALUE!	#VALUE!			#VALUE!
Aldrin	mg/l	LIQUID	3.7	0.047										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Aliphatics & Aromatics >C5-35	mg/l	LIQUID	-	-	<0.0100	0.11	<0.0100	<0.0100	<0.0100					1.47	1.51	0.827	0.033	0.031	0.137	<0.0100						
Aliphatics >C10-12	mg/l	LIQUID	3.6	0.037	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100			<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C12-16	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100			0.014	0.062	0.052	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C12-35	mg/l	LIQUID	-	-										0.789	1.18	0.67	0.019	0.028	0.137	<0.0100						
Aliphatics >C16-21	mg/l	LIQUID	-	-	<0.0010	0.0067	<0.0010	<0.0010	<0.0010					0.11	0.023	0.013	<0.0100	<0.0100	<0.0100	<0.0100				<0.0100	0.02	
Aliphatics >C16-C35	mg/l	LIQUID	-	-						<0.0100	<0.0100										0.038	0.051	0.037			0.023
Aliphatics >C21-35	mg/l	LIQUID	-	-	<0.0010	0.058	<0.0010	<0.0010	<0.0010					0.665	1.09	0.605	0.019	0.028	0.137	<0.0100				0.02	0.02	
Aliphatics >C35-44	mg/l	LIQUID	-	-						<0.0100	<0.0100										<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C5-12	mg/l	LIQUID	-	-	<0.0100	0.065	<0.0100	<0.0100	<0.0100																	
Aliphatics >C5-6	mg/l	LIQUID	190	1.9	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.1000	<0.1000			<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.1000	<0.1000	<0.1000	<0.0100	<0.0100	<0.1000
Aliphatics >C6-8	mg/l	LIQUID	150	1.5	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				<0.0100	<0.0100	
Aliphatics >C8-10	mg/l	LIQUID	5.7	0.057	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0100	<0.0100			<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C8-C44*	mg/l	LIQUID	-	-						<0.0100	<0.0100										0.05	0.064	0.044			0.031
Alkalinity	mg/l	LIQUID	-	-						2610	165	39	70								47	3370	237			362
Alkalinity-Carbonate as CaCO3	mg/l	LIQUID	-	-																				190	120	
alpha-Hexachlorocyclohexane	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Ammoniacal Nitrogen as N	mg/l	LIQUID	-	-	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	0.1	0.02	<0.0100	0.02	0.78	1.85	<0.2000	0.674	<0.2000	<0.2000	0.562	0.04	0.08	0.08	0.13	0.45	0.11
Aniline	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025																	
Anthracene	mg/l	LIQUID	-	-	<0.0000	0.00096	0.00005	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	0.000029	<0.0000	0.00001	0.0001	<0.0000
Aromatics >C10-12	mg/l	LIQUID	660	6.8	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100			<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.026	<0.0100	<0.0100	<0.0100	<0.0100
Aromatics >C12-16	mg/l	LIQUID	3700	39	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100			<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aromatics >C12-35	mg/l	LIQUID	-	-										0.682	0.332	0.154	<0.0100	<0.0100	<0.0100	<0.0100						
Aromatics >C16-21	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100			0.088	0.036	0.013	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aromatics >C21-35	mg/l	LIQUID	-	-	<0.0010	0.048	<0.0010	<0.0010	<0.0010	<0.0100	<0.0100			0.594	0.296	0.141	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.015	<0.0100	<0.0100	0.012
Aromatics >C35-44	mg/l	LIQUID	-	-						<0.0100	<0.0100										<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aromatics >C5-35	mg/l	LIQUID	-	-	<0.0100	0.048	<0.0100	<0.0100	<0.0100																	
Aromatics >C5-7	mg/l	LIQUID	20000	210	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050										<0.0050	<0.0050	<0.0050			<0.0050
Aromatics >C6-7	mg/l	LIQUID	-	-										<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				<0.0100	<0.0100	
Aromatics >C7-8	mg/l	LIQUID	21000	220	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100				<0.0100	<0.0100	
Aromatics >C8-10	mg/l	LIQUID	190	1.9	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0100	<0.0100			<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aromatics >C8-C44*	mg/l	LIQUID	-	-						0.000011	<0.0100										<0.0100	0.04	0.019			0.02
Arsenic	mg/l	LIQUID	-	-	0.0047	0.003	0.004	0.0041	0.004	0.001	<0.0010	<0.0010	<0.0010	0.00169	0.00134	0.00175	0.0117	0.00184	0.00894	0.000888	0.001	0.001	0.005	0.0025	0.0017	0.001
Atrazine	mg/l	LIQUID	-	-										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001						
Azinphos-ethyl	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Azinphos-methyl	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Azobenzene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Barium	mg/l	LIQUID	-	-	0.19	0.21	0.085	0.075	0.08	0.33	0.12	0.09	0.13	0.121	0.101	0.198	0.992	0.0521	0.474	0.0178	0.03	0.08	0.11	0.075	0.1	0.06
Benzene	mg/l	LIQUID	20	0.21	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/l	LIQUID	-	-	<0.0000	0.01	0.00043	<0.0000	0.00012	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	0.00002	<0.0000	<0.0000	0.00001	<0.0001	<0.0000
Benzo(a)anthracene	mg/l	LIQUID	-	-	<0.0000	0.0056	0.00034	<0.0000	0.00006	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	<0.0000	<0.0000	0.00001	0.0001	<0.0000
Benzo(a)pyrene	mg/l	LIQUID	-	-	<0.0000	0.0081	0.00054	<0.0000	0.0001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	0.000017	<0.0000	<0.0000	0.00001	<0.0001	<0.0000
Benzo(b)fluoranthene	mg/l	LIQUID	-	-	<0.0000	0.013	0.001	<0.0000	0.00016	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	0.000019	<0.0000	<0.0000	0.00001	<0.0001	<0.0000
Benzo(k)fluoranthene	mg/l	LIQUID	-	-	<0.0000	0.0073	0.00031	<0.0000	0.00007	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	<0.0000	<0.0000	0.00001	<0.0001	<0.0000
Benzoic Acid	mg/l	LIQUID	-	-																						
Benzyl Alcohol	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025																	
Beryllium	mg/l	LIQUID	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0100	<0.0100	<0.0100	<0.0100	<0.0001	<0.0001	0.00072	0.0185	0.0002	0.00407	<0.0001	<0.0100	<0.0100	<0.0100	<0.0001	<0.0001	<0.0100
beta-Hexachlorocyclohexane	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Bis(2-chloroethoxy)methane	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Bis(2-chloroethyl)ether	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Bis(2-chloroisopropyl)ether	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025																	
Bis(2-ethylhexyl)adipate	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025																	
Bis(2-ethylhexyl)phthalate	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0020	<0.0020	<0.0080	<0.0020	0.00575	<0.0080	<0.0020						
Boron	mg/l	LIQUID	-	-	0.096	0.099				0.19	0.11	<0.0100	0.15	0.0813	0.197	0.038	0.242	0.0859	<0.0300	0.0539	<0.1000	0.43	0.16	0.18	0.1	0.18
Boron*	mg/l	LIQUID	-	-			0.054	0.051	0.057																	
Bromide	mg/l	LIQUID	-	-																<0.0600						
Bromobenzene	mg/l	LIQUID	20	0.22	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromochloromethane	mg/l	LIQUID	-	-	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromodichloromethane	mg/l	LIQUID	1.6	0.017	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050								<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	<0.0050
Butylbenzylphthalate	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Butyric Acid (4-(2,4-dichlorophenoxy)-Butanoic acid (DB))	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Cadmium	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.0006	<0.0001	0.0000001	0.0000002	0.00025	0.000402	0.0000977	0.00321	0.000196	0.000533	<0.0001	<0.0001	<0.0001	<0.0001	0.00003	0.00007	<0.0001
Calcium	mg/l	LIQUID	-	-	83	80	56	58	64	117	106	44	71	94.9	286	105	880	47.2	50.6	20.2	16	549	199	82	57	441
Carbazole	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Carbendazim	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Carbetamide	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Carbon Disulphide	mg/l	LIQUID	5.6	0.056																				<0.0200	<0.0200	
Carbophenothion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Chlordane - alpha	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Chlorfenvinphos	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Chloridazon*	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Chloride	mg/l	LIQUID	-	-	220	220	210	200	210	26	20	24	35	18	20.4	14.9	186	198	37.7	35.9	92	39	20			23
Chlorobenzene	mg/l	LIQUID	15	0.098	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane	mg/l	LIQUID	1000	10	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	<0.0050
Chloroethene	mg/l	LIQUID	0.063	0.00062	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroform	mg/l	LIQUID	85	0.79	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	0.00014	<0.0001	0.00025	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloromethane	mg/l	LIQUID	1.4	0.014	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010								<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloropropham	mg/l	LIQUID	-	-										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001						
Chlorothalonil	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Chlorpyriphos	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Chlorpyriphos-methyl*	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Chlortoluron	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Chromium	mg/l	LIQUID	-	-						<0.0010	<0.0010	0.000002	0.000001	0.0057	0.0041	0.00562	0.0169	<0.0012	0.045	<0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium - Hexavalent	mg/l	LIQUID	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0100	<0.0100	<0.0030	<0.0030	<0.0030	0.00321	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LIQUID	-	-						<0.0010	<0.0010	<0.0100	<0.0100								<0.0010	<0.0010	<0.0010			<0.0010
Chrysene	mg/l	LIQUID	-	-	<0.0000	0.01	0.00048	<0.0000	0.0001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	<0.0000	<0.0000	0.00001	0.0001	<0.0000
cis-1,2-Dichloroethene	mg/l	LIQUID	13	0.13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010																	
cis-1,3-Dichloropropene	mg/l	LIQUID	-	-						<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Conductivity- Electrical 20deg	uS/cm	LIQUID	-	-	1060	1070	941	958	984															800	550	
Conductivity- Electrical 20deg	mS/cm	LIQUID	-	-										0.569	1.23	0.555	1.27	0.896	0.502	0.27						
Conductivity- Electrical 25deg*	uS/cm	LIQUID	-	-																	448	3520	1310			3630
Conductivity- Electrical 25deg*	µS/cm	LIQUID	-	-						750	557	354	517													
Copper	mg/l	LIQUID	-	-	0.0051	0.0034	0.0039	0.0044	0.0036	0.009	0.008	0.000006	0.000006	0.0511	0.0053	0.0092	0.21	0.00761	0.0708	<0.0009	0.007	<0.0010	0.003	0.0042	0.0032	0.002
Coronene	mg/l	LIQUID	-	-																						
Cyanazine	mg/l	LIQUID	-	-																						
Cyanide	mg/l	LIQUID	-	-	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<0.0200	<0.0200	<0.0200	<0.0200	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	0.00003	<0.0000	<0.0000	<0.0500	<0.0500	<0.0000
Cyanide Free	mg/l	LIQUID	-	-	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200					<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500				<0.0500	<0.0500	

Max of Normalised Results										
					ML164-CP036	ML164-CR009	ML164-CR029	ML164-CR046a	ND001-CP049	ND001-CR002
					Watton House Embankment	Watten House West Viaduct	Chattle Hill Box Structure	Watten House West Viaduct	Chattle Hill Box Structure	Water Orton No. 3 Viaduct
Determinant Name	Units	Normalised Matrix	GACgwvap (Comm)	GACgwvap (Resi)	8.2	22.7	24.32	2.81	1.94	4.25
1,1,1,2-Tetrachloroethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,1-Trichloroethane	mg/l	LIQUID	290	3	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-Tetrachloroethane	mg/l	LIQUID	150	1.6	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-Trichloroethane	mg/l	LIQUID	49	0.52	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-Biphenyl	mg/l	LIQUID	1300	15						
1,1-Dichloroethane	mg/l	LIQUID	260	2.7	<0.0010	<0.0010	<0.0010	0.003	<0.0010	<0.0010
1,1-Dichloroethene	mg/l	LIQUID	16	0.16	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010
1,1-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,3 Trichlorobenzene	mg/l	LIQUID	3.1	0.035	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2,3-Trichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2,4-Trichlorobenzene	mg/l	LIQUID	7.2	0.068	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2,4-Trimethylbenzene	mg/l	LIQUID	2.2	0.024	<0.0010	<0.0010	<0.0010	0.012	<0.0010	<0.0010
1,2-Dibromo-3-Chloropropane	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dibromoethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichlorobenzene	mg/l	LIQUID	220	2	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-Dichloroethane	mg/l	LIQUID	0.85	0.0089	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-Dichloropropane	mg/l	LIQUID	2.6	0.022	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3,5 Trichlorobenzene	mg/l	LIQUID	0.66	0.0074	<0.0010	<0.0010	<0.0010	0.003	<0.0010	<0.0010
1,3,5-Trimethylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0030	<0.0010	<0.0010
1,3-Dichlorobenzene	mg/l	LIQUID	2.8	0.031	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,4-Dichlorobenzene	mg/l	LIQUID	460	5	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2-(2,4-Dichlorophenoxy)propionic Acid	mg/l	LIQUID	-	-						
2,2-Dichloropropane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2,3,4,6-Tetrachlorophenol	mg/l	LIQUID	-	-						
2,3,5,6-Tetrachlorophenol	mg/l	LIQUID	-	-						
2,4,5-Trichlorophenol	mg/l	LIQUID	-	-						
2,4,5-Trichlorophenoxy Acetic Acid (T)	mg/l	LIQUID	-	-						
2,4,6-Trichlorophenol	mg/l	LIQUID	-	-						
2,4-Dichlorophenol	mg/l	LIQUID	-	-						
2,4-Dichlorophenoxy Acetic Acid (D)	mg/l	LIQUID	-	-						
2,4-Dimethylphenol	mg/l	LIQUID	-	-						
2,4-Dinitrophenol	mg/l	LIQUID	-	-						
2,4-Dinitrotoluene	mg/l	LIQUID	-	-						
2,6-Dinitrotoluene	mg/l	LIQUID	-	-						
2-Chloronaphthalene	mg/l	LIQUID	14	0.16						
2-Chlorophenol	mg/l	LIQUID	-	-						
2-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
2-Methyl-4,6-Dinitrophenol	mg/l	LIQUID	-	-						
2-Methylnaphthalene	mg/l	LIQUID	-	-						
2-Methylphenol	mg/l	LIQUID	-	-						
2-Nitroaniline	mg/l	LIQUID	-	-						
2-Nitrophenol	mg/l	LIQUID	-	-						
3,3'-Dichlorobenzidine	mg/l	LIQUID	-	-						
3/4 Methylphenol	mg/l	LIQUID	-	-						
3-Nitroaniline	mg/l	LIQUID	-	-						
4,4-DDE	mg/l	LIQUID	-	-						
4,4-DDE*	mg/l	LIQUID	-	-						
4-Bromophenyl Phenyl Ether	mg/l	LIQUID	-	-						
4-Chloro Phenyl Ether	mg/l	LIQUID	-	-						
4-Chloro-3-Methylphenol	mg/l	LIQUID	-	-						
4-Chloroaniline	mg/l	LIQUID	-	-						
4-Chlorophenol	mg/l	LIQUID	-	-						
4-Chlorophenyl Phenyl Ether	mg/l	LIQUID	-	-						
4-Chlorotoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
4-Isopropyltoluene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
4-Methylphenol	mg/l	LIQUID	-	-						
4-Nitroaniline	mg/l	LIQUID	-	-						
4-Nitrophenol	mg/l	LIQUID	-	-						
Acenaphthene	mg/l	LIQUID	15000	170	<0.0000	<0.0000	<0.0000	0.0806	<0.0000	<0.0000
Acenaphthylene	mg/l	LIQUID	20000	220	<0.0000	<0.0000	<0.0000	0.00462	<0.0000	<0.0000
Acidity as calcium carbonate	mg/l	LIQUID	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
Aldrin	mg/l	LIQUID	3.7	0.047						
Aliphatics & Aromatics >C5-35	mg/l	LIQUID	-	-						
Aliphatics >C10-12	mg/l	LIQUID	3.6	0.037	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C12-16	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C12-35	mg/l	LIQUID	-	-						
Aliphatics >C16-21	mg/l	LIQUID	-	-						
Aliphatics >C16-C35	mg/l	LIQUID	-	-	<0.0100	0.301	0.1	0.023	0.022	0.035
Aliphatics >C21-35	mg/l	LIQUID	-	-						
Aliphatics >C35-44	mg/l	LIQUID	-	-	<0.0100	0.017	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C5-12	mg/l	LIQUID	-	-						
Aliphatics >C5-6	mg/l	LIQUID	190	1.9	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000
Aliphatics >C6-8	mg/l	LIQUID	150	1.5						
Aliphatics >C8-10	mg/l	LIQUID	5.7	0.057	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aliphatics >C8-C44*	mg/l	LIQUID	-	-	0.017	0.324	0.112	0.027	0.026	0.041
Alkalinity	mg/l	LIQUID	-	-	126	93	87	242	2070	478
Alkalinity-Carbonate as CaCO3	mg/l	LIQUID	-	-						
alpha-Hexachlorocyclohexane	mg/l	LIQUID	-	-						
Ammoniacal Nitrogen as N	mg/l	LIQUID	-	-	0.18	0.6	0.5	3.4	<0.0100	0.14
Aniline	mg/l	LIQUID	-	-						
Anthracene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	0.00174	<0.0000	<0.0000
Aromatics >C10-12	mg/l	LIQUID	660	6.8	<0.0100	<0.0100	<0.0100	0.709	<0.0100	<0.0100
Aromatics >C12-16	mg/l	LIQUID	3700	39	<0.0100	<0.0100	<0.0100	1.39	<0.0100	<0.0100
Aromatics >C12-35	mg/l	LIQUID	-	-						
Aromatics >C16-21	mg/l	LIQUID	-	-	<0.0100	0.015	<0.0100	0.123	0.018	0.022
Aromatics >C21-35	mg/l	LIQUID	-	-	<0.0100	0.156	0.053	0.052	<0.0100	<0.0100
Aromatics >C35-44	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Aromatics >C5-35	mg/l	LIQUID	-	-						
Aromatics >C5-7	mg/l	LIQUID	20000	210	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aromatics >C6-7	mg/l	LIQUID	-	-						
Aromatics >C7-8	mg/l	LIQUID	21000	220						
Aromatics >C8-10	mg/l	LIQUID	190	1.9	<0.0100	<0.0100	<0.0100	0.066	<0.0100	<0.0100
Aromatics >C8-C44*	mg/l	LIQUID	-	-	<0.0100	0.183	0.064	2.34	0.023	0.025
Arsenic	mg/l	LIQUID	-	-	<0.0010	0.001	<0.0010	0.01	0.005	0.001
Atrazine	mg/l	LIQUID	-	-						
Azinphos-ethyl	mg/l	LIQUID	-	-						
Azinphos-methyl	mg/l	LIQUID	-	-						
Azobenzene	mg/l	LIQUID	-	-						
Barium	mg/l	LIQUID	-	-	0.18	0.03	0.04	0.06	0.07	0.05
Benzene	mg/l	LIQUID	20	0.21	<0.0010	<0.0010	<0.0010	0.002	<0.0010	<0.0010
Benzo (g,h,i) perylene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Benzo(a)anthracene	mg/l	LIQUID	-	-	<0.0000	0.000016	0.000016	0.000038	<0.0000	<0.0000
Benzo(a)pyrene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Benzo(b)fluoranthene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	0.000012	<0.0000	<0.0000
Benzo(k)fluoranthene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Benzoic Acid	mg/l	LIQUID	-	-						
Benzyl Alcohol	mg/l	LIQUID	-	-						
Beryllium	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
beta-Hexachlorocyclohexane	mg/l	LIQUID	-	-						
Bis(2-chloroethoxy)methane	mg/l	LIQUID	-	-						
Bis(2-chloroethyl)ether	mg/l	LIQUID	-	-						
Bis(2-chloroisopropyl)ether	mg/l	LIQUID	-	-						
Bis(2-ethylhexyl)adipate	mg/l	LIQUID	-	-						
Bis(2-ethylhexyl)phthalate	mg/l	LIQUID	-	-						
Boron	mg/l	LIQUID	-	-	0.29	0.91	0.7	0.08	0.26	0.36
Boron*	mg/l	LIQUID	-	-						
Bromide	mg/l	LIQUID	-	-						
Bromobenzene	mg/l	LIQUID	20	0.22	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromochloromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromodichloromethane	mg/l	LIQUID	1.6	0.017	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bromomethane	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Butylbenzylphthalate	mg/l	LIQUID	-	-						
Butyric Acid (4-(2,4-dichlorophenoxy)-Butanoic acid (DB))	mg/l	LIQUID	-	-						
Cadmium	mg/l	LIQUID	-	-	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/l	LIQUID	-	-	141	490	510	42	85	534
Carbazole	mg/l	LIQUID	-	-						
Carbendazim	mg/l	LIQUID	-	-						
Carbetamide	mg/l	LIQUID	-	-						
Carbon Disulphide	mg/l	LIQUID	5.6	0.056						
Carbophenothion	mg/l	LIQUID	-	-						
Chlordane - alpha	mg/l	LIQUID	-	-						
Chlorfenvinphos	mg/l	LIQUID	-	-						
Chloridazon*	mg/l	LIQUID	-	-						
Chloride	mg/l	LIQUID	-	-	166	127	205	45	212	74
Chlorobenzene	mg/l	LIQUID	15	0.098	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloroethane	mg/l	LIQUID	1000	10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chloroethene	mg/l	LIQUID	0.063	0.00062	<0.0010	0.003	0.003	0.008	<0.0010	<0.0010
Chloroform	mg/l	LIQUID	85	0.79	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010
Chloromethane	mg/l	LIQUID	1.4	0.014	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chloropropham	mg/l	LIQUID	-	-						
Chlorothalonil	mg/l	LIQUID	-	-						
Chlorpyriphos	mg/l	LIQUID	-	-						
Chlorpyriphos-methyl*	mg/l	LIQUID	-	-						
Chlortoluron	mg/l	LIQUID	-	-						
Chromium	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium - Hexavalent	mg/l	LIQUID	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Chromium (III) Oxide	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chrysene	mg/l	LIQUID	-	-	<0.0000	0.000014	<0.0000	0.000021	<0.0000	<0.0000
cis-1,2-Dichloroethene	mg/l	LIQUID	13	0.13	<0.0010	<0.0010	<0.0010	0.044	<0.0010	<0.0010
cis1,3-Dichloropropene	mg/l	LIQUID	-	-						
cis-1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Conductivity- Electrical 20deg	uS/cm	LIQUID	-	-						
Conductivity- Electrical 20deg	mS/cm	LIQUID	-	-						
Conductivity- Electrical 25deg*	uS/cm	LIQUID	-	-	1230	4180	5290	1050	1860	3640
Conductivity- Electrical 25deg*	µS/cm	LIQUID	-	-						
Copper	mg/l	LIQUID	-	-	<0.0010	0.000001	<0.0010	0.002	<0.0010	<0.0010
Coronene	mg/l	LIQUID	-	-						
Cyanazine	mg/l	LIQUID	-	-						
Cyanide	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Cyanide Free	mg/l	LIQUID	-	-						

Max of Normalised Results					Location ID	Asset	Sample Depth														
					BD160-SW001	BD161-CR008	BD161-CR008	BD161-CR010	BD162-SW001	BD163-CR017	BD164-CR003	BD164-CR003	ML155-CR003	ML155-SW001	ML155-SW002	ML156-CP008	ML156-CR012	ML156-SW001	ML156-SW002	ML156-SW003	ML156-SW004
					Coleshill West Viaduct	Coleshill West Viaduct	Coleshill West Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	M42 - M6 Motorway Link West Viaduct	Water Orton Cutting	Water Orton Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Lane Embankment	Bickenhill Embankment	Birmingham Interchange Station	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station
Determinant Name	Units	Normalised Matrix	GACgwvap (Comm)	GACgwvap (Resi)	0	2	31.78	6.95	0	27.7	4.24	7.75	2.41	0.2	0.2	0	0	0	0	0	0
Cyanide Free as CN	mg/l	LIQUID	-	-	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200				<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Cypermethrin	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
Diazinon	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
Dibenz-a-h-anthracene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	<0.0000		<0.0000	<0.0000	<0.0000	0.00001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Dibenzofuran	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Dibromochloromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dibromomethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dichlorodifluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dichloromethane	mg/l	LIQUID	370	3.3									<0.0500	<0.0500	<0.0500						
Dichlorvos	mg/l	LIQUID	-	-																	
Dieldrin	mg/l	LIQUID	-	-																	
Diethylphthalate	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Dimethoate	mg/l	LIQUID	-	-																	
Dimethylphthalate	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Di-N-Butyl Phthalate	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Di-N-Octyl Phthalate	mg/l	LIQUID	-	-		<0.0030	<0.0020														
Diphenyl ether	mg/l	LIQUID	-	-		<0.0030	<0.0020														
Diphenylamine	mg/l	LIQUID	-	-																	
Dissolved Oxygen Unfixed	mg/l	LIQUID	-	-	5.8	6.4	6.6	6.2	5.2	0.5	8.9	5.6				2.4	6	10.2	10.3	10.5	10.3
Disulfoton	mg/l	LIQUID	-	-																	
Diuron	mg/l	LIQUID	-	-																	
Endosulfan I	mg/l	LIQUID	590	7.4																	
Endosulfan II	mg/l	LIQUID	600	7.5																	
Endosulfan Sulfate	mg/l	LIQUID	-	-																	
Endrin	mg/l	LIQUID	-	-																	
EPH >C10-12	mg/l	LIQUID	-	-												<0.0100	<0.0100				
EPH >C10-40	mg/l	LIQUID	-	-																	
EPH >C12-16	mg/l	LIQUID	-	-												0.031	<0.0100				
EPH >C16-21	mg/l	LIQUID	-	-												0.022	<0.0100				
EPH >C21-35	mg/l	LIQUID	-	-												0.022	0.045				
EPH >C8-40	mg/l	LIQUID	-	-	0.08	0.06	0.07	0.04	0.06	1.09	0.03	0.06				0.09	0.06	0.04	0.04	0.05	0.06
EPH/TPH >C6-8	mg/l	LIQUID	-	-	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000		<0.1000				<0.1000	<0.1000				
Ethion	mg/l	LIQUID	-	-																	
Ethylbenzene	mg/l	LIQUID	960	10	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ethylparathion	mg/l	LIQUID	-	-																	
Etrimphos	mg/l	LIQUID	-	-																	
Fenitrothion	mg/l	LIQUID	-	-																	
Fenthion	mg/l	LIQUID	-	-																	
Fluoranthene	mg/l	LIQUID	-	-	0.000011	<0.0030	<0.0020	0.000016	<0.0000	<0.0000		<0.0000	0.00002	0.00001	0.00005	<0.0000	<0.0000	<0.0000	<0.0000	0.000014	0.000019
Fluorene	mg/l	LIQUID	18000	210	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	0.000034		<0.0000	<0.0000	<0.0000	0.00001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Fluroxypyr*	mg/l	LIQUID	-	-																	
gamma-hexachlorocyclohexane	mg/l	LIQUID	-	-																	
Glyphosate	mg/l	LIQUID	-	-																	
GRO >C5-10	mg/l	LIQUID	-	-	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000		<0.1000				<0.1000	<0.1000				
GRO >C5-12	mg/l	LIQUID	-	-																	
GRO >C7-8	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050				<0.0050	<0.0050				
GRO >C8-10	mg/l	LIQUID	-	-												<0.0100	<0.0100				
GRO Surrogate % recovery	%	LIQUID	-	-																	
Hardness,Calcium as CaCO3	mg/l	LIQUID	-	-																	
Hardness,Total as CaC03	mg/l	LIQUID	-	-	264	78	78	437	235	413	438	439				487	272	362	368	351	342
Heptachlor	mg/l	LIQUID	-	-																	
Heptachlor Epoxide	mg/l	LIQUID	-	-																	
Heptanoic Acid	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Hexachlorobenzene (HCB)	mg/l	LIQUID	1.4	0.016																	
Hexachlorobutadiene (HCBD)	mg/l	LIQUID	0.23	0.0017	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorocyclopentadiene	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Hexachloroethane	mg/l	LIQUID	0.74	0.0085		<0.0070	<0.0060														
Indeno(1,2,3-cd)pyrene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	0.00002	<0.0000	<0.0000		<0.0000	<0.0000	<0.0000	0.00003	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.000011
Iron	mg/l	LIQUID	-	-	0.58			55.2	0.64	7.57	57.6	27	0.04	0.11	0.08			0.19	0.28	0.21	0.1
Isodrin	mg/l	LIQUID	-	-																	
Isophorone	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Isopropylbenzene	mg/l	LIQUID	86	0.85	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Isoproturon	mg/l	LIQUID	-	-																	
Lead	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0003	0.0051	0.0005	<0.0010	<0.0010	<0.0010	0.000001	<0.0010	<0.0010
Linuron	mg/l	LIQUID	-	-																	
m,p xylenes	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	mg/l	LIQUID	-	-	24	8	8	66	22	73	62	63				71	40	37	39	35	34
Malathion	mg/l	LIQUID	-	-																	
Manganese	mg/l	LIQUID	-	-	0.069			1.077	0.088	0.333	0.926	0.412	0.31	0.003	0.001			0.000018	0.000023	0.00002	0.00001
MCPA	mg/l	LIQUID	-	-																	
M-Dinitrobenzene	mg/l	LIQUID	-	-																	
Mecoprop	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
Mecoprop (MCPP) (2-(4-chloro-2-methylphenoxy)	mg/l	LIQUID	-	-																	
Mercury	mg/l	LIQUID	0.095	0.0011	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0001	0.00008	0.00006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Methabenzthiazuran	mg/l	LIQUID	-	-																	
Methiocarb	mg/l	LIQUID	-	-																	
Methoxychlor	mg/l	LIQUID	-	-																	
Methyl tert-butyl ether (MTBE)	mg/l	LIQUID	7800	83									<0.0010	<0.0010	<0.0010						
Methyl tert-pentyl ether	mg/l	LIQUID	-	-									<0.0010	<0.0010	<0.0010						
Methylparathion	mg/l	LIQUID	-	-																	
Methylphenols	mg/l	LIQUID	-	-														<0.0005	<0.0005	<0.0005	<0.0005
Mevinphos	mg/l	LIQUID	-	-																	
Monlinuran	mg/l	LIQUID	-	-																	
Monuron	mg/l	LIQUID	-	-																	
Naphthalene1-methyl-	mg/l	LIQUID	-	-		<0.0030	<0.0020														
Napthalene	mg/l	LIQUID	23	0.22	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	0.000234		<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
n-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel	mg/l	LIQUID	-	-	0.002	0.001	0.001	0.003	0.002	0.005	<0.0010	0.002	0.003	0.011	0.003	0.004	<0.0010	0.000002	0.000002	0.000002	0.000002
Nitrate as N	mg/l	LIQUID	-	-	2.2	<0.2000	<0.2000	0.3	2.1	<0.2000	22.9	19.2	4.3	6.5	8.7	4	30.2	3.8	4	3.1	3.1
Nitrate as NO3	mg/l	LIQUID	-	-																	
Nitrite as N	mg/l	LIQUID	-	-	0.04	<0.0100	<0.0100	<0.0100	0.03	<0.0100	<0.0100	0.09	<0.1000	<0.1000	<0.1000	1.06	0.01	0.02	0.02	0.01	0.01
Nitrobenzene	mg/l	LIQUID	-	-		<0.0070	<0.0060														
Nitrogen	mg/l	LIQUID	-	-																	
N-Nitroso-Di-N-Propylamine	mg/l	LIQUID	-	-		<0.0070	<0.0060														
N-Nitrosodiphenylamine*	mg/l	LIQUID	-	-		<0.0070	<0.0060														
n-propylbenzene	mg/l	LIQUID	240	2.7	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
o,p - DDE	mg/l	LIQUID	-	-																	
o,p - DDT	mg/l	LIQUID	-	-																	
o,p - TDE	mg/l	LIQUID	-	-																	
o,p-Methoxychlor*	mg/l	LIQUID	-	-																	
Ortho Phosphate as PO4	mg/l	LIQUID	-	-																	
Orthophosphate*	mg/l	LIQUID	-	-																	
Oxygen (Dissolved)	mg/l	LIQUID	-	-									7.9	8.7	7.9						
O-Xylene	mg/l	LIQUID	1100	12	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
p,p - DDT	mg/l	LIQUID	-	-																	
PAH,Total	mg/l	LIQUID	-	-	<0.0002			<0.0003	<0.0002	<0.0005		<0.0002	0.00008	0.00009	0.00038	<0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
P-Dinitrobenzene	mg/l	LIQUID	-	-																	
Pendimethalin	mg/l	LIQUID	-	-																	
Pentachloronitrobenzene	mg/l	LIQUID	-	-																	
Pentachlorophenol (PCP)	mg/l	LIQUID	-	-		<0.0700	<0.0600														
Permethrin	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
Permethrin II*	mg/l	LIQUID	-	-																	
pH	pH Units	LIQUID	-	-	7.8	7.7	7.7	8.2	7.8	7.7	7.9	8				7.7	7.6	7.6	7.8	7.7	7.7
Phenanthrene	mg/l	LIQUID	-	-	<0.0000	<0.0030	<0.0020	<0.0000	<0.0000	0.000066		<0.0000	<0.0000	0.00002	0.00004	0.000023	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Phenol	mg/l	LIQUID	-	-		<0.0280	<0.0240											<0.0005	<0.0005	<0.0005	<0.0005
Phenol (Monohydric)	mg/l	LIQUID	-	-																	
Phenol Index	mg/l	LIQUID	-	-	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500				<0.0500	<0.0500				
Phenoxy Acetic acid herbicide: MCPA*	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
Phosalone	mg/l	LIQUID	-	-																	
Phosphate	mg/l	LIQUID	-	-	0.15	0.01	0.01	0.24	0.15	0.62	0.12	0.06				0.02	0.05	0.02	0.02	<0.0100	<0.0100
Phosphorous	mg/l	LIQUID	-	-																	
Phosphorus as P	mg/l	LIQUID	-	-	0.3	<0.1000	1.12	2.6	0.2	1.2	1.9	0.9				15.7	0.2	<0.1000	<0.1000	<0.1000	<0.1000
Phosphorus, Total Inorganic	mg/l	LIQUID	-	-																	
Pirimiphos-methyl	mg/l	LIQUID	-	-																	
Potassium	mg/l	LIQUID	-	-	5	8	8	1	5	14	1	2				4	2	3	4	3	3
Prometryne	mg/l	LIQUID	-	-																	
Propazine	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
Propetamphos	mg/l	LIQUID	-	-																	
Propham	mg/l	LIQUID	-	-																	
Pyrene	mg/l	LIQUID	-	-	0.000014	<0.0030	<0.0020	0.000021	<0.0000	<0.0000		<0.0000	0.00002	0.00001	0.00005	<0.0000	<0.0000	<0.0000	0.000012	0.000016	0.000022
Sec-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Selenium	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	0.005	<0.0010	0.002	0.001	0.003	0.0055	0.0006	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silvex	mg/l	LIQUID	-	-																	
Simazine	mg/l	LIQUID	-	-									<0.0001	<0.0001	0.0002						
Sodium	mg/l	LIQUID	-	-	22	23	23	24	22	100	22	27				12	14	104	107	111	118
Solids, Suspended	mg/l	LIQUID	-	-	31	5430	5500	44700	55	972	11200	3870	35000	<10.0000	60	570000	23700	6	26	12	13
Styrene	mg/l	LIQUID	810	8.8	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate	mg/l	LIQUID	-	-																	
Sulphate as SO4	mg/l	LIQUID	-	-	87	17	17	38	74	65	29	24				70	34	90	92	96	98
Tecnazene	mg/l	LIQUID	-	-																	
Telodrin	mg/l	LIQUID	-	-																	
Tentatively Identified Compounds - VOC	mg/l	LIQUID	-	-	<0.0050			<0.0050	<0.0050	0.02		<0.0050				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Terbutryn	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
Tert-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethene	mg/l	LIQUID	4.6	0.034	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Tetrachloromethane (Carbon Tetra Chloride)	mg/l	LIQUID	0.77	0.0053	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene	mg/l	LIQUID	21000	230	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Alkalinity as CaCO3	mg/l	LIQUID	-	-																	
Total BTEX	mg/l	LIQUID	-	-									<0.0040	<0.0040	<0.0040						
Total dissolved solids	mg/l	LIQUID	-	-	430	140	150	487	380	711	560	493	190	490	520	0.665	0.459	0.76	0.76	0.8	0.79
Total hardness	mg/l	LIQUID	-	-																	
Total Nitrogen	mg/l	LIQUID	-	-	3	2	3	14	3	18	97	21				79	48	4	5	4	3
Total Organic Carbon	mg/l	LIQUID	-	-	5.4	7.1	8.5	42.7	5.4	46.3	1.9	10.1	28	55	47	0	2.1	5.7	5.7	5.8	5.9
Total suspended solids	mg/l	LIQUID	-	-																	
Traidimefon	mg/l	LIQUID	-	-																	
trans - Chlordane	mg/l	LIQUID	-	-																	
trans-1,2-Dichloroethene	mg/l	LIQUID	16	0.16	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Triallate	mg/l	LIQUID	-	-																	
Triazophos	mg/l	LIQUID	-	-																	
Tribromomethane	mg/l	LIQUID	400	3.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Max of Normalised Results																										
					ML156-SW005	ML156-SW006	ML156-SW007	ML156-SW008	ML156-SW009	ML157-CP001	ML157-CP010	ML157-SW001	ML157-SW002	ML158-CP002	ML158-CP007	ML158-CP020	ML158-CP021	ML158-CR018	ML159-CR019	ML159-SW001	ML160-SW002	ML161-CR021	ML162-CR004a	ML162-SW001	ML162-SW002	ML163-CR021a
					Birmingham Interchange Station	Birmingham Interchange Station	Bickenhill Cutting	Birmingham Interchange Station	Birmingham Interchange Station	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Coleshill No. 1 Embankment	Coleshill No. 3 Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill North Viaduct	Lichfield Road Embankment
Determinant Name	Units	Normalised Matrix	GACgwvap (Comm)	GACgwvap (Resi)	0	0	0	0	0	0	0	0	0	0.24	6.35	2.83	3.77	3.3	7.72	0	0	28.74	26.29	0	0	3.87
Cyanide Free as CN	mg/l	LIQUID	-	-						<0.0200	<0.0200	<0.0200	<0.0200								<0.0200	<0.0200	<0.0200			<0.0200
Cypermethrin	mg/l	LIQUID	-	-																						
Diazinon	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Dibenz-a-h-anthracene	mg/l	LIQUID	-	-	<0.0000	0.0016	0.00006	<0.0000	0.00002	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	<0.0000	<0.0000	<0.0000	<0.0001	<0.0000
Dibenzofuran	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Dibromochloromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dibromomethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dichlorodifluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010								<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dichloromethane	mg/l	LIQUID	370	3.3																				<0.0500	<0.0500	
Dichlorvos	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Dieldrin	mg/l	LIQUID	-	-										<0.0000	<0.0000	0.000075	<0.0000	<0.0000	<0.0000	<0.0000						
Diethylphthalate	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Dimethoate	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Dimethylphthalate	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Di-N-Butyl Phthalate	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Di-N-Octyl Phthalate	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0050	<0.0050	<0.0200	<0.0050	<0.0050	<0.0200	<0.0050						
Diphenyl ether	mg/l	LIQUID	-	-																						
Diphenylamine	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025																	
Dissolved Oxygen Unfixed	mg/l	LIQUID	-	-						3.5	4.9	9.1	10.5								5.9	1.7	5.8			4.8
Disulfoton	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Diuron	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Endosulfan I	mg/l	LIQUID	590	7.4										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Endosulfan II	mg/l	LIQUID	600	7.5										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Endosulfan Sulfate	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Endrin	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
EPH >C10-12	mg/l	LIQUID	-	-						<0.0100	<0.0100															
EPH >C10-40	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100					1.72	2.08	1.22	0.224	0.143	0.309	<0.0460						
EPH >C12-16	mg/l	LIQUID	-	-						<0.0100	<0.0100															
EPH >C16-21	mg/l	LIQUID	-	-						<0.0100	<0.0100															
EPH >C21-35	mg/l	LIQUID	-	-						<0.0100	<0.0100															
EPH >C8-40	mg/l	LIQUID	-	-						0.01	0.02	0.03	0.03								0.14	0.04	0.02			0.03
EPH/TPH >C6-8	mg/l	LIQUID	-	-						<0.1000	<0.1000										<0.1000	<0.1000	<0.1000			<0.1000
Ethion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Ethylbenzene	mg/l	LIQUID	960	10	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ethylparathion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Etrimphos	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Fenitrothion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Fenthion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Fluoranthene	mg/l	LIQUID	-	-	<0.0000	0.013	0.00062	0.00014	0.00011	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	0.000016	<0.0000	<0.0000	0.00002	0.0001	<0.0000
Fluorene	mg/l	LIQUID	18000	210	<0.0000	0.00075	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	0.000487	<0.0000	0.00001	0.0001	<0.0000
Fluroxypyr*	mg/l	LIQUID	-	-										<0.0000	0.000172	<0.0000	0.000162	<0.0000	<0.0000	<0.0000						
gamma-hexachlorocyclohexane	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Glyphosate	mg/l	LIQUID	-	-										<0.0020	<0.0020	<0.0002	<0.0020	<0.0002	<0.0002	<0.0002						
GRO >C5-10	mg/l	LIQUID	-	-						<0.1000	<0.1000										<0.1000	<0.1000	<0.1000			<0.1000
GRO >C5-12	mg/l	LIQUID	-	-										<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500						
GRO >C7-8	mg/l	LIQUID	-	-						<0.0050	<0.0050										<0.0050	<0.0050	<0.0050			<0.0050
GRO >C8-10	mg/l	LIQUID	-	-						<0.0100	<0.0100															
GRO Surrogate % recovery	%	LIQUID	-	-										104	93	104	94	107	104	100						
Hardness,Calcium as CaCO3	mg/l	LIQUID	-	-																				320	230	
Hardness,Total as CaC03	mg/l	LIQUID	-	-						383	306	139	218	686	1540	1590	1120	204	423	82.2	48	1990	736			1450
Heptachlor	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Heptachlor Epoxide	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Heptanoic Acid	mg/l	LIQUID	-	-																						
Hexachlorobenzene (HCB)	mg/l	LIQUID	1.4	0.016	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Hexachlorobutadiene (HCBD)	mg/l	LIQUID	0.23	0.0017	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050	<0.0050			<0.0050
Hexachlorocyclopentadiene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Hexachloroethane	mg/l	LIQUID	0.74	0.0085										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Indeno(1,2,3-cd)pyrene	mg/l	LIQUID	-	-	<0.0000	0.0053	0.00041	<0.0000	0.00009	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	0.000018	<0.0000	<0.0000	0.00001	<0.0001	<0.0000
Iron	mg/l	LIQUID	-	-	0.16	10	0.17	0.14	0.17			1.74	0.16	51.6	239	301	136	8.29	178	0.925	20.2	0	11.2			132
Isodrin	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Isophorone	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Isopropylbenzene	mg/l	LIQUID	86	0.85	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Isoproturon	mg/l	LIQUID	-	-										0.000511	0.000506	0.000502	0.000501	0.000501	0.000492	0.000515						
Lead	mg/l	LIQUID	-	-	0.00022	0.00024	0.0011	0.0012	0.0014	0.005	<0.0010	<0.0010	<0.0010	0.00039	0.000516	0.0136	0.113	0.00526	0.0618	0.000282	<0.0010	<0.0010	0.006	<0.0003	0.0008	<0.0010
Linuron	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
m,p xylenes	mg/l	LIQUID	-	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	mg/l	LIQUID	-	-	35	40	22	24	26	22	10	7	10	8.27	31.4	5.74	112	13.8	34.6	7.09	2	151	58	29	21	85
Malathion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Manganese	mg/l	LIQUID	-	-	0.032	1.4	0.016	0.019	0.025			0.000054	0.000087	1.59	29.8	10.2	8.87	0.272	3.12		0.619	0	0.364			2.769
MCPA	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
M-Dinitrobenzene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025																	
Mecoprop	mg/l	LIQUID	-	-																						
Mecoprop (MCPP) (2-(4-chloro-2-methylphenoxy)	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Mercury	mg/l	LIQUID	0.095	0.0011	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0001	<0.0001	<0.0001	<0.0001	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0001	<0.0001	<0.0000
Methabenzthiazuran	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Methiocarb	mg/l	LIQUID	-	-										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001						
Methoxychlor	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Methyl tert-butyl ether (MTBE)	mg/l	LIQUID	7800	83										<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030				<0.0010	<0.0010	
Methyl tert-pentyl ether	mg/l	LIQUID	-	-																				<0.0010	<0.0010	
Methylparathion	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Methylphenols	mg/l	LIQUID	-	-								<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005						
Mevinphos	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Monlinuran	mg/l	LIQUID	-	-										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001						
Monuron	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Naphthalene1-methyl-	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025																	
Napthalene	mg/l	LIQUID	23	0.22	<0.0000	0.00085	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	0.00033	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0000	0.0096	0.000022	<0.0000	0.0006	0.000036
n-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010			<0.0010
Nickel	mg/l	LIQUID	-	-	0.0012	0.0013	<0.0005	0.0013	<0.0005	0.003	0.002	0.000003	0.000004	0.00568	0.0109	0.00209	0.0811	0.00492	0.0466	0.000562	0.001	0.004	0.003	0.003	0.003	0.008
Nitrate as N	mg/l	LIQUID	-	-						27	15.9	18.2	22	4.65	4.65	35.1	18	3.22	27.2	0.449	0.3	4	3.8	3.3	<0.5000	<0.2000
Nitrate as NO3	mg/l	LIQUID	-	-	9.2	11	9.8	5.2	5.6																	
Nitrite as N	mg/l	LIQUID	-	-	<0.0350	<0.0350	<0.0350	<0.0350	<0.0350	0.12	0.01	<0.0100	0.01	0.0265	0.0648	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0100	<0.0100	0.39	0.1	<0.1000	<0.0100
Nitrobenzene	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Nitrogen	mg/l	LIQUID	-	-	17	67	7	3.8	3.5					5.51	6	35.1	19.6	2.98	26.8	2				<10.0000	<10.0000	
N-Nitroso-Di-N-Propylamine	mg/l	LIQUID	-	-										<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
N-Nitrosodiphenylamine*	mg/l	LIQUID	-	-																						
n-propylbenzene	mg/l	LIQUID	240	2.7	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
o,p - DDE	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
o,p - DDT	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
o,p - TDE	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
o,p-Methoxychlor*	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Ortho Phosphate as PO4	mg/l	LIQUID	-	-										<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	0.0219	0.0509						
Orthophosphate*	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100																	
Oxygen (Dissolved)	mg/l	LIQUID	-	-	11.3	4.5	11	10.9	10.8					4.9	5.13	7.3	5.88	6.99	8.34	8.75				10	3.4	
O-Xylene	mg/l	LIQUID	1100	12	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
p,p - DDT	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
PAH,Total	mg/l	LIQUID	-	-	<0.0000	0.1	0.005	0.00028	0.00095	<0.0002	<0.0002	<0.0002	<0.0002								<0.0002	<0.0114	<0.0002	0.00017	0.0024	<0.0002
P-Dinitrobenzene	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025																	
Pendimethalin	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Pentachloronitrobenzene	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Pentachlorophenol (PCP)	mg/l	LIQUID	-	-	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025					<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010						
Permethrin	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Permethrin II*	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
pH	pH Units	LIQUID	-	-	7.5	7.4	8	8.2	7.6	7	7.2	6.3	7.1	7.69	6.96	7.45	7.27	6.45	6.76	7.8	7.1	7.6	8			7.4
Phenanthrene	mg/l	LIQUID	-	-	<0.0000	0.0084	0.00013	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	<0.0000	0.000112	<0.0000	0.00001	0.0011	<0.0000
Phenol	mg/l	LIQUID	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				<0.0005	0.06	
Phenol (Monohydric)	mg/l	LIQUID	-	-										<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005						
Phenol Index	mg/l	LIQUID	-	-						<0.0500	<0.0500										<0.0500	<0.0500	<0.0500			<0.0500
Phenoxy Acetic acid herbicide: MCPA*	mg/l	LIQUID	-	-																						
Phosalone	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Phosphate	mg/l	LIQUID	-	-						0.09	<0.0100	<0.0100	<0.0100								0.19	<0.0100	0.02	<0.5000	1.3	<0.0100
Phosphorous	mg/l	LIQUID	-	-	0.036	1.5	0.05	0.045	0.031																	
Phosphorus as P	mg/l	LIQUID	-	-						6.6	5.6	0.3	<0.1000	1.77	3.43	12.5	1.91	0.267	3.23	0.175	2.7	0	0.4			4.4
Phosphorus, Total Inorganic	mg/l	LIQUID	-	-																				<1.0000	2	
Pirimiphos-methyl	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Potassium	mg/l	LIQUID	-	-	3.9	3.7	2.8	2.7	2.8	5	3	4	4	3.47	7.55	13.4	31	5.83	3.41	23.4	3	26	3	4	9	11
Prometryne	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Propazine	mg/l	LIQUID	-	-										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001						
Propetamphos	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Propham	mg/l	LIQUID	-	-										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001						
Pyrene	mg/l	LIQUID	-	-	<0.0000	0.014	0.00065	0.00013	0.00013	<0.0000	<0.0000	<0.0000	<0.0000	<0.0010	<0.0010	<0.0040	<0.0010	<0.0010	<0.0040	<0.0010	0.000019	<0.0000	<0.0000	0.00003	0.0001	0.000013
Sec-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Selenium	mg/l	LIQUID	-	-	0.0012	0.00078	0.00078	0.00071	0.00074	<0.0010	<0.0010	<0.0010	<0.0010	0.00391	0.00107	<0.0008	<0.0089	0.00131	<0.0049	<0.0008	<0.0010	0.002	0.002	0.0006	<0.0005	0.002
Silvex	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Simazine	mg/l	LIQUID	-	-										0.000488	0.000489	0.000483	0.000479	0.000482	0.000476	0.00048						
Sodium	mg/l	LIQUID	-	-	110	130	120	140	130	25	12	7	13	24.5	27	4.73	111	122	16.2	16.1	68	388	51	34	15	375
Solids, Suspended	mg/l	LIQUID	-	-	11	7400	120	16	29	220000	349000	155	11								2270	326000	1610	<10.0000	19	111000
Styrene	mg/l	LIQUID	810	8.8	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate	mg/l	LIQUID	-	-										150	392	35.7	94.1	118	55.6	<2.0000						
Sulphate as SO4	mg/l	LIQUID	-	-	83	88	82	78	93	44	30	22	38								12	2170	449			1720
Tecnazene	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Telodrin	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Tentatively Identified Compounds - VOC	mg/l	LIQUID	-	-						<0.0050	<0.0050	<0.0050	<0.0050								<0.0050	<0.0050	<0.0050			<0.0050
Terbutryn	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Tert-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethene	mg/l	LIQUID	4.6	0.034	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	<0.0050
Tetrachloromethane (Carbon Tetra Chloride)	mg/l	LIQUID	0.77	0.0053	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene	mg/l	LIQUID	21000	230	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Alkalinity as CaCO3	mg/l	LIQUID	-	-	150	190	120	110	120					305	1120	1600	455	55	65	95						
Total BTEX	mg/l	LIQUID	-	-										<0.0280	<0.0280	<0.0280	<0.0280	<0.0280	<0.0280	<0.0280				<0.0040	<0.0040	
Total dissolved solids	mg/l	LIQUID	-	-	710	740	640	660	660	0.634	0.516	0.32	0.45	446	1020	441	980	706	393	223	220	30700	1070	510	430	3320
Total hardness	mg/l	LIQUID	-	-	352	362	231	245	267																	
Total Nitrogen	mg/l	LIQUID	-	-						135	81	22	24								20	39	6			24
Total Organic Carbon	mg/l	LIQUID	-	-	7.1	19	8.8	8.7	8.1	0	15	17	15	22.2	12.6	<3.0000	<3.0000	<3.0000	<3.0000	15.7	7.1	157	6.5	50	68	30.8
Total suspended solids	mg/l	LIQUID	-	-										1410	23000	34500	6490	282	8510	5.5						
Traidimefon	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
trans - Chlordane	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
trans-1,2-Dichloroethene	mg/l	LIQUID	16	0.16	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Triallate	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Triazophos	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Tribromomethane	mg/l	LIQUID	400	3.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Max of Normalised Results										
					ML164-CP036	ML164-CR009	ML164-CR029	ML164-CR046a	ND001-CP049	ND001-CR002
					Watton House Embankment	Watten House West Viaduct	Chattle Hill Box Structure	Watten House West Viaduct	Chattle Hill Box Structure	Water Orton No. 3 Viaduct
Determinant Name	Units	Normalised Matrix	GACgwvap (Comm)	GACgwvap (Resi)	8.2	22.7	24.32	2.81	1.94	4.25
Cyanide Free as CN	mg/l	LIQUID	-	-	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
Cypermethrin	mg/l	LIQUID	-	-						
Diazinon	mg/l	LIQUID	-	-						
Dibenz-a-h-anthracene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Dibenzofuran	mg/l	LIQUID	-	-						
Dibromochloromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dibromomethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dichlorodifluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dichloromethane	mg/l	LIQUID	370	3.3						
Dichlorvos	mg/l	LIQUID	-	-						
Dieldrin	mg/l	LIQUID	-	-						
Diethylphthalate	mg/l	LIQUID	-	-						
Dimethoate	mg/l	LIQUID	-	-						
Dimethylphthalate	mg/l	LIQUID	-	-						
Di-N-Butyl Phthalate	mg/l	LIQUID	-	-						
Di-N-Octyl Phthalate	mg/l	LIQUID	-	-						
Diphenyl ether	mg/l	LIQUID	-	-						
Diphenylamine	mg/l	LIQUID	-	-						
Dissolved Oxygen Unfixed	mg/l	LIQUID	-	-	5.1	6.6	7.7	1.2	2.1	4.8
Disulfoton	mg/l	LIQUID	-	-						
Diuron	mg/l	LIQUID	-	-						
Endosulfan I	mg/l	LIQUID	590	7.4						
Endosulfan II	mg/l	LIQUID	600	7.5						
Endosulfan Sulfate	mg/l	LIQUID	-	-						
Endrin	mg/l	LIQUID	-	-						
EPH >C10-12	mg/l	LIQUID	-	-						
EPH >C10-40	mg/l	LIQUID	-	-						
EPH >C12-16	mg/l	LIQUID	-	-						
EPH >C16-21	mg/l	LIQUID	-	-						
EPH >C21-35	mg/l	LIQUID	-	-						
EPH >C8-40	mg/l	LIQUID	-	-	0.02	0.56	0.07	3.78	0.03	0.11
EPH/TPH >C6-8	mg/l	LIQUID	-	-	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000
Ethion	mg/l	LIQUID	-	-						
Ethylbenzene	mg/l	LIQUID	960	10	<0.0010	<0.0010	<0.0010	0.004	<0.0010	<0.0010
Ethylparathion	mg/l	LIQUID	-	-						
Etrimphos	mg/l	LIQUID	-	-						
Fenitrothion	mg/l	LIQUID	-	-						
Fenthion	mg/l	LIQUID	-	-						
Fluoranthene	mg/l	LIQUID	-	-	<0.0000	0.000012	<0.0000	0.00039	<0.0000	<0.0000
Fluorene	mg/l	LIQUID	18000	210	<0.0000	<0.0000	<0.0000	0.0411	<0.0000	<0.0000
Fluroxypyr*	mg/l	LIQUID	-	-						
gamma-hexachlorocyclohexane	mg/l	LIQUID	-	-						
Glyphosate	mg/l	LIQUID	-	-						
GRO >C5-10	mg/l	LIQUID	-	-	<0.1000	<0.1000	<0.1000	0.11	<0.1000	<0.1000
GRO >C5-12	mg/l	LIQUID	-	-						
GRO >C7-8	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
GRO >C8-10	mg/l	LIQUID	-	-						
GRO Surrogate % recovery	%	LIQUID	-	-						
Hardness,Calcium as CaCO3	mg/l	LIQUID	-	-						
Hardness,Total as CaC03	mg/l	LIQUID	-	-	476	1400	1460	<109.0000	566	1630
Heptachlor	mg/l	LIQUID	-	-						
Heptachlor Epoxide	mg/l	LIQUID	-	-						
Heptanoic Acid	mg/l	LIQUID	-	-						
Hexachlorobenzene (HCB)	mg/l	LIQUID	1.4	0.016						
Hexachlorobutadiene (HCBD)	mg/l	LIQUID	0.23	0.0017	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorocyclopentadiene	mg/l	LIQUID	-	-						
Hexachloroethane	mg/l	LIQUID	0.74	0.0085						
Indeno(1,2,3-cd)pyrene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000
Iron	mg/l	LIQUID	-	-	40.3	12	208	12.6	236	233
Isodrin	mg/l	LIQUID	-	-						
Isophorone	mg/l	LIQUID	-	-						
Isopropylbenzene	mg/l	LIQUID	86	0.85	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Isoproturon	mg/l	LIQUID	-	-						
Lead	mg/l	LIQUID	-	-	<0.0010	0.005	<0.0010	<0.0010	<0.0010	<0.0010
Linuron	mg/l	LIQUID	-	-						
m,p xylenes	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	0.008	<0.0010	<0.0010
Magnesium	mg/l	LIQUID	-	-	30	44	45	<1.0000	86	73
Malathion	mg/l	LIQUID	-	-						
Manganese	mg/l	LIQUID	-	-	2.857	0.526	3.689	0.342	3.062	4.93
MCPA	mg/l	LIQUID	-	-						
M-Dinitrobenzene	mg/l	LIQUID	-	-						
Mecoprop	mg/l	LIQUID	-	-						
Mecoprop (MCPP) (2-(4-chloro-2-methylphenoxy)	mg/l	LIQUID	-	-						
Mercury	mg/l	LIQUID	0.095	0.0011	<0.0000	<0.0000	<0.0000	0	<0.0000	<0.0000
Methabenzthiazuran	mg/l	LIQUID	-	-						
Methiocarb	mg/l	LIQUID	-	-						
Methoxychlor	mg/l	LIQUID	-	-						
Methyl tert-butyl ether (MTBE)	mg/l	LIQUID	7800	83						
Methyl tert-pentyl ether	mg/l	LIQUID	-	-						
Methylparathion	mg/l	LIQUID	-	-						
Methylphenols	mg/l	LIQUID	-	-						
Mevinphos	mg/l	LIQUID	-	-						
Monlinuran	mg/l	LIQUID	-	-						
Monuron	mg/l	LIQUID	-	-						
Naphthalene1-methyl-	mg/l	LIQUID	-	-						
Napthalene	mg/l	LIQUID	23	0.22	<0.0000	<0.0000	<0.0000	0.804	0.000031	0.000025
n-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel	mg/l	LIQUID	-	-	0.002	0.009	0.001	0.045	0.002	0.007
Nitrate as N	mg/l	LIQUID	-	-	<0.2000	<0.2000	<0.2000	<0.2000	0.3	<0.2000
Nitrate as NO3	mg/l	LIQUID	-	-						
Nitrite as N	mg/l	LIQUID	-	-	<0.0100	0.02	0.02	0.02	<0.0100	0.04
Nitrobenzene	mg/l	LIQUID	-	-						
Nitrogen	mg/l	LIQUID	-	-						
N-Nitroso-Di-N-Propylamine	mg/l	LIQUID	-	-						
N-Nitrosodiphenylamine*	mg/l	LIQUID	-	-						
n-propylbenzene	mg/l	LIQUID	240	2.7	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010
o,p - DDE	mg/l	LIQUID	-	-						
o,p - DDT	mg/l	LIQUID	-	-						
o,p - TDE	mg/l	LIQUID	-	-						
o,p-Methoxychlor*	mg/l	LIQUID	-	-						
Ortho Phosphate as PO4	mg/l	LIQUID	-	-						
Orthophosphate*	mg/l	LIQUID	-	-						
Oxygen (Dissolved)	mg/l	LIQUID	-	-						
O-Xylene	mg/l	LIQUID	1100	12	<0.0010	<0.0010	<0.0010	0.008	<0.0010	<0.0010
p,p - DDT	mg/l	LIQUID	-	-						
PAH,Total	mg/l	LIQUID	-	-	<0.0002	<0.0002	<0.0002	0.941172	<0.0002	<0.0002
P-Dinitrobenzene	mg/l	LIQUID	-	-						
Pendimethalin	mg/l	LIQUID	-	-						
Pentachloronitrobenzene	mg/l	LIQUID	-	-						
Pentachlorophenol (PCP)	mg/l	LIQUID	-	-						
Permethrin	mg/l	LIQUID	-	-						
Permethrin II*	mg/l	LIQUID	-	-						
pH	pH Units	LIQUID	-	-	7	7.1	7.7	11.3	7.6	7.5
Phenanthrene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	0.0084	<0.0000	<0.0000
Phenol	mg/l	LIQUID	-	-						
Phenol (Monohydric)	mg/l	LIQUID	-	-						
Phenol Index	mg/l	LIQUID	-	-	<0.0500	<0.0500	<0.0500	1.21	<0.0500	<0.0500
Phenoxy Acetic acid herbicide: MCPA*	mg/l	LIQUID	-	-						
Phosalone	mg/l	LIQUID	-	-						
Phosphate	mg/l	LIQUID	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
Phosphorous	mg/l	LIQUID	-	-						
Phosphorus as P	mg/l	LIQUID	-	-	0.8	0.6	9	0.4	12.6	11.7
Phosphorus, Total Inorganic	mg/l	LIQUID	-	-						
Pirimiphos-methyl	mg/l	LIQUID	-	-						
Potassium	mg/l	LIQUID	-	-	2	44	37	51	6	16
Prometryne	mg/l	LIQUID	-	-						
Propazine	mg/l	LIQUID	-	-						
Propetamphos	mg/l	LIQUID	-	-						
Propham	mg/l	LIQUID	-	-						
Pyrene	mg/l	LIQUID	-	-	<0.0000	<0.0000	<0.0000	0.000201	<0.0000	0.000026
Sec-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Selenium	mg/l	LIQUID	-	-	<0.0010	0.004	<0.0010	0.005	0.003	0.008
Silvex	mg/l	LIQUID	-	-						
Simazine	mg/l	LIQUID	-	-						
Sodium	mg/l	LIQUID	-	-	90	444	795	176	223	307
Solids, Suspended	mg/l	LIQUID	-	-	9220	785	55300	3240	53600	294000
Styrene	mg/l	LIQUID	810	8.8	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulphate	mg/l	LIQUID	-	-						
Sulphate as SO4	mg/l	LIQUID	-	-	246	2100	2850	151	274	1580
Tecnazene	mg/l	LIQUID	-	-						
Telodrin	mg/l	LIQUID	-	-						
Tentatively Identified Compounds - VOC	mg/l	LIQUID	-	-	<0.0050	<0.0050	<0.0050	1.208	<0.0050	<0.0050
Terbutryn	mg/l	LIQUID	-	-						
Tert-Butylbenzene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethene	mg/l	LIQUID	4.6	0.034	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Tetrachloromethane (Carbon Tetra Chloride)	mg/l	LIQUID	0.77	0.0053	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene	mg/l	LIQUID	21000	230	<0.0010	<0.0010	<0.0010	0.006	<0.0010	<0.0010
Total Alkalinity as CaCO3	mg/l	LIQUID	-	-						
Total BTEX	mg/l	LIQUID	-	-						
Total dissolved solids	mg/l	LIQUID	-	-	897	3630	4570	638	1150	3300
Total hardness	mg/l	LIQUID	-	-						
Total Nitrogen	mg/l	LIQUID	-	-	3	5	32	12	39	24
Total Organic Carbon	mg/l	LIQUID	-	-	9.65	7.68	14.4	35.6	26	30.7
Total suspended solids	mg/l	LIQUID	-	-						
Traidimefon	mg/l	LIQUID	-	-						
trans - Chlordane	mg/l	LIQUID	-	-						
trans-1,2-Dichloroethene	mg/l	LIQUID	16	0.16	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,3-Dichloropropene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Triallate	mg/l	LIQUID	-	-						
Triazophos	mg/l	LIQUID	-	-						
Tribromomethane	mg/l	LIQUID	400	3.1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Max of Normalised Results					Location ID	Asset	Sample Depth														
					BD160-SW001	BD161-CR008	BD161-CR008	BD161-CR010	BD162-SW001	BD163-CR017	BD164-CR003	BD164-CR003	ML155-CR003	ML155-SW001	ML155-SW002	ML156-CP008	ML156-CR012	ML156-SW001	ML156-SW002	ML156-SW003	ML156-SW004
					Coleshill West Viaduct	Coleshill West Viaduct	Coleshill West Viaduct	Coleshill No. 3 Embankment	Coleshill No. 3 Embankment	M42 - M6 Motorway Link West Viaduct	Water Orton Cutting	Water Orton Cutting	Diddington Cutting	Diddington Lane Embankment	Diddington Lane Embankment	Bickenhill Embankment	Birmingham Interchange Station	Bickenhill Embankment	Bickenhill Embankment	Bickenhill Embankment	Birmingham Interchange Station
Determinant Name	Units	Normalised Matrix	GACgwvap (Comm)	GACgwvap (Resi)	0	2	31.78	6.95	0	27.7	4.24	7.75	2.41	0.2	0.2	0	0	0	0	0	0
Trichloroethene	mg/l	LIQUID	0.77	0.0057	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.0050	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Trichlorofluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Triclopyr	mg/l	LIQUID	-	-																	
Trietazine	mg/l	LIQUID	-	-									<0.0001	<0.0001	<0.0001						
Trifluralin	mg/l	LIQUID	-	-																	
Trimethylphenol	mg/l	LIQUID	-	-														<0.0005	<0.0005	<0.0005	<0.0005
Trivalent Chromium	mg/l	LIQUID	-	-									<0.0030	0.23	<0.0030						
Vanadium	mg/l	LIQUID	-	-	0.003	0.013	0.013	0.02	0.003	0.003	0.006	0.005	<0.0020	0.004	0.004	0.001	0.005	0.000005	0.000004	0.000004	0.000004
Xylene	mg/l	LIQUID	-	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020				<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Xylenols	mg/l	LIQUID	-	-														<0.0005	<0.0005	<0.0005	<0.0005
Zinc	mg/l	LIQUID	-	-	0.016	0.003	0.007	0.029	0.011	0.01	0.028	0.024	0.007	0.02	0.008	0.002	0.003	0.000009	0.00001	0.000008	0.000008

Max of Normalised Results																										
					ML156-SW005	ML156-SW006	ML156-SW007	ML156-SW008	ML156-SW009	ML157-CP001	ML157-CP010	ML157-SW001	ML157-SW002	ML158-CP002	ML158-CP007	ML158-CP020	ML158-CP021	ML158-CR018	ML159-CR019	ML159-SW001	ML160-SW002	ML161-CR021	ML162-CR004a	ML162-SW001	ML162-SW002	ML163-CR021a
					Birmingham Interchange Station	Birmingham Interchange Station	Bickenhill Cutting	Birmingham Interchange Station	Birmingham Interchange Station	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Bickenhill Cutting	Packington Embankment	M42 Motorway Box Structure	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Pool Wood Embankment	Coleshill No. 1 Embankment	Coleshill No. 3 Embankment	M42 Coleshill Box Structure	M42 Coleshill Box Structure	M42 Coleshill North Viaduct	Lichfield Road Embankment
Determinant Name	Units	Normalised Matrix	GACgwvap (Comm)	GACgwvap (Resi)	0	0	0	0	0	0	0	0	0	0.24	6.35	2.83	3.77	3.3	7.72	0	0	28.74	26.29	0	0	3.87
Trichloroethene	mg/l	LIQUID	0.77	0.0057	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	<0.0050
Trichlorofluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Triclopyr	mg/l	LIQUID	-	-										<0.0000	0.000042	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Trietazine	mg/l	LIQUID	-	-																						
Trifluralin	mg/l	LIQUID	-	-										<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000	<0.0000						
Trimethylphenol	mg/l	LIQUID	-	-								<0.0005	<0.0005													
Trivalent Chromium	mg/l	LIQUID	-	-	0.011	0.0083	0.0085	0.009	0.0096					0.0057	0.0041	0.00562	0.0137	<0.0030	0.045	<0.0030				<0.0030	<0.0030	
Vanadium	mg/l	LIQUID	-	-	0.0067	0.0053	0.0081	0.0092	0.009	0.001	0.004	0.000003	0.000002	<0.0013	<0.0013	0.00406	0.0171	0.00283	0.0463	<0.0013	0.002	0.001	0.002	0.003	<0.0020	0.001
Xylene	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020			<0.0020
Xylenols	mg/l	LIQUID	-	-								<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005						
Zinc	mg/l	LIQUID	-	-	0.048	0.054	0.014	0.017	0.02	0.046	0.034	0.000017	0.000022	0.0395	0.0467	0.0591	0.721	0.0839	0.118	0.00464	0.024	<0.0020	0.022	0.016	0.009	0.004

Max of Normalised Results										
					ML164-CP036	ML164-CR009	ML164-CR029	ML164-CR046a	ND001-CP049	ND001-CR002
					Watton House Embankment	Watten House West Viaduct	Chattle Hill Box Structure	Watten House West Viaduct	Chattle Hill Box Structure	Water Orton No. 3 Viaduct
Determinant Name	Units	Normalised Matrix	GACgwvap (Comm)	GACgwvap (Resi)	8.2	22.7	24.32	2.81	1.94	4.25
Trichloroethene	mg/l	LIQUID	0.77	0.0057	<0.0050	<0.0050	<0.0050	0.007	<0.0050	<0.0050
Trichlorofluoromethane	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Triclopyr	mg/l	LIQUID	-	-						
Trietazine	mg/l	LIQUID	-	-						
Trifluralin	mg/l	LIQUID	-	-						
Trimethylphenol	mg/l	LIQUID	-	-						
Trivalent Chromium	mg/l	LIQUID	-	-						
Vanadium	mg/l	LIQUID	-	-	<0.0010	<0.0010	<0.0010	0.082	0.001	<0.0010
Xylene	mg/l	LIQUID	-	-	<0.0020	<0.0020	<0.0020	0.02	<0.0020	<0.0020
Xylenols	mg/l	LIQUID	-	-						
Zinc	mg/l	LIQUID	-	-	0.033	5.484	0.007	0.003	0.036	<0.0020

Appendix E. Advantages and Disadvantages of Remediation Options

Table 78: Advantages and disadvantages of remediation options

Preliminary Remediation Objective	Target Contaminants	Suitable Media	Remediation Option Description	Advantages	Disadvantages
Break pathway between contaminated soil and human health receptors.	Non-volatile soil contaminants or contaminants in which critical exposure pathways are non-vapour (except cover systems incorporating geomembranes).	Soils at ground surface	**Cover systems** - Clean cover systems involve the placement of a clean layer of soil or hardstanding to restrict exposure pathways from underlying contaminated ground. The method is commonly applied to address risks to human health, but can be adapted with the addition of impermeable layers and geomembranes to reduce leachate production and vapour migration. Such impermeable barrier systems may need to be accompanied by gas venting and cover system drainage provisions. Design considerations include the cross contamination and intermixing between the clean cover and underlying contaminated ground, requirements for basal warning layers and geotextiles to maintain long term integrity of the cover system, and the proposed land use on the cover layer.	- Quick and easy to validate. - Cost effective*. - Effective solution to mitigate the risk posed by lead in the area of soft landscaping to the east of the new station building.	- Does not remove contamination source. - Requirement to source and import clean cover medium. - Not effective against existing groundwater pollution - Impermeable barrier systems may not be durable unless the cover system is robustly designed to minimise risks of penetration during site operation. Complete elimination of leachate production is rarely possible.
Remove contamination source.	All solid contaminants that meet the Waste Acceptance Criteria in the Landfill Regulations can be disposed, but it is not generally economic as a remediation technique for anything other than 'difficult' contaminants that are not amenable to chemical or biological degradation, washing or thermal treatment or present unsafe exposure risks to personnel.	Unsuitable for wastes containing levels of total organic carbon >6%, loss on ignition > 10% and / or high leachates	**Excavation and offsite disposal** – Excavation and disposal of contaminated soil at a licensed landfill or soil treatment centre. Landfilling of contaminated waste is subject to high rates of taxation. From 1st April 2020 the landfill tax rates are as follows: - Standard rate: £94.15/tonne - Lower rate: £3.00/tonne [only applicable to inert materials defined in Landfill Tax (Qualifying Material) Order 2011]	- Removes contamination source. - Quick and easy to validate. - Good for localised hotspot removal. - Suitable for wastes that are incapable of meeting a structural or landscaping classification (SHW U1a material) - Suitable for wastes that are incapable of in-situ or ex-situ remediation safely.	- Disposal and/ or treatment costs can be significant. - Not a sustainable solution. - Requirement to source and import backfill material. - Increased traffic and noise during excavation. - Unsuitable for liquid wastes - Unsuitable for wastes containing levels of total organic carbon >6%, loss on ignition > 10% and / or high leachates - Landfill Regulations require prior treatment of waste prior to disposal to reduce its volume or hazardous nature and facilitate its handling or enhance recovery.

Preliminary Remediation Objective	Target Contaminants	Suitable Media	Remediation Option Description	Advantages	Disadvantages
Remove contamination source.	Petroleum hydrocarbons, heavy metals, selected VOCs and pesticides.	Granular soils	**Ex-situ Soil washing** - Removes contaminants adsorbed onto coarser sand and gravel particles. Chemical contaminants can then be transferred from the soil surface to the wash water which will require further treatment and disposal. The process removes contaminants in one of two ways: - Dissolving or suspending contaminants in the wash solution - Concentrating contamination into a smaller volume through particle size separation. Additives including surfactants can be added to improve the removal efficiency of polar compounds such as hydrocarbons. The method is also to some extent effective against heavy metals.	- Allows soils containing hazardous chemicals to be excavated and treated on-site. - Can be employed as a reprocessing step, significantly reducing the quantity of material that would require further treatment by another technology or disposal off-site. - Creates clean granular material	- Works best when the soil does not contain a large amount of silt or clay. – Disposal of contaminated wash water required. – Large area required for stockpiling. - Increased traffic and noise during excavation.
Remove contamination source.	Petroleum hydrocarbons, PAHs, chlorinated compounds, ethers	Contaminants in saturated and unsaturated zones	**In-situ chemical oxidation** - Oxidation agents supply free electrons in a chemical reaction. Oxidation can be used to break down organic contaminants ultimately to carbon dioxide. This process involves the introduction of an oxidizing compound into soil via mixing, or groundwater via well injection. The oxidation agents may operate alone (i.e. hydrogen peroxide, or ozone) or may require the addition of a catalyst to activate another agent (for instance sodium persulphate).	- Contaminated soil can remain in situ during treatment. - Powerful and fast acting - Mass reduction in contaminant levels	- May require further different remediation when contaminant concentrations reduce. - Potentially complex permitting to ensure that oxidising agents do not migrate into sensitive waters - Biologically destructive: Can sterilize topsoil - Some oxidizing agents can be harmful to human health and care is required to minimize risks to remediation personnel. -Variable effectivity in heterogenous soils or soils or variable permeability -Bench / field trials may be required to demonstrate effectiveness.
Remove contamination source.	Chlorinated solvents	Contaminants in saturated and unsaturated zones	**In-situ chemical reduction** - Reducing agents extract electrons in a chemical reaction. Chemical reduction can be used breakdown chlorinated compounds typically through a process of dechlorination and hydrogenation. This process involves the	- Contaminated soil can remain in situ during treatment. - Mass reduction in contaminant levels - Can use food-grade reducing agents that	- Dispersion of compounds in saturated zone can be restricted in lower permeability areas, although microemulsions can improve mobility.

Preliminary Remediation Objective	Target Contaminants	Suitable Media	Remediation Option Description	Advantages	Disadvantages
			introduction of a reducing compound into soil via mixing, or groundwater via well injection. A typical perchloroethene reduction process results in the sequential creation of the following breakdown products: perchloroethene (PCE) → trichloroethene (TCE), → dichloroethene (DCE) → vinyl chloride (VC)→ethene	are relatively safe to personnel and biological organisms.	- Careful design and management required to reduce risks associated with the creation of more toxic breakdown products such as vinyl chloride. - Bench / field trials may be required to demonstrate effectiveness
Remove contamination source.	Aliphatic and aromatic hydrocarbons Polyaromatic Hydrocarbons	Soil contaminants	**Ex-situ Bioremediation** – Ex-situ bioremediation makes use of naturally occurring or added bacteria to utilize organic contaminants as a food source, and in combination with oxygen, results in the mass reduction of contamination in soils. The technology is typically applied to petroleum hydrocarbon contaminants. The bioremediation control parameters are typically: temperature, oxygen, water, nutrients, and pH. Aeration is normally optimized by arranging soil in surface biopiles which are mechanically turned on a regular basis. Nutrients may be added to improve bacterial cell growth if naturally deficient in the soils. In cold weather conditions, remediation may be optimized by covering the biopiles with sheeting and maintaining oxygen levels using aeration pumps.	- Less equipment required compared to other remedial technologies. - Can be used in-situ or ex-situ. - Relatively low costs* - Relatively mature remediation technology with good track record	– Large area required for stockpiling if undertaken ex-situ. - May require further different remediation when contaminant concentrations reduce. - Increased traffic and noise during excavation if undertaken ex-situ. - Ex-situ treatment may not be appropriate in built-up areas due potential odour/ vapour release. - Temperature dependent. Tends to be less efficient in cooler weather, although modern systems tend to overcome these limitations through the use of specialist nutrient additions and enhanced aeration. - Less effective against long chain hydrocarbons and large poly aromatic hydrocarbons. Pre-remediation treatability studies may be required to assess effectiveness for these contaminants - Requires careful management of leachate to avoid contamination of bioremediation area. Provisions required for safe discharge of leachates.

Preliminary Remediation Objective	Target Contaminants	Suitable Media	Remediation Option Description	Advantages	Disadvantages
Remove contamination source	Petroleum hydrocarbons, non-chlorinated solvents	Contaminants in unsaturated zone	**In-situ Bioventing** - Bioventing increases oxygen levels in the unsaturated zone to enhance bioremediation of organic contaminants in soil. The oxygen is typically injected from surface wells.	Achieves mass reduction in contamination levels within the unsaturated zone.	- Limited track record in the UK; - Requires soils to exhibit optimum range of pH and soil moisture to promote biodegradation - Not suitable for contaminants below or near to the water table - Performance likely to be limited in fine grained soils of low gas permeability or in low temperature conditions. - Potentially lengthy treatment programmes particularly for large hydrocarbon species. - Care required managing dispersion of contaminated soil vapours around treatment area.
Remove contamination source.	Light petroleum hydrocarbons, VOCs	Contaminants in the saturated zone	**In-situ air sparging** - Air sparging strips contaminants from groundwater in the saturated zone by flushing (bubbling). Air is pumped into the ground through wells. Oxygenation of groundwater to enhance biodegradation is a secondary remediation mechanism. Air sparging is often combined with soil vapour extraction to improve the efficiency of contaminant removal.	- Contaminated soil can remain in situ during treatment. - Cost effective and easily monitored.	- Risk remains from direct contact, inhalation of dust from contaminated soils. - Air emissions may need to be treated and/ or permit obtained. - Remediation timescales may be lengthy - Not suitable for low volatility contaminants - Efficiency of extraction systems are limited in low permeability or organic rich soils. Where soil composition is variable, the effectiveness of SVE could vary on spatial scales.
Remove contamination source.	Volatile hydrocarbons / fuels and VOCs. The technology is typically applicable to volatile compounds with a Henry's Law constant greater than 0.01 or a	Soil contaminants in the unsaturated zone	**In-situ Soil Vapour Extraction (SVE):** SVE systems work by applying a vacuum to the unsaturated zone to extract volatile contaminants. The vacuum is applied via vertical wells and / or horizontal vents. Treatment of the extracted soil gases may be performed by active charcoal adsorption,	- Achieves mass reduction in contamination from the unsaturated zone - Relatively simple technology	- Air emissions may need to be treated and/ or permit obtained. - Remediation timescales may be lengthy - Not suitable for low volatility contaminants

Preliminary Remediation Objective	Target Contaminants	Suitable Media	Remediation Option Description	Advantages	Disadvantages
	vapour pressure >0.5mm Hg		catalytic oxidation, fume incineration or gas discharge to the atmosphere. The efficiency of SVE systems may be improved by the imposition of a geomembrane at the ground surface to reduce bypassing the soil vapour reservoir. If groundwater is shallow or prone to rising, depression pumps may be installed to maintain or increase the depth of the unsaturated zone.		- Efficiency of extraction systems are limited in low permeability or organic rich soils. Where soil composition is variable, the effectiveness of SVE could vary on spatial scales.
Remove contamination source.	Metals/ inorganics, hydrocarbons, VOCs	Groundwater	**Pump and treat** – Groundwater is pumped from wells to an above-ground treatment system that removes the contaminants. Enhanced physical abstraction systems inject surfactants to lift the contaminants from the sorbed phase and to improve recovery.	- Contaminated soil can remain in situ during treatment.	- Settlement risks associated with dewatering. - Generated by-products require offsite disposal. - Duration of treatment can be unpredictable
Reduction in leachate mobility	Organic contaminants Inorganic Contaminants – typically heavy metals	Soil contaminants	**Soil Stabilisation** - Soil stabilisation is typically used to reduce the aqueous mobility of contaminants. It is distinct from solidification which results in a reduction in soil permeability, but at the cost of high cement additions, and the potential for increased mobilization of copper, lead, arsenic, and ammonium (Pensaert, et al. 2008lii; Bates and Hills, 2015liii). The most effective methods employ proprietary additives including modified clays to target reductions in specific leachates at addition rates typically <5%. This minimizes impacts on geotechnical properties. Soil stabilisation may be applied in-situ through rotavation methods but is perhaps easiest to control using ex-situ batching methods.	- Suitable for a wide range of contaminants - Proven capability to achieve significant reductions in leachate concentrations particularly for organic species - Can be combined with cement / lime stabilisation to improve geotechnical properties. - Rapid completion times - Can be deployed using readily available equipment with minimum set up time	- Likely to require treatability studies to determine correct additives for use - Does not result in mass reduction in contamination - Long term durability is not certain - Increases in material volume following stabilisation
Prevent permeation of contaminants into water supply pipes	VOCs, SVOCs, phenols, cresols and chlorinated phenols, ethers, nitrobenzene, ketones, aldehydes, mineral oils, amines	N/A	**Upgrading water supply pipes** – Selection of pipe material suitable for ground conditions in accordance with UKWIR guidance[xliii].	- Quick and easy to install/ validate. - Cost effective*.	- Does not remove contamination source.
Prevent erosion of buried concrete in aggressive ground conditions	Sulphates, mineral acids, magnesium cations, ammonium salts, phenols	N/A	**Upgrading class of concrete** – Selection of appropriate class of concrete for ground conditions in accordance with guidance presented in BRE Special Digest 1.	- Quick and easy to install/ validate. - Cost effective*.	- Does not remove contamination source.

Preliminary Remediation Objective	Target Contaminants	Suitable Media	Remediation Option Description	Advantages	Disadvantages
Remove contamination source.	Hydrocarbons	Free phase product (LNAPL)	**Excavation and skimming** – Excavate a series of trenches and use a sump pump to remove free phase.	- Quick and easy to install/ validate. - Cost effective*.	- Settlement risks associated with dewatering. - Requires offsite disposal of skimmed product. - Does not remove dissolved phase contamination.
Break contamination pathway	Organics and Inorganics	Groundwater	**Permeable reactive barriers (PRBs):** PRBs are used to treat groundwater contaminants along the axis of groundwater migration. They are often employed at the margins of developments or contaminant plumes to restrict off-site migration. As their name implies PRBs are designed to have minimal impact on soil permeability and therefore minimize impacts on groundwater flow pathways and groundwater levels. The reactive phase comprising the barrier is typically installed in a trench into the saturated zone. Funnel and gate approaches channel groundwater towards reactive / adsorption sections which can be replaced when saturated. The reactive phase is selected to breakdown the contaminants or immobilize them. PRBs utilizing zero-valent iron reactive phases have been constructed to promote reductive dichlorination. PRBs have also been derived as an application of e-clay soil stabilisation technology.	- Designed to minimize impact on groundwater flow pathways - Effective against a wide range of contaminants	- Long term durability concerns: Potential requirement for long term maintenance and replacement of adsorptive material. - Does not remove contamination at source - Verification period can be lengthy in areas of low groundwater permeability
Remove contamination source.	Hydrocarbons and VOCs	Soils or groundwater	**In-situ bioremediation** – bioremediation by introduction of oxygen into the subsurface via injection wells.	- Proven treatment of TPH, PAHs and VOCs - Can be completed in-situ	Level of effectiveness dependent on specific contaminant and conditions present May not be as effective as ex-situ bioremediation in heterogeneous soils
Remove contamination source	Some metals/ inorganics/ bacterial contamination (coper, lead, zinc, BOD/COD, nitrogen, phosphorus and suspended solids, coliforms)	Groundwater	**Ex-situ biological treatment** – constructed wetlands	- Effective at treating metals - Moderate to low relative costs* - Well developed - Standalone treatment	- Lots of space required - Not effective on TPH, PAHs and VOCs. - High capital costs - Transfers inorganic contaminants to wetland sediment

Preliminary Remediation Objective	Target Contaminants	Suitable Media	Remediation Option Description	Advantages	Disadvantages
Break contamination pathway	Ground gases	Ground gas	**Gas Migration barrier:** Gas migration barriers share a common objective, namely to mitigate the lateral migration of ground gases towards receptors. Barriers typically create a low pressure area to draw ground gas towards the barrier, and vent the gases to the atmosphere. Traditional methods include granular filled trenches, but these can suffer from degradation over time as they become clogged with fines. More advanced modern methods include passive dilution barriers which connect deep gas collection standpipe together in a surface collector trench which vents via above ground venting cowls. The design must ensure that gas is diluted to an acceptable concentration at the outlet. Barriers typically extend across the source / pathway media, although it may not be essential to penetrate the full depth of the source or pathway if the zone of influence extends some distance beyond the barrier.	-Empirical evidence has shown that the barriers are effective at limiting lateral migration of ground gases. -Should not inhibit groundwater migration	May be expensive to install in area of deep gas sources Requires good access at margins of gassing ground to install barrier In ground obstructions may restrict depth of installation.
Break contamination pathway	Permanent or volatile ground gases, radon	Ground gas	**Foundation Protection** Generic foundation gas protection methods recognized by BS8485:2015+A1:2019 are: • Structural barriers • Ventilation Measures • Gas resistant membranes The purpose of these measures is to restrict gas migration into buildings constructed over gassing ground. The BS standard offers a range of options employing at least two of the above systems to address gas risks for different types of building. Monitoring is sometimes required to confirm the performance of protection systems.	- Use of multiple gas protection systems introduces redundancy in the event that one system fails - Flexible application of options to suit development - Effective at mitigating risk to building occupants from ground gases	- Effectiveness critically depends upon good workmanship, CQA and validation. - Membranes are particularly vulnerable to rupture - Does not address off-site migration

*Relative costs: design, construction and operations and maintenance costs of the core process that defines each treatment.

Appendix F. Qualitative risk assessment definitions

The qualitative risk summaries for non-controlled waters are derived from the Environmental Statement Volume 5, Technical Appendices, Scope and methodology Report Addendum (CT-001-000/2), Annex F, (HS2, 2013).

Table 79: Classification of probability

Classification	Definition of the probability of harm/pollution occurring
High Likelihood	The contaminant linkage exists and it is very likely to occur in the short term, and/or will almost inevitably be realised in the long term, and/or there is current evidence of it being realised.
Likely	The source, pathway and receptor exist for the contaminant linkage and it is probable that this linkage will occur. Circumstance are such that realisation of the linkage is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	The source, pathway and receptor exist and it is possible that it could occur. Circumstances are such that realisation of the linkage is by no means certain in the long term and less likely in the short term.
Unlikely	The source, pathway and receptor exist for the contaminant linkage but it is improbable that it will be realised even in the long term.

Table 80: Classification of consequence

Classification	Definition of consequence
Human health receptors – site end users	
Severe	Acute damage to human health based on the potential effects on the critical human health receptor.
Medium	Chronic damage to human health based on the potential effects on the critical human health receptor.
Minor	Minimal short-term effects on human health based on the potential effects on the critical human health receptor.
Negligible	No appreciable impact on human health based on the potential effects on the critical human health receptor.
Controlled water receptors	
Severe	Pollution of a Principal aquifer within a source protection zone (inner and outer) or potable supply characterised by a breach of drinking water standards. Pollution of a surface water course characterised by a breach of an Environmental Quality Standard (EQS) at a statutory monitoring location or resulting in a change in the General Quality Assessment (GQA) grade of river reach. Discharge of a hazardous or non-hazardous substance to groundwater.
Medium	Pollution of a Principal aquifer outside a source protection zone (inner and outer) or a Secondary A aquifer characterised by a breach of drinking water standards. Pollution of an industrial groundwater abstraction or irrigation supply that impairs its function. Substantial pollution but insufficient to result in a change in the GQA grade of river reach.
Minor	Low levels of pollution of a Principal aquifer outside a source protection zone or an industrial abstraction, or pollution of a Secondary A or B aquifer. Low levels of pollution insufficient to result in a change in the GQA of river reach, pollution of a surface water course without a quality classification.
Negligible	No appreciable pollution, or pollution of a low sensitivity receptor such as a secondary (undifferentiated) aquifer or a surface water course without a quality classification.
Ecosystem receptors	
Severe	For sites with designations as follows – Sites of Special Scientific Interest, National Nature Reserve, Special Protection Area (and potential sites), Special Area of Conservation (and candidate sites) or Ramsar. Irreversible adverse change in the functioning of the ecological system or any species of special interest that forms part of that system.
Medium	For sites with designations as follows – Site of Special Scientific Interest, National Nature Reserve, Special Protection Area (and potential sites), Special Area of Conservation (and candidate sites) or Ramsar. Substantial adverse change in the functioning of the ecological system or any species of special interest that forms part of that system.
Minor	Harm to ecosystems of a low sensitivity such as sites of local importance. No appreciable harm to ecosystems with statutory designations.
Negligible	Limited harm to ecosystems of low sensitivity such as sites of local importance.
Property receptors – buildings, foundations and services including the operational HS2 scheme	

Classification	Definition of consequence
Severe	Collapse of a building or structure including the services infrastructure from explosion due to ground gasses.
Medium	Significant damage to a building or structure including the services infrastructure impairing their function.
Minor	Damage to buildings/structures and foundations but not resulting in them being unsafe for occupation. Damage to services but not sufficient to impair their function.
Negligible	No appreciable damage to buildings/structures, foundations and services.
Property receptors – Grade 1 agricultural land	
Severe	Substantial loss in the value of crops or domestically-grown produce resulting from disease, death or other physical damage. Death to livestock, domesticated animals or wild animals subject to shooting or fishing rights.
Medium	Substantial diminution in yield of crops or domestically-grown produce resulting from disease, death or physical damage. Serious disease or serious physical damage to livestock, domesticated animals or wild animals subject to shooting or fishing rights.
Minor	Harm to crops but not resulting in a substantial loss in value or diminution in yield. Limited harm in terms of disease or other physical damage. Serious disease or other serious physical damage to livestock, domesticated animals or wild animals subject to shooting or fishing rights.
Negligible	No appreciable harm, or harm to a low sensitivity receptor.

Table 81: Estimation of risk

		Consequence			
		Severe	**Medium**	**Minor**	**Negligible**
Probability	**High Likelihood**	Very High	High	Moderate	Moderate / Low
	Likely	High	Moderate	Moderate / Low	Low
	Low Likelihood	Moderate	Moderate / Low	Low	Very Low
	Unlikely	Moderate / Low	Low	Very Low	Very Low

Table 82: Definition of classified risks

Risk	Definition
6 (Very High risk)	There is a high probability that a contaminant linkage could exist between a source and a designated receptor resulting in detriment to the receptor. Investigation and remediation will be required prior to (or as part of) construction. During construction further mitigation and monitoring measures (in accordance with the draft CoCP) are likely be required. Such sites are considered significant.
5 (High risk)	It is likely that a contaminant linkage exists with potentially a severe effect on designated receptors. Investigation and remediation is very likely to be required. Such sites are considered significant.
4 (Moderate risk)	It is possible that an effect could arise to a designated receptor through a contaminant linkage. However, the effect is most likely to be moderate to minor. Further investigative work is likely to be required to clarify the risk. Some remediation works may be required. Such sites may be considered significant.
3 (Moderate / Low risk)	It is possible that a contaminant linkage could exist, but if it does, any effects would normally be minor. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.
2 (Low risk)	It is a low possibility that a contaminant linkage could exist. However, should there be a linkage the effect to the receptor (with regards to controlled waters) would normally be minor or negligible and the effect on human health would be negligible. No investigation or remedial works are likely to be required.
1 (Very low risk)	It is unlikely that a contaminant linkage could exist between a source and a designated receptor.

The qualitative risk summaries for controlled waters are derived from HS2 Technical Standard – groundwater protection Document number HS2-HS2-EV-STD-000-000010.

Table 83: Classification of Probability

Classification	Definition
High likelihood	There is a linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a linkage and all the elements are present and in the right place, which means that it is probably that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place and is less likely in the shorter term.
Unlikely	There is a linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Table 84: Classification of consequence

Classification	Criteria	Example
Major	Adverse: Loss of an attribute and /or quality and integrity of an attribute	Adverse: Increased flood risk to essential infrastructure, highly or more vulnerable developments; loss of a fishery; decrease in surface water ecological or chemical WFD status or groundwater qualitative or quantitative WFD status
	Beneficial: Creation of new attribute or major improvement in quality of an attribute	Beneficial: Creation of flood plain and decrease in flood risk; increase in productivity or size of fishery; increase in surface water ecological or chemical WFD status; increase in groundwater qualitative or quantitative WFD status.
Moderate	Adverse: Loss of part of an attribute or decrease in integrity of an attribute	Adverse: Increased flood risk to less vulnerable developments; Partial loss of fishery; measurable decrease in surface water ecological or chemical quality or reversible change in the yield or quality of an aquifer, affecting existing users, but not changing any WFD status
	Beneficial: Moderate improvement in quality of an attribute	Beneficial: Measurable increase in surface water quality or in the yield or quality of aquifer benefiting existing users but not changing any WFD status
Minor	Adverse: Some measurable change to the integrity of an attribute	Adverse: Increased flood risk to water compatible development or impact which does not affect existing or any possible future developments; measurable decrease in surface water ecological or chemical quality; decrease in yield or quality of aquifer not affecting existing users or changing any WFD status
	Beneficial: Measurable increase, or reduced risk of negative effect to an attribute	Beneficial: Measurable increase in surface water ecological or chemical quality; increase in yield or quality of aquifer not affecting existing users or changing any WFD status
Negligible	No change to integrity of attribute	Negligible change to flood risk; discharges to watercourse or changes to an aquifer which lead to no change in the attribute's integrity

Table 85: Comparison of Magnitude of Effect (Consequence) Against Probability

	Consequence			
Probability	**Major**	**Moderate**	**Minor**	**Negligible**
High likelihood	Very high risk	High risk	Moderate risk	Moderate/low risk
Likely	High risk	Moderate risk	Moderate/low risk	Low risk
Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

Appendix G. GI Proposals

Table 86: Proposed GI

Start chainage	End chainage	Environmental Statement Site ID (ES LQ)	Site Title	Land Use Classification	LLAU Development Proposals*	Missing GI (Inside LQ Site)	Missing GI (Outside LQ Site)	Supplementary GI Already Proposed	Further GI Target Notes: Additional Contam only GI	Additional Contamination only Holes (no)	Accessibility for GI
161+300	161+600	19-05	Woodlands Cemetery historical landfill	1 - historical land use		0	0	0	Outside LOD and LLAU	0	N/A
162+580	162+660	19-07	Former sewage works	2 - historical land use	2	16	2	4	Supplementary GI within ES LQ Site	7	
162+980	162+980	19-08	Infilled pond	1 - historical land use	1	0	6	0	Small (61m2) Class 1 Site Within LLAU Only.	2	N/A
163+100	163+500	19-10	Grimstock hill historical landfill and Trajan hill historical landfill	2 - historical land use		0	0	0	Outside LOD and LLAU	0	N/A
163+390	163+390	19-12	Former garage (not former sewage works - considered in 19-07)	1 - historical land use	1	0	0	0	Outside LOD and LLAU	0	N/A
163+350	163+350	19-13	Grimstock hill historical landfill and Trajan hill historical landfill	2 - historical land use		0	0	0	Outside LOD and LLAU	0	N/A
162+980	162+980	19-14	Infilled Pond In eastern land take; chainage 163+000 - assessed in LQ 19-08	1 - historical land use	1				See 19-08	0	N/A
163+250	163+280	19-15	Infilled pond	1 - historical land use	2	0	2	0	Small (2m2) Class 1 Site Within LLAU Only.	0	N/A
163+250	163+250	19-16	Grimstock Hill Historical Landfill 100m east of land take; chainage 163+250							0	
164+800	164+900	19-16 (20-04)	Infilled pond - covered in 19-36	1 - historical land use	3	0	0	0	No GI Proposed in area of significant earthworks, with LOD.	0	Area is adjacent to a minor road in an area of scrubland. Should be readily accessible.
		19-17	Infilled Wantage Road Quarry 30m east of land take; chainage 163+120 - 163+300							0	
164+080	164+850	19-17 (20-01)	Coleshill Gas Works historical landfill	2 - historical land use	2	45	2	15	Needed	17	Area is relatively vegetated, GI is likely to be difficult without first clearing the site
1+040(NC)	1+070(NC)	19-17 (20-01)	Coleshill Gas Works historical landfill - combined in assessment for LQ 19-17 (20-01)	2 - historical land use	2				See 19-17 (20-01)	0	N/A
159+800	159+900	19-18	Vehicle depot - combined in assessment for LQ 24-58	2 - current land use	1				See 24-58	0	
		19-19	Infilled Pond In western land take; chainage 163+350			0	0			0	
161+220	161+260	19-20	Timber yard, formerly a saw mill	1 - historical & current land use	2	3	38	1	Small Class 1 Site - Sufficient GI Required	5	Site is an active timber yard. Access appears plausible though owner/occupier permission will be necessary
163+350	163+350	19-20	Infilled pond in western land take; 163+350	2 - historical land use		0	0			0	
163+385	163+385	19-21	Infilled Pond In western land take; chainage 163+385 - assessed in LQ site 19-15		-	0	0	0	ES LQ site is barely within LLAU (2m2)	0	N/A
164+800	164+900	19-23	Infilled Pond In eastern land take; chainage 164+480 - assessed in LQ site 19-36		2					0	
164+260	164+280	19-24	Birmingham to Nuneaton Line - covered in assessment for 19-17 (20-01)	1 - historical land use	1	0	0	1	Class 1 site within railway lines	0	Railway: Assumed inaccessible.
1+070(NC)	1+120(NC)	19-24	Birmingham to Nuneaton Line - combined in assessment for LQ 19-17 (20-01)	1 - historical land use	1				N/A	0	Railway: Assumed inaccessible.
164+300	164+750	19-25	Coleshill Sewage Treatment Works - combined in	2 - current land use	2				See 19-17 (20-01)	0	

			assessment for LQ 19-17 (20-01)								
164+300	164+750	19-25 (20-02)	Sewage works in and adajcent to eastern landtake; chainage 164+320 - 164+550 - covered in LQ site 19-36		1	17	7	22		0	
159+900	160+000	19-26	Depot 80m east of land take; chainage 159+750 - 159+950 - combined in assessment 24-58		1	0	0	0	Insignificant LLAU encroachment, 35m2	0	
164+550	164+750	19-26 (20-06)	Coleshill Water Reclamation Works historical landfill - covered in LQ site 19-17 (20-01)	2 - historical land use	1	0	0	0	Minor intrusion into LLAU	0	N/A
162+250 (BS)	162+550 (BS)	19-27	Former Coleshill Hall Hospital with former tank	1 - historical land use	1	0	4	0	Not in LoD or LLAU	0	N/A
161+220	161+260	19-29	Timber Yard (former Saw Mill) Intersected by Proposed Scheme; chainage 161+250 - 161+350 - assessed in LQ site 19-20		2				See 19-20	0	
		19-33	Vehicle Depot Adjacent eastern land take; chainage 163+400 - 163+450 Former garage 30m east land take			0	0			0	
163+400	164+300	19-34	Coleshill Industrial Estate Adjacent to 250m to the east of land take - partially covered in assessment 19-17 (20-01)		2	0	0	5	Sufficient GI proposed within LQ site 19-17 (20-01)	0	N/A
162+600	162+600	19-35	Electricity substation	1 - current land use	1	0	0	0	Small (127m2) Existing Class 1 Electricity Substation	0	N/A
164+200	164+800	19-36	Coleshill Sewage Works On route, in eastern and western land take & upto 250m east of land take; chainage 164+600 - 164+930		2	44	44	0	Target 2 holes within LOD	40	
163+000	163+000	19-38	Infilled pond	1 - historical land use	1	0	0	0	Area within LOD is very small (4m2) Class 1 site.	0	
		19-38	Former tank in western land take, chainage 162+680 (Birmingham Spur)		2	0	0	0	target 1 hole.	5	
2+700	2+700	19-40	Infilled pond; chainage 2+700 (North chord)	2 - historical land use	2	0	0	0	Small ES LQ within LLAU only.	1	
163+350	163+350	19-40	Infilled pond in eastern land take; chainage 163+350			0	0			0	
163+350	163+350	19-41	Infilled Pond In eastern land take; chainage 163+350	2 - historical land use	2	0	0	0	ES LQ site in area of proposed landscaping	1	
2+400 (NC)	2+400 (NC)	19-43	Infilled pond	1 - historical land use	2	0	0	0	Area of proposed landscaping planting. Target 1 hole	1	
3+700 (NC)	3+700 (NC)	19-45	Infilled pond	1 - historical land use	1	0	0	0	Site is outside LOD with no earthworks proposed in LLAU. Class 1 site. (221m2)	0	N/A
1+200 (NC)	1+200 (NC)	19-46	Infilled pond	2 - historical land use	2	0	2	0	Target 1 hole within LOD	1	N/A
1+000 (NC)	1+100 (NC)	19-49	Former works including coal and cement block factories now Jack O'Watton Business park	1 - historical land use	1	0	0	0	ES LQ is within LOD with no proposed investigation	2	Active industrial estate, locations are within the yard of a fencing supplier. Prior-arrangement with the owner/occupier will be necessary
0+800	0+800	19-52 (20-05)	Infilled pit in landtake area; chainage 0+800		1	0	0	0	Small ES LQ Site within LLAU only	2	N/A
164+370	164+550	19-56 (20-03)	Infilled pit	2 - historical land use	1	0	0	0	ES LQ Site entirely within LOD	1	
164+400	164+400	19-56 (20-03)	Infilled pond intersected by North Chord; chainage 1+100 - covered in LQ site 19-36		-	0	0	0	ES LQ Site entirely within LOD	0	
2+480	2+480	19-68	Infilled Pond In land take area; chainage 2+480		1	0	0	0	ES LQ site is barely within LLAU (28m2)	0	N/A

2+400 (NC)	2+400 (NC)	19-69	Infilled Pond In land take area; chainage 2+240 - assessed in LQ 19-43		1	0	0	0	See 19-43	0	N/A
3+700 (NC)	3+700 (NC)	19-71	Infilled Pond In land take area; chainage 1+900 - assessed In LQ 19-45		1	0	0	0	See 19-45	0	N/A
1+000 (NC)	1+100 (NC)	19-73	Former works inc. coal and cement block factory Adjacent to 250m from land take; chainage 1+180 - assessed in LQ 19-49		1			0	See 19-49	0	
164+400	164+400	19-75	Infilled Pond Intersected by Northern Spur; chainage 1+100 - assessed in LQ site 19-56 (20-03)		-			0	See 19-56 (20-03)	0	
165+150	165+150	20-10	Infilled pond in eastern land take, chainage 165+340		1	0	0	0	Small ES LQ within LLAU only. Insignificant ground break anticipated	0	N/A
165+100	165+100	20-58	Birmingham and Derby railway line 165+100 on route assessed in LQ site 20-06 - Sub-Lot 7-8		2	0	0	2	Existing railway line	0	Existing railway line
155+200	155+900	23-50	Jacksons Brickworks Landfill - assessed in LQ site 24-1		1				See 24-1	0	
		24-04	Hampton-in-Arden to Shustoke Dismantled Railway					EWC	N/A	0	N/A
		24-09	Myrtle cottage farm					EWC	N/A	0	N/A
155+200	155+900	24-1	Jacksons Brickworks Landfill (historical)	2 - historical land use	2	2	4	2	Further GI required in suppl phase	9	Area is an active waste recycling centre. Access will require prior-arrangement with the owner/occupier
156+000	156+000	24-11	Infilled pit	2 - historical land use		0	3	1	EWC conducting GI	1	N/A
		24-12	N3: Park Farm Quarry Site			0	0	EWC	With EWC works	0	N/A
155+900	155+900	24-13	Former Smithy	1 - historical land use	1	0	0	0	Small Class 1 ES LQ Site immediately adjacent to the EWC area	1	Site is within agricultural land. Access will need to be arranged with the land owner/occupier
158+000	158+500	24-16	Backfilled Borrow Pit			0	0	EWC	Within EWC works	0	N/A
156+000	156+000	24-2	Infilled pond	2 - historical land use	1	0	0	0	Class 2 site entirely within LOD but no ground break proposed	1	Difficult access, immediately adjacent to existing slip road.
158+500	158+500	24-23	Infilled Sand and Gravel Quarry			0	0	EWC	Within EWC works	0	N/A
155+800	155+800	24-3	Cottage Farm		-			0		3	
155+900	157+500	24-32	Rugby to Birmingham Rail Line		1	0	0	0	Active railway	0	Active railway
		24-34	Backfilled Borrow Pit			0	0			0	
		24-36	Warren Farm with tank - addressed in LQ 24-34							0	
		24-37	Park Farm - addressed in 24-12							0	
		24-38	Middle Bickenhill Landfill			0	0			0	
		24-39	Infilled Pit			0	0			0	
		24-40	Infilled Pit			0	0			0	
157+000	158+200	24-41	Packington operational Landfill	2 - current land use	1	0	0	0	Outside LOD, no ground break assumed in LLAU. Hybrid Bill appears to identify the parcel as being used for "access" only	0	N/A
157+800	158+100	24-43	Melbicks Garden & Leisure centre - addressed in LQ 24-44	1 - current land use	1	0	0	0	Small-scale investigation required in LOD	0	Car park for an existing garden centre. Prior arrangement for access will be required with owner/occupier

158+000	158+300	24-44	Brackenlands Farm Landfill (historical)	2 - historical land use	1	0	8	0	Outside LOD, sufficient GI	22	Area of scrubland adjacent to a major road. Unlikely to be any issues with access
158+400	159+200	24-46	Birmingham Business Park	1 - current land use	2	0	4	0	Minor intrusion into LOD, GI along periphery	2	Car park for Fujitsu UK. Access subject to prior arrangement with owner/occupier.
		24-5	Windbridge Nurseries Landfill			0	0			0	
158+500	158+600	24-54	Coleshill Civic Amenity Site Landfill (historical)	2 - historical land use	1	0	0	0	Outside LOD, small class 2 site	1	N/A
159+400	159+500	24-56	Infilled gravel pit	2 - historical land use		0	0	0	Outside LOD and LLAU	0	N/A
159+800	159+900	24-58	Highways Agency Depot (operational)	1 - current land use	1	0	21	0	Target 1 hole within LLAU	6	Proposed additional GI location is to the rear of an active warehouse. Access to be arranged with the owner/occupier
155+600	155+700	24-63	Proposed Bickenhill recycling centre site		3	0	0	0	No GI within LOD, but not believed to have been subject to development historically	0	
162+000 (BS)	162+000 (BS)	No LQ Site	River Cole Crossing			1	0	0	Sufficient GI	1	
156+500 (ML)	156+500 (ML)	No LQ Site	Monitor shallow Gas							2	
159+300 (ML)	159+300 (ML)	N/A	Former Pond near ML159-CP003 (Nickel Leachate Hotspot)							4	
162+700 (BS)	163+200 (BS)	N/A	Near soil leachate exceedances							3	
164+000 (ML)	164+000 (ML)	N/A	Verification: Targeting location of postulated elevated CrVI in leachate / groundwater							3	
164+000 (ML)	164+000 (ML)	N/A	Near to ML164-TP015 Hotspot							2	
163+500 (BS)	163+500 (BS)	No LQ Site	Ammoniacal N and TPH hotspot identified in BD163-CR017					0	TPH and Amm N hostpot encountered in groundwater	1	

Note: LLAU Development Proposals: 1 Temporary or Access; 2 Permanent Shallow Works; 3 Permanent Deep Works.

Appendix H. Asbestos Risk Assessment

Appendix I. Disclaimer

This disclaimer should be read in accordance with the technical limitations in Section 10.

This report has been prepared solely for use by the party which commissioned it (the "client") in connection with the captioned project. It should not be used for any other purpose. No person other than the client may rely on the content, information or any views expressed in this report. We accept no duty of care, responsibility or liability to any other recipient of this report. This report is confidential and contains proprietary intellectual property.

No representation, warranty or undertaking, express or implied, is made and no responsibility or liability is accepted by us to any party other than the client, as to the accuracy or completeness of the information contained in this report.

We disclaim all and any liability whether arising in tort or contract or otherwise which it might otherwise have to any party other than the client, in respect of this report, or any information attributed to it.

This report represents the technical findings and opinions of experienced geo-environmental specialists and does not constitute legal, insurance or financial advice, for which separate, independent advice should be consulted from qualified professionals if so required.

The findings and opinions of this report are based on information obtained from a variety of sources as detailed in this report. We cannot and do not guarantee the authenticity or reliability of the information from other sources upon which we have relied. To the extent that this document is based on information supplied by other parties, We accept no liability for any loss or damage suffered by the client due to an error or omission in this report which is (i) due to an error or omission data, information or statements supplied to us by other parties including the client ("Data") or (ii) which arises from any conclusions based on such Data. We have not independently verified such Data and have assumed it to be accurate, complete, reliable and current as of the date of such information.

To the extent that this report is based on information obtained from a ground investigation, any such investigation can examine only a small part of the subsurface conditions. Where we have been responsible for the design of a ground investigation, we shall have used reasonable skill and care. However, in any ground investigation there remains a risk that pockets or "hot-spots" of contamination may not be identified, because investigations are necessarily based on sampling at localised points. Not finding any indicators of contamination does not mean that hazardous substances do not exist at the site.

Certain indicators or evidence of hazardous substances or conditions may have been outside the limited portion of the subsurface investigated or monitored and thus may not have been identified or their full significance appreciated. Such risks may be mitigated to a degree by carrying out further ground investigation, or during construction works, by on-site visual observation and validation testing.

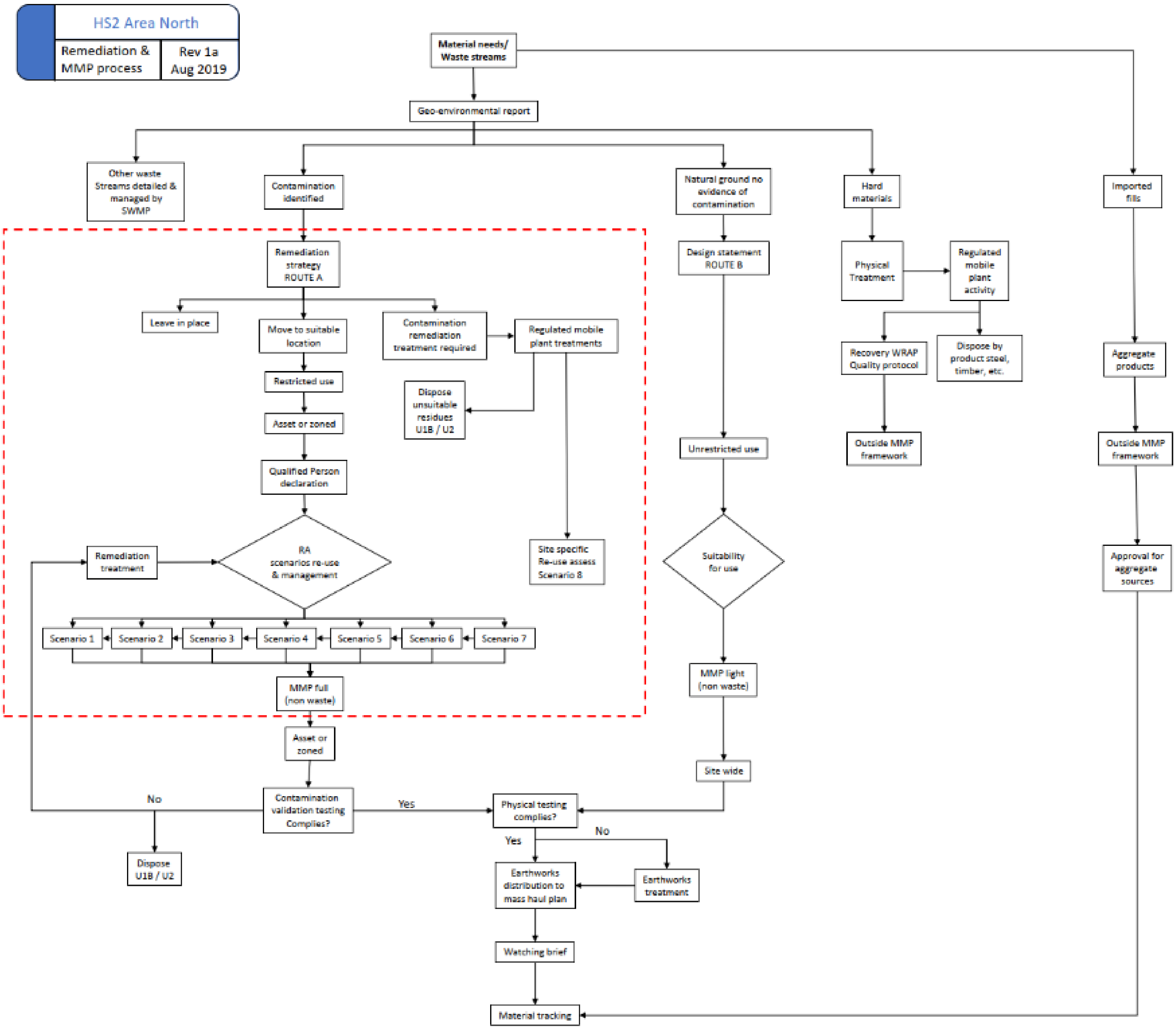
It is also possible that environmental monitoring has not identified certain conditions because of the relatively short monitoring period. Accordingly, it is possible that the ground investigation and monitoring failed to indicate the presence or significance of hazardous substances or conditions. If so, their presence could not have been considered in the formulation of our findings and opinions.

For the avoidance of doubt, where the words "remediation" or "remedial action" are used in this report, these words and phrases shall refer to actions to reduce or control risks from relevant pollutant linkages associated with the site. Unless explicitly stated, remediation shall NOT be assumed to refer to actions to eliminate contamination risks.

This report has been produced using due skill and care, in accordance with statute and best practice at the reporting date stated in the report. We accept no liability for any change in geo-environmental risk interpretation resulting from changes in guidance and/or statute after the reporting date.

We believe that providing information about limitations is essential to help the client identify and thereby manage its risks. These risks can be mitigated – but they cannot be eliminated - through additional research. We will, on request, advise the client of the additional research opportunities available, their impact on risk, and their cost.

Appendix J. Materials Management Framework


HS2 Area North
Remediation & MMP process
Rev 1a Aug 2019
Material needs/ Waste streams
Geo-environmental report
Other waste Streams detailed & managed by SWMP
Contamination identified
Natural ground no evidence of contamination
Hard materials
Imported fills
Remediation strategy ROUTE A
Leave in place
Move to suitable location
Contamination remediation treatment required
Regulated mobile plant treatments
Restricted use
Dispose unsuitable residues U1B / U2
Asset or zoned
Qualified Person declaration
Remediation treatment
RA scenarios re-use & management
Site specific Re-use assess Scenario 8
Scenario 1
Scenario 2
Scenario 3
Scenario 4
Scenario 5
Scenario 6
Scenario 7
MMP full (non waste)
Asset or zoned
Contamination validation testing Complies?
No
Yes
Dispose U1B / U2
Design statement ROUTE B
Unrestricted use
Suitability for use
MMP light (non waste)
Site wide
Physical testing complies?
No
Yes
Earthworks distribution to mass haul plan
Earthworks treatment
Watching brief
Material tracking
Physical Treatment
Regulated mobile plant activity
Recovery WRAP Quality protocol
Dispose by product steel, timber, etc.
Outside MMP framework
Aggregate products
Outside MMP framework
Approval for aggregate sources

Appendix K. References

[i] HS2 (May 2016) Delta Junction Geotechnical Desk Study (Volume 1 and Volume 2). Report number C223-CSI-GT-REP-030-000003, Revision P06

[ii] HS2 (2017): "*Technical Standard – Land Quality*", Report ref: HS2-HS2-EV-STD-000-000027, P04, June 2017

[iii] HS2 (2017): "*High Speed Rail (London to West Midlands) Environmental Minimum Requirements: Annex 4: Environmental Memorandum*"

[iv] Environment Agency (2004) Model Procedures for the Management of Land Contamination. Contaminated Land Report 11

[v] HS2 (2013): Environmental Statement Volume 5, Technical Appendices, Draft Code of Construction Practice (CT-003-000)

[vi] Laing-Murphy (May 2019). WP053(A) – BIS – Enabling Works North Contract, Remediation Strategy Report. Document no.: 1EW04-LMJ-EV-REP-NS07-053013

[vii] Letter from A.R Key, Severn Trent Water Authority dated 12th September 1984

[viii] Report of Director of Environmental Health and Trading Standards, General Purposes Committee, 28th November 1991

[ix] HS2 (2016): "*C224 Interchange Triangle Land Contamination – Preliminary Risk Assessment*", ref. P1N3-ARP-EV-REP-NS07-000001, P01

[x] Laing Murphy (2018): "*WP.53(A) BIS N1 Scheme Design – Pre-SDSC Design Release – Enabling Works North Contract, Ground Investigation Strategy Report.*" Ref. 1EW04-LMJ-EV-REP-NS07-053008

[xi] Johnson, C.C., Ander, E.L., Cave, M.R., and Paulumbo-Roe, B. (2012). Normal background concentrations (NBCs) of contaminants in English soils: Final project report. British Geological Survey Commissioned Report, CR/12/035

[xii] HS2 (2017): PH1-HS2-EV-REG-000-000001 Rev P02

[xiii] Sita drawing no Lpl-Pln-1109-01: "Composting Facility Location", November 2008

[xiv] Enterprise Limited (2013): *"Bickenhill HWRC and transfer facility, Operational Working Plan"*, ref. ENTSOL003

[xv] Arup / URS (undated): "HS2 London – West Midlands, Land Quality Technical Note – Detailed methodology for land contamination assessments"

[xvi] HS2 (2017): "Technical Standard – Groundwater Protection" Ref. HS2-HS2-EV-STD-000-000010

[xvii] Ian Farmer Associates (January 2018). Birmingham Interchange Station and People Mover Area A. Factual Ground Investigation Report, 1G001-BIA. Final Factual. Document number 1G001-IFR-GT-REP-060-000001, Issue 06

[xviii] Ian Farmer Associates (January 2018). Birmingham Interchange Station and People Mover Area B Factual Ground Investigation Report, 1G002-BIB. Final Factual, Issue 06. Document number 1G002-IFR-GT-REP-000-000004, Issue 06

[xix] Environmental Scientifics Group (December 2017) Birmingham Interchange and People Mover Area C Factual Report on Ground Investigation, E5601-15. Final Factual. Document number 1G003-ESG-GT-REP-000-000005, Revision P02

[xx] Ian Farmer Associates (September 2017). Birmingham Interchange Station and People Mover Area D. Factual Ground Investigation Report, 1G004-BID. Final Factual. Document number 1G004-IFR-GT-REO-000-000004, Issue 07

[xxi] RPS (August 2017) Factual Report for Ground Investigation Work Package. Delta Junction, Area A, WP-DJA-001. Final Factual. Document Number 1G026-RPS-GT-REP-000-000005, Revision P02

[xxii] Environmental Scientifics Group (October 2017). Factual Report on Ground Investigation. Delta Junction Area Z, WP-DJZ-001. Final Factual. Document Number 1G027-ESG-GT-REP-000-00002, Revision P02

[xxiii] BAM Ritchies (February 2018). NPA – North Package A (Phase A – Addendum Report), BAX.HS06. Draft Factual. Document number 1G105-BAM-GT-REP-000-000013, Revision P01
[xxiv] Soil Engineering Geoservices Limited. (May 2018) Report on a Ground Investigation at North Package B Phase B. Draft Factual. Document number 1G006-SEN-REP-000-000003
[xxv] Soil Engineering Geoservices Limited. (December 2017). Report on a Ground Investigation at Ufton to BIS Area X, WP-UBX-001. Final 02 Factual Report. Document number 1G062-SEN-GT-REP-000-000007
[xxvi] HS2 (Balfour Beatty / Vinci), 1MC09-N2 HS2 Ground Investigation Report Annex A -Sub-Lots 5, 6 and 7, Document number: 1MC09-BBV-GT-REP-N002-100005
[xxvii] Balfour Beatty Vinci (2018): Section N1 - Geotechnical risk register, Document number: 1MC08-MSD-GT-REG-N001-000001, Rev P01.4
[xxviii] CL:AIRE (2014): "SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, Final Project Report (Revision 2)"
[xxix] Environment Agency (2009): "Human Health toxicological assessment of contaminants in soil", Science Report SC050021/SR2
[xxx] Environment Agency (2009: "Updated technical background to the CLEA Model", Science Report SC050021/SR3
[xxxi] HS2 (2017): "Technical Standard: Land Quality", Ref. HS2-HS2-EV-STD-000-000027
[xxxii] Environment Agency (2005): "The UK Approach for Evaluating Human Health risks from Petroleum Hydrocarbons in Soils"
[xxxiii] British Standards Institution (2015): "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings", BS8485:2015+A1:2019, January 2019
[xxxiv] CIRIA C665. Assessing Risks Posed by Hazardous Ground Gases to Buildings, 2007
[xxxv] HSE, "EH40/2005 Workplace exposure limits, Containing the list of workplace exposure limits for use with the Control of Substances Hazardous to Health Regulations (as amended)", March 2013
[xxxvi] Environment Agency (2009): "*Updated technical background to the CLEA Model*", Science Report SC050021/SR3.
[xxxvii] Environment Agency (February 2018): "The Environment Agency's approach to groundwater protection Version 1.2"
[xxxviii] Rivers & Lakes – Metal Bioavailability Assessment Tool (M-BAT) (https://www.wfduk.org/resources/rivers-lakes-metal-bioavailability-assessment-tool-m-bat) 28 July 2014. Accessed 17th January 2018
[xxxix] Environment Agency water quality data archive (http://environment.data.gov.uk/water-quality/view/landing), Staffordshire, Warwickshire, and West Midlands 2017 data. Accessed 17th January 2018
[xl] Magrath, S.P., Loveland, P.J. 1992. "*The Soil Geochemical Atlas of England and Wales*". Glasgow: Blackie
[xli] Rawlins, B.G., et al. 2012. "The advanced soil geochemical atlast of England and Wales". British Geological Survey: Keyworth
[xlii] BRE (2005): "*Concrete in aggressive ground BRE Special Digest 1: 2005*".
[xliii] UK Water Industry Research (2011): Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, Report ref. 10/WM/03/21
[xliv] HS2 (2019): "WP053(A) – BIS – Enabling Works North Contract, Remedial Options Appraisal Report". Ref. 1EW04-LMJ-EV-REP-NS07-053012
[xlv] Laing-Murphy (2019): WP034 Invasive Species Mitigation – Enabling Works North Contract: Site Specific INNS Biosecurity Plan and Species-Specific Management Plan", ref. 1EW04-LMJ-EV-PLN-N000-034000
[xlvi] Environment Agency (2004): "Guidance on the use of Stabilisation/Solidification for the Treatment of Contaminated Soil" (R&D Technical Report P5-064/TR/1).

[i] CL:AIRE (2011): "*Definition of Waste: Development Industry Code of Practice*", Version 2, March 2011.
[xlvii] HS2 (2017): "Technical Standard – Materials Management Framework", Ref. HS2-HS2-EV-STD-000-000006
[xlviii] Arup, "C224 Ground Investigation Scoping Study", Report ref: C224-ARP-GT-REP-04000000323, December 2013
[xlix] Balfour Beatty Vinci (2018): "Land Contamination GI Scoping Strategy", ref. 1MC08-BBV-EV-SUR-N002-1000002
[l] Zetica (2014): "Unexploded Ordnance Desk Study", Ref. 0615-ZET-GT-REP-000-000001
[li] Laing-Murphy (2019): "WP034 Invasive Species Mitigation – Enabling Works North Contract: Site Specific INNS Biosecurity Plan and Species – Specific Management Plan"
[lii] Pensaert, S. *et al.* (2008): "*Immobilisation, Stabilisation, Solidification: A new Approach for the Treatment of Contaminated Soils: Case Studies: London Olympics, and Total Ertvelde*", 15de Innovatieforum Geotechniek – 8th October 2008.
[liii] Bates, E., Hills, C. (2015): "*Stabilisation and Solidification of Contaminated Soil and Waste: A Manual of Practice*", Hyggemedia.

RSK GEOSCIENCES

APPENDIX F LONGITUDINAL PROFILE

HS2 Asset ID HS2-000001162

Fit for Review and Comment

Profile

Scale H 1:600 V 1:100

Reference Information

In accordance with the Contract the Subcontractor shall have no liability for any errors, omissions and/or inadequacies for the following Third Party data upon which this drawing is based:
- Sixense 2019 Survey data supplied in HS2 Survey Grid.
- DTM, Associated Survey provided by BBV, Sixense (2019 LiDAR)
- Local Topographical information provided by BBV and Supply Chain Partners
- Alignment and Chainage for Stage 2 Detailed Design based upon PMA 3.0

METRES @ 1:500 — 0 5 10 20 50

METRES @ 1:100 — 0 1 2 5 10

Rev	Description	Drawn	Checked	Approved	Con App
P01.1	Fit for Review and Comment	--- ---	--- ---	--- ---	--- ---

HS2 accepts no responsibility for any circumstances which arise from the reproduction of this document after alteration, amendment or abbreviation or if it is issued in part or issued incompletely in any way.

Scale with caution as distortion can occur.

This document is issued for the party which commissioned it and for specific purposes connected with the captioned project only. It should not be relied upon by any other party or used for any other purpose. We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

Legend:
- Existing Ground
- Soil Stripping (Topsoil, Upper and Lower Subsoil)
- Topsoil Resoiling
- Subsoil Resoiling
- Remediated material sourced from middle Bickenhill Landfill.
- 900mm Class 2 layer
- Zone B/C Earthwoks fill
- Zone A Earthworks fill
- Zone A1 Earthworks fill
- Zone D Earthwoks fill
- Zone D1 Earthwoks fill
- Embankment fill

HS2

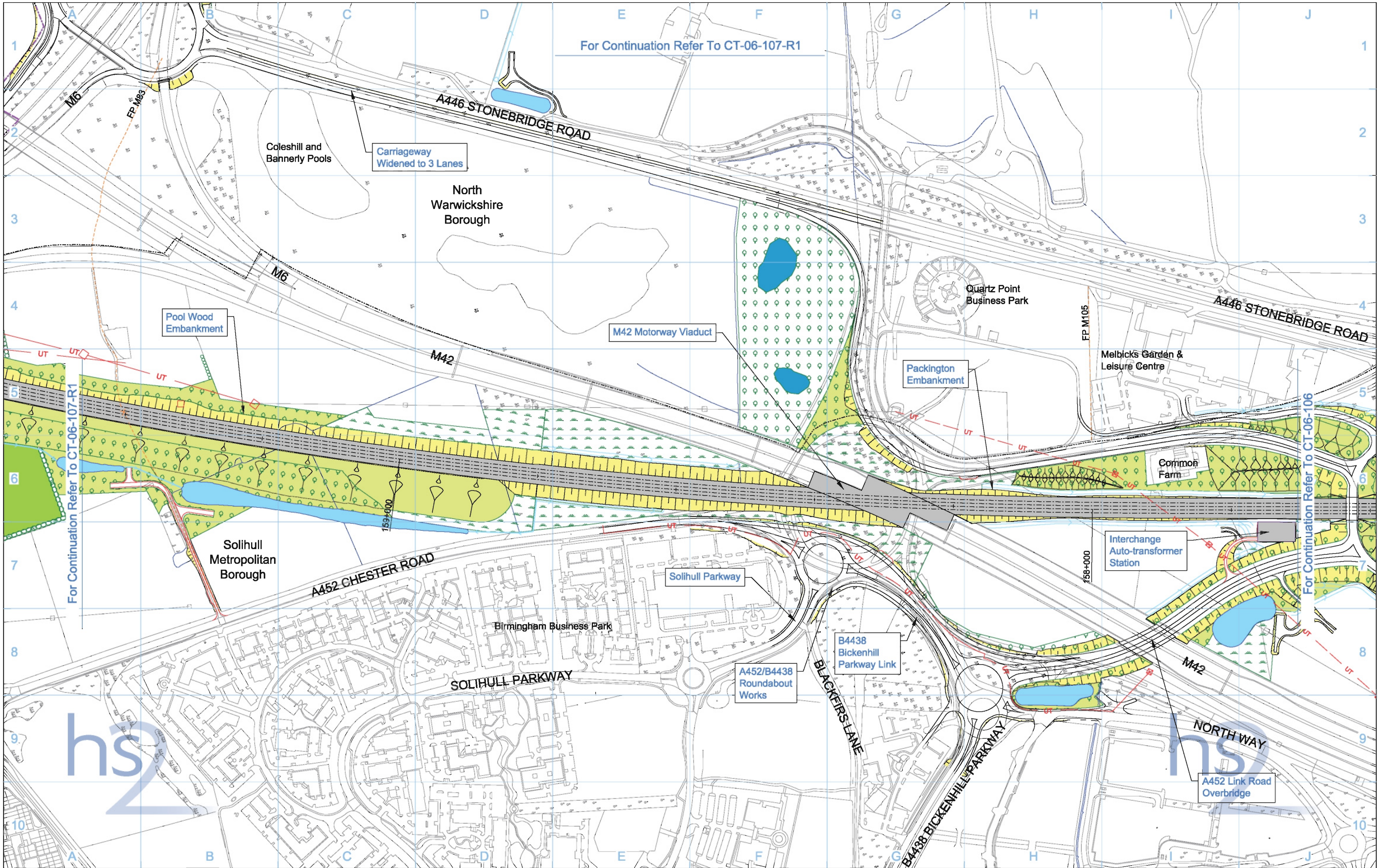
Registered in England: Registration No. 06791686
Registered office: 2 Snow Hill, Queensway, Birmingham, B4 6GA

Official

Creator/Originator: Balfour Beatty VINCI

Field	Value
Project/Contract	(N2) Delta Junction To WCML Tie In
Zone	Delta Main Line
Drawn	---
Checked	---
Approved	---
Drawing Title	Pool Wood Embankment Longitudinal profile
Date	---
Scale	As Shown
Size	A0x2
Deliverable	Yes (MIDP)
Gate	DD
Suitability	S3
Drawing No.	1MC09-BBV_MSD-CV-DPP-NS04_NL10-219401
Rev.	P01.1

APPENDIX G PLANS FOR THE POOL WOOD EMBANKMENT SUBMITTED WITHIN VOLUME 2 CFA24 BIRMINGHAM INTERCHANGE AND CHEMSLEY WOOD



Legend

- Depot, station, headhouse or portal building
- Tunnel portal
- Electricity substation
- Land drainage area
- Ecological mitigation pond
- Balancing pond
- Replacement floodplain storage
- Woodland habitat creation
- Wetland habitat creation
- Grassland habitat creation
- Landscape mitigation planting (scrub / woodland)
- Grassed areas
- Sustainable placement
- Public realm
- Engineering earthworks
- Landscape earthworks
- Rail alignment formation
- Returned to suitable development use
- County boundary
- Borough / District boundary
- Community forum boundary
- Watercourse diversion
- Existing watercourse
- Ditches - new
- Hedgerow habitat creation
- UT Main utility works
- Existing public right of way (PRoW)
- New, diverted or realigned PRoW
- Stopped-up PRoW
- Tunnels external extent
- Rail alignment
- HS2 Access road
- Noise fence barrier
- 10+000 Chainage (e.g. 10+000)

Map Number: CT-06-107

Map Name: Proposed Scheme

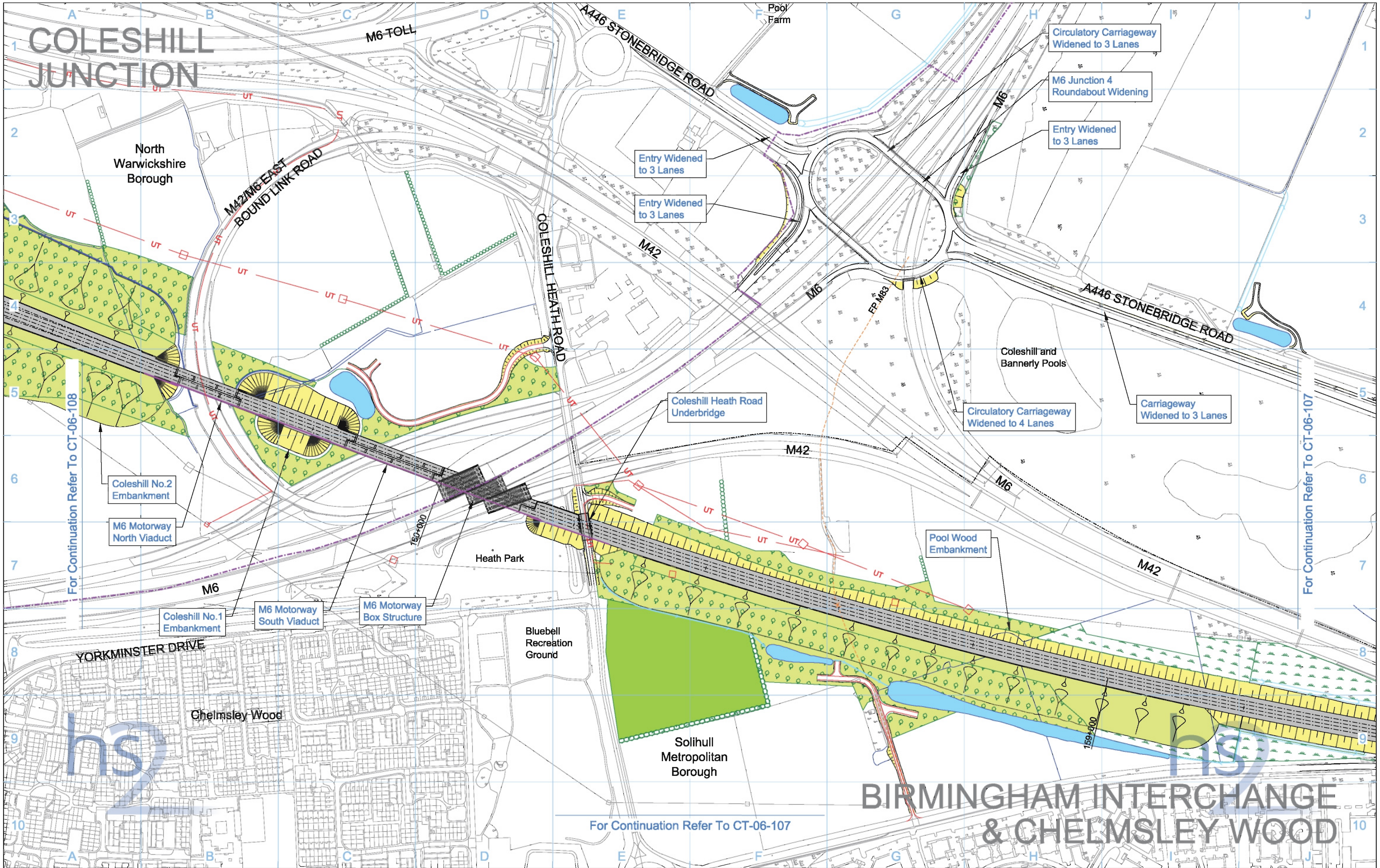
Community Forum Area: CFA24 Birmingham Interchange and Chelmsley Wood

Registered in England. Registration number 06791686
Registered office: Eland House, Bressenden Place, London SW1E 5DU

Scale at A3: 1:5,000

0 50 100 150 200 250 Metres

Doc Number: C224-ARP-EV-DPL-040-206107 P06 Date: 29/10/13



Legend

- Depot, station, headhouse or portal building
- Tunnel portal
- Electricity substation
- Land drainage area
- Ecological mitigation pond
- Balancing pond
- Replacement floodplain storage
- Woodland habitat creation
- Wetland habitat creation
- Grassland habitat creation
- Landscape mitigation planting (scrub / woodland)
- Grassed areas
- Sustainable placement
- Public realm
- Engineering earthworks
- Landscape earthworks
- Rail alignment formation
- Returned to suitable development use
- County boundary
- Borough / District boundary
- Community forum boundary
- Watercourse diversion
- Existing watercourse
- Ditches - new
- Hedgerow habitat creation
- UT Main utility works
- Existing public right of way (PRoW)
- New, diverted or realigned PRoW
- Stopped-up PRoW
- Tunnels external extent
- Rail alignment
- HS2 Access road
- Noise fence barrier
- 10+000 Chainage (e.g. 10+000)

Map Number: **CT-06-107-R1**

Map Name: **Proposed Scheme**

Community Forum Area: CFA24 Birmingham Interchange and Chelmsley Wood

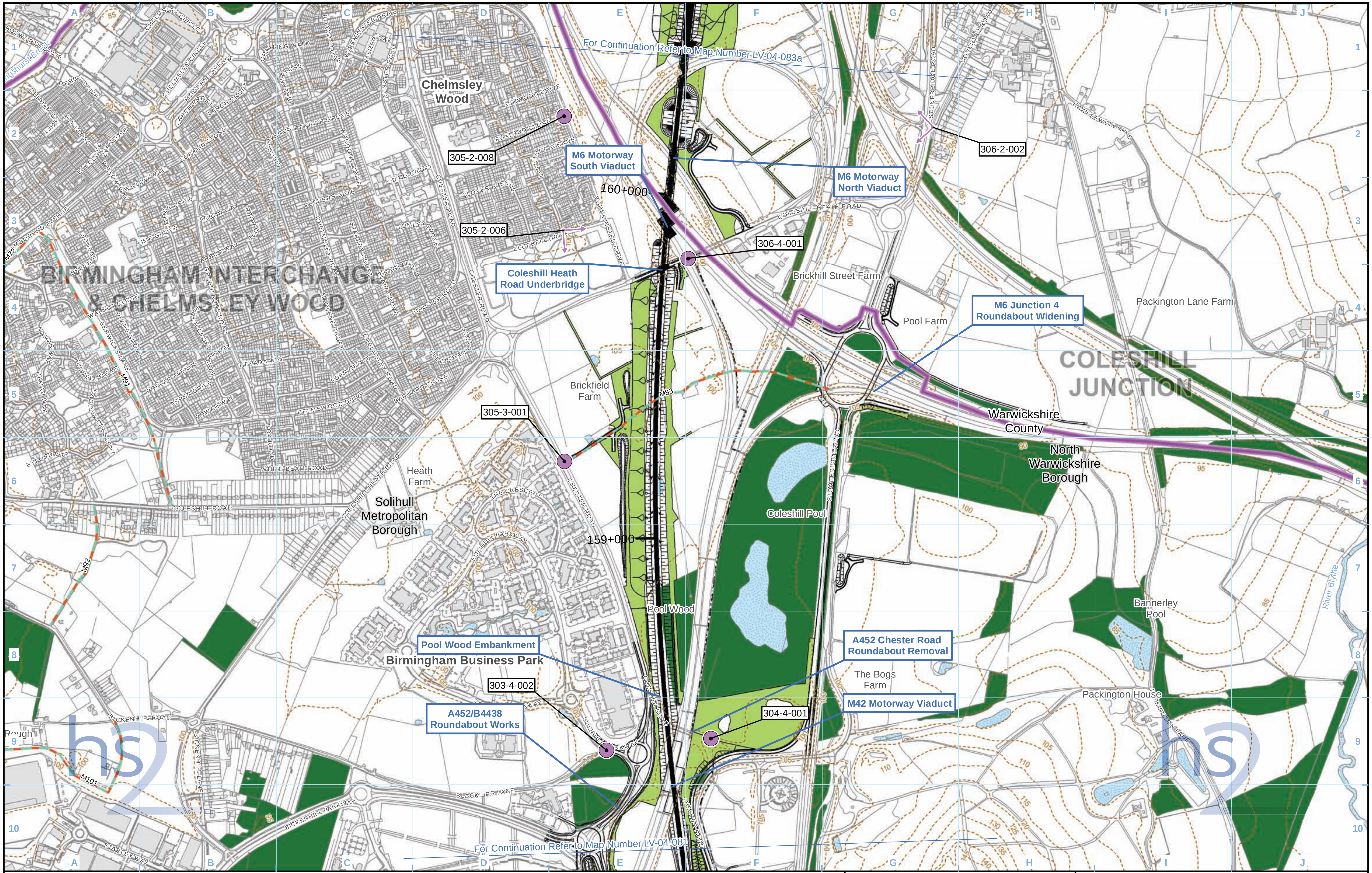
HS2 Ltd accept no responsibility for any circumstances, which arise from the reproduction of this map after alteration, amendment or abbreviation or if it is issued in part or issued incomplete in any way.

Registered in England. Registration number 06791686
Registered office: Eland House, Bressenden Place, London SW1E 5DU

Scale at A3: 1:5,000

0 50 100 150 200 250 Metres

Doc Number: C224-ARP-EV-DPL-040-206207 P06 Date: 29/10/13



Legend

- Route in tunnel
- Route on surface
- Depot, station, headhouse or portal building
- Community forum boundary
- County boundary
- District/Borough boundary
- Public Rights of Way
- 5m contours
- Water body
- Watercourse
- Existing woodland and tree belts
- Proposed tree planting
- Significantly affected viewpoint
- Photomontage location
- 001-1-001 Viewpoint number

Engineering earthworks:
- Embankment
- Cutting

Non engineering earthworks:
- Embankment
- Cutting

Map Number: LV-04-082a

Map Name: Operational Phase Significantly Affected Viewpoints

Community Forum Area CFA24: Birmingham Interchange & Chelmsley Wood

Scale at A3: 1:10,000

0 100 200 300 400 Metres

Doc Number: C254-ARP-EV-MAP-040-000237 -P06

Date: 28/10/13

APPENDIX H TECHNICAL STANDARD - EARTHWORKS, DOCUMENT NO. HS2-HS2-GT-STD-000-000001 (P08)

HS2

Technical Standard - Earthworks

Document no.: HS2-HS2-GT-STD-000-000001

Revision	Author	Checked by	Approved by	Date Approved	Issued for/Revision details
P01	Atkins/Arup	Duncan McFadyean	John Irwin	07/07/2015	Initial Issue
P02	Atkins/Arup	Duncan McFadyean	John Irwin	21/10/2015	Reissued addressing P01 comments
P03	Nick Sartain	Duncan McFadyean	John Irwin	04/12/2015	Reissued addressing P02 comments
P04	Nick Sartain	Duncan McFadyean	John Irwin	18/03/2016	Including Protection Layer
P05	Nick Sartain	Duncan McFadyean Sarah Trinder	John Irwin	21/06/2017	Modifications to Tables 4.2, Chapter 5 Addition of requirements for reinforced soil, rock slopes and secondary aggregates Multiple editorial changes
P06	Nick Sartain	Sarah Trinder	John Irwin	26/04/2019	Incorporating Phase 1 Standards Challenges; EDCs; revised ground movement criteria; editorial changes
P07	Nick Sartain	Sarah Trinder	John Irwin	13/05/2019	Correction to typo in P06
P08	Nick Sartain	Sarah Trinder	John Irwin	December 2019	Incorporating comments from Phase 1 MWCCs and issue of CD 622 by Highways England

Handling instructions: None

Contents

List of acronyms

CDM Construction (Design and Management) Regulations (2015)
DRA Designer's Risk Assessment
DRR Designer's Risk Register
EGL Existing ground level
E-GDR Earthworks Geotechnical Design Report
FRL Finished rail level
GDR Geotechnical Design Report
GFR Geotechnical Feedback Report
GIR Ground Investigation Report
GRR Geotechnical Risk Register
NR Network Rail
PRS Project Requirement Specification
SCEW HS2 Specification for Civil Engineering Works, Series 600, Earthworks
SHW The UK Department for Transport Specification for Highway Works
TSI Technical Specifications for Interoperability
UIC International Union of Railways

References

Title	Reference
AFNOR Standard XP P94-091 "Soil: investigation and testing – swelling test in oedometer – determination of deformations by loading several test pieces. December 1995	AFNOR XP P94-091
ASIRI NATIONAL PROJECT, Recommendations on the design, construction and control of rigid inclusion ground improvements, Paris: Presses des Pont, 2013, ISBN 978-285978-470-6.	ASIRI National Project
Atkinson J H and Farrar D M Stress path tests to measure soil strength parameters for shallow landslips. Proc., 11th Int. Conf. on Soil Mech. and Found. Eng., San Francisco, Vol. 2, 983–986. 1985	Atkinson and Farrar (1985)
BS 1377: 1990 Methods of test for soils for civil engineering purposes. British Standards Institution, 1990	BS 1377: 1990
BS 5930: 2015: Code of practice for site investigations. British Standards Institution, 2015	BS 5930: 2015
BS 6031: 2009 Code of practice for earthworks. British Standards Institution, 2009	BS 6031: 2009
BS 8004: 2015 Code of practice for foundations. British Standards Institution, 2015	BS 8004: 2015
BS 8006-1: 2010 + A1: 2016 Code of practice for strengthened / reinforced soils and other fills. British Standards Institution	BS 8006-1: 2010
BS 8006-2: 2011 Code of practice for strengthened / reinforced soils and other fills: Part 2 – Soil nail design. British Standards Institution	BS 8006-2: 2011

BS EN 1990:2002 Eurocode – basis of structural design – general rules. British Standards Institution, 2002	BS EN 1990: 2002
BS EN 1991-2: 2003 Eurocode 1 – actions on structures: Part 2 – traffic loads on bridges. British Standards Institution, 2003	BS EN 1991-2: 2003
BS EN 1997-1: 2004 Eurocode 7 – geotechnical design: Part 1 - general rules. British Standards Institution, 2004	BS EN 1997-1: 2004
BS EN 1997-2: 2007 Eurocode 7 - geotechnical design: Part 2 - ground investigation & testing. British Standards Institution, 2007	BS EN 1997-2: 2007
NA to BS EN 1997-1:2004:2007 UK National Annex to Eurocode 7: geotechnical design. General rules (+A1:2014) (incorporating Corrigendum No. 1). British Standards Institution, 2007	NA to BS EN 1997-1:2004:2007
BS EN 13108-1: 2006 + C1:2008 Bituminous mixtures - material specifications - Part 1: Asphalt Concrete	BS EN 13108-1: 2006
BS EN 12697-24: 2012 Bituminous mixtures - test methods for hot mix asphalt. Resistance to fatigue	BS EN 12697-24: 2012
BS EN 12697-26: 2012 Bituminous mixtures - test methods for hot mix asphalt. Stiffness	BS EN 12697-26: 2012
BS EN 16907-1: 2018 Earthworks – Part 1 principles and general rules	BS EN 16907-1: 2018
BS EN 16907-2: 2018 Earthworks – Part 2 classification of materials	BS EN 16907-2: 2018
BS EN 16907-3: 2018 Earthworks – Part 3 construction procedures	BS EN 16907-3: 2018
BS EN 16907-4: 2018 Earthworks – Part 4 soil treatment with lime and/or hydraulic binder	BS EN 16907-4: 2018
BS EN 16907-5: 2018 Earthworks – Part 5 quality control	BS EN 16907-5: 2018
BS EN ISO 14688-2: 2004 + A1:2013 Geotechnical investigation and testing – Identification and classification soil: Part 2 – principles for a classification. British Standards Institution, 2013	BS EN ISO 14688-2: 2004
BS EN ISO 14689-1: 2003 Geotechnical investigation and testing — Identification and classification of rock: Part 1 – identification and description. British Standards Institution, 2003	BS EN ISO 14689-1: 2003
BS EN ISO 17892-2: 2014 Geotechnical investigation and testing — laboratory testing of soil: Part 2 – determination of bulk density. British Standards Institution, 2014	BS EN ISO 17892-2: 2014
Canal and River Trust Code of practice for works affecting the Canal and River Trust, Parts 1-3, 2014	Canal and River Trust (2014)
CIRIA C574 (Lord J A, Clayton C R I and Mortimore R N) Engineering in chalk. CIRIA, 2002	CIRIA C574
CIRIA C591 (Perry J Pedley M J & Brady K) Infrastructure cuttings – condition appraisal & remedial treatment. CIRIA, 2005	CIRIA C591
CIRIA C731 The international levee handbook. CIRIA, 2013	CIRIA C731
CIRIA C758D Abandoned mineworkings manual (2019). CIRIA, 2019	CIRIA C758D
Department for Environment, Food and Rural Affairs (Defra) PB13298: 2009 Construction code of practice for the sustainable use of soils on construction sites, Defra, 2009	PB13298: 2009

Ellis E A and O'Brien A S Effect of height on delayed collapse of cuttings in stiff clay. Proc. ICE Geotechnical Engineering, Vol. 160, p. 73 to 84, April, 2007	Ellis and O'Brien (2007)
French PBT Standard NF P 94 117.1	NF P 94 117.1
Gasparre, A., Nishimura, S., Minh, N. A., Coop, M. R. & Jardine, R. J. (2007) "The stiffness of natural London Clay", Geotechnique 57, No. 1, 33–47	Gasparre et al (2007)
International Union of Railways (UIC) Earthworks and track bed for railway lines. UIC Code 719R : 3rd Edition, 2008	UIC Code 719R
Department of Transport Series 600 - Earthworks – Manual of Contract Documents for Highway Works: Specification for Highway Works, 2016	SHW Series 600
Department of Transport Design Manual for Roads and Bridges, 2013	DMRB
Her Majesty's Stationary Office Radioactive Substances Act 1993	HMSO (1993)
Highways England Managing geotechnical risk, 2008	HD22/08
Highways England Managing geotechnical risk, 2019	CD 622
HS2 Construction Demolition and Excavation Waste Strategy	HS2-HS2-EV-STR-000-000004
HS2 Excavated Materials Management Strategy (EMMS)	HS2-HS2-CL-REP-000-000001
HS2 Geotechnical Certificate Template GT1	HS2-HS2-GT-TEM-000-000033
HS2 Landscape Design Approach	HS2-HS2-EV-STR-000-000010
HS2 Lineside Vegetation Management Strategy	HS2-HS2-EV-STR-000-000009
HS2 Specification for Ground Investigation	HS2-HS2-GT-SPE-000-000001
HS2 Technical Standard - Civil Engineering Seismic Design	HS2-HS2-CV-STD-000-000010
HS2 Technical Standard – Climate Change Adaptation and Resilience	HS2-HS2-SU-STD-000-000003
HS2 Technical Standard – Cross Drainage	HS2-HS2-DR-STD-000-000001
HS2 Technical Standard – Fencing	HS2-HS2-CV-STD-000-000002
HS2 Technical Standard – General Track Specification	HS2-HS2-RT-STD-000-000004
HS2 Technical Standard – Geotechnical Data Management	HS2-HS2-GT-STD-000-000008
HS2 Technical Standard – Groundwater Protection	HS2-HS2-EV-STD-000-000010
HS2 Technical Standard – Instrumentation and Monitoring	HS2-HS2-CV-STD-000-000004
HS2 Technical Standard – Land Quality	HS2-HS2-EV-STD-000-000027
HS2 Technical Standard – Landscape Earthworks Design	HS2-HS2-EV-STD-000-000021
HS2 Technical Standard – Landscape Maintenance, Management and Monitoring Plan	HS2-HS2-EV-STD-000-000023
HS2 Technical Standard – Lineside Vegetation	HS2-HS2-EV-STD-000-000005
HS2 Technical Standard - Materials Management Plan Framework	HS2-HS2-EV-STD-000-000006
HS2 Technical Standard - Materials and Durability	HS2-HS2-CV-STD-000-000003
HS2 Technical Standard – Rail loading for civil infrastructure	HS2-HS2-CV-STD-000-000009
HS2 Technical Standard – Railway Drainage	HS2-HS2-DR-STD-000-000003
HS2 Technical Standard – Spatial Arrangements,	HS2-HS2-CV-STD-000-000001

HS2 Technical Standard - Soil Handling for Land Restoration	HS2-HS2-EV-STD-000-000008
HS2 Technical Standard – Track Alignment Design	HS2-HS2-RT-STD-000-000001
HS2 Technical Standard – Water Framework Directive Compliance Strategy	HS2-HS2-EV-STD-000-000012
HS2 Technical Standard – Water Resources and Flood Risk Consenting Strategy	HS2-HS2-EV-STD-000-000015
HS2 Waste Management Policy	HS2-HS2-EV-POL-000-000021
HSE Managing Health and Safety in Construction – Construction (Design and Management) Regulations 2015. Health and Safety Executive, 2015.	HSE (2015)
Lees A Obtaining parameters for geotechnical analysis, NAFEMS, 2012.	Lees (2012)
London Underground Limited (LUL) Guidance Document G0054B: Earth Structures – Guide for slope stability analysis, December 2014	LUL Guidance Document G0054B
McMillan & Matheson Rock slope hazard assessment: a new approach. Engineering Geology Special Publications **1998,** v. 15, **p. 177-183**	McMillan & Matheson, (1998)
Network Rail NR/GN/CIV/211 Definition of Rock Slope Hazard Index (RSHI)	NR/GN/CIV/211
Network Rail NR/L2/CIV/003, Engineering Assurance of Building and Civil Engineering Works, 2012	NR/L2/CIV/003
Network Rail NR/L2/CIV/086, Management of Earthworks	NR/L2/CIV/086
Network Rail NR/L3/CIV/065, Examination of Earthworks	NR/L3/CIV/065
Network Rail NR/L3/CIV/071 Issue 4, Geotechnical Design, 2011	NR/L3/CIV/071
Nowak P and Gilbert P Earthworks: A Guide, 2nd Ed., ICE Publishing, 2015	Nowak and Gilbert (2015)
O'Brien A S Invited Keynote Paper for Main Session 4, Vol. 1, p.125 to 143, Madrid, Spain, September, 2007	O'Brien (2007)
PD CEN/TS 17006:2016 Earthworks - Continuous Compaction Control, December 2016	PD CEN/TS 17006:2016
SCEW HS2 Specification for Civil Engineering Works, Series 600, Earthworks	HS2-HS2-CV-SPE-000-010600
SCEW NG HS2 Specification for Civil Engineering Works, Notes for Guidance on Series 600, Earthworks	HS2- HS2-CV-SPE-000-020600
TRL PPR554 Rock slope risk assessment	TRL PPR554 (2011)

Project terminology

The project terminology used within this document can be found in the 'HS2 Project dictionary' (HS2-HS2-PM-GDE-000-000002).

Conventions

Mandatory clauses

The following convention is used to indicate mandatory clauses.

Mandatory clauses are differentiated from the main text of this document by use of a 'black box'. They contain the word 'shall' to indicate their status as a requirement.

Departures

Non-compliance with a mandatory clause is considered to be a departure from this Technical Standard. It is recommended that the designer discusses any proposed departures with the 'standard owner' at an early stage.

Guidance

The following convention is used to indicate guidance.

NOTE – Guidance is differentiated from the paragraph to which it relates by use of italic type and use of the words "should" or "may".

1 Introduction

1.1 Background

1.1.1 This Technical Standard sets out the Employers Requirements to be satisfied by Designers for the geotechnical design of earthworks (including at-grade sections) of the HS2 Project, and provides general guidance that may be of assistance in satisfying these requirements. The Earth Structures referred to in this standard comprise engineered earthworks (including embankments, cuttings, at-grade earthworks and their associated engineering slopes) necessary for the support of high speed rail and other infrastructure associated with the project.

1.1.2 This Technical Standard does not address the geometric definition of the project which creates the requirement for Earth Structures. For further information, see Technical Standards Landscape Earthworks Design HS2-HS2-EV-STD-000-000021 and Spatial Arrangements HS2-HS2-CV-STD-000-000001.

1.1.3 Requirements for elements of the Works other than earthworks are presented in other Technical Standards. However, aspects of these subjects are covered by this document where they impact on the design of the earthworks.

1.1.4 This Technical Standard provides Designers with a common basis for design and proportioning cuts and fills, which allows for consistency of approach route-wide, uniformity in assessing both construction impacts and cost estimates, and the basis of a unified approach to operational monitoring, maintenance and renewal.

1.1.5 This Technical Standard shall be used during all stages of design (to the level of detail required at each stage).

1.1.6 This Technical Standard shall be read with the HS2 Specification for Civil Engineering Works, Series 600, Earthworks (SCEW, HS2-HS2-CV-SPE-000-010600).

1.2 Basis of Technical Standard

1.2.1 This Technical Standard is based upon international practice on the design of high-speed railway systems and construction of UK earthworks (particularly the UK Department for Transport Design Manual for Roads and Bridges (DMRB)), modified to include the results of bespoke studies and modelling. Mandatory standards that apply include the Technical Specifications for Interoperability (TSI) for high-speed railway and the Eurocodes (BS EN 1997-1 (Eurocode 7) and BS EN 16907 in particular). Compliance with this Technical Standard is considered complementary to BS EN 16907. Other relevant and subsidiary standards and codes are referenced for guidance where appropriate.

1.2.2 The Earth Structures shall be designed to ensure the required geometrical accuracy and stability for the track, with minimal maintenance over the design life, at economic cost, and to facilitate safe construction and maintenance. These Earth Structures shall be able to support the dynamic loads from the high-speed rolling stock running at Design Speed (HS2-HS2-CV-STD-000-000001).

1.2.3 The performance requirements described in this Technical Standard shall be designed to be achieved over the design life of the project. Consideration may be given to an alternative approach of planned maintenance interventions if this provides demonstrable whole-life value to the project.

1.2.4 This Technical Standard differentiates between Structural Earthworks (i.e. those engineered earthworks required to provide the operational platform for, or whose slopes face, the high-speed railway, other railways and highways) and Environmental Mitigation Earthworks (i.e. earthworks whose function is to provide environmental mitigation and which require a much lower specification). In addition, there are Agricultural Soils (topsoil and subsoil) whose requirements are described in Technical Standard – Soil Handling for Land Restoration HS2-HS2-EV-STD-000-000008.

1.2.5 To optimise the cost and construction programme for the project, an integrated earthworks design shall be undertaken – i.e. Structural Earthworks, Environmental Mitigation Earthworks and contaminated land remediation works (Technical Standard – Land Quality HS2-HS2-EV-STD-000-000027) shall be designed in a fully coordinated manner.

1.2.6 The design shall be undertaken with particular consideration to maintenance of the infrastructure. The operational railway shall be maintainable within the following maintenance periods: 00:00 to 04:59 Mondays to Saturdays and 00:00 to 07:59 Sundays. Maintenance which does not impact on the operation of the railway and which can be undertaken safely may be undertaken during operational hours.

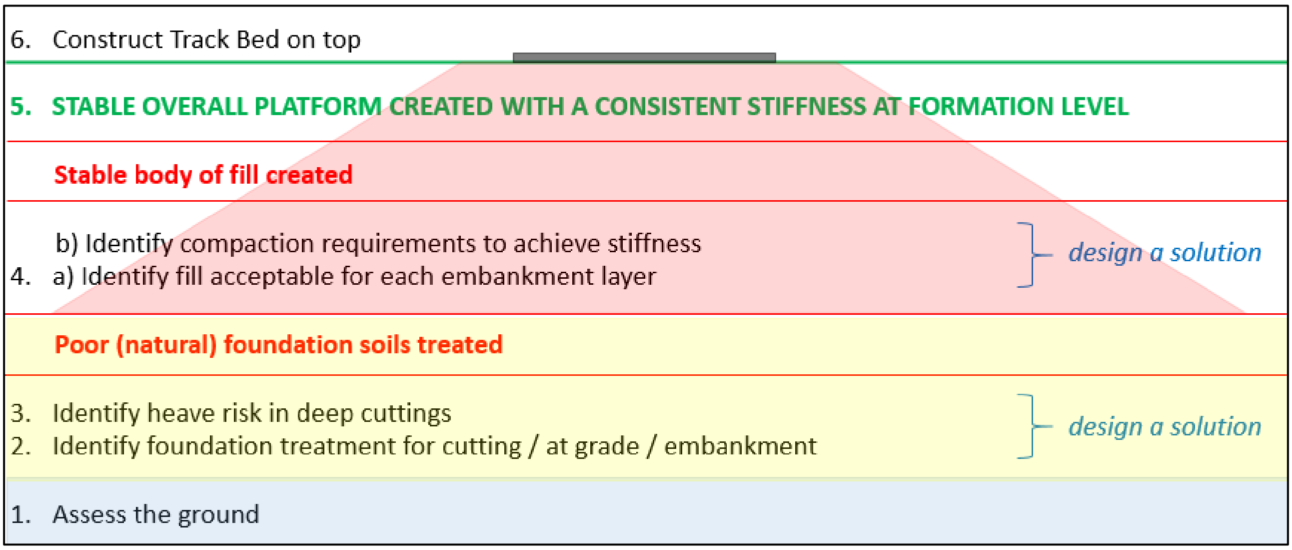
1.3 Risk management approach

1.3.1 In order to ensure the safety of the HS2 earthworks system a formal approach to geotechnical risk management is required. The process described in this Technical Standard builds on the established methodology developed by Highways England in CD 622 (formerly HD22/08). Throughout the design the Designer shall identify, manage, mitigate (eliminate where possible) and communicate risks associated with each element of the earthworks. The Designer shall mitigate hazards by following the HS2 hazard management processes as detailed in the HS2 Railway System Safety Strategy (HS2-HS2-EN-STR-000-000001) and the HS2 system safety hazard management procedure (HS2-HS2-EN-PRO-000-000002).

1.4 Design philosophy

1.4.1 This Technical Standard has been developed based on the general philosophy of constructing a series of stable Structural Earthworks whose stiffness is sufficient and consistent at Formation Level, onto which the Track Bed can be placed. Figure 1.4/1 illustrates the general approach that has been followed, with the first step being to assess the ground.

Figure 1.4/1 – Earthworks design philosophy



1.4.2 *This Technical Standard includes earthworks requirements that have been specifically identified for the HS2 Design Speed in order to reduce the dynamic response of the ground to acceptable levels. This is affected by the adoption of a layered stiffness approach, with stiffness permitted to diminish with depth below rail level. Specific earthworks requirements include the construction of the upper part of embankments from a high specification fill material, and particular foundation treatments of the natural ground where required.*

1.5 Further information

Standard owner

1.5.1 The 'standard owner' should be consulted in the event of any query about the requirements and guidance given in this document (refer to the 'Responsibilities' section of the eB webpage for this Technical Standard), with consultants and contractors using the applicable Technical Query procedure.

1.5.2 Where appropriate, the 'standard owner' will then consult relevant colleagues (e.g. other standards owners where there is a technical interface and/or Infrastructure Directorate for operational / maintenance aspects) or forward queries to them for answer.

2 General requirements

2.1 Health, safety and risk assessment

2.1.1 When designing earthworks, health and safety risks shall be identified and where possible eliminated. This applies to foreseeable risks occurring during construction, operation and maintenance. Where it is not possible to eliminate risks, the general 'principles of prevention' shall be applied as defined by the CDM Regulations 2015 and brought to the attention of the Principal Designer. In doing so, pre-construction information shall be taken into account, and residual risks shall be clearly recorded on the design risk register (DRR) and communicated to the wider project.

2.1.2 As the design is developed the DRR shall be updated with the residual geotechnical and health & safety risks that have been identified together with any appropriate mitigation measures.

2.1.3 HS2 Ltd has committed to treat the health risks to those constructing, operating, maintaining the HS2 railway, and those affected by it, on parity with associated safety risks. In fulfilling the duties of the designer and in applying the 'principles of prevention', equal consideration shall be given to health as to safety risks.

2.1.4 A Geotechnical Risk Register (GRR), in accordance with BS 6031: 2009 Clause 4.2, shall be developed by the Contractor from commencement and shall be regularly updated throughout the design phases of the project, with residual risks communicated to the wider project team through the DRR.

2.2 Geotechnical design

Design standards

2.2.1 Geotechnical analysis and design shall be undertaken in accordance with this Standard, all other HS2 Technical Standards and documents referenced within this Standard, and the nationally applicable guidance and standards. Eurocodes and relevant associated UK National Annexes and documents shall apply.

2.2.2 *Key Guidance / Standards applicable to the geotechnical design of HS2 earthworks are summarised in Table 2.2.1/1 below. This list is intended to highlight the primary references for earthworks design and is not exhaustive.*

Table 2.2/1 – Key Guidance / Standards applicable to the geotechnical design of HS2 earthworks

Hierarchy	Code/Standard	Applicability matrix						
		HS2 Railway	Highways England	Local Authority Highway	Network Rail	Canal and River Trust	Environmental Mitigation Earthworks	Environment Agency Flood Defence Works
0	All HS2 Technical Standards[1]	**M**	**M**	**M**	**M**	**M**	**M**	**M**
1	BS EN 1997 Parts 1 & 2 – Eurocode 7: Geotechnical Design and corresponding UK National Annexes	**M**	**M**	**M**	**M**	**M**	**M**	**M**
2	BS 6031:2009: Code of practice for earthworks (BS6031)	**M**	**M**	**M**	**M**	**M**	**M**	**M**
4	UIC 719R 2008: Earthworks and Track-Bed Layers for Railway Lines (UIC719R)	S	N	N	N	N	N	N
5	UK Department for Transport: Design Manual for Roads and Bridges, 2013 (DMRB)	S	**M**	S	S	S	S	N
6	Network Rail: NR/L3/CIV/071 Issue 4 'Geotechnical Design' (CIV071); (note - this document is likely to be replaced, and the new NR standard will apply).	S	N	N	**M**	N	N	N
7	BS 8006-1:2010 + A1 2016 & BS8006-2:2011: Code of practice for strengthened/reinforced soils	S	S	S	S	S	S	G
8	HA 74/07: Treatment of Fill and Capping Materials Using Either Lime or Cement or Both	G	S	G	G	G	N	G
9	Code of Practice for Works Affecting Canal and River Trust.	N	N	N	N	**M**	N	G
10	The International Levee Handbook (CIRIA 2013, C731)	G	G	G	G	G	G	G
11	DEFRA PB13298: 2009 Construction Code of Practice for the Sustainable Use of Soils on Construction Sites	S	S	S	S	S	S	S
12	Relevant industry good practice guidance (e.g. CIRIA reports, BGS guides etc.)	G	G	G	G	G	G	G

Notes to Table 2.2.1/1:
1. Presumes these do not conflict with the Eurocodes.

Key to applicability matrix:
M = Mandatory
MP = Mandatory minimum with specific appendices
S = Specific applications, as detailed in this document
G = Guidance / good practice
N = Not Applicable

2.2.3 This Technical Standard defines the project-specific requirements for the geotechnical design of earthworks. Where there are no particular requirements provided within this document the Designer shall follow the requirements set out within the documents listed within Table 2.2.1/1, which should be considered as minimum requirements.

2.2.4 Where conflict exists between these codes the hierarchy shall be as numbered above (with 0 being the highest priority) except where specifically stated otherwise in this document, with the items identified as 'mandatory' taking priority. If a conflict is identified between this document and the mandatory standards listed above then the Designer shall notify HS2 Ltd. to agree a resolution.

2.2.5 The applicability of updates to guidance documents shall be agreed between the Designer and HS2 Ltd.

Geotechnical category

2.2.6 The design of each Earth Structure on the project shall be placed in a Geotechnical Category in accordance with BS EN 1997-1, and shall be no lower than the categorisation defined in Table 2.2/2. The corresponding design process in BS EN 1997-1 for each category of Earth Structure shall then apply.

2.2.7 HS2 Mainline is defined as the HS2 high speed rail track and track components including operational infrastructure such as OLE masts, signals and lineside equipment. Offline is defined as all infrastructure including ancillary HS2 assets (including depots and sidings) and 3rd party assets which are associated or impacted by the project but are not critical to the operation of the high speed railway (i.e. assets that are not HS2 Mainline).

2.2.8 The checking categories shall be as defined in the Works Information, or else DMRB Standard BD2 where not addressed in the Works Information, and shall be no lower than those presented in Table 2.2/2. Additionally, where a large number of similar structures all require Category II checking, the Contractor shall propose (for HS2's acceptance) at least one for Category III checking to ensure the robustness of interpretation and analysis.

Table 2.2/2 – Geotechnical categories applicable for earthworks design

Earthworks case	Element	Infrastructure case	Geotechnical category	Level of checking required
EW 1	Embankment for HS2 Railway	HS2 Mainline	GC 3	H<12m – CAT II H>12m – CAT III GH – CAT III
EW 2	Cutting (including at-grade) for HS2 Railway	HS2 Mainline	GC 3	H<15m – CAT II H>15m – CAT III GH – CAT III
EW 3	Not used			
EW 4	Foundation Treatments to HS2 Railway embankment / cutting	HS2 Mainline	GC 3	CAT II GH – CAT III
EW 5	3rd party infrastructure and other development earthworks that present significant risk to the HS2 Railway	Offline	GC 3	CAT III
EW 6	3rd party infrastructure and other development earthworks that will not present significant risk to the HS2 Railway	Offline	GC 2	CAT II (see note 5)
EW 7	HS2 landscaping and Environmental Mitigation Earthworks that present significant risk to the HS2 Railway, such as false cuttings and overbridge and underbridge earthworks that face or support the railway respectively.	HS2 Mainline or Offline	GC 3	CAT III
EW 8	HS2 landscaping and Environmental Mitigation Earthworks that present significant risk to 3rd party infrastructure and other development earthworks	Offline	GC 2	CAT II (see note 5)
EW 9	Other landscape and Environmental Mitigation Earthworks	Offline	GC 1	CAT I

Notes to Table 2.2/2

1. "H" indicates Earth Structure height / depth (values are based on the Earth Structure heights provided in Table 2.3.3/2). The check shall include any associated transitions at structures.
2. "D" indicates depth of Foundation Treatment to improve the properties of the in situ natural soils.
3. "GH" indicates significant level of risk associated with a geohazard (such as relic failure planes, voided ground, significant (in the context of Table 4.2/1) long-term heave or settlement), or construction methodology, such that specific remedial measures are required. This would include cutting foundations where significant ground improvement is required.
4. Where more than one of the earthworks cases listed above applies to an Earth Structure the level of checking required shall be the highest category from the various cases.
5. The category stated is a minimum requirement. A higher requirement may be required by the affected 3rd party.

Site Investigation information

2.2.9 HS2 Ltd. provides Site Investigation data (primarily detailed geotechnical desk studies and ground investigation data) to Contractors and Designers as relevant to their contract. The Contractor and Designer shall review, interpret and utilise this and all other available information during the earthworks design and construction planning. The HS2 terminology and its relationship to Eurocode 7 definitions is shown in Table 2.2/3 below. The requirements in each of these phases shall follow the general guidance given in Clause 6 of BS 6031: 2009.

Table 2.2/3 – Ground Investigation (GI) stages terminology

Eurocode 7 / BS 6031 terminology	HS2 terminology
Desk Study	Geotechnical Desk Study
Preliminary Investigation	Main Ground Investigation
Design Investigation	Supplementary Ground Investigations
Construction Investigation	Supplementary Ground Investigations and Field Trials

2.2.10 The Designer shall review all the available site investigation data and design any Supplementary GI and Field Trials required to confirm design principles and parameters. The Contractor shall carry out Supplementary GI in accordance with the HS2 Specification for Ground Investigation (HS2-HS2-GT-SPE-000-000001). The Contractor shall verify and document by inspection, testing and reporting that the geotechnical conditions revealed during construction remain compatible with the safe design and construction of the Works.

2.2.11 The Contractor shall manage the geotechnical data (including as-revealed/as-built data) in accordance with the Technical Standard – Geotechnical Data Management HS2-HS2-GT-STD-000-000008. The Contractor shall facilitate the incorporation of ground data into the project BIM in order to ensure that all information can be passed to, and used by, other designers and contractors throughout the life of the project (including operation).

Geotechnical reporting requirements

2.2.12 The following contract-wide documents shall be prepared:

- Geotechnical Desk Study;
- Geotechnical Risk Register (to be updated throughout the design process), Section 2.1;
- Existing data review and Proposals for GI;
- Earthworks Geotechnical Design Report (E-GDR) - one report covering all earthworks within a Contract package;
- Proposed Operations and Maintenance Plan.

2.2.13 The scheme will be divided into elements that shall be grouped into appropriate packages for geotechnical reporting purposes. The following reports shall be prepared for each group of elements:

- Ground Investigation Report (GIR);
- Geotechnical Design Reports (GDR);
- Drawings, specifications and Designer's H&S Risk Assessment;
- Proposed Testing and Verification Plan;
- Geotechnical Feedback Report (GFR) including as-revealed/as-built geotechnical data;

Geotechnical certification requirements

2.2.14 Geotechnical certification shall be undertaken for all geotechnical design submissions in order to ensure that geotechnical risk is managed throughout the lifetime of the project.

2.2.15 For HS2 assets the Geotechnical Certificate Template GT1 (HS2-HS2-GT-TEM-000-000033) shall be used. A geotechnical design submission refers to a complete package of design documents for an asset(s) from scheme design onwards, and certification is not required for individual document submissions unless they cannot be suitably packaged within a design submission.

2.2.16 For highways assets geotechnical certification will be in accordance with CD 622[1], including the requirement to appoint a Designer's Geotechnical Advisor.

2.2.17 For conventional rail assets geotechnical certification will be in accordance with the Network Rail Standard NR/L2/CIV/003, including the requirement to appoint relevant Contractor's Responsible Engineer (CRE).

Contaminated land

2.2.18 Requirements for the assessment and remediation of contaminated land are set out in Technical Standard HS2-HS2-EV-STD-000-000027.

2.3 Definitions

Symbology

2.3.1 Symbols used in this document and during the design of the HS2 railway earthworks shall be as defined in UIC 719R Clause 1.1.1, with the following amendments:

[1] CD622 replaced HD22/08 in August 2019 and this Technical Standard P08 was updated to reflect this change in December 2019. Any design started prior to the issue of this Technical Standard P08 using the approach and templates presented in HD22/08 rather than CD622 need not be amended to reflect this change.

Table 2.3/2 – Amended symbols

Symbol	Term	Definition	Unit	Comments
D	Particle size	The size of the particle as determined by sieve analysis or sedimentation	mm	SCEW uses D, not d
γ_b	Bulk unit weight	The total weight of soil divided by its volume	kN/m^3	Referred to in Eurocode 7 as 'Weight Density'
ρ_b	Bulk density	The total mass of soil divided by its volume	kg/m^3	Determined in accordance with BS EN ISO 17892-2: 2014
E_{V2}	Modulus of Deformation	Modulus of Deformation obtained by 2nd loading in the plate bearing test (see UIC 719 Table 2 for details)	MPa	Determined in accordance with NF P 94 117.1 (French test method)

Table 2.3/3 – Additional symbols

Symbol	Term	Definition	Unit	Comments
AV	Air voids content	The volume of air voids in the soil expressed as a percentage of the total volume of the soil	%	Determined in accordance with BS 1377-4:1990
I_{d2}	Slake durability index	The resistance of rock material to disintegration when subject to two cycles of wetting and drying	%	Determined in accordance with ISRM (2007)
V_s	Shear wave velocity	The velocity at which shear waves travel through a soil.	MPa	May be measured using surface or downhole geophysics techniques (see Section 4.5). Determination of the correct orientation of V_s is critical in anisotropic soils, which can be expected throughout the HS2 route. Where V_s is referenced in this Technical Standard it refers to the velocity of horizontally propagating vertically oscillating waves, $V_{s(hv)}$.See Gasparre et al (2007).
V_R	Rayleigh wave velocity	The velocity at which Rayleigh waves travel across a surface.	m/s	May be measured using surface geophysics techniques (see Section 4.5).

HS2 railway earthworks terminology

2.3.2	The following sections define the terminology that shall apply to the earthworks constructed to carry the HS2 railway. Where these earthworks are extended to incorporate other related infrastructure (e.g. station platforms) then these terms shall also apply.

2.3.3 **Earthworks** is a general term used to describe both the process of constructing **Earth Structures** and the general name used for sections of embankment, cutting and at-grade infrastructure. The completed Earth Structures include:

- (Track Bed layers – part of the track system, are not part of the Earth Structure but the requirements for the Protection Layer are included in Sections 4 and 5 of this Technical Standard);
- The Prepared Subgrade (see Sections 4 and 5);
- Embankment Fill (beneath loaded areas) including any Starter Layer and / or any basal-reinforced earthworks and / or stabilisation and / or reinforced soil where necessary;
- Topsoil and subsoil, where required on embankments or cuttings, or other surface treatments;
- Earthworks side slopes;
- Landscape fill / Environmental Mitigation Earthworks Fill (may be absent);
- Earthworks Foundation (see below, and see Section 4 for Foundation Treatment, and heave mitigation measures);
- Earthworks Transitions (see Section 6).

Track bed terminology

2.3.4 *The **Track Bed** is constructed above the earthwork and provides the support to the track. It will be made up of a series of layers as defined in Table 2.3/4 and illustrated in Figure 2.3/5.*

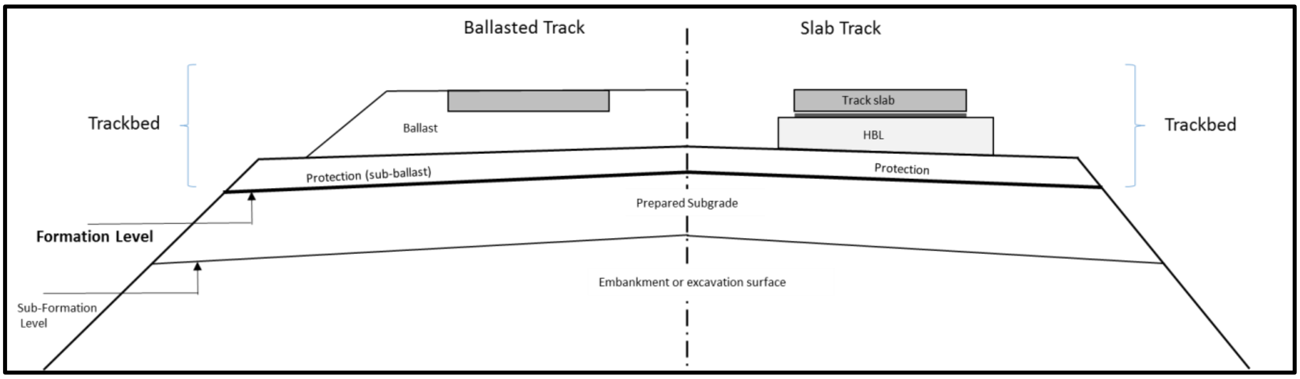
2.3.5 In the event of any conflict in respect of Track Bed requirements, Technical Standard – General Track Requirements HS2-HS2-RT-STD-000-000004 shall take priority.

Table 2.3/4 – Track Bed terminology

Element		Ballasted track and sleepers	Slab track
Track components (not covered by Technical Standard – Earthworks)		Rails	Rails
		Sleepers	Track slab
Track Bed layers	(not covered by Technical Standard – Earthworks)	Ballast	Concrete layer depending on track system
			Hydraulic bound layer (HBL)
	(covered by Technical Standard – Earthworks)	Protection Layer (sub-ballast) [the term blanket shall not be used]	Protection Layer [the term blanket shall not be used]
Earthworks (see section above 'HS2 Railway Earthworks Terminology')		Formation (surface)	
		Prepared Subgrade	
		Sub-Formation (surface)	
		Embankment Fill or Foundation	

2.3.6 *The combined thickness of the track and Track Bed layers, whether ballasted track or slab track is described in Technical Standard HS2-HS2-RT-STD-000-000004.*

Figure 2.3/5 – Schematic cross section illustrating Track Bed terminology



Earthworks geometry terminology

2.3.7 Earthwork designation of embankment / cutting / at-grade shall be as defined in Table 2.3/6.

2.3.8 *The definitions are relative to finished rail level (FRL), as this will be the primary vertical level identified on engineering drawings. Therefore the earthwork height is delineated based on FRL relative to existing ground level (EGL).*

Table 2.3/6 – Earth Structure designation for HS2 Mainline

Earth Structure	Earth Structure height: FRL relative to EGL (m)	*Notes on earthwork situation*	*Notes on implications on earthworks drains and trackside drains* [1]
High Embankment	>+12	*Standard compaction methods are not intended to cover very high embankments, therefore the fill material requirements will need special consideration.*	*For the embankment cases any drain installed in the natural ground will typically be an earthwork drain (toe of embankment drain) not a trackside drain. Therefore any trackside drainage can be isolated from the influence of the natural ground / groundwater if required.*
Medium Embankment	+6 to +12	*The embankment height is likely to mean that the fill material will determine the dynamic response.*	
Low Embankment	+1 to +6	*Track Bed will be above existing ground level. The Track Bed design will be significantly influenced by the dynamic response of the superficial / weathered solid geology, which may require Foundation Treatment.*	
At-Grade	-1 to +1	*The base of the Track Bed will be below natural ground level. The Track Bed design will be influenced by the dynamic response of the superficial / weathered solid geology and therefore the likelihood of requiring Foundation Treatment will be high.* *The surface soils may also be susceptible to seasonal shrink / swell effects – this is addressed in the 'Cut to Fill' transitions section (see Section 6.5).*	*This situation will form the transition between the two drainage cases described for cuttings and embankments. In some cases both trackside and earthworks drainage may be necessary to cover both requirements.*
Shallow Cutting	-1 to -5	*The Track Bed design will be influenced by the dynamic response of the weathered soils and therefore the likelihood of requiring Foundation Treatment will be high.*	*The cutting is sufficiently deep to ensure that any trackside drain will also provide drainage to the cutting slope.* *Note: in Source Protection zones groundwater and surface water may need to be managed separately to prevent surface water (which may include oils & contaminants) entering the aquifer.*
Medium Cutting	-5 to -10	*This depth has been determined to remove the influence of weathering.*	
Deep Cutting	-10 to -20	*Deep cuttings may require special consideration of risks associated with long-term slope stability and heave.*	
Very Deep Cutting	>-20	*Very deep cuttings will require special consideration of risks associated with long-term slope stability and heave.*	

Notes to Table 2.3/6

1. Reference should also be made to Technical Standard – Railway Drainage HS2-HS2-DR-STD-000-000003.

Earth Structure terminology

2.3.9 The Earth Structure shall comprise various layers as defined below.

- The **Formation Level** is the top of the Earth Structure and shall be at the base of the Track Bed;
- The **Prepared Subgrade** is the layer below the Track Bed (the UIC 719R term "form layer" shall not be used). The top surface of the Prepared Subgrade shall be cross-graded as required and specified in the HS2 Track Specification;
- The base of the Prepared Subgrade is the "**Sub-Formation Level**";
- The **Upper Embankment** is the layer of high quality fill below the Prepared Subgrade within an embankment, where required;
- The **Lower Embankment** is the bulk embankment fill below the Upper Embankment on medium and high embankments where required to achieve the Formation Level.
- **Starter Layer** is an initial layer at the base of the embankment that may be required to perform a drainage or working platform function.
- **Top of Foundation Level** is the upper surface of any earthworks Foundation; depending on the type of Earth Structure the Top of Foundation Level will coincide with the Sub-Formation Level in cuttings, and the base of embankments.
- The **Foundation** is the zone below the original ground level that supports a significant proportion of the earthworks and Track Bed and any imposed load (including vehicle traffic loadings). In favourable ground conditions the Foundation will be the natural soils, whilst in areas of unfavourable ground conditions the Foundation will include any engineered materials installed below any starter layer (or as part of or as substitution for a starter layer) for ground improvement purposes (e.g. band drains, controlled modulus columns, or deep excavate and replace layers, piled slab for earthworks etc.). This process shall be referred to as **Foundation Treatment**, and Section 4.8 sets out the associated requirements.

2.3.10 Figures 2.3/6 to 8 below are simplified cross-sections of the main Earth Structure types: embankment, at-grade and cutting, omitting drainage, lineside services and other infrastructure for clarity. They do not preclude the use of zoned embankment (Section 4.2), and do not prescribe the width of Foundation treatment (Section 4.8).

Figure 2.3/6 – General earthwork embankment terms (the case illustrated is a "medium embankment")

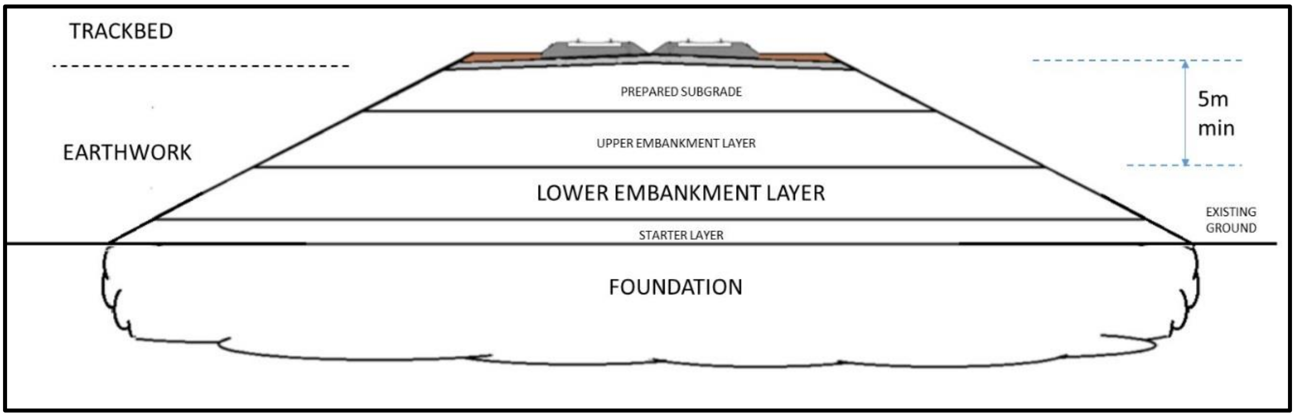


Figure 2.3/7 – General earthwork cutting terms (the case illustrated is a "medium cutting")

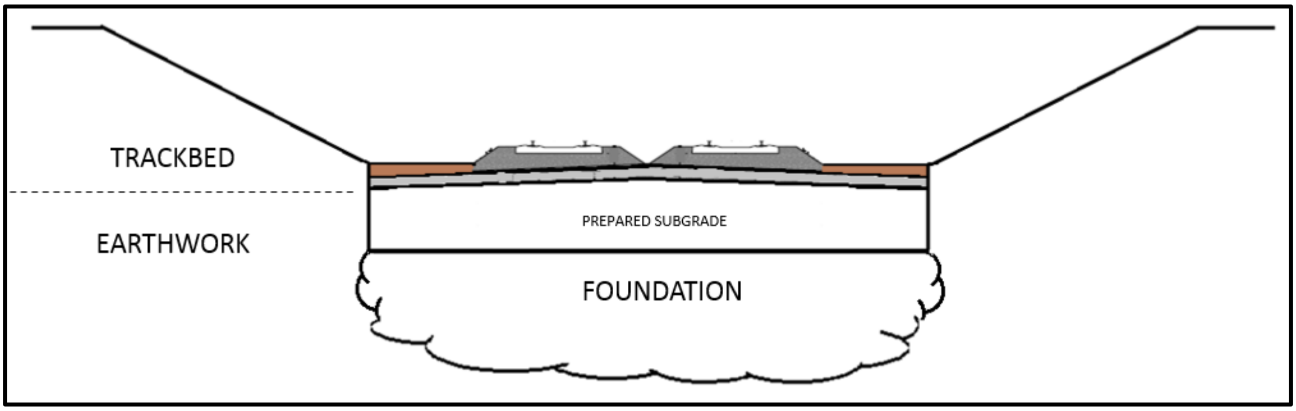
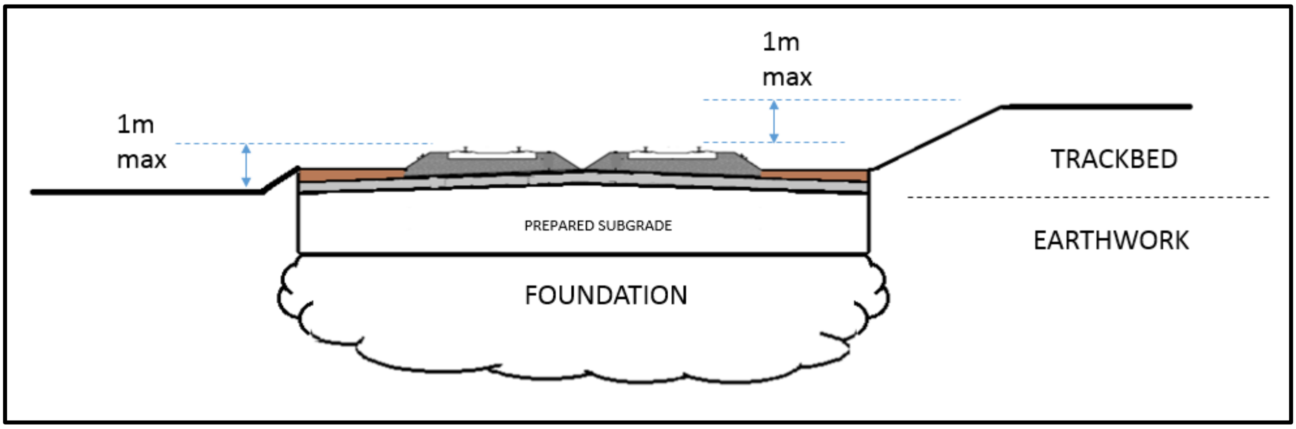


Figure 2.3/8 – General earthwork at-grade terms



General geotechnical design terminology

2.3.11	The terms defined below are used in this document and shall be adopted during geotechnical design:

- **Earthworks Settlement** shall be the permanent downward displacement of the earthwork due to static effects (such as consolidation) and any accumulated effects of dynamic loading;
- **Earthworks Heave** shall be the permanent upward displacement of the earthwork due to static effects, including hydraulic uplift;
- **Earthworks Dynamic Stiffness** is the transient stiffness of the earthwork at any defined level in response to dynamic loading;
- **Earthworks Static Stiffness** is the stiffness of the earthwork at any defined level under the application of a sustained load;
- **Geotechnical Ground Model** is the model of the sub-surface features used to develop the earthworks design and to communicate geotechnical understanding of risks;
- **Discontinuity** is a hard point in an earthwork, such as an underbridge, shallow culvert, switches and crossings, significant fault, cut-fill transition or other identified by the Designer (not to be confused for discontinuity as defined in rock mechanics);
- **Long Earthwork** is an earthwork > 800m long without a discontinuity;
- **Short Earthwork** is not a long earthwork;
- **Internal Creep** is creep or secondary consolidation within embankment materials;
- **Foundation Creep** is creep or secondary consolidation within natural soils (below embankments or cuttings).

Non-HS2 mainline earthworks terminology

2.3.12 For earthworks other than those that support the Mainline HS2 railway the appropriate terminology and definition of terms shall be as intended by the eventual earthworks asset manager. The following documents provide the relevant terminology and definitions:

- Earthworks terminology for highway construction shall be in accordance with the DMRB and associated publications;
- Earthworks terminology for classic railway construction (i.e. non-HS2 railway) shall be in accordance with NR/L3/CIV/071 and associated publications;
- Earthworks terminology for works that impact any Canal & River Trust infrastructure shall be in accordance with relevant guidance issued by the Canal and River Trust;
- Earthworks terminology for landscape earthworks / environmental mitigation earthworks design and construction shall be in accordance with Technical Standard HS2-HS2-EV-STD-000-000021;
- For all other Offline earthworks, Earth Structure geometry shall be as defined in the DMRB.

2.3.13 Where there are no third party established definitions then the terminology set out in BS 6031: 2009 shall be adopted.

2.4 Soil, rock and fill classification

Description and classification of soils and rocks

2.4.1 The description of in situ soils and rocks shall be based on field assessments of the material, and shall be in accordance with BS 5930: 2015, which details how BS EN ISO14688-1 and BS EN ISO 14689-1 shall be applied in the UK.

2.4.2 Following laboratory testing to determine physical characteristics of the soil (such as grading, plasticity and strength), classification of soils shall be in accordance with BS 6031: 2009 Clause 3.1, which describes the application of BS EN ISO 14688-2 to UK practice. Primary classification shall be by particle size but modified to suit the in-situ condition.

2.4.3 The soil and rock classifications system set out in UIC 719R shall not be used for this project.

Classification of fill materials for use in earthworks

2.4.4 *Following 'soil description' and 'soil classification', an additional process of 'fill classification' is required, which is dependent on the engineering properties of the soil and geotechnical application. BS 6031: 2009 Clause 3.1 states that the engineering properties of the soil will differ between two major cases, in terms of 'fines' content (particles <0.063mm), as follows:*

- *Where a soil is assessed for geotechnical design (e.g. slope stability, settlement or bearing capacity), fine (cohesive) soils are likely to include >35% fines; and*
- *Where a soil is considered as an engineered fill material for use in earthworks, fills with >15% fines are classified as cohesive (see Table 2.4/1).*

2.4.5 *Table 1c of BS 6031: 2009 is reproduced below as Table 2.4/1 to illustrate the difference in approach that is applicable for the description and classification of soils for the cases listed above.*

Table 2.4/1 – Definitions of fill material classifications for different earthworks circumstances from BS 6031: 2009

Table 1c) **Comparison of soil definitions in different earthworks circumstances**

% passing a 63 µm sieve		0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100			
UK standard approach to earthworks material classification by grading (after SHW A), B))	fill behaviour	granular fill	intermediate fill C), classified as cohesive fill	cohesive fill	
UK traditional approach to classification for geotechnical design (after BS 5930:1999+A1 D))	soil parameters	coarse/granular	intermediate zone C)	cohesive/fine grained	
BS EN 1997-1:2004 geotechnical design approach, (after BS EN ISO 14688-1:2002 E))	simplified interpretation for comparison purposes	coarse soil	composite coarse soil	composite fine soil	fine soil
			BS EN 1997-1:2004 approach does not set any fixed boundary but generally > 10% of the secondary fraction is likely to be needed in most soil types to constitute a composite soil.		

A) SHW [1] sets the granular/intermediate divide at 15% in recognition of pore water pressure in dynamic action of compaction.

B) The terms "granular" and "cohesive" are included here with regard to behaviour, the soil description terms in accordance with BS 5930:1999+A1 are "coarse" and "fine".

C) The designer has to use judgement of how a soil will behave within the intermediate zone, which is not considered in BS 5930:1999+A1.

D) Most fills in the UK that are in the intermediate range are classified as class 2C. Alternatively, the designer can create a new site-specific class e.g. "class 2F, clayey sand".

E) The BS EN 1997-2:2007 approach for identification and description of soils is set out within BS EN ISO 14688-1:2002, 4.3, by this system many soils are classified as composite soils and the distinction between soil terms can be summarized as follows:

- "composite fine soil" is a soil where the fines content is sufficient to determine the engineering properties;
- "composite coarse soil" is a soil where the fines content is not sufficient to determine the engineering properties (BS EN ISO 14688-1:2002 should be referred to for the full determination procedures).

2.4.6 The classification of on-site and imported materials for use within earthworks on the HS2 project shall be in accordance with the SCEW.

2.4.7 BS 6031: 2009 describes how the classification of fill materials for use in earthworks can vary during excavation, transportation and deposition. Accordingly, fill material can be classified at any of these stages, and classifications shall be assigned based on the class most appropriate to the required life of the given application.

2.4.8 Primary classification shall be by particle size in accordance with Table 2.4/2, followed by plasticity index in the case of cohesive soils. The main types of fill and Class groupings to be applied on the HS2 project are summarised in Table 2.4/3, and the sub-division of classes set out in Table 6/1 of the SCEW shall be followed.

Table 2.4/2 – Primary classification for use in earthworks

Primary material class	Particle size
Cohesive	Greater than 15% fine soil particles
Granular	Less than 15% fine soil particles

Notes to Table 2.4/2

1. Fine soil particles defined as those <0.063mm (63 µm)

Table 2.4/3 – Classification of earthworks material

Type	SCEW Class	Description	*Typical use*
Unacceptable Materials	U1A	Geotechnically unsuitable materials that can be treated	*Treat and use as general / landscaping fill or remove from works*
	U1B	Chemically unsuitable materials[1]	*Treat as necessary to achieve site specific threshold criteria assessed for the receiving location and use as general / landscaping fill or remove from works*
	U2	Radioactive[3] waste	*Where waste has been so classified, remove to a suitably licensed facility*
General Fill	1	Granular material	*General fill*
	2	Cohesive material	*General fill*
	3	Chalk	*General Fill*
Landscape fill	4	Various fill for use in Environmental Mitigation Earthworks areas	*Landscape and Environmental Mitigation Earthworks*
Topsoil	5	Topsoil or turf	*Topsoiling / Landscaping*
Subsoil	5S	Agricultural subsoil	*Subsoil underlying topsoil[4]*
Selected Fill	6	Selected granular material	*Fill for selected purpose*
	7	Selected cohesive material	*Fill for selected purpose*
	8	Miscellaneous material (Class 1, 2 or 3) used for lower trench backfill	*Lower Trench backfill*
Stabilised Fill	9	Selected granular (Class 6) or selected cohesive (Class 7) material that has been stabilised with cement, lime, or other binders	*Highways capping, HS2 transition zone fill and HS2 embankment fill*

Notes to Table 2.4/3

1. For complete definition refer to SCEW, HS2-HS2-CV-SPE-000-010600 and HS2-HS2-CV-SPE-000-020600, and also Technical Standard HS2-HS2-EV-STD-000-000027.
2. Not used
3. As defined in the 'Radioactive Substances Act 1993'.
4. Land that is to be returned to agricultural use will require the topsoil and subsoil to be separated at excavation and replaced in separate layers, hence a specific Class will be required for subsoil.

2.4.9 *Given the length of HS2, and the wide range of soils and rock strata that will be encountered, it is anticipated that it will be necessary for the Designer to further subdivide earthworks fill classes in an appropriate manner so that the laboratory test data used to define the acceptability limits in the SCEW are applicable. Therefore, sub-division of classes may be made based on any of the following:*

- *Clarification of particular fill properties, e.g. "Class 2A1" could be assigned based on a* *particular range of fill plasticity;*

- *Particular HS2 criteria, e.g. "Class 1A.h" could be used to set additional grading criteria or permitted constituents for well graded general granular fill used in the HS2 Mainline embankments;*
- *In some cases it may be necessary to assign sub-classes based on geological strata, e.g. "Class 2A.$_{OXC}$" for Oxford Clay Formation if this soil was expected to behave differently to other Class 2A fills.*

2.4.10 *Agricultural subsoils (Class 5S) represent the more weathered cohesive and granular materials at shallow depth below areas used for agriculture. HS2 will permanently displace a considerable volume of agricultural subsoils and these materials will be available for both agricultural and civil engineering purposes where suitable. This Technical Standard refers in conventional engineering terms to "soils", which are predominantly weathered and unweathered geological materials, and are not generally agricultural subsoils. See also Section 4.*

Non-engineered fill materials

2.4.11 Non-engineered fill materials include mine waste, quarry spoil, historical Made Ground, etc. The classification of such materials shall be determined by the Designer on a site specific basis to address the particular engineering and chemical properties and any risks associated with the material in question.

Secondary aggregates

2.4.12 Where the use of site won or imported secondary aggregate is proposed the primary geotechnical material classification shall be in accordance with Table 2.4/3.

2.4.13 In addition, the Designer shall identify any further geotechnical and chemical testing needed to confirm that the secondary aggregate will not adversely or aggressively react with other materials with which it could reasonably be expected to come into contact in its proposed placement environment. In particular, the Designer shall assess and record the potential for such aggregates, as a result of chemical reactions, to generate localised or wide area heave effects; adversely react with new or existing structural elements; or generate gas vapours or leachate that could impact the local or wider environment.

2.5 Materials Management Plan Framework and Excavated Materials Management Strategy

2.5.1 The Designer shall carry out the earthworks design in accordance with the requirements of Technical Standard - Materials Management Plan Framework, HS2-HS2-EV-STD-000-000006. The objective of this MMP Framework is primarily to facilitate the implementation of the HS2 Excavated Materials Management Strategy (EMMS) (HS2-HS2-CL-REP-000-000001).

2.5.2 The design of earthworks shall maximise the use of site-won materials where suitable and optimise the use of better quality materials.

2.5.3 *HS2 has developed an integrated design approach that uses excavated material to satisfy the fill material requirements of the project wherever reasonably practicable, thereby reducing the need for imported materials and reducing the amount of excavated material requiring removal off-site. This is outlined in the Excavated Materials Management Strategy (EMMS), with an overall objective of providing a consistent robust route-wide approach for the use of excavated materials, disposal and carbon minimisation. This is part of a sustainable approach to mitigate the environmental effects of the construction and operation of HS2.*

2.5.4 *HS2 has developed policy for the handling of materials that cannot be accommodated in the construction or otherwise re-used. This is contained in HS2 Waste Management Policy (HS2-HS2-EV-POL-000-000021) and Construction Demolition and HS2 Excavation Waste Strategy (HS2-HS2-EV-STR-000-000004).*

2.6 Geotechnical ground model and material parameters

2.6.1 A Geotechnical Ground Model shall be developed and updated throughout the design and construction phases of the project. The ground model shall be formed from all the available data sources including:

- HS2 Geotechnical Desk Studies;
- Digital Terrain Model;
- Historical mapping and existing infrastructure as-built information;
- Published geological information including mapping and historical ground investigation data;
- Hydrographic and hydrogeological data;
- Remote Sensing information;
- Geomorphological mapping and assessment, including any elements of this undertaken by the Contractor;
- Ground Investigation data assessment, including any investigation and/or monitoring undertaken by the Contractor;
- Records and reports of ground conditions exposed in the Works.

2.6.2 The Geotechnical Ground Model shall include: the ground surface; subsurface geological and anthropomorphic materials; geological structures; groundwater; contamination; and existing in-ground infrastructure / foundations, and the interaction between these elements. Further items to be included in the ground model that are specific to the design of slopes are included in Section 3.2.

2.6.3 The basis of the development of the Geotechnical Ground Model and the model itself shall be presented in the reports identified in Section 2.2 along with an associated GRR (Section 2.1). In addition, a 3D version of the geotechnical ground model shall be incorporated into the BIM utilising the standardised nomenclature that is included within the HS2 Specification for Ground Investigation. The model within the BIM shall be prepared to communicate:

- Prior to construction – ground and groundwater conditions;
- Operational stage – completed earthwork profile, zones of fill material and natural strata, and the long-term groundwater levels allowed for in the design;
- The principal ground risks identified in the Geotechnical Risk Register.

2.6.4 The level of detail within the model shall be sufficient to aid understanding of ground conditions and simplified to a limited number of strata to aid visualisation in 3D, but no less defined than the Geological Formations published by the BGS. The model should be suitable to enable the wider project team to consider the influence of ground conditions on permanent and temporary works design and to manage future ground risks and maintenance.

2.6.5 *There are additional requirements for assessing the ground conditions that influence the Track Bed design; these are listed in Section 5.4.*

2.6.6 Design parameters for earthworks materials shall be derived in accordance with BS EN 1997-1 and presented in the relevant GDR (Section 2.2), noting any additional requirements included in Sections 3, 4, 5 and 6 of this Technical Standard.

2.7 HS2 railway requirements

2.7.1 This section sets out the high level requirements that shall be satisfied for the successful design, construction, operation and maintenance of the HS2 railway.

2.7.2 The design of the earthworks and Track Bed should be integrated to ensure the most economic, sustainable and robust mutual compatibility.

Railway loading

2.7.3 The design shall take into account all static, transient and dynamic loads that will be applied to and by the Earth Structure, and any changes in these loads – such as an increase in lateral earth pressure, and negative skin friction developed on piles. Consideration shall be given to variable actions acting both alone and in combination with other actions.

2.7.4 Design of earthworks shall consider the static and pseudo-static effects of the railway operations in accordance with BS EN 1991-2 using the load models described in Technical Standard - Train Load Models for Civil Engineering Design, HS2-HS2-CV-STD-000-000009.

2.7.5 The characteristic loads shall be multiplied by the load factor (γQ) specified in National Annex to BS EN 1990: UK National Annex to Eurocode – Basis of structural design (2002) + A1 (2005).

2.7.6 *BS 6031:2009 clause 7.2.3 provides guidance on how to apply loads as actions for earthworks design.*

2.7.7 Elements of the earthwork and Track Bed above Sub-Formation Level shall be designed in accordance with Section 5.

2.7.8 *For the design of earthworks elements below Sub-Formation Level, the requirements of BS EN 1991-2 are acceptable with regard to dynamic loading.*

2.7.9 Rail loading shall not be considered in respect of long-term consolidation settlements except for at locations where trains may be expected to be stationary.

Surcharge loading

2.7.10 The Designer shall consider likely future inspection, maintenance and emergency access requirements in the selection of specific surcharge loading. The loading shall be applied to give the most unfavourable effect on the structural member / element under consideration.

2.7.11 Particular consideration shall be given to the application of any additional loads resulting from the construction of Environmental Mitigation Earthworks.

2.7.12 In the absence of specific requirements, a minimum maintenance surcharge of 10kPa shall be applied to all footways and access routes in accordance with Clause 7.2.3 of BS 6031: 2009.

Seismic design requirements

2.7.13 Earthworks shall be designed in accordance with Technical Standard – Civil Engineering Seismic Design, HS2-HS2-CV-STD-000-000010.

Groundwater

2.7.14 The earthworks drainage requirements shall be determined as part of the earthworks design (see BS 6031:2009 Clause 7.5 for further details).

2.7.15 Groundwater levels can vary substantially in response to meteorological, seasonal, climate change and abstraction trends. Design groundwater levels and/or pressures shall consider all possible extremes and shall not be based on short-term data without taking into account likely variation. The groundwater regime shall be established from the ground investigations and field observations, with particular attention given to local site records and data from piezometers and standpipes. As far as is reasonably practicable, design groundwater levels shall be based on appropriate levels measured in groundwater monitoring instrumentation which has been monitored for at least a full cycle of seasons (12 months, or at least 6 months where timed to determine the seasonal limits).

2.7.16 The groundwater conditions adopted for design shall take account of the following:

- Climatic and seasonal variations (including allowances for the effects of climate change);

- Adverse groundwater conditions produced by perched, artesian or sub-artesian water tables that might reasonably be expected to occur over the design working life of the structure;
- Adverse weather conditions, such as prolonged periods of precipitation or prolonged drought;
- Changes in the existing groundwater conditions due to the construction and use of the structure, and of any reasonably foreseeable changes in the infrastructure in and around the site (including changes in land use);
- Potential long-term changes in the groundwater conditions due to variations in abstraction rates including mine water pumping;
- The possible leakage from mains water pipes, sewers, balancing ponds etc. and the blockage of drainage systems;
- Surface water flows, including the effect of future flooding, as outlined in the project flood risk assessment;
- Groundwater chemistry where this is significant to the construction and/or to the negative impact of any change to the wider environment induced by the design;
- Any contaminants which may impact groundwater treatment or disposal.

2.7.17 The Designer shall confirm that the drainage design maintains groundwater levels below the values given in Table 2.7/1 below, with due cognisance given to the anticipated post-construction groundwater regime and response rate to surface water flooding events. All earthworks materials that could be below the groundwater level or that could be affected by flood waters (ground or surface) shall be designed such that their performance meets requirements whether they are wet or dry, and that they will not degrade additionally under railway loadings and will not require maintenance following a flood event. Where appropriate this shall include measures to prevent the flow of fines into or out of granular earthworks materials.

Table 2.7/1 – Required groundwater level for drainage design purposes

Track type	Groundwater control depth [1]
Ballasted Track	Below Prepared Subgrade and greater than 1m below all rail levels
Slab Track	Below Prepared Subgrade and greater than 1.2m below all rail levels

Note: The drainage along the route shall be designed in order to maintain the groundwater level beneath the track at or below the groundwater control depths quoted in this table, unless otherwise agreed with HS2 on a location by location basis. Refer to Technical Standard HS2-HS2-DR-STD-000-000003.

2.7.18 The design of the earthworks drainage shall be integrated with the surface water drainage system. Where the route is within a Source Protection Zone the two systems may need to be kept separate, depending on the requirements of the regulator. Reference shall be made to Technical Standard HS2-HS2-DR-STD-000-000003, Technical Standard – Groundwater protection, HS2-HS2-EV-STD-000-000010, and Technical Standard - Water Framework Directive Compliance Process, HS2-HS2-EV-STD-000-000012.

Surface water

2.7.19 Earthworks shall be designed so they are not adversely affected by surface water flooding. The output from the project flood modelling shall be used to develop design flood events to inform the earthworks design.

2.7.20 *The likelihood of surface water or river flooding affecting HS2 earthworks is small given the provisions in the drainage Standards and the general design approach of keeping earthworks out of flood plains. However it remains possible, and the previous Clause is included to remind designers to consider any relevant limit states and the resilience of the infrastructure to rare events. The Designer should consider the possible impacts on a site-by-site basis. Erosion mitigation is the most likely response, and may be necessary in areas of particular concern.*

Design life

2.7.21 The design of the earthworks shall achieve serviceable Earth Structures satisfying a design life of 120 years, defined in accordance with BS 6031: 2009 Clause 7.4.2. Where the earthworks include artificial materials (including lime and / or cement) these structural elements shall be designed to a design life of 120 years. This requirement is due to the difficulty of planning and undertaking maintenance on the Earth Structure supporting operational HS2 track without disrupting the operation of the railway or third party infrastructure.

2.7.22 The Designer shall include adequate provision for routine maintenance to be undertaken without disruption to the rail operation (e.g. drain clearance and vegetation management). Any element of the design that relies upon the continued function of a component of the Earth Structure shall include adequate provision for the routine maintenance of that component (e.g. slope drains may require an inspection chamber and pipe that can be cleared, rock traps cleared of debris.).

2.7.23 Design of elements to a lower design life (e.g. utilising a Planned Maintenance Intervention design approach) is acceptable provided that they are capable of being practicably inspected, maintained, replaced or upgraded in accordance with the maintenance requirements of the project and shall in total commitment (i.e. initial cost, replacement cost plus all monitoring and maintenance for the full 120 years) offer a no greater total cost than the equivalent 120 year whole-life design. Where an alternative design life is proposed, monitoring and a long-term observational approach shall form part of the design solution. The design shall set out clear requirements for operation, management and maintenance, including threshold criteria and management plans. Such designs shall be presented on the basis of quantitatively assessed safety risk and to the satisfaction of HS2 Ltd.

Durability

2.7.24 The environmental conditions shall be assessed (in relation to the design working life of the structure and the durability of the construction materials) to determine any necessary provisions for protecting or providing resistance to the earthworks and associated structural elements.

2.7.25 In particular, the earthworks design shall take account of the following:

- The potential effect of stray electrical currents on the long-term durability of buried metallic elements / components (such as ground anchorages, soil nails, and dowels) and the consequences of a premature failure of these;
- The durability of any artificial materials (such as geosynthetics) that form part of the earthwork (see BS6031: 2009 Clause 7.4.2);
- The consequences of a lineside fire on the performance of the structural components (in particular, geosynthetics);
- The effect of erosion / scour on exposed faces of earthworks slopes due to surface water flow;
- Coarse granular fill material particle durability;
- Durability of stabilised materials;
- Durability of secondary aggregates;
- An allowance for the effects of weathering and climate change.

2.7.26 *See also Technical Standard – Materials and Durability, HS2-HS2-CV-STD-000-000003.*

Climate change resilience

2.7.27 The effects of climate change shall be assessed to determine any necessary provisions for protecting or providing resistance to any potential accelerated degradation of earthworks. See also Technical Standard - Climate Change Adaptation and Resilience HS2-HS2-SU-STD-000-000003 for requirements and the Climate Change Design Impact Assessment (HS2-HS2-EV-REP-000-000023) for guidance.

2.7.28 *Specific requirements for Earth Structure slopes with respect to Climate Change are detailed in Section 3.4.1.7 of this Technical Standard.*

Lineside planting

2.7.29 All lineside planting shall be undertaken in accordance with Technical Standard – Lineside Vegetation, HS2-HS2-EV-STD-000-000005.

2.8 Offline earthworks requirements

Highways

2.8.1 The design of Highways earthworks shall be undertaken in accordance with those documents listed in Table 2.2/1. In particular, the DMRB shall apply.

Railways

2.8.2 The design of earthworks for classic railways (i.e. other than the HS2 Mainline Railway) shall be undertaken in accordance with current Network Rail standards, including those documents listed in Table 2.2/1.

Canals and rivers

2.8.3 The design of earthworks that have potential to impact on existing canals and rivers shall be undertaken in accordance with those documents listed in Table 2.2/1. In particular, the Canal & River Trust – Code of Practice for Works Affecting the Canal & River Trust, Parts 1-3, shall apply.

Environmental Mitigation Earthworks

2.8.4 *Environmental Mitigation Earthworks will comprise a major proportion of all the earthworks on the HS2 project and may include earthworks to address the following:*

- *Sound mitigation;*
- *Visual screening;*
- *Landscape integration;*
- *Safety;*
- *Environmental and habitat compensation;*
- *Agricultural and forestry mitigation;*
- *Mitigation for heritage features;*
- *The infilling of voids and hollows to achieve the above.*

2.8.5 The geotechnical design of Environmental Mitigation Earthworks shall be undertaken in accordance with those documents listed in Table 2.2/1. In addition, the following documents shall apply:

- Technical Standards HS2-HS2-EV-STD-000-000005, HS2-HS2-EV-STD-000-000006 and HS2-HS2-EV-STD-000-000021;

- HS2 Landscape Design Approach (HS2-HS2-EV-STR-000-000010) and Technical Standard - Landscape Maintenance, Management and Monitoring Plan, HS2-HS2-EV-STD-000-000023;
- Department for Environment Food and Rural Affairs (DEFRA) - Construction Code of Practice for the Sustainable Use of Soils on Construction Sites

3 Design of slopes

3.1 Introduction

3.1.1 The purpose of this section is to provide the requirements for the geotechnical design of the gradients of the engineered slopes for the Earth Structures (i.e. cuttings and embankments) for the HS2 project, so that a consistent standard of slope analysis and presentation is adopted across all areas of the project.

3.1.2 The slope gradients required for Environmental Mitigation Earthworks are addressed separately in Technical Standard HS2-HS2-EV-STD-000-000021.

3.1.3 The specific requirements for HS2 Railway slopes are presented in Section 3.4 to 3.9. The requirements for offline earthworks are presented in Section 3.10.

3.1.4 The design of slopes shall, where practicable, mitigate the risk of third party activities on their stability.

3.2 Assessment of geohazards affecting slopes

3.2.1 The design of the slopes shall mitigate the effect of geohazards that impact on slope stability, including:

- Groundwater conditions, including the presence of artesian and sub-artesian conditions and seasonal variations of these;
- Presence and residual shear strength of relic shear surfaces (particularly in over-consolidated fissured clay / mudstone formations) and periglacial effects;
- Presence of natural or man-made voids;
- Potential for progressive slope failure in over-consolidated high plasticity clay / mudstone strata;
- Presence of valley bulge / cambering features;
- Stability of existing, natural slopes;
- Potential for Made Ground, especially non-engineered fill materials;
- Quality of rock, including discontinuity orientation and condition;
- Allowance for weathering effects, including those accelerated by climate change.

3.2.2 Specific geohazard assessments shall be carried out for all slopes and presented in the E-GDR (Section 2.2) and the Geotechnical Ground Model where appropriate (Section 2.5).

3.2.3 The Designer shall make provisions in the contract-specific appendices to the SCEW to ensure that the design is reviewed and verified against actual ground conditions exposed during the construction phase of the earthworks.

3.3 HS2 railway slopes, general design requirements

3.3.1 For the purpose of slope design, the Earth Structure slopes that could impact the HS2 Mainline are considered to be Earthworks Cases EW1, EW2, EW5 and EW7, as defined in Table 2.2/2. These shall be designed in accordance with the following requirements.

3.3.2 The design of the Earth Structure slopes shall be undertaken in accordance with the requirements of BS EN 1997-1: 2004 and the corresponding UK National Annex, and BS 6031: 2009. This Technical Standard also specifies a number of alternative and / or additional requirements to those set out in BS EN 1997-1: 2004 that shall be satisfied in order to address particular issues.

3.3.3 Not used.

3.3.4 Earth Structure slopes shall be designed to ensure their maintenance requirement is as low as reasonably practicable over the design life (Section 2.7).

3.3.5 The slopes shall be designed to ensure their stability and reliability, giving due cognisance to the following, as a minimum:

- The geotechnical characteristics of the in situ ground in and around which cuttings will be formed and on which embankments will be founded, including both material and mass characteristics;
- UK experience of long-term slope performance in similar materials;
- The geotechnical characteristics of the fill materials used to construct embankments / engineered false cuttings;
- The height / depth of the Earth Structure;
- Requirements for placement of any mitigation earthworks; particularly where these may impart additional unfavourable surcharges;
- Future weathering of exposed soils and any requirements to protect the surface against degradation;
- The groundwater level and fluctuations in the groundwater table;
- The effect of any existing nearby trees or vegetation;
- Particular conditions at the site, e.g.:
  - Topography;
  - Hydrology;
  - Hydrogeology;
  - Specific risks associated with particular geological units, such as the presence of relic failure surfaces, voided ground, swelling and shrinkage of clayey soils, progressive failure;
- Maintenance requirements including access for, and safety of, maintenance personnel;

- Specific requirements for proposed vegetation (see Technical Standard HS2-HS2-EV-STD-000-000005) or other proposed HS2 landscaping;
- Climate change resilience.

3.3.6 The Designer shall address all relevant failure modes, both in the short- and long-term.

3.3.7 The Designer shall report the allowances made for potential effects of climate change over the Design Life in the design of all slopes.

Finishing of slopes

3.3.8 The face of Earth Structures slopes shall be stable and shall be finished to meet the landscape requirements.

3.3.9 Scour protection measures shall be included where earthworks slopes are considered to be at risk of erosion (e.g. in flood zones).

3.3.10 The Designer shall consider the effects of animal burrowing on the stability of Earth Structure slopes, and shall specify appropriate protection measures where required.

3.3.11 *It is anticipated that this will include a suitable mesh installed below the* topsoil *on embankment slopes constructed of fine or sandy fills that are prone to rabbit / badger burrowing. See also Technical Standard – Fencing, HS2-HS2-CV-STD-000-000002.*

Construction factors

3.3.12 The Designer shall consider the construction-related factors that can influence slope stability, as described in Clause 7.2.8 of BS 6031: 2009.

Slope maintenance

3.3.13 The designer shall specify the inspection and maintenance requirements for slopes, including at least the following features:

- **Drainage** – of both surface water and groundwater as these can have a significant influence on the stability of earthworks slopes (particularly with regard to progressive failure).;
- **Vegetation** – to be managed appropriately as its presence and removal can adversely affect the stability of earthwork slopes (particularly with regard to seasonal movements of clay slopes), see the HS2 Lineside Vegetation Management Strategy (HS2-HS2-EV-STR-000-000009);
- **Animal damage** – burrowing activity can undermine the stability of earthworks;
- **Erosion** – due to the action of water (drainage, heavy rainfall, watercourses, floods etc.);
- **Scaling of rock slopes** – including the removal of fallen debris from rock traps / nets etc.

3.4 Particular requirements for the design of soil slopes

3.4.1 The design of soil slopes shall be undertaken in accordance with Clause 11.5.1 of BS EN 1997-1: 2004 and the guidance provided in BS 6031: 2009.

3.4.2 The use of generic stability charts or infinite slope methods shall not be permitted for the design of the Earthworks Cases EW1, EW2, EW5 or EW7 (Table 2.2/2) because of the complex nature of the scheme, the geotechnical category of the earthworks, and potentially severe consequences associated with a slope failure.

3.4.3 Guidance presented in various formation-specific publications (such as BGS, CIRIA etc.) shall be considered on a site-specific basis.

3.4.4 Not used.

3.4.5 *CIRIA report R185 provides guidance with respect to the use of the observational method of design.*

3.4.6 The Designer shall assess whether computational numerical methods of analysis are required where strata are considered to be prone to non-linear progressive failure (e.g. high plasticity over-consolidated clays and mudstones). As a minimum, the Designer shall consider the risk of progressive failure occurring during the design life, and assess how best to manage the risk by design; particularly with respect to design life / whole-life value to the project (see also Section 2.7).

3.4.7 *Approaches to management of risk of progressive failure by design may include slackening of the slope or stiffening at the toe if necessary, depending on the existing land made available. There are a number of widely-available reports and guidance documents available for a range of lithological units (e.g. CIRIA reports, BGS guides etc.). Designers should make use of such documents as part of the design process; particularly with regard to management of risk.*

Reinforced soil slopes

3.4.8 The design of reinforced soil slopes shall conform to the previous requirements for unreinforced slopes, including durability, as well as the following specific requirements.

3.4.9 Reinforced soil slopes shall be no steeper than 69° from the horizontal. Otherwise they shall be considered to be structures, subject to the requirements of Technical Standard – Retaining Structures, –HS2-HS2-CV-STD-000-000006.

3.4.10 Reinforced slopes shall be designed in accordance with BS 8006-1: 2010 + A1 2016 (strengthened / reinforced soils) and BS 8006-2: 2011 (soil nailed slopes), as appropriate.

3.4.11 The design shall demonstrate compliance with the following requirements with respect to a High Speed Rail environment:

- Durability, including corrosion resistance;
- Settlement and creep of earthworks;
- Maintainability of the structure for the duration of the design life;
- Integration/compatibility with rail systems infrastructure, e.g. foundations for structures or overhead line mast foundations;
- Integration/compatibility with earthworks design, including transition zones;
- Strain compatibility between facing and reinforcement.

3.5 Particular requirements for the design of rock slopes

3.5.1 Design in accordance with this Technical Standard is required to deliver a safe and serviceable slope at the point of handover. Where it is possible that a situation of rock slope materials susceptible to degradation will be present, further definition of requirement is provided for security of serviceability during the subsequent operational and maintenance phase of the project throughout the Design Life.

3.5.2 This document does not prescribe the method of design/construction, but requires that the design takes account of serviceability issues that could arise within a period of time (no less than 30 years) in the condition of rock slopes to less than 'serviceable' and/or unsafe within 120 years. 'Serviceable' is defined in Network Rail 'Rail Rock Slope Risk Appraisal' and as 'Feature Grades' in Highways England HD41/15, which are based on Transport Research Laboratory (TRL) 'Rock Slope Hazard Index (RSHI) system', 'Rock Slope Hazard Rating (RSHR) system' (McMillan & Matheson, 1997) and 'Rock slope risk assessment' (Report PPR554) (TRL) for rock slope inspection. It is accepted that an expectation of operational inspection and monitoring may be applied as part of the overall design consideration, however this shall not include remedial interventions and measures that require railway line possessions or closures or speed restrictions in order to implement.

3.5.3 The design of cutting slopes in rock masses shall be undertaken in accordance with Clause 11.5.2 of BS EN 1997-1: 2004, and the guidance provided in Clause 7.3.2 of BS 6031: 2009.

3.5.4 The design shall not allow falling rocks to reach the railway track components, including lineside equipment, and debris shall not encroach into the area defined by the Uniform Structure Gauge.

3.5.5 The design shall mitigate both:

- The risk of instability of rock masses whose probability of occurrence is difficult to determine. Safety is the primary element that shall be considered, with a comprehensive assessment of the mechanisms of failure likely to be involved and an evaluation of the unstable rock masses;

- The risk of falling rocks that can reach any location where falling rocks could impact the operation of the railway or affect asset performance. The risk shall be evaluated using structural studies and trajectory design.

3.5.6 All completed rock slopes shall be handed over with the benefit of an independently verified Rock Slope Hazard Rating (see below) that supports an initial HD41 Feature Grade 1, with a Design Life expectation of no poorer than Feature Grade 2.

3.5.7 Feature Grade 2 has a geotechnical intervention summary definition of: "*Remedial intervention is not required, but preventative intervention may be required*. *Works do not need to be programmed and may be done as part of other schemes".*

3.5.8 The RSHI and RSHR determinations shall be undertaken progressively as part of the design and construction of the slopes and shall maximise benefit from all accessible information including inspection, mapping and performance of the slope as it is exposed during construction. All evidence used in the assessment shall be entered to HS2's geotechnical risk management and BIM. Detailed user guidance notes shall be compiled explaining how both the Index and Rating systems have been applied, especially any variable approach to data collection and the use of different scales and nomenclature for presentation of the results, which may otherwise render comparison of these results almost impossible.

3.5.9 Guidance on the application of the above processes can be found in: NR/L2/CIV/086 Management of Earthworks (and related references); NR/L3/CIV/065 Examination of Earthworks; NR/GN/CIV/211 Definition of Rock Slope Hazard Index (RSHI).

3.5.10 Should the Designer choose not to use the RSHI approach, any alternative shall incorporate at least the following features. It shall:

- Provide a consistent, appropriate and robust approach to both initial and detailed risk assessment and identify key actions which shall be resolved before handover;
- Ensure that condition features which may be subject to change over time, or contribute to risk assessment and/or trigger key actions are identified for targeting during O&M surveys;
- Provide alignment of the risk assessment process to that adopted for the geotechnical asset;
- Support a more unified approach for wider infrastructure asset and Value Management processes;
- Be viable for the long-term;
- Be cost effective in comparison to RSHI;
- Be supported by routinely available resources and competencies;
- Account for likelihood of projectile size (that may impact a train) exceeding those that permit compliance with BS EN 15152 – 2007.

3.5.11 High tensile netting systems are unlikely to be able to meet the above requirements.

3.5.12 Assessment of rock slope shall take account also of the following:

- Susceptibility to weathering and Climate Change;
- The impact of subsidence arising from known proposals for mining within influencing distance of the slope;
- Active or known proposed mining;
- Impact of karstification risk.

3.5.13 Specifically in coalfield areas, the assessment of rock slopes shall take account of:

- Rising groundwater (where this is being supressed by ongoing pumping or has not stabilised to natural elevations);
- Prognosis for significant residual ground movement at major faults (e.g. coalfield boundary faults) and mine-induced breaklines;
- Acid Mine Drainage effects;
- Self-heating;
- The presence of abandoned mine workings and
- The influence of seatearths and clay-mylonites.

3.5.14 The design shall account for weathering to ensure that stability is maintained throughout the design life.

3.5.15 Weak, heavily weathered rocks can exhibit engineering characteristics intermediate between those of a soil and those of a rock. In cases of doubt, separate analyses of slope stability shall be made, assuming that the material behaves either as a soil or as a rock.

3.6 Slope profiles

3.6.1 The Designer shall determine the required slope profiles. The slope profile shall allow sufficient space at the crest and toe of an earthworks slope for: drainage, maintenance access, security fence, landscaping requirements, and any other requirements identified by HS2 Ltd. The spatial requirement and relative location of such features shall be determined by the Designer to accommodate any Environmental Mitigation Earthworks and boundary fences above or adjacent to the earthwork slope. Specific spatial requirements are presented in Technical Standard HS2-HS2-CV-STD-000-000001.

3.6.2 *Initial earthworks slope gradients have been recommended previously for Preliminary Design / land purchasing purposes for Phase 1. These are summarised and presented for information purposes only in Tables A1 and A2 in Appendix A, based on geological strata, and geological / geotechnical features pertinent to those strata. It should be noted that the slope gradients indicated in Appendix A do not include for any reduced slope gradients or false cuttings that may be required to mitigate the environmental impact of the scheme (refer to Technical Standard HS2-HS2-EV-STD-000-000021 for further details).*

3.6.3 The Designer shall determine the need for berms and/or rock traps in the slope profiles determined, along with associated maintenance intervention periods and access requirements. The Designer should refer to the various formation-specific publications (such as CIRIA, BGS etc.) for further guidance in this respect.

3.6.4 *Benching of a rock cut slope can help reduce the volume and speed of rockfall debris and hence the potential danger to the infrastructure. The width and height of benches on a cutting are dependent upon the rock strength and the overall slope angle of the cutting and the orientation and persistence of joints in the rock. By making the slope angle between the benches steeper than the overall cutting slope angle, rocks usually may only fall directly onto the bench below, thereby preventing progression further downslope. References for guidance on the design and sizing of benches, ditches, catch fences and rock traps include UIC719R, Simons et al. (2001) and CIRIA C591 Section 5.5.4.*

3.6.5 Intact rock slopes with gradients of between 45° and 90° to the horizontal shall be provided with a stone trap at the base and benches having a width of approximately 1/3 of the height of each step produced, unless detailed assessment demonstrates that they are not susceptible to potential rock fall. Access provision necessary to minimise any maintenance of these features and slopes shall be identified.

3.6.6 Where land-take permits, chalk cuttings shall be designed in accordance with Section 6.2 of CIRIA C574 (2002) to give a stable cut angle for long-term maintenance of vegetation. This will typically limit slope angles to 1V:1H or shallower.

3.6.7 The Designer shall account for the effects of frost and surface run-off on the stability of the surface of cutting and embankment slopes through their design life.

3.6.8 *Surface protection measures such as granular blankets or soil erosion control mats may be necessary in some circumstances, particularly in silty and sandy soils. In rock cuttings it may be appropriate to consider steep faces to limit water ingress and thus reduce the potential for damaging accumulations of ice (provided that overall stability of the rock mass is not compromised by such steepening measures). However, this is unlikely to fully mitigate the effects of freeze-thaw, and trapping of rock fall is likely to be required in such cases.*

3.7 Drainage requirements

3.7.1 Toe drainage is required in all cuttings and embankments, and shall be in accordance with Technical Standard HS2-HS2-DR-STD-000-000003. Toe drains shall be located at an appropriate distance from the slope toe to ensure that the groundwater is adequately managed, with the drain depth being sufficient to satisfy the slope design requirements, in addition to the other required functions. The Design shall provide good easily accessible access to toe drains to enable them to be easily inspected and regularly maintained to ensure their efficient functioning, particularly in slopes constructed within high plasticity over-consolidated clay strata.

3.7.2 Installation of toe drains presents a risk of strain softening whilst the trench is open. This is a particular problem in high plasticity over-consolidated clay strata because it can initiate the process of deterioration that can then lead to progressive failure in the long-term. The Designer shall address this issue when assessing the depth, width, time to construct and method of installation of toe drains.

3.7.3 Cut-off drainage, including crest drainage to cuttings, shall be provided where the surrounding land slopes towards an earthwork and shall be required to be maintained. The Designer shall decide whether interceptor drains require lining in order to limit percolation of collected water into the earthwork.

3.7.4 Designs involving the routine use of slope drainage to improve stability should generally be avoided to minimise maintenance. However, with consideration given to the design life requirements set out in Section 2.6, the Designer shall assess the need for the installation of slope drainage where seepage control is necessary in order to maintain stability. Additional drainage may be required where relic slip surfaces are suspected / identified. Wherever the stability of a slope relies on such slope drainage then it shall be designed to be inspected and maintained without affecting the operation of the HS2 railway (see also Section 2.7).

3.7.5 *For ease of maintenance, it may be necessary to design slope drains to include a slotted pipe and catch-pit / inspection chamber to facilitate drain clearance from the downslope end of the drain run. Alternatively, the Designer may be able to prolong the life of slope drains by careful specification of filter material to provide an increased degree of resistance to silting. It should normally be assumed that the effective design life of drainage is less than 20 years.*

3.8 Material parameters and porewater pressures

3.8.1 The Designer shall assess all available information and obtain all necessary additional information and derive geotechnical material parameters for slope stability assessments in accordance with BS EN 1997-1: 2004 and Clause 7.2.4 of BS 6031: 2009. This shall include post peak strength parameters for clay soils where relevant.

3.8.2 For all new earthworks, the vertical depth of weathering shall be assessed based on site investigation information.

3.8.3 The Designer shall also consider effects of additional weathering during the design life (of cuttings in particular), and material parameters shall be selected accordingly.

3.8.4 Residual shear strength parameters shall be used for those strata that are known to contain relic failure surfaces (or where there is evidence to justify that relic slip surfaces are likely to be present). Where there is evidence of significant strain but not clear relic slip surfaces, and back-analysis of existing slopes supports the use of values higher than residual, then the Designer may select a post-peak value appropriate for the anticipated strain.

3.8.5 *In accordance with BS EN 1997-1: 2004 clause 11.5.1(8), partial factors normally used for overall stability analyses may not be appropriate where residual shear strength parameters are used. Additional guidance in this respect is provided in clause 7.3.3 of BS 6031: 2009, as follows:*

"The partial factor used with the residual angle of shearing resistance should be chosen with due consideration to the confidence level of the data and the consequences of failure of the slope. Usually it should not be necessary for the partial factor applied to the residual angle of shearing resistance to exceed 1.1 provided the effective cohesion used in conjunction with that angle is set to zero".

3.8.6 The strength parameters selected for Earth Structure slopes that are to be constructed in high plasticity over-consolidated clays shall reflect the inherent characteristics of the material, which in turn shall reflect the potential for progressive failure.

3.8.7 *Some general guidance with respect to material parameters and partial factors when assessing deep-seated progressive failure of slopes constructed in high plasticity over-consolidated clays is provided in the Guidance Document G0054B Earth Structures – Guide for Slope Stability Analysis (LUL, 2014). It should be recognised, however, that the guidance offered in G0054B was developed primarily for the assessment of existing assets (predominantly constructed in London Clay), rather than for the design of new Earth Structures. There is a significant body of UK literature on this subject which should be referenced during design, including, with respect to design for progressive failure mechanisms in embankments and cuttings O'Brien (2007) and Ellis and O'Brien (2007) respectively.*

3.8.8 The effects of weathering and associated seasonal wetting and drying in clay slopes in the vadose zone can lead to an overall softening of the soil through down-slope strain and loss of cohesion. To account for such effects in fine soils / cohesive fills (excluding stabilised soils), the Designer shall adopt the parameters shown in Table 3.8/1, unless otherwise justified.

Table 3.8/1 – Parameters that shall apply for the vadose zone for Earth Structure slopes constructed within fine soils / cohesive fills

Depth below slope surface (m)	Embankment slopes			Cutting slopes		
	r_u	Φ′	c′	r_u	Φ′	c′
0 – 1.5	0.2 (min) or an equivalent porewater pressure	$Φ'_{cv}$	≤1 kPa	0.2 (min) or an equivalent porewater pressure	$Φ'_{cv}$	≤1 kPa
>1.5	Groundwater profile	Derived in accordance with BS EN 1997-1 & UK National Annex		Groundwater profile	Derived in accordance with BS EN 1997-1 & UK National Annex	

Notes:

1. Where an Earth Structure slope contains high plasticity over-consolidated clay / mudstone, the depth of the vadose zone shall be increased to 2.0m.
2. These vadose zone parameters may not apply to stabilised soils in embankments. The Designer shall assess weathering effects on stabilised soils within the vadose zone and apply suitable parameters for slope design within these materials.
3. The Designer may amend this approach if these parameters result in the use of design strengths which are lower than residual.

3.8.9 *Although the primary purpose for the application of the parameters shown in Table 3.8/1 in the vadose zone is to address near-surface softening effects in high plasticity soils (Atkinson and Farrar, 1985), recent research has shown that the consideration of such a softened zone should also help to mitigate the effects of climate change.*

Groundwater

3.8.10 The Designer shall derive appropriate groundwater profiles for all slope stability assessments in accordance with Section 2.7 of this document. This shall be in addition to, and separate from, the porewater pressure requirements in the vadose zone set out in Table 3.8/1.

3.8.11 Careful consideration shall be given to the effects of groundwater drawdown induced by the excavation of earthworks cuttings and installation of temporary and permanent drainage; also to cuttings in geologies with interbedded high and low permeability strata that can generate adverse seepage profiles. The design shall ensure that groundwater drawdown is in compliance with the Water Framework Directive, see Technical Standard HS2-HS2-EV-STD-000-000012. Requirements for consents are detailed within Technical Standard HS2-HS2-EV-STD-000-000015. Reference shall also be made to Technical Standard HS2-HS2-EV-STD-000-000010.

Applicable partial factors

3.8.12 Partial factors shall be applied to actions, materials and resistances in accordance with BS EN 1997-1, using the partial factors set out in the UK National Annex to BS EN 1997-1: 2004.

3.8.13 *Clause 7.3.3 of BS 6031:2009 provides a description of the application of partial factors to actions, materials and resistances.*

3.8.14 The Designer shall select partial factors in accordance with the risk profile of the slope, taking account of:

- The greater potential risks / consequences associated with failure of the Mainline HS2 earthworks slopes;
- The requirement for reduced maintenance liability for the earthworks;
- The uncertainty presented by climate change.

3.9 Offline works slopes

3.9.1 For the purpose of slope design, the HS2 Offline slopes are considered to be any slopes which are not HS2 Mainline slopes as defined in Section 3.3.

3.9.2 The design of the Offline works slopes shall be undertaken in accordance with those documents listed in Table 2.2/1.

3.9.3 The design of Offline earthworks shall be subject to the agreement of any adopting authority.

4 Design of HS2 Railway Earth Structures

4.1 Introduction

4.1.1 Earthworks shall form a consistent support to the HS2 railway and other infrastructure at the required Formation Level. Earth Structures shall be designed in accordance with BS 6031: 2009 and the requirements of this document, as identified at Section 2.2.

4.1.2 *Excess deformation of the earthworks would affect track, drainage and other infrastructure performance and therefore is required to be minimised within the specified design life of the project. Deformation can occur by several processes including:*

- *Degradation and settlement of the Track Bed and earthworks under cyclic rail loading;*
- *Heave or degradation due to frost or chemical action;*
- *Shrink / swell due to seasonal and climatic effects;*
- *Heave due to unloading in cuttings;*
- *Collapse of embankment fill;*
- *Foundation settlement due to earthwork loading;*
- *Foundation differential settlement due to variations in underlying geology;*
- *Damage or disruption due to vibration and Rayleigh Wave propagation;*
- *Foundation collapse due to sub-surface features including solution features and mine workings;*
- *Variations in strata stiffness due to geological variations or buried structures;*
- *Shear failure due to overloading / unloading;*
- *Dissipation of excess negative or positive pore pressures caused by excavation and/or compaction;*
- *Fatigue in bonded materials as a result of repeated loading;*
- *Fretting at the highly stressed contacts in granular materials;*
- *Failure to protect the earthworks from infiltration and capillary rise.*
- *Mining activities current and historical*

4.1.3 The Designer shall assess and mitigate the singular, combined and cumulative effects of these processes to ensure that the track does not experience damaging deformations.

Requirements for earthworks transitions are presented in Section 6 of this Technical Standard.

4.2 HS2 performance requirements

4.2.1 This section presents performance requirements and the values in Table 4.2/1 will be used for design purposes and, in the case of the dynamic stiffness requirements only, for final validation of the Earth Structure performance. The values presented in Table 4.2/2 will be used during construction to control the quality of the works.

4.2.2 The Designer shall demonstrate, with appropriate verification and validation, that all of the criteria in Tables 4.2/1 and 4.2/2 can be satisfied by the proposed earthworks solution or that any proposed variations to these requirements satisfy all performance requirements of this Technical Standard. The Designer shall also demonstrate that the engineering mitigation required to achieve these criteria is proportionate to the benefit. The Designer shall raise any mitigation measures considered disproportionate to the benefit with HS2 Ltd.

4.2.3 *Cases where a minor exceedance of these criteria require expensive intervention, a 'cliff-edge effect', should be reviewed with HS2 Ltd with a cost-benefit analysis to determine whether a Departure against these criteria is appropriate.*

4.2.4 The Design shall minimise as far as reasonably practicable long-term ground-movements, and shall record how this has been done.

4.2.5 There will be situations where the total ground movement criteria in Table 4.2/1 are exceeded, but where a specific review of the implications for track maintenance could confirm that less onerous criteria are acceptable because the predicted differential ground movements remain small. Designers are encouraged to raise a Departure in this situation to confirm the acceptable total ground movement limits.

4.2.6 *This is likely to be applicable for long earthworks, but other situations where a Departure should be submitted would include crossings of landfills and shallow coal mines where HS2 Ltd will take a site-specific risk-based approach to confirming design criteria.*

4.2.7 Earthworks outside the zone supporting the loading from the high-speed trains need not comply with the requirements of Tables 4.2/1, 4.2/2 and 4.3/1 providing the earthwork as a whole meets the performance requirements of this Technical Standard, especially in respect of slope stability. Soils of the same Class shall be used laterally over the full width of the zone supporting the loading from the high-speed trains.

4.2.8 *This is to permit the notion of zoned embankments where the track support zone is laterally consistent, but where the shoulders of embankments could be designed from different (lower) Classes of material if it is economical to do so. The materials for shoulders of zoned* *embankments may need to be specified as a particular material class in the contract-specific appendices to the SCEW.*

4.2.9 The relationship between the dynamic performance criteria in Table 4.2/1 and the Modulus of Deformation Values in Table 4.2/2 shall be assessed on a site specific basis.

4.2.10 Ground movements shall not result in; drainage falls that are not compliant with Standards, in designs that require pumped drainage or designs that exceedance of any limit associated with:

- track vertical alignment and / or gradient;
- structural clearance for bridges (including overbridges adjacent to heaving cuttings where the track may need to be lifted to give a smooth alignment);
- OLE foundations and catenary wire contacts;
- the softening of the formation and any associated unacceptable reduction of stiffness.

Table 4.2/1 – HS2 railway Earth Structure performance requirements

Performance period	Design loading regime / primary driver	Performance type [1]	Limit value to be satisfied by design for	
			Ballasted track	Slab track
Very short-term (instantaneous)	Dynamic Railway Loading	Rayleigh wave velocity measured at the Formation in the frequency range 10-50Hz [2,3]	≥ 1.6*DS (m/s)	≥ 1.6*DS (m/s)
Medium-term (seasonal; 6 to 12 month)	Seasonal and Climatic effects	Shrink/swell [4]	+/-10mm (max)	+/-10mm (max)
		Frost Heave	No movement permitted	No movement permitted
Long-term (Design Life) To be applied from the time of installation of slab track or of track laying on ballast	Static Railway Loading Loading and Unloading effects of Earth Structure Embankment and foundation construction issues	High-speed line total heave (Short Earthworks) [6]	≤ 30mm	≤ 15mm
		High-speed line total heave (Long Earthworks) [6]	≤ 60mm	≤ 60mm
		High-speed line total heave within 150m of S&C [6]	≤ 10mm	≤ 10mm
		High-speed line total settlement (Short Earthworks) [6]	Phase One ≤ 60mm Phase Two ≤ 100mm	≤ 30mm
		High-speed line total settlement (Long Earthworks) [6]	Phase One ≤60mm Phase Two ≤ 100mm	≤ 60mm
		High-speed line total settlement within 150m of S&C [6]	Same as plain line	≤ 15mm
		High-speed line total settlement (embankments between structures spaced at less than the minimum separation) [7]	≤ 60mm	≤ 15mm
		High-speed line longitudinal distortion [5]	≤1:1000	See Figure 4.2/1
		High-speed line transverse distortion (cant) [5]	≤ 1:1000	≤ 1:1000
		Longitudinal and transverse distortion in earthwork approaches (transition locations)	≤ 1:1500	≤ 1:1500
		Depots total settlement [8]	≤ 100mm over 20 years	≤ 60mm over 20 years
		Depots differential heave or settlement [8]	≤ 1:500	≤ 1:500

Notes to Table 4.2/1

1. All Limiting values are at Formation Level (top of Prepared Subgrade). Settlement and heave limits are ground movement limits not acceptable track deformations.
2. The frequency range shall be confirmed by field trials.
3. DS = Design Speed
4. Non-cumulative i.e. should be reversible over the seasonal cycle.
5. Distortion assessment shall include any seasonal effects.
6. See also Clause 4.2.5.
7. See HS2-HS2-RT-STD-000-000001 Appendix A Section 17 for definitions.
8. These limits apply for areas of track in depots. Different values for other areas within depot sites may be agreed with HS2 Ltd.

Figure 4.2/1 – Differential ground movement limits for slab track on high-speed line

Note: these are ground movement limits not acceptable track deformations.

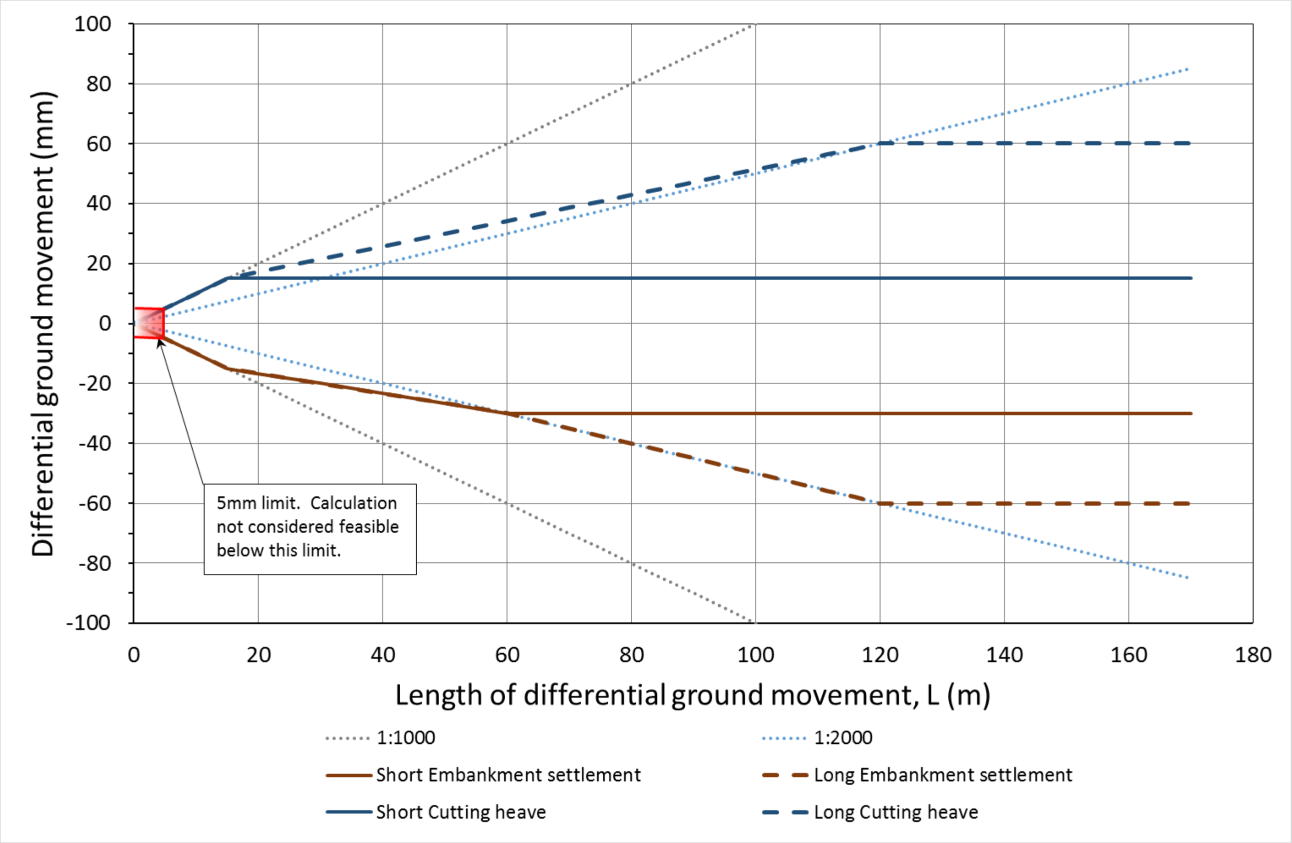


Table 4.2/2 – Modulus of deformation limits and compaction requirements for the earthwork layers

Location	Trackbed/ earthworks layer	Material	Modulus of deformation E_{V2}[4]	Minimum compaction acceptability criteria (Modified Proctor)[7]	Comment
Cutting	Protection Layer	Selected granular (S) Bituminous (B)	500 MPa (max) 120 MPa (min)[1]	100% MDD (min) 8% AV (max)[8]	Min thickness 0.22m (granular) 0.12m (bituminous)
	Prepared Subgrade	Granular	500 MPa (max) 60 MPa (min) (S) 80MPa (min) (B)	100% MDD (min) 8% AV (max)	Min thickness[2] 0.40m (S) 0.35m (B)
Embankment	Protection Layer	Selected granular (S) Bituminous (B)	500 MPa (max) 120 MPa (min)[1]	100% MDD (min) 8% AV (max)[8]	Min thickness 0.22m (granular) 0.12m (bituminous)
	Prepared Subgrade	Granular	500 MPa (max) 60 MPa (min)(S) 80 MPa (min) (B)	100% MDD (min) 8% AV (max)	Min thickness[2] 0.40m (S) 0.35m (B)
	Upper Embankment Fill	Granular	Surface 60MPa (min) 1m above LEF 45MPa (min)	98% MDD (min) 8% AV (max)	Combined with Prepared Subgrade to provide minimum 5m thickness
		Chalk		Note 6	
		Stabilised cohesive		98% MDD (min) 5% AV (max)	
	Lower Embankment Fill	Granular	-	95% MDD (min) 10% AV (max)	
		Chalk		Note 6	
		Cohesive[5]		95% MDD (min) 5% AV (max)	
	Embankment Starter Layer	Granular	-	SCEW Method	500mm max thickness[9]
Foundation (DS≥230kph)	Where the top of Foundation is <2.0m (S) or 1.5m (B) below Formation Level	In situ, granular fill or treated in-situ	60 MPa (min) (S) 45 MPa (min) (B)	N/A	Foundation stiffness to be determined following any Foundation Treatment. See note 10.
Foundation (DS<230kph)	Where the top of Foundation is <1.5m (S) or 1.0m (B) below Formation Level				
Depots	Formation	In situ, granular fill or treated in-situ	80 MPa (S) 40 MPa (B)	N/A	Formation level in depots shall be: 800mm below rail level (S) 700mm below rail level (B);

Notes to Table 4.2/2

1. Deformation modulus quoted for selected granular material. If protection layer is bituminous, then deformation modulus ≥170MPa (10°C ≤ T < 20°C), or ≥150MPa (20°C ≤ T ≤ 30°C)
2. Prepared Subgrade may be omitted or reduced in thickness if the natural ground meets the Modulus of Deformation requirements subject to construction considerations. Where the natural ground exceeds the maximum acceptable Modulus of Deformation the Designer shall determine the appropriate thickness of Prepared Subgrade to suit the particular site conditions subject to a minimum of 200mm thickness to act as a moderating layer. The thickness may need to be increased in poor ground conditions to achieve the minimum E_{V2} requirements at Formation Level.
3. Values may vary depending on track construction Slab (S) or Ballasted (B) to ensure adequate support of the track structure.
4. For testing requirements refer to SCEW, Clause 612.
5. Cohesive soils are likely to require stabilisation in order to satisfy both the stiffness and compaction requirements
6. The compaction acceptability criteria for chalk shall be confirmed by relationship testing for the particular form of chalk proposed in order to achieve the required stiffness and deformation performance requirements.
7. The stipulated air voids (AV) criteria shall be read in conjunction with the requirements stated within Section 4.2.3.
8. These values apply if a selected granular protection layer is adopted. Requirements for a bituminous protection layer are presented in Section 5.
9. Starter layer may be omitted if both drainage and working platform functions are performed by other layers of the Earth Structure.
10. The specified modulus of deformation is required at the Foundation surface and to at least 2.0m (S) or 1.5m (B) below Formation Level for DS≥230kph. For example, for slab track in a shallow cutting on in-situ ground with E_{V2} = 25MPa, 2.0m of engineered fill with E_{V2} = 60MPa is needed below the Formation Level. For the remaining ground underneath this minimum thickness, the design shall be governed by the dynamic stiffness and ground movement requirements.

4.3 Determination of fill material acceptability

4.3.1 The removal of additional material from directly below the HS2 Railway alignment, to form 'borrow pits', shall not be permitted.

4.3.2 For each source of potential fill material available on site the Designer shall collate the available ground investigation data that is relevant to the assessment of fill material suitability. The data shall be presented in appropriate tabular and graphical format to identify different fill material types / subdivisions within each identified geological stratum. The data shall also be presented in the form of relationship testing plots (Nowak and Gilbert, 2015) in order to assess the characteristics of the material as an earthworks fill. The Designer shall assess suitability and acceptability to ensure that characteristic values are a cautious estimate of the likely characteristics, per stratum per source area, and that materials that require to be handled or used differently within the design can be practicably distinguished and separated during normal earthworks operations. The Designer shall identify any risks to be managed during the earthworks process and shall assess at least the following aspects of excavated materials for use as earthworks fills:

- Soil grading, natural moisture content, plasticity, chemical properties;
- Properties of materials that will be excavated as rock fill (including chalk);
- Likely change in soil properties during excavation, during handling and following placement as a compacted fill material (such as undrained shear strength);
- The optimum range of moisture content at the time of placement of the fill material (compared to natural moisture content);
- The air voids content that is likely to be achievable;
- The strength / stiffness of the soil at different moisture contents, which shall be compared to the target criteria at Table 4.2/1 above;

- The variability in behaviour of the soil as an earthworks material;
- The potential for post-compaction changes in soil properties or volume (particularly in the case of stiff clays) including the swell test stated at Table 4.2/3;
- Suitability for modification / stabilisation with binders.

4.3.3 The guidance on these aspects provided in BS6031: 2009 and Earthworks: A Guide (Nowak and Gilbert, 2015) shall be considered in making this assessment. Through this approach the Designer shall develop the relationship between the in-situ condition and the performance that can be achieved in the earthwork. The design of compaction regimes and any treatment of fill materials shall produce an 'Acceptability Envelope' for each material encountered and situation in which it is proposed to be used. The relationship assessment shall be required to demonstrate which fill materials can be expected to meet the desired performance criteria set out in Section 4.2.

4.3.4 The Designer shall assess construction Quality Control criteria for each fill type to achieve consistency throughout the Earth Structure. Earthworks control shall focus on achieving the design density and air voids content to ensure that stiffness and other performance characteristics are achieved. Additionally, where modification or stabilisation is proposed then the control of dosing, mixing and mellowing will be critical.

4.3.5 Where the slope stability considerations of a fill material (Section 3) require specific special measures, such as weathering protection for clay materials or capillary break layers below silty materials, the Designer shall ensure that these measures are identified in the GDR and are adopted in the design.

4.3.6 For proposed off-site sources similar relationship and acceptability criteria shall be developed.

4.3.7 Table 4.3/1 lists fill materials that are unacceptable for specific locations within the HS2 Mainline earthworks.

Table 4.3/1 – Unacceptable Earthworks Fill Materials within HS2 Mainline Earthworks

Material characteristic	Unacceptable limit	Excluded location
Class U1A	Section 2.4	To be excluded from all works unless treated
Class U1B	Section 2.4	To be excluded from all works unless treated
Class U2	Section 2.4	To be excluded from all works
Class 6B, 6C and 6D	N/A	Starter layers of Classes 6B, 6C or 6D materials shall not be used within 2.0m of the HS2 Formation (slabtrack) or 1.5m of the HS2 Formation (ballasted track).
Granular Fill: constituents - argillaceous material	I_{d2} <60%	Not to be used as granular fill in HS2 Mainline Embankment Fill, see 4.3.8 below.
Cohesive Fill: constituents - argillaceous particles >20mm	>50% of the fill mass	Not to be used as HS2 Mainline Embankment Fill
Cohesive Fill: Clay or Silt – Particle size	>15% particles passing 63µm see Section 2.4	Not to be used as HS2 Mainline Upper Embankment fill or Prepared Subgrade.
Cohesive Fill: Clay / Mudstone – excessive plasticity[1]	ω_L >35% see Figure 4.2.3/1	Not to be used as HS2 Mainline Embankment Fill. The suitability of this limit may be investigated by field trials as some materials which (moderately) exceed this limit may perform well. The Designer shall propose acceptance criteria related to a 'source approval' approach (i.e. per cutting or equivalent length / depth of excavation) which shall be based on a moderately cautious, rather than absolute, interpretation of the available Atterberg limits.
Cohesive Fill: Silt – excessive plasticity[1]	ω_L >35% see Figure 4.2.3/1	
Treated Cohesive Fill: Clay / Mudstone – excessive plasticity prior to treatment[1]	ω_L>65 % or I_p>40% see Figure 4.2.3/1	Not to be used as HS2 Mainline Embankment Fill
Treated Cohesive Fill: Standard Silt – excessive plasticity prior to treatment[1]	ω_L>65% see Figure 4.2.3/1	Not to be used as HS2 Mainline Embankment Fill
Cohesive Fill – CBR Swell Limit[2]	>3%	Not to be used as HS2 Mainline Embankment Fill
Organic Content	>1%	Not to be incorporated into earthworks fills (except landscaping)

Notes to Table 4.3/1
1. Plasticity Index Test in accordance with BS 1377-2: 1990.
2. CBR swell test in accordence with Clause 7.3 of BS1377-4: 1990.
3. ω_L = liquid limit.
4. I_p = plasticity index.

4.3.8 General granular fill material used in the HS2 Mainline embankments shall not include non-durable argillaceous rock that could suffer significant post-construction changes in volume and stiffness, and the slake durability criterion set in Table 4.3/1 is intended to preclude the use of such materials. It is recognised that there may be materials which do not meet this criterion but which may be acceptable as granular fills, possibly with light processing (e.g.

weakly cemented sandstone with siltstone bands) and for such specific materials the Designer shall propose specific trials or other justification to ensure that they are classified and used economically within the project whilst meeting the required performance criteria.

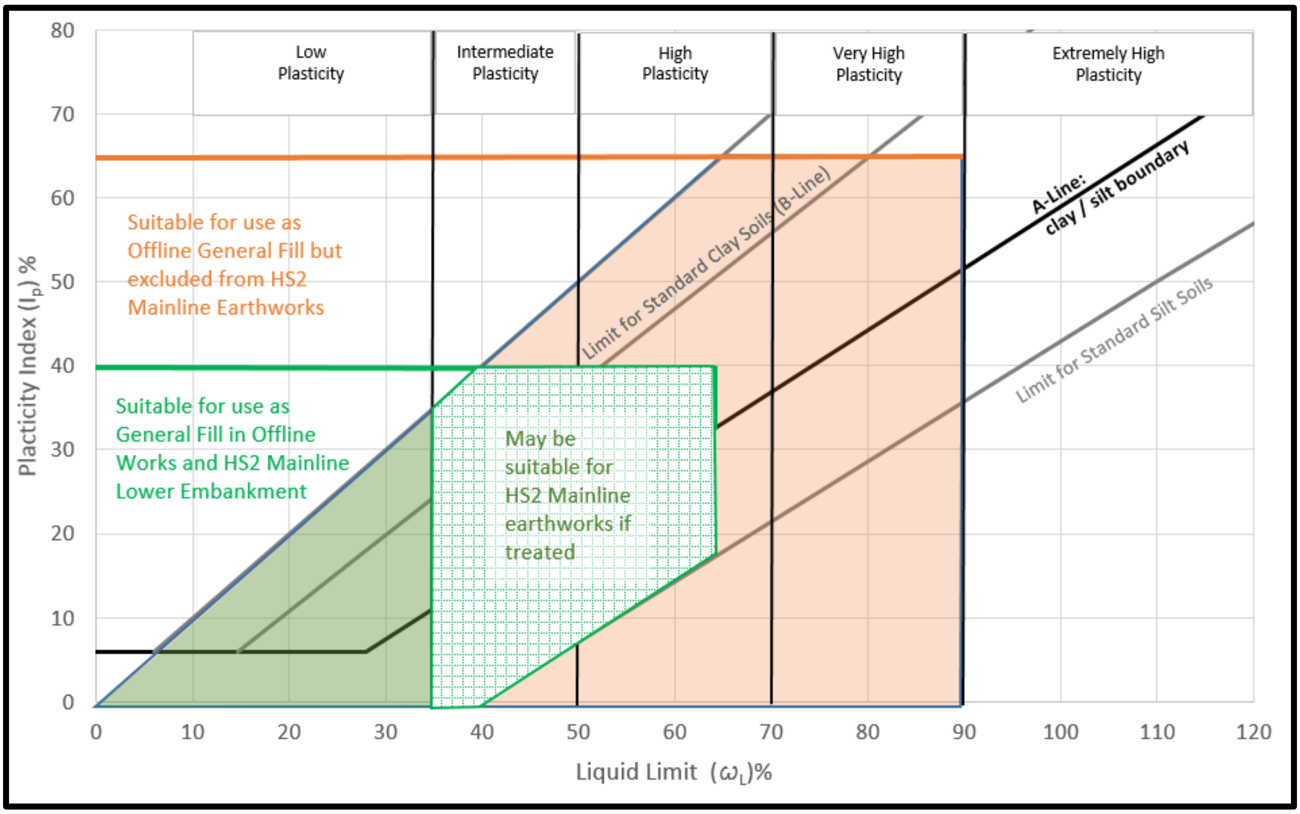
4.3.9 Chalk that classifies as either Class 1 or Class 3 may be an acceptable fill material for the Upper and Lower Embankment fill, provided that the specified Modulus of Deformation values can be satisfied.

4.3.10 *Table 4.3/1 identifies that the use of fine grained materials, Class 2 'Cohesive Fills' in the HS2 Mainline earthworks will be restricted to the construction of the Lower Embankment only. This is to avoid fine grained materials, with potentially low shear strength, low stiffness or poor volumetric stability, being included within the most highly loaded zone below the track.*

4.3.11 Large lumps of very stiff / hard clay can be susceptible to significant post-construction changes in volume (Nowak and Gilbert, 2015). The Designer shall ensure that the SCEW includes appropriate controls on material condition (e.g. lump size, shear strength, moisture content) and construction methodology (e.g. layer thickness, compactive effort) in order to mitigate these effects.

4.3.12 Figure 4.3/1 presents the acceptability range of fine grained fill materials in the HS2 Lower Embankment and in Offline Earth Structures. Where used as Lower Embankment Fill these materials shall be below the plasticity limits set in Table 4.3/1.

Figure 4.3/1 – Acceptability range for cohesive fill materials



Notes to Figure 4.3/1

1. *A-line Chart Based on BS 5930: 2015*
2. *Developed from SHW and Spanish Earthworks Standard.*

Stabilised fills

4.3.13 Treatment using lime, cement or other additives may by proposed to achieve the acceptability or performance limits (over the design life) required. These treatments may be by modification or stabilisation. The design shall account for potentially adverse chemical properties of the ground or other agents.

4.4 Trial earthworks

4.4.1 Trial earthworks shall be undertaken to demonstrate that the required performance detailed in Section 4.2 can be consistently achieved for the ground conditions and fill materials envisaged. Where trials evidence acceptable performance of materials for use in Earth Structures without meeting the compaction criteria set out in Table 4.2/2 then the Designer may propose modified criteria for the acceptance of HS2 Ltd., based on appropriate relationship testing and classification testing (including particle density) to assess the risk of collapse settlement, softening of the fill or other deleterious effects.

4.4.2	The location, extent and construction of any trial earthworks proposed shall be agreed with HS2 Ltd. in advance.

4.4.3 *Such earthworks trials may include:*

- *Detailed ground investigation of the Foundation conditions below and adjacent to the Trial Embankment site, including the determination of dynamic parameters;*
- *Construction of an embankment utilising the materials and construction techniques proposed for the main works, including any Foundation Treatments;*
- *Construction of a trial excavation;*
- *Demonstration of any Foundation treatments;*
- *Earthworks control and verification, and the installation of supplementary instrumentation to validate performance of the earthworks during and following construction;*
- *Determination of in situ Modulus of Deformation (E_{V2}) and dynamic parameters at regular vertical and horizontal spacing throughout the construction, including at each change in Earthworks Layer;*
- *Long-term monitoring of settlement throughout the full embankment height;*
- *Determination of the relationship between dynamic parameters and Modulus of Deformation (E_{V2}).*

4.4.4 *Data from a trial embankment construction and monitoring should be used to validate or adjust the earthworks construction requirements and earthworks control and validation requirements in advance of completion of the detailed design. Consideration should be given to incorporating any trial embankments into the permanent works; depending on the degree of damage caused by intrusive testing, these embankments may form part of the HS2 railway Earth Structures (provided that all end product criteria are met) or part of other less sensitive Earth Structures, such as landscape features. If longer-term trials are envisaged then future access requirements should be taken into account.*

4.5 Earthworks control and verification

4.5.1 Earthworks control and verification shall be required throughout the construction period. Earthworks control and verification shall include the following key stages of Quality Assurance (QA) and Quality Control (QC):

- Pre-construction verification of ground conditions (QA & QC);
- Control and verification of Foundation Treatments (QC);
- Control and verification of earthworks filling (embankments) (QC);
- Monitoring during 'hold' periods, if required (QC);
- Verification of performance indicators at Formation Level (including sub-formations to relevant depths) (QA);
- Monitoring of earthworks performance during commissioning (QA);
- Long term performance monitoring (QA).

4.5.2 Earthworks Control and Verification Requirements are set out in Table 4.5/1. QA and QC criteria shall be developed by the Designer. Novel testing methodologies shall be justified, validated and calibrated against proven techniques and accepted by HS2 Ltd prior to their use in the works.

4.5.3 The inspection and testing undertaken shall be recorded in a format compatible with the project BIM requirements.

4.5.4 The Designer shall specify in the SCEW an inspection and testing regime to ensure and demonstrate that the Earth Structures have been constructed in accordance with the design and achieve the required performance, including processes for managing the remediation of non-conformances. Testing shall be undertaken at sufficient intervals in both elevation and plan to verify the adequacy of the constructed Earth Structure. Continuous compaction control methods in accordance with PD CEN/TS 17006:2016 shall be specified.

4.5.5 The Designer shall specify requirements to protect and repair elements of the permanent earthworks where, for example, the construction sequence requires construction of the Earth Structure to be staged, delayed, or the route is to be used as a temporary access route to other parts of the project.

4.5.6 The Designer shall specify suitable testing and in situ verification of dynamic properties for all Earth Structures during and following construction.

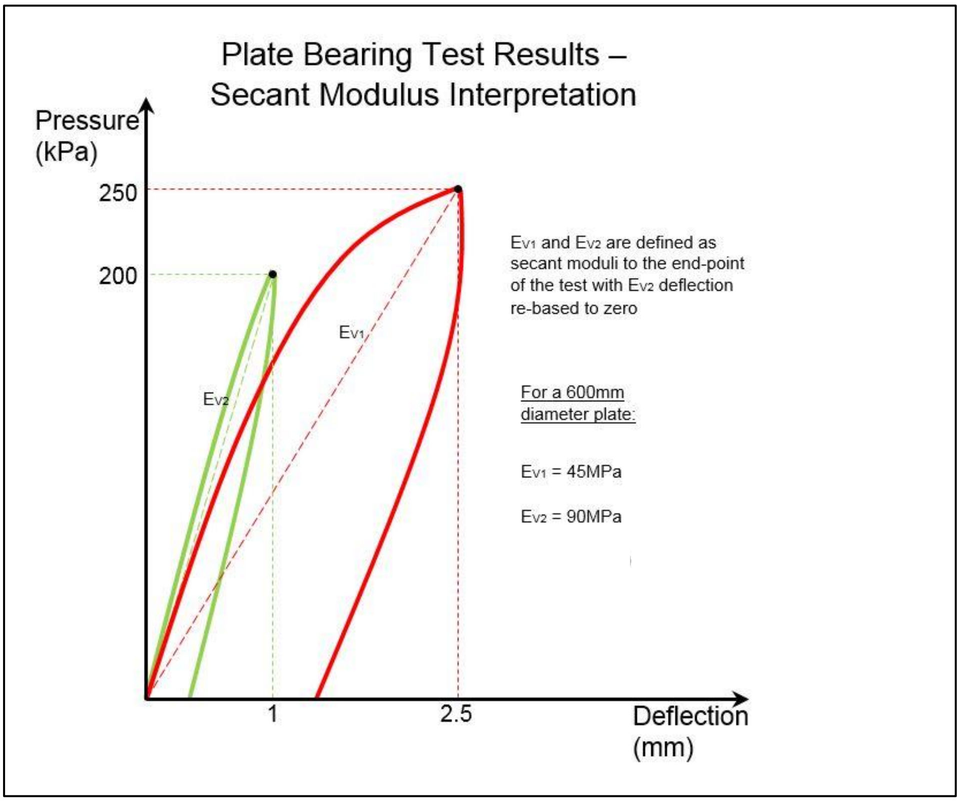
Table 4.5/1 – Earthworks control and verification requirements

Stage	Key driver / risk	Minimum requirement	*Examples of additional Designer's requirements*
Pre-construction verification of ground conditions	Confirmation of Designer's ground model	Recorded Sub-Formation inspections. Pre-earthworks testing to confirm material classification.	*Trial pitting, static cone penetration testing (CPT), plate bearing tests, dynamic probing (DP), geophysics.*
Source approval for fill materials before incorporation into the works	Construction quality control QA/QC	Detailed Relationship Testing to clarify the acceptability limits.	*Classification testing, relationship testing, acceptability envelope.*
Source approval for manufactured components (including pre-cast concrete products, geosynthetics, etc.)	Construction quality control QA/QC	Compliance test results in accordance with supplier / manufacturer's QA scheme	*Specialist tests for use in high-speed railway Earth Structures applications.*
Control and verification of Foundation Treatments (if required)	Construction quality control QA/QC	As built drawings, materials verification, inspection records.	*Pile tests, vibro-column tests.*
Control and verification of earthworks filling (embankments)	Construction quality control QA/QC	Compliance test results (material acceptability criteria). Continuous Compaction Control (CCC) plant monitoring including (but not limited to) roller integrated compaction measuring and documentation system with GPS positioning, indirect bearing capacity test (stiffness measured by the roller and its correlation with E_{V2}, at least for granular fills), Weak Area Analysis and near real-time records availability. In-situ inspection records. End product acceptability criteria (Tables 4.2/1, 4.2/2).	*MCV, lime / cement control treatment.*
Monitoring during 'hold' periods (if required)	Ensure that Foundation consolidation / heave is substantially complete, in accordance with the design	Level monitoring and determination of degree of consolidation / heave to provide reliable projection of meeting the end-performance criteria.	*Pore pressure measurement, extensometer measurement, rod and plate gauge.*
Verification of performance indicators	Confirmation of dynamic parameters (see Table 4.2.1/1)	Surface wave geophysics, seismic CPT.	
Monitoring of performance during commissioning	To ensure the Earth Structure performs as designed whilst the Track Bed and track system is installed	Inspection records, monitoring data.	*Level monitoring, extensometer, pore pressure measurement.*

Stage	Key driver / risk	Minimum requirement	*Examples of additional Designer's requirements*
Long-term performance monitoring	To ensure that the Earth Structure performs as required during operation	Provision for long-term line / level monitoring (Table 4.2/1) (installed, commissioned and handed-over). To enable review against limits.	*Level monitoring, extensometer, pore pressure measurement, Track alignment.*

4.5.7 Surface Deformation Modulus, measured at the second load cycle (E_{V2}), shall be determined at the levels required by the SCEW using plate bearing tests performed in accordance with the French Standard NF P 94-117.1 utilising a plate of 600mm diameter and a maximum pressure of 250kN/m². E_{V2} shall be determined as the secant modulus on the second load cycle as shown in the example in Figure 4.5/1.

Figure 4.5/1 – Example of Determination of E_{V2} from Plate Bearing Test



4.6 Assessment of ground movements

4.6.1 *Heave and settlement due to the construction of earthworks has been studied through the Preliminary Design of Phase 1.*

General requirements

4.6.2 Ground movement assessments shall consider the potential for all applicable mechanisms for heave or settlement. The Designer shall assess the magnitude of ground movement at the formation level, the differential ground movement, the timescale and rates of the movement, and the depth below the base of earthwork that will be significantly influenced. The level of detail of the analysis shall be appropriate for the individual earthwork and shall be determined based on the following factors:

- Height of embankment / depth of cutting;
- Thickness of clay strata within the depth of influence;
- Plasticity / swell potential of the soils beneath the earthwork;
- Longitudinal complexity, including faulting, discontinuities etc;
- Adjacent earthworks that may affect the HS2 Mainline Earth Structures, such as Environmental Mitigation Earthworks or other 3rd Party Infrastructure;
- Construction sequence.

4.6.3 The ground model for each earthwork shall be established from the available desk study information and the site investigations, with particular attention given to:

- Geological sequence and structure: including presence of rock below the base of cuttings and the influence of any faulting;
- Existing weathering profile;
- Predicted weathering profile that will develop during the design life of an HS2 cutting (allowing for the stress relief fissuring that will occur as a result of cutting excavation and subsequent heave, and consideration of any likely long-term breakdown of diagenetic bonding);
- Drainage path: including allowance for the presence of fissures, sand laminations / layers, and other bands (e.g. limestone, siltstone) of higher permeability strata present within the lower permeability clays and mudstones;
- Stress history: the existing (K_o) and future vertical and horizontal stresses within the depth of influence of the earthwork;
- Locations where the ground response is likely to vary greatly over a short distance, such as across steeply inclined interbedded strata (e.g. weaker mudstones and harder sandstones) or buried quarry walls;
- Depth of influence.

4.6.4 Both the short-term and long-term ground movements shall be considered, to assess all of the following:

- Initial ground movement due to vertical loading and/or unloading (elastic);
- Consolidation or time-dependent ground movement due to dissipation of pore water pressure;
- Differential ground movement, including transient conditions;
- Inundation settlement;
- (In cuttings) heave due to plastic deformation as a result of stress anisotropy and increase in shear stresses (horizontal stress being much greater than vertical stress). This is plastic and time dependent as the difference becomes higher with dissipation of porewater pressure;
- (In cuttings) loss of bonding.

4.6.5 Creep shall be included in the prediction of ground movement calculations as follows:

- Internal creep within embankments shall be ignored. The design at earthworks transitions (Section 6) shall remain robust to manage all internal ground movements.
- Foundation creep shall be ignored except where soils have undrained shear strength less than 100kPa or in situations where creep settlements may be expected to be significant such as landfill sites, spoil heaps, backfilled shallow mines.

4.6.6 The design may adopt an observational approach (*ab initio*, as defined in CIRIA C760) provided there is sufficient time in the programme and an adequate plan for the eventuality that measured ground movements exceed those predicted. The Designer shall demonstrate by modelling and instrumentation and monitoring that there is sufficient time in the programme.

Particular requirements for the assessment of heave

4.6.7 Stress relief has been identified as the primary issue to be addressed with respect to heave, and hence is the focus of the requirements of this section. The Designer shall also consider whether there are any other factors that may result in heave at any given location. Volume change as a consequence of seasonal variations in water content, changes in mineralogy, hydraulic uplift, or other factors shall be assessed by the Designer and mitigation measures determined where the heave is expected to exceed the limits set at Table 4.2/1. The Designer shall also review the GI data to identify the potential presence of any expansive clays (which is related to mineralogy, plasticity index and clay fraction) that will require special measures.

4.6.8 Heave shall be assessed for each medium, deep and very deep cutting (as defined in Table 2.3/6) where the HS2 track will be underlain by a soil sequence that includes more than 10m combined thickness of clay or mudstone that is prone to heave, within 30m of finished track level. Clay soils shall be judged as being prone to heave where the liquid limit is greater than 35% and where the geological strata is known to be in an over-consolidated state, based on geological history (e.g. over-consolidation ratio is likely to be greater than 3). The level of detail of the assessment shall comply with the minimum requirements stated in Table 4.6/1.

Table 4.6/1 – Minimum analysis requirements to assess clay heave in cuttings

Depth of cutting	Method of analysis	Minimum frequency of analysis points	Requirements for additional analysis
>20m	Numerical modelling	50m	See notes 1 and 2
10 to 20m	Numerical modelling for adverse ground conditions or asymmetrical cutting geometry. Conventional methods for favourable ground conditions	100m	See notes 1 and 2
5 to 10m	Conventional methods for favourable ground conditions	250m	See note 1

Notes to Table 4.6/1

1. Additional analysis shall be undertaken at locations that present the potential for significant differential heave, such as at significant changes in ground conditions, overbridge foundations, or tunnel portals.
2. Additional analysis shall be undertaken where the track alignment design tolerances could be exceeded as a result of clay heave, e.g. where the design alignment is close to the maximum permissible gradient.

Supplementary Ground Investigation and testing for prediction of heave potential

4.6.9 The Contractor shall undertake Supplementary GI if it is considered that the available data are insufficient to an economical design of the foundation treatment.

4.6.10 *Supplementary GI to investigate heave might include the formation of boreholes to confirm the Ground Model, including: the existing weathering profile; presence of fissures; sand laminations, layers and other bands (limestone, siltstone), the groundwater profile; in situ testing to determine the stress history and permeability; and laboratory testing to characterise the soils (natural moisture content, particle size distribution, Atterberg limits, mineralogy, shrinkage limit) to obtain relevant design parameters for determination of the magnitude, timescale and rate of heave.*

4.6.11 *Laboratory tests that should be considered for obtaining the relevant design parameters for determination of heave are summarised below:*

- *Measurement of swelling pressure and / or measurement of swelling in accordance with BS1377-5: 1990 – Methods of test for soils for civil engineering purposes, Part 5: Compressibility, permeability and durability test;*
- *Determination of the one-dimensional consolidation properties in accordance with BS1377-5: 1990 – Methods of test for soils for civil engineering purposes, Part 5: Compressibility, permeability and durability test, amended with the loading stages described below;*

- *Oedometer test for determination of swelling pressure of stiff clay in accordance with the HS2 GI Specification for Ground investigation (HS2-HS2-GT-SPE-000-000001);*
- *Oedometer test for determination of the expansibility of stiff clay in accordance with the HS2 GI Specification for Ground investigation (HS2-HS2-GT-SPE-000-000001);*
- *French Standard XP P 94-091: Soil Investigation and Testing - Swelling test in oedometer;*
- *Isotropically and / or Anisotropically consolidated undrained triaxial tests (CIU and CAU respectively) with an extension stress path;*
- *Consolidation tests with porewater pressure measurements (Rowe cell) in accordance with BS 1377-6: 1990 – Methods of test for soils for civil engineering purposes, Part 6: Consolidation and permeability tests in hydraulic cells and with pore pressure measurement.*

4.6.12 One-dimensional consolidation tests (either oedometer or triaxial cell) shall be scheduled to load the sample to compensate for the effects of sampling and for the effects of compression on the swelling index of the soil, and to take the sample to the extremes of unloading that it is will experience in-situ. This is likely to include unloading to very low stress and load paths with two unload-reload loops. Further information is presented in the Cutting Heave Ground Investigation Guidance Note, 1D031-EDP-GT-NOT-000-000001.

4.6.13 *The choice of tests will depend on the analysis method used to determine heave, but it is recommended to undertake more than one type of test for comparison of the parameters obtained, since the disturbance of diagenetic bonding (and hence the derived parameters) differ according to the testing method.*

Monitoring of ground movements and verification

4.6.14 For earthworks where the Designer considers that ground movements will approach the limits specified in Table 4.2/1 and at transition zones, instrumentation (e.g. extensometers, piezometers) shall be installed to monitor the ground movements and changes in the porewater pressures during and following construction, in order to verify the predicted magnitude, timescale and rate of ground movement, and to provide data (in a format to be agreed with HS2 Ltd.) to inform track monitoring during operation. Where instrumentation is needed to monitor settlement, both internal settlements within newly constructed embankments and underlying settlements of natural ground beneath embankments shall be monitored. At transitions settlement monitoring of structures may also be necessary. Refer to Technical Standard – Instrumentation and Monitoring, Section 5 (HS2-HS2-CV-STD-000-000004).

4.6.15 Should the monitored ground movement differ from the predicted, then the original assumptions and ground movement predictions shall be re-assessed.. The need for mitigation measures shall be agreed with HS2 Ltd and where necessary shall be implemented.

4.6.16 Numerical models shall be verified / calibrated with the aid of any results from early construction works.

4.7 Specific requirements for analysis of ground movement using numerical modelling

4.7.1 Numerical models shall capture the variability of ground conditions at the site with depth. Specific soil parameters and stress history shall be assigned to soils at all depths in order to ensure stability of the model including:

- The initial stresses in the ground prior to excavation, i.e. existing stress ratio Ko with depth;
- The soil stiffness and its variation with stress changes and strain;
- Changes in horizontal and vertical stresses due to construction;
- Initial horizontal and vertical permeability, and subsequent changes (e.g. due to change in ground level (degree of saturation) and subsequent fissuring);
- Where possible, parameters for analysis shall be determined satisfying the guidance provided by NAFEMS (2012).

4.7.2 The analysis shall be capable of modelling the following:

- Undrained soil behaviour;
- Coupled consolidation;
- Steady state seepage, with consideration given to the effect of transient groundwater flow; and
- Spatial, possibly non-linear, variation of key input parameters (e.g. Ko changing with depth, permeability varying with changing voids ratio or with the opening of fissures).

4.7.3 The constitutive model used to represent the soil shall be capable of modelling the following:

- Stress dependent soil stiffness;
- Small strain soil stiffness;
- Non-linear stress-strain behaviour of soil such as strain-hardening and strain-softening;
- Anisotropy of soil permeability and possibly soil stiffness; and
- If possible, changes of parameters such as permeability with strain (e.g. through opening of fissures due to unloading of the soil).

4.7.4 The Designer shall use the numerical model to assess the various possible ground movements as a consequence of the construction, which shall include the following aspects:

- Vectors of elastic ground movement during and immediately after construction;

- Ground movement due to dissipation of excess porewater pressures;
- Plastic shearing deformation, in particular at the sides and base of deep cuttings (indicative of passive failure and thus dependent on the initial stress state and soil shear strength).

4.7.5 The model shall be calibrated by analysing case studies.

4.7.6 The design output shall include the following results:

- The Ground Model used and full details of the soil parameters adopted shall be presented in report format accompanying the analysis.
- Ground movement results shall be presented in tabular format, graphical format and longitudinal profile format.
- The magnitude of predicted ground movement with time at discrete locations, including presentation as a long section. The component that will occur during construction and any hold period prior to track construction shall be clearly identified. Subsequent ground movement that will affect the track during the 120 year design life of the railway shall be estimated at years following construction: Year 0, 1, 3, 10, 20, 50 and 120.
- Cross sections across the earthwork profile, with contours and displacement vector arrows illustrating ground movement with depth below the track. Special consideration shall be given to any locations where the earthwork profile is asymmetric.
- In cuttings, the predicted movement in the 3m below Formation Level, and the reduction in total heave due to any excavation and replacement of soil below the final rail level shall be specifically identified.
- Modelling of mitigations (e.g. overdig, pre-inundation, etc.) and combinations thereof.

4.8 Foundation Treatment

4.8.1 *The phrase "Foundation Treatment" has been used to encompass any earthworks activity specifically undertaken to modify the strength / stiffness of the natural ground that forms the Foundation to either embankments <u>or</u> the Track Bed, as illustrated in Figures 2.3/7 to 9. In most cases the requirement will be to increase the soil strength and/or stiffness, but in some cases the problem to be addressed will be variation in stiffness or excessively high stiffness immediately beneath the Track Bed.*

4.8.2 Foundation Treatment is required where the existing soils below proposed embankments or beneath the Track Bed under sections of low embankments, at-grade or cutting, do not achieve the minimum stiffness criteria set out in Section 4.2, or where the settlement limits identified in Section 4.2 are predicted to be exceeded during the Design Life. The Foundation Treatment shall be designed to meet these requirements.

4.8.3 Foundation treatment shall extend laterally as needed to satisfy the performance of Structural Earthworks in respect of transverse differential settlement, bearing capacity and slope stability.

4.8.4 *Based on the desk study undertaken a number of potential causes of non-compliant soils have been identified that are likely to require Foundation Treatment, including the following:*

- *Soft superficial deposits, such as recent river alluvium or glacial lake deposits;*
- *Cut / fill transition zones;*
- *Interbedded coarse and fine soils that are likely to soften as a consequence of adverse groundwater conditions during construction;*
- *Weathered solid geology strata; especially high plasticity clays subject to cryoturbation effects during the Pleistocene glaciation;*
- *Solid geology strata of high plasticity clay or mudstone that are likely to reduce in strength (through the effects of weathering) beneath the Track Bed during the operational life of HS2;*
- *Infill to sink holes in soils and rocks that are susceptible to dissolution (e.g. chalk);*
- *Differential strata competencies presented across fault zones and/or extensive areas of softened fault gouge*
- *Anthropomorphic ground conditions, such as: backfilled quarries, mine entries, landfill, and areas of non-engineered Made Ground;*
- *Significant variations in stiffness, e.g. where Track Bed cuts across localised zones of hard sandstone.*

4.8.5 Where discrete formation treatments are proposed (e.g. controlled modulus columns, piles), the design shall prevent, as far as reasonably practicable, unacceptable post-construction differential settlements.

Rigid inclusions

4.8.6 Where rigid inclusions are used beneath earthworks to mitigate ground movement they shall be designed using a method that addresses the soil-structure interaction in the earthwork-foundation-natural soil system. The design of the rigid inclusions will depend on whether their function is to prevent serviceability or ultimate limit states occurring. Guidance can be found in BS 8006-1: 2010 and BS 8004: 2015, which in turn references the ASIRI National Project. Whichever analysis method is used, the design shall always comply with UK National Annex to Eurocode 7.

Foundation treatment for Track Bed support

4.8.7 Where the existing ground conditions will not satisfy the stiffness and design life requirements at the base of any Prepared Subgrade then a Foundation Treatment shall be designed.

4.8.8 Foundation Treatment shall be designed to achieve the requirements of Table 4.2/2. The design of Foundation Treatments shall allow for effects of any softer underlying material and the potential reduction in the strength of any replacement material in the long-term.

4.8.9 Where Foundation Treatment is required beneath the Prepared Subgrade it shall be extended to consistently satisfy the requirements of Table 4.2/2.

4.8.10 Foundation Treatment by excavation and replacement shall not be used if the depth of excavation required is likely to result in softening of the ground during the earthworks process.

Example Foundation Treatments

4.8.11 Example Foundation Treatments are summarised in Table 4.8/1, and others may be applicable.

Table 4.8/1 – Example Foundation Treatments

Foundation Treatment	***Comments***
Excavation and replacement	*Where the unsuitable material is at shallow depth, and groundwater conditions are favourable to open excavation.*
Lime and/or cement stabilisation	*Can be undertaken either ex-situ as excavate and replace or in situ as soil mixing, provided geochemical conditions are favourable. The use of GGBS or other specialist agents may allow some adverse of geochemical conditions to be mitigated.*
Staged construction	*Where time is available in the construction programme to allow the compressible materials within the Foundation to consolidate and strengthen, to prevent overloading.*
Consolidation by surcharge	*May be used to accelerate consolidation of compressible soils where ground is of suitable strength to avoid bearing capacity failure.*
Consolidation with band drains	*May be used in association with staged construction and / or surcharging to reduce time to achieve consolidation. Quality and disposal of expelled water to be addressed*
Adoption of Hold Period	*To allow a majority of the Foundation settlement to occur a 'hold period' may be adopted prior to final trimming and track construction. Surcharging and Band Drains may be used to accelerate settlement and reduce hold period.*
Basal geosynthetic reinforcement	*Where ground reaction is generally good but variable or basal spreading failure is a risk.*
Reinforced soil	*May extend the range of re-use of materials available. Not suited to cohesive soils.*
Vibro-stone columns or vibro-concrete columns with load transfer platform at Top of Foundation Level	*Loose or low strength / stiffness soil that can be improved by densification and are able to provide sufficient lateral restraint to a stone or concrete column. Plasticity of stone columns under dynamic loading will need to be proven by prior modelling.*
Controlled modulus columns (CMCs) with load transfer platform at Top of Foundation Level	*Soft soil that can be mixed with grout to form stiff soil / grout support columns. Columns may need to be contiguous where insufficient lateral confinement is available.*
Piled Foundation with load transfer platform or pile cap at Top of Foundation Level	*Soft, compressible soil that cannot be improved by other methods, and excavation and replacement is impractical.*
Grouting of voids/broken ground	*Stabilisation of dissolution features or mine workings within influence of the Foundation.*

Foundation Treatment	***Comments***
Dynamic compaction (including rapid impact and high energy impact compaction (HEIC) methods)	*In very limited circumstances only and with prior acceptance by HS2 Ltd.; suited to unsaturated granular deposits.*

Treatment of mine workings

4.8.12 Treatment of mine workings shall be based on the guidance in CIRIA C758D"Abandoned mine workings manual 2019". It is not expected that treated mine workings within 5m depth of the Foundation will provide for an adequately uniform foundation and will need to be replaced with engineered fill.

Verification and monitoring for foundation treatment

4.8.13 A regime of verification testing and monitoring shall be provided by the Contractor to confirm that the mitigation measures have been installed to the design and meet the end-product and end-performance requirements.

4.8.14 *Where a new or novel technique is proposed, numerical analysis and modelling supported by a series of field trials may be required to demonstrate the appropriateness of the technique.*

5 Design of Prepared Subgrade and Protection Layer

5.1 Introduction

5.1.1 The approach presented in this Technical Standard is empirical, based on UIC 719R. However, an analytical design may be adopted as an alternative to this prescriptive approach.

5.1.2 If an analytical design is to be used, the design methodology of such an approach, and the approach to verification and validation, shall be accepted by HS2 before commencement of detailed design. The requirements of this Section remain mandatory.

5.2 Prepared Subgrade design requirements

5.2.1 Prepared Subgrade shall be designed to achieve performance criteria and the minimum construction requirements set out in Section 4.2.

5.2.2 Prepared Subgrade may be omitted subject to the requirements of Table 4.2/2, Note 2, subject to the approval of HS2 Ltd.

5.2.3 The Prepared Subgrade shall extend laterally to the trackside drain, and the drain shall extend to a depth below the Prepared Subgrade. Refer to Technical Standard HS2-HS2-DR-STD-000-000003.

5.2.4 The Prepared Subgrade shall be separated from a fine (cohesive) formation to prevent migration of fines. This may comprise either a designed filter layer or a geotextile separator.

5.2.5 The lateral extent of any Foundation Treatment must include the track support zone. The track support zone shall be assumed to be the part of the Earth Structure which supports the track and is defined by a 1:1 gradient projected down into the Earth Structure and foundation from either the sleeper end for ballasted track, or the lower edge of HBL for slab track.

Specific requirements for ballasted track

5.2.6 Drainage crossfalls shall be provided at Formation and Sub-Formation Level to allow surface water from the ballast to drain to the track side drainage system.

Specific requirements for slab track

5.2.7 The upper surface of the Earth Structure beyond the edge of the Track Bed shall be designed with an appropriate crossfall to direct surface water away from the track.

5.3 Prepared Subgrade design methodology

Assessment of ground conditions

5.3.1 The assessment shall identify the ground conditions below Formation Level, including:

- Collate available information (desk study, ground investigation, laboratory testing);
- Prepare a long-section at a suitable scale to reveal the ground conditions influencing the Track Bed;
- Review the ground and groundwater conditions at Formation Level / Sub-Formation Level to identify:
  - Initial stiffness (prior to construction);
  - Groundwater / porewater pressure conditions that give a potential for softening during construction;
  - Long-term equilibrium moisture content stiffness (to address the potential for softening in the long-term);
  - Variability of ground conditions.
- Identify any problematic soils, including all those listed at UIC 719R Table 5 that are classified as QS0, plus any other areas identified as being of concern (e.g. non-engineered Made Ground);
- Review the route to identify any areas where there is a risk of pumping of fines at Sub-Formation Level;
- Transition zone requirements.

Identification of areas of Foundation Treatment and determination of requirements

5.3.2 The requirements for the design of Foundation Treatment are presented in Section 4.8.

Determination of the Prepared Subgrade design thickness

5.3.3 The thickness of the Prepared Subgrade shall be determined in accordance with the requirements of Section 4.2.2 for the ground conditions identified along the route.

Moderation of the design

5.3.4 The Designer shall minimise changes in Prepared Subgrade construction along the route, but shall also address local variations in ground conditions. The minimum length between specified changes in the design Track Bed and Prepared Subgrade solution shall typically be 1,000m, and never less than 200m. Transitions shall be provided between significant changes in construction, including structures, as per Section 6 of this Technical Standard.

5.3.5 *Localised soft spots or hard spots should be addressed by Foundation Treatment to remove the problem soil and bring the ground stiffness to a similar stiffness as the adjacent ground (rather than changing the Track Bed and Prepared Subgrade solution for the section).*

Design review and QA

5.3.6 The Designer shall develop an inspection and testing regime to be followed during construction to ensure that the required quality and performance criteria are demonstrated to have been achieved.

5.4 Protection Layer design requirements

5.4.1 The Protection Layer shall be designed to achieve performance criteria and the minimum construction requirements set out in Section 4.2.

5.4.2 The Protection Layer shall extend laterally to the trackside drain.

5.4.3 Where the Protection Layer comprises a selected granular material, it shall be separated from a fine (cohesive) formation to prevent migration of fines. This may comprise either a designed filter layer or a geotextile separator.

Specific requirements for ballasted track

5.4.4 The Protection Layer shall be a bituminous layer beneath ballasted track.

Specific requirements for slab track

5.4.5 The Protection Layer shall be a selected granular layer beneath slab track.

5.4.6 The Protection Layer shall be designed such that:

- in the temporary condition it drains freely;
- in the temporary and permanent condition it always satisfies the minimum thickness requirement of Table 4.2/2; and
- the Main Works Civils Contractor places sufficient material to enable the Rail Systems Contractor to profile the surface of the Protection Layer to the final, permanent design.

Performance requirements for bituminous Protection Layers

5.4.7 Bituminous Protection Layers shall be asphalt concretes conforming to the requirements of BS EN 13108-1: 2006. The following are minimum requirements:

- The Protection Layer shall be designed to suffer no permanent deformations from construction machinery;
- The dynamic modulus value shall be between 3,700 MPa and 7,100 MPa (BS EN 12697-26: 2012);

- Deformation value for one million cycles shall not be lower than 120 µm/m (Annex D of BS EN 12697-24: 2012);
- The density shall not be less than 98 % of the reference density value.

Design review and QA

5.4.8 The Designer shall develop an inspection and testing regime to be followed during construction to ensure that the required quality and performance criteria are demonstrated to have been achieved and shall determine and apply a suitable QA testing regime that assures the achievement of these requirements.

6 Design of transitions

6.1 Introduction

6.1.1 The purpose of this section is to establish the basis of a route-wide approach to the design of earthworks transitions of all types. It presents the minimum performance requirements for the railway to ensure a consistent approach is taken at all sites.

6.2 HS2 railway structures transitions

6.2.1 There are many situations where the Formation and its supporting elements can be expected to change and at such locations earthworks transitions will be required. The function of an earthworks transition is to maintain the ride quality of the track by smoothing the change in Formation properties and dynamic response to ensure that both repeated loading across a discontinuity does not result in a progressive degradation of support, and long-term differential movements due to gravity loading do not compromise performance.

6.2.2 A transition shall be designed at all locations where differential settlement, differential heave and / or differential longitudinal earthworks dynamic stiffness will result in conditions in the short- or long-term that do not meet the performance requirements targeted in this Technical Standard. The transition shall be designed to mitigate this deficiency.

Settlement / heave

6.2.3 At transition locations the following sources of settlement (and heave) shall be addressed by the transition design:

- Settlements within embankment materials;
- Settlements in natural soils below embankments, including secondary consolidation;
- Heave in natural soils in cuttings (over the lifetime of the cutting).

6.2.4 *Long-term movements in natural soils are to be considered at transitions because of the sensitivity of differential ground movements at these locations. The designer should also consider the likely long-term behaviour of the adjacent structures when making design decisions. Similarly, internal settlements within embankments, from static and dynamic loading, need to be managed. The prediction of these settlements by calculation is potentially challenging but the designer should give them due consideration. Quantitative analysis of ground movements should be undertaken where feasible (i.e. where both sufficiently accurate input parameters can be determined and an adequate model for the analysis can be described), but in some situations qualitative and/or empirical (see Clause 6.3.5) assessments of the predicted differential movements may be appropriate.*

6.2.5 The magnitude and duration of ground movements from these sources shall be considered in aggregate and shall be limited by design.

6.2.6 The Designer shall determine the length of any hold period required between the construction of an earthwork and placing of the track.

Transition requirements

6.2.7 The Designer shall minimise, as far as is reasonably practicable, the longitudinal rate of change of stiffness of the Formation and differential ground movements, including those arising from long-term ground movements. As a minimum transitions shall be designed to satisfy the longitudinal differential ground movement requirements specified in Section 4.2. The magnitude and duration of settlement of the natural soils shall be determined by calculation.

6.2.8 Transitions for high speed mainline shall not be less than 20m long and be of sufficient length to meet the differential settlement criteria in Section 4.2.

6.2.9 The transition geometry shall allow for Foundation Treatment and shall ensure full compaction of all earthwork materials in the transition is practical.

6.2.10 Twist (differential movement that varies transversely, across the tracks) is particularly hazardous and shall be minimised or eliminated by engineering all transitions to be perpendicular to the horizontal alignment.

6.2.11 Transition design shall take account of the programming of the works since this influences the geometry of the transition (including ground improvement) and the (vertical and horizontal) loading on abutment foundations.

Drainage

6.2.12 The design of drainage at transitions shall ensure water does not accumulate at these critical areas of earthworks. The drainage system shall be designed to minimise and facilitate maintenance.

6.3 Underbridges

6.3.1 Underbridge transitions shall be designed to control the internal settlement of approach embankments and the differential settlement of natural soils beneath them to the requirements of Section 6.2. The transition in dynamic stiffness of the earthworks shall be smoothed progressively between high and low stiffness areas.

Geometry of earthwork and abutments

6.3.2 The geometry of wing walls and side slopes on the approach to underbridges shall be designed in order to achieve an economic design since the volume of selected and expensive materials may be considerably reduced by good detailing.

6.3.3 Locally steeper side slopes may be possible when using selected or stabilised soils. Unless reinforced soil and / or topsoil retention solutions are adopted, slopes steeper than 1V:1.5H shall not be used.

6.3.4 *UIC 719R presents transition designs from various high-speed railways. They typically use a wedge of cement-bound material adjacent to abutments to minimise internal settlement, and to provide higher than normal dynamic stiffness on the approach to the abutment wall. There is then typically a zone of selected granular fill between this and the normal embankment construction to further manage differential settlement and the variation in dynamic stiffness. The designs presented in UIC 719R do not explicitly address settlement from the embankment foundations, nor do they include examples of transitions between structures and embankments constructed from stabilised soils.*

6.3.5 The empirical design of transitions shall be limited to the extent that the analogue is valid for HS2 (e.g. train speed, tonnage, trackform, geology need to be comparable for a similar design to be proposed). Evidence that the performance and maintenance requirements of empirically based designs will be acceptable is required.

6.4 Culverts

6.4.1 Culvert foundations shall be designed in conjunction with the earthworks transition.

6.4.2 Culvert transitions shall be considered as a special case of an underbridge. The transition design shall be dependent on the cover.

6.4.3 Culvert locations will typically be wet and will typically have poor surficial soils. The design shall make particular allowance for the potential for differential settlement in the natural soils and for the constructability of permanent and temporary works in locations of high groundwater.

6.4.4 Refer also to Technical Standard HS2-HS2-DR-STD-000-000001.

6.5 Cut to fill

6.5.1 Cut / fill transitions shall be designed to smooth the change in stiffness between the embankment design and the cutting design, including any foundation treatments.

6.5.2 The Design shall mitigate any geomorphological hazards periglacial action, relic shear zones and seasonal shrinkage and swelling.

6.5.3 The drainage of cut / fill transitions shall manage surface and groundwater to prevent the softening of Foundations or the trapping of water in engineered soils at the transition location.

6.6 Cut to cut-and-cover tunnel

6.6.1 The construction of cut-and-cover tunnels results in a sequence of ground unloading and loading that needs to be taken into account in the design. The Designer shall estimate by calculation the magnitude of the heave and settlement of the tunnel after construction and backfilling taking account of the proposed construction sequence and programme. The Designer shall compare these ground movements to the heave in the cutting approaching the tunnel over the lifespan of the tunnel.

6.6.2 The Designer shall mitigate the differential movement between the tunnel and approach earthwork, through appropriate specification of the construction sequence and programme and design of the earthwork.

6.7 Abrupt change in ground conditions

Abrupt change in static stiffness

6.7.1 Where there is an abrupt change in the static stiffness of the ground conditions in the longitudinal direction then the principles of limiting the differential settlement described above shall apply.

6.7.2 *Such a situation might occur when the alignment passes over the highwall of an infilled quarry, or a landfill site.*

6.7.3 Abrupt transitions to soft formations shall either be bridged where practical or mitigated by ground treatment.

6.7.4 *The situation will be particularly acute where the stiff stratum comprises rock or ledges of rock changing to less competent strata. In this case, the Designer may consider excavating (with benching) the hard stratum to a limited depth and backfilling with engineered fill to smooth the transition on the hard side. The use of geogrid reinforcement spanning the feature and overlapping on to any Foundation Treatment on the soft side in such situations may be beneficial.*

Abrupt change in dynamic earthworks stiffness

6.7.5 Abrupt variation in the dynamic earthworks longitudinal stiffness of Foundations shall be mitigated in low-height embankments and in cuttings as far as reasonably practicable.

6.7.6 *Such a situation could occur where there are mixed stiffness interbedded strata that are steeply dipping. Mitigation is required to avoid differential settlement that may reflect up to the Track Bed, and to control the dynamic effects of heterogeneity so close to the Track Bed.*

6.7.7 *Over-excavation of the Foundation could be considered, and backfilling with a regulating course. The regulating course may need to be stabilised or reinforced to span across the soft strata.*

6.8 Ballasted to ballastless transitions

6.8.1 The requirements for ballasted to ballastless transitions are covered in Technical Standard HS2-HS2-RT-STD-000-000004.

6.9 Modelling requirements

6.9.1 Analysis shall be undertaken to demonstrate that the design meets the requirements of Section 6.2, and shall address:

- the 3D nature of the transition;
- non-linear soil behaviour;
- prediction of short-term and long-term ground movements.

6.9.2 Models shall be verified by comparison to the performance of comparable earthworks or by benchmarking against other such software.

6.9.3 *The intention is to ensure that there is confidence in the heave and settlement predictions at transitions which are primarily a function of movements in the underlying (natural) soils rather than the engineered earthworks in embankments. It does not require the modelling to be explicitly 3D, non-linear etc, but requires that whatever modelling is done accounts for these aspects.*

6.10 Non-HS2 transitions

Highway structure transitions

6.10.1 Transitions between structures and earthworks on highways shall be designed in accordance with the relevant highway standards (i.e. DMRB or any specific local standards).

Network Rail structure transitions

6.10.2 Transitions on Network Rail infrastructure shall be designed in accordance with the relevant Network Rail standards.

7 Requirements for HS2 Specification for Civil Engineering Works

7.1 Introduction

7.1.1 The HS2 Specification for Civil Engineering Works, Series 600, Earthworks (SCEW, HS2-HS2-CV-SPE-000-010600) is based on the SHW Series 600, modified to account for HS2 Ltd. project requirements. The accompanying Notes for Guidance (SCEW NG, HS2-HS2-CV-SPE-000-020600) should also be reviewed.

7.1.2 The Designer shall specify particular requirements (during and following construction) for the earthworks designs and compile all contract-specific appendices to the SCEW.

7.1.3 This section summarises a series of items that the Designer shall consider when compiling the appendices to the SCEW. This series is not an exhaustive list, and the Designer shall identify all pertinent requirements.

7.2 General considerations

7.2.1 *General specification considerations include but are not limited to the following:*

a. *Testing requirements;*

b. *Specification for baseline monitoring;*

c. *Identify any proposed sub-division of fill classification based on individual geological strata (see Section 2.4);*

d. *Compliance with the limitations on acceptable materials stated in Table 2.4/3;*

e. *Particular requirements for earthworks at third party interfaces.*

7.3 Slopes

7.3.1 *Slope specification considerations include but are not limited to the following:*

a. *Measurement of porewater pressure and other parameters during construction (and post-construction, if required) and an action plan should specific trigger levels be reached;*

b. *Inspection of the sequence of strata exposed during cutting works to validate the ground model assumed for design, and to enable adjustment of the design where found to be needed;*

c. *Site specific protections (e.g. fire, rock spalling, perennial seepages, dentition, rectification of solution features, agreed access to any permanent outcrops, etc);*

d. *Maintenance regime for slope specific features such as drains or rock traps;*

e. *Specific protection against burrowing animals;*

f. *Specification (including inspection, rectification and certification) to deliver earthworks to Rock Slope Hazard Rating Feature Grade 1, with a long term expectation of no poorer than Feature Grade 2.*

7.4 Earth structures, including transitions

7.4.1 *Earth structure specification considerations include but are not limited to the following:*

a. *Reviewing and recording the actual ground conditions encountered during the construction phase of the earthworks to validate the ground model assumed during design, and to enable adjustment of the design where found to be needed;*

b. *Record keeping of any excavation and replacement carried out below original ground level in order to meet settlement or dynamic stiffness criteria;*

c. *Earthworks (including compaction) trials (where appropriate);*

d. *Confirmation that borrow pits shall not be formed below the HS2 Mainline alignment;*

e. *Establishing the material specific relationship between performance criteria (e.g. shear wave velocity) and compaction control criteria (e.g. E_{V2}) by lab testing and field trials;*

f. *Material specific relationship testing and site control requirements, especially for chalk fill and cohesive fill;*

g. *Earthworks control and verification specification (QA/QC) including the end product compaction requirements incorporating air voids limitations (refer to Section 4.2);*

h. *Dosing requirements and verification regime, and (where appropriate) requirements for mix design for soils treated with lime, cement and / or other binders;*

i. *Frequency of testing of earthworks materials to be undertaken by the contractor at source and on completion;*

j. *Details and end product/end performance verification of any Foundation Treatment works undertaken by the contractor;*

k. *Particular requirements for the protection and re-validation of earthworks that are subject to delay during construction, especially intermediate surfaces that are used as haul routes or are exposed to the weather for significant periods;*

l. *Heave monitoring of cuttings during excavation and hold period requirements, including trigger levels at which review and reassessment should be instigated;*

m. *Settlement monitoring of embankments including any surcharge and hold period incorporating trigger levels at which review and reassessment should be instigated;*

n. *Confirmation of earth structure performance, especially shear wave velocity at Sub-Formation Level;*

7.5 Earthwork formation

7.5.1 *Earthwork formation specification considerations include but are not limited to the following:*

a. *Confirmation and recording of conditions at Sub-Formation Level by inspection and testing prior to placement of Prepared Subgrade;*

b. *Procedure for dealing with and recording soft and hard spots within the Sub-Formation;*

c. *Particular requirements for construction of Prepared Subgrade*

d. *Frequency of testing of earthworks materials to be undertaken at source and on completion;*

e. *Confirmation of Prepared Subgrade condition and performance, including any necessary rectification work and retest.*

Appendix A – Slope gradients assumed for preliminary design purposes

Table A1 – Slope gradients within Drift deposits assumed for Preliminary Design

Drift Geology	Range of typical cutting slope gradients assumed for Preliminary Design	Geotechnical / slope stability issues to be aware of	Geotechnical Parameters adopted for Preliminary Design			
			γ_b (Mg/m³)	Φ'p (deg)	Φ'r (deg)	c' (kPa)
Alluvium	1V:3H	Alluvium of limited extent may be present locally in the cuttings and where encountered localised slackening of the cutting slopes may be required.	1.8	25	20	0
River Terrace Deposits	1V:2H to 1V:2.5H (slopes up to 5m)	Shallower slopes may be required in areas of high groundwater or loose material. If elevated groundwater levels or perched groundwater are encountered, dewatering measures may be required during construction together with appropriate permanent drainage measures.	1.9	35	-	0
Head	1V:3H to 1V:4H	The potential presence of **relic shear surfaces** within the Head deposits may cause instability in cutting slopes and some form of remedial measures may be required.	1.8	23	-	0
Glacial Till (S of Bicester)	1V:2.5H (slopes up to 5m) 1V:3H (slopes up to 10m)	The potential presence of low strength clay layers within cuttings face may cause localised instability in cutting slopes. Perched groundwater may be encountered within fissures or granular horizons present within the Glacial Till. Dewatering measures may be required during construction together with appropriate permanent drainage measures.	2.0	30	15	0
Glacial Till (Thrussington Member)	1V:3.5H	The potential presence of low strength clay layers may cause local instability in cutting faces. Perched groundwater may be encountered within granular horizons. Dewatering measures may be required during construction together with appropriate permanent drainage measures.	1.9-2.1	28-30	-	-
Glacial Till (Oadby Member)	1V:3.5H	The potential presence of low strength clay layers may cause local instability in cutting faces. Perched groundwater may be encountered within granular horizons. Dewatering measures may be required during construction together with appropriate permanent drainage measures.	1.9-2.1	28-30	-	-
Glacio-lacustrine Deposits (Delta)	1V:3.5H (See C223 Delta Geotechnical Desk Study)	Drainage of high silt content materials require special consideration. Varved / laminated material is likely to transmit water to cut face and may destabilise the face. Cuttings should be designed at relatively shallow angles. Stabilisation of the material may be required for thick deposits. Potential for some shrink/swell behaviour with changing water content.	1.9-2.1	27-32	-	-
Glacio-fluvial Sands and Gravels	1V:2H to 1V:2.5H (slopes up to 5-10m)	Shallower slopes may be required in areas of high groundwater or loose material. Dewatering measures may be required during construction together with appropriate permanent drainage measures.	1.9	35	-	0
Baginton Sand and Gravel Formation	1V:3H to 1V:3.5H	Shallower slopes may be required in areas of high groundwater or loose material. Dewatering measures may be required during construction together with appropriate permanent drainage measures.	1.9-2.1	-	-	-
Clay-with-flints	1V:3H (slopes up to 10m)	Clay-with-flints may have a low internal angle of friction and therefore over steepened slopes may be subject to instability. The potential presence of **relic shear surfaces** within the Clay-with-flints may cause instability in cutting slopes and some form of remedial measures may be required.	2.0	23	-	0
Wolston Formation						

Notes to Table A1:

1. For Preliminary Design purposes, all embankment side slopes were assumed at 1V: 2.5H.
2. False cuttings not included at Preliminary Design stage.

Table A2 – Slope gradients within Solid strata assumed for Preliminary Design

Solid Geology[1] Group	Formation	Range of typical cutting slope gradients assumed for Preliminary Design	Geotechnical features / issues to be aware of	Geotechnical Parameters adopted for Preliminary Design (italics: weathered parameters) γ_b (Mg/m³)	Φ'_p (deg)	Φ'_r (deg)	c' (kPa)
Thames Group	London Clay Formation	1V:3H (only minor slope in this stratum)	Only minor slope in this stratum	-	-	-	-
Lambeth Group	Reading Formation	1V:2H to 1V:3H (for most slopes)	Contains numerous polished fissures which gives rise to a blocky texture and potential for slope stability issues. Likely to be veiled with Head Deposits (CIRIA C583, 2004). These processes are also likely to have formed **relic shear surfaces** within the uppermost section of this unit, resulting in a weathered near surface zone. The potential presence of relic shear surfaces within the Reading Formation may cause instability in cutting slopes and some form of remedial measure maybe required if intersected. Sand lenses within the clay form potential pathways for groundwater movement which may lead to increased pore pressures within the sand lenses which can weaken the soil mass and reduce the stability of slopes.	2.0	23	-	0
	Upnor Formation	(Not expected in cuttings)	Some of the clays and silts within the formation may be soft and sometimes fissured.	-	-	-	-
White Chalk Subgroup	Newhaven Chalk Formation Seaford Chalk Formation Lewes Nodular Formation New Pit Chalk Formation Holywell Nodular Formation	1V:1H (in a single unweathered lithology) 1V:2H (slopes of 7-26m where overlain by Palaeogene or Quaternary Deposits) 1V:3H (extensively weathered or structureless chalk, shallow/perched groundwater exists or deep cuttings)	There is significant potential for the presence of solution features within the chalk. Such features may present a risk to slope stability. Rock head is likely to be very irregular.	*2.0* 1.9	*33 [30]* 39 [34]	-	*0 [0]* 20 [0]
Grey Chalk Subgroup	Zig Zag Chalk Formation West Marlbury Marly Chalk Formation	1V:2H (for most slopes) 1V:2H to 1V:3H (where overlain by Palaeogene or Quaternary Deposits)	Perched groundwater may be encountered within fissures. Dewatering measures may be required during construction. Marl seams will also present potential issues regarding perched groundwater and dewatering. In order to maintain the stability of the cutting after construction, permanent drainage measures may be required.	*2.0* 1.9	*33 [30]* 39 [34]	-	0 [0] 20 [0]
Wealden	Upper Greensand Formation	1V:2H (slopes up to 10m)	Shallower slope gradients may be required where extensively weathered material is identified, where shallow/perched groundwater exists or where deep cuttings are to be formed. In the cohesive layers there is a potential presence of relic shear surfaces which may cause instability in cutting slopes. Permanent drainage measures may be required to maintain the stability of the cutting after construction.	1.9	27	-	0
	Gault Formation	1V:4H to 1V:5H (slopes of 5m to10m)	Clay is highly to extremely expansive and is likely to have a high shrink-swell potential. There is the significant potential for **relic slip surfaces** to be present within the Gault Formation; these may become reactivated if support is removed from the lower part of the slope or load added to the upper part of the slope. Permanent drainage measures may be required to maintain the stability of the cutting after construction. Deep cuttings in the Gault Clay may be subject to base heave due to stress relief.	2.0	25	-	0
	Whitchurch Sand Formation	No cuttings anticipated. But consider:	Clay/mudstone beds within the Whitchurch Sand Formation can contain highly expansive clays.	1.8	30	-	0

		1V:2H (material weathered to a soil and dominated by sand) Steeper where cemented	Perched groundwater or elevated groundwater levels may be encountered – dewatering measures may be required during construction.				
Purbeck Group	Purbeck Formation	No cuttings anticipated. But consider: 1V:1H to 1V:2H (slopes up to 5m)	Shallower slopes may be required where material is weathered to a soil. Clay/mudstone beds within the Purbeck Group can contain highly expansive clays. If elevated groundwater levels or perched groundwater are encountered, dewatering measures may be required during construction, together with appropriate permanent drainage measures.	2.0	35	-	25
Portland Group	Portland Stone Formation	1V:2H to 1V:3H (slopes up to 5m)	The Portland Group may be affected by cambering, producing large subsurface fissures which can be filled with superficial material which may display different geotechnical properties to the surrounding rock mass. Perched groundwater or elevated groundwater levels may be encountered the Portland Group; therefore, dewatering measures may be required during construction.	2.1	35	-	25
	Portland Sand Formation			2.0	35	-	10
Ancholme Group	Kimmeridge Clay Formation	1V:3.5H to 1V:5H (slopes of 5m to 10m)	The high plasticity of the unit means it exhibits shrink-swell behaviour and has a high potential for volume change. Landslides in the Kimmeridge Clay Formation are well documented, and are generally attributed to the presence of **relic slips** within the unit. Perched groundwater may be encountered within fissures or limestone bands; dewatering measures may be required during construction. Permanent drainage measures may be required in order to maintain the stability of the cutting after construction. Deep cuttings in the Kimmeridge Clay may be subject to base heave due to stress relief and groundwater uplift pressures from the limestone bands.	*1.9* 1.9	*21* 25	- -	*0* 0
	Ampthill Clay Formation	1V:3.5H to 1V:5H (slopes up to 20m)	Typically fissured and may contain shear surfaces in the top couple of metres. There is the potential for **relic slip surfaces** to be present within the Ampthill Clay Formation. These may become reactivated if support is removed from the lower part of the slope or load added to the upper part of the slope. The high to very high plasticity of this material indicates that it exhibits a shrink-swell behaviour and has a high potential for volume change. Perched groundwater may be encountered within fissures; dewatering measures may be required during construction. Permanent drainage measures may be required in order to maintain the stability of the cutting after construction. Deep cuttings in the Ampthill Clay may be subject to base heave due to stress relief.	*2.0* 2.0	*22* 25	*10* 10	*0* 0
	West Walton Formation	1V:3H	There is the potential for **relic slip surfaces** to be present within the West Walton Formation. These may become reactivated if support is removed from the lower part of the slope or load added to the upper part of the slope. The intermediate to high plasticity of the West Walton Formation suggests a medium shrink-swell potential. Deep cuttings in the West Walton Formation may be subject to base heave due to stress relief and groundwater uplift pressures where limestone / siltstone bands are present.	2.0	23	15	0
	Oxford Clay Formation	1V:4H to 1V:4.5H (slopes of 5m to 10m)	There is the potential for **relic slip surfaces** to be present within the Oxford Clay Formation. These may become reactivated if support is removed from the lower part of the slope or load added to the upper part of the slope. The high to very high plasticity of the Oxford Clay Formation suggests a high shrink-swell potential. Deep cuttings in the Oxford Clay may be subject to base heave due to stress relief.	*2.0* 2.0	*23* 23	*16* 16	*0* 0
	Kellaways Formation	1V:2H to 1V:3.5H (slopes up to 5m)	It is expected to exhibit shrink-swell potential with a high potential for volume change. If elevated groundwater levels or perched groundwater are encountered, dewatering measures may be required during construction, together with appropriate permanent drainage measures.	1.9 (sand) 2.0 (clay)	34 (sand) 28 (clay)	30 (sand) - (clay)	0 (sand) 0 (clay)

Great Oolite Group	Cornbrash Formation	1V:1H to 1V:2H	For material weathered to a soil shallower slopes may need to be considered. If elevated groundwater levels or perched groundwater are encountered, dewatering measures may be required during construction, together with appropriate permanent drainage measures.	2.3 NOTE: Parameters applicable to Oolitic Limestone only	35	-	10
	Forest Marble Formation	1V:1H to 1V:2H	The engineering properties will be strongly affected by the presence of weaker clay layers, the differential weathering they will suffer and how they may squeeze and flow under pressure from more competent bands above and below. Shallower slopes may be required where this material is weathered to a soil. If elevated groundwater levels or perched groundwater are encountered, dewatering measures may be required during construction, together with appropriate permanent drainage measures.	2.3	35	-	10
	White Limestone Formation	1V:1H to 1V:2H	Prone to cambering when exposed on slopes where the underlying Lias Group is also exposed. If elevated groundwater levels are encountered, dewatering measures may be required during construction, together with appropriate permanent drainage measures.	NOTE: Parameters applicable to Oolitic Limestone only			
	Rutland Formation	1V:1H to 1V:2.5H (depending on limestone / mudstone proportion)	If elevated groundwater levels or perched groundwater are encountered, dewatering measures may be required during construction, together with appropriate permanent drainage measures.				
	Taynton Limestone Formation	1V:1H to 1V:2.5H (depending on limestone / mudstone proportion)	If elevated groundwater levels or perched groundwater are encountered, dewatering measures may be required during construction, together with appropriate permanent drainage measures.				
	Sharp's Hill Formation	1V:2H to 1V:2.5H	If elevated groundwater levels or perched groundwater are encountered, dewatering measures may be required during construction, together with appropriate permanent drainage measures.				
	Horsehay Sand Formation	1V:2H to 1V:2.5H	If elevated groundwater levels or perched groundwater are encountered, dewatering measures may be required during construction, together with appropriate permanent drainage measures.				
Inferior Oolite Group	Northampton Sands Formation	1V:2H (but unlikely to be a cutting entirely within this unit due to limited thickness)	Unit is predisposed to cambering when exposed on hillsides along with the underlying Lias Group. If elevated groundwater levels or perched groundwater are encountered, dewatering measures may be required during construction together with appropriate permanent drainage measures.	2.0	35	-	0
Lias Group	Whitby Mudstone Formation	1V:4H to 1V:4.5H	Where the Whitby Mudstone forms a steep slope capped by harder Middle Jurassic strata there is a high risk of cambering and landsliding. Potential for **relic slip surfaces** to be present. These may become reactivated if support is removed from the lower part of the slope or load added to the upper part of the slope. Has a medium to high shrink-swell potential. Perched groundwater may be encountered within fissures/fractures or the limestone bands present within the Whitby Mudstone Formation. Dewatering measures may be required during construction. In order to maintain the stability of the cutting after construction, permanent drainage measures may be required. Deep cuttings in the Whitby Mudstone may be subject to base heave due to stress relief and groundwater uplift pressures where limestone bands are present.	*1.9* 2.0	*23* 25	*7* 10	*0* 1.5
	Marlstone Rock Formation	1V:2H (but unlikely to be a cutting entirely within this unit due to limited thickness) Otherwise: 1V:3.5H to 1V:4H (where lower part of the cutting is in Dyrham Formation)	The formation may be at risk of cambering where it overlies the Dyrham Formation. Due to the ferruginous nature of the stratum additional measures may be required to treat groundwater (from dewatering or long-term drainage) prior to discharge back to the environment. Perched groundwater may be encountered within this unit, and dewatering measures may be required during construction. Permanent drainage measures may be required in order to maintain the stability of the cutting after construction. It may be possible for uplift pressures to form when the Marlstone Rock is capped with a thin layer of Whitby Mudstone, and dewatering or a pressure relief system may be necessary in this case.	2.1	35	-	10

			The presence of ledges of Marlstone Rock at the track formation may require some form of transition details to be developed.				
	Dyrham Formation	1V:3.5H to 1V:4H (slopes up to 15m)	Potential presence of low strength clay layers, typically associated with **relic slip surfaces**, or laminated clay layers. Perched groundwater may be encountered within the limestone bands or sand beds present within the Dyrham Formation. Dewatering measures may be required during construction. In order to maintain the stability of the cutting after construction, permanent drainage measures may be required. Deep cuttings in the Dyrham Formation may be subject to base heave due to stress relief and groundwater uplift pressures where limestone bands are present. Has a medium shrink-swell potential overall.	*2.0* 2.0	*25* 25	- -	*0* 2
	Charmouth Mudstone Formation	1V:4H to 1V:6H (slopes up to 5m) 1V:2.5H for unweathered mudstone (see C223 Warwickshire Geotechnical Desk Study)	Potential presence of low strength clay layers, typically associated with **relic slip surfaces**, or laminated clay layers. Perched groundwater may be encountered within the limestone bands present within the Charmouth Mudstone Formation Dewatering measures may be required during construction. In order to maintain the stability of the cutting after construction, permanent drainage measures may be required. Deep cuttings in the Charmouth Mudstone may be subject to base heave due to stress relief and groundwater uplift pressures where limestone bands are present. Has a medium to high shrink-swell potential overall.	*1.9* 1.9	*23* 23-27	- 13	*0* 2
	Blue Lias Formation – Rugby Limestone Member and Saltford Shale Member	1V:2.5H to 1V:4H for weathered material. 1V:1.5H to 1V:2.5H for unweathered material (see C223 Warwickshire Geotechnical Desk Study)	Slope drainage may be required to deal with local seepages. Stabilisation may be required if cuttings Intersect discontinuities and topography at unfavourable angles. Ripping may be required to remove stronger horizons in deeper cuttings. Potential for issues with shrinkage and swelling in mudstone layers.	1.9-2.1	26-30	-	-
Penarth Group	Penarth Group (undivided)	1V:2.5H to 1V:4.5H for weathered material. 1V:2H to 1V:2.5H for unweathered material (see C223 Warwickshire Geotechnical Desk Study)	Drainage may be required depending on groundwater regime between different rock types. Stabilisation may be required if cuttings intersect discontinuities at unfavourable angles. Potential for shrinkage/swelling in mudstone layers.	1.9-2.1	28-30	-	-
Mercia Mudstone Group	Mercia Mudstone (undifferentiated)	1V:2.5H to 1V:3.5 H	Potential for local inflow of water where sandstones are interbedded with the general mudstone in cuttings leading to deteriorating subgrade conditions. Drainage may be required during construction and long term to enhance stability. Local interceptor, herringbone or other shallow batter drains may be required to control water seepage from more permeable strata in Mercia Mudstone. Deep drains may be required to achieve long term stability where the water table is close to the final cut ground level. Ripping / blasting may be required to remove strong siltstone /sandstone horizons encountered in deeper cuttings. Heave and softening of subgrade in cuttings on exposure.	Grade IV: 1.8-2.1 Grade III: 2.0-2.3 Grade II/I: 2.2-2.5	Grade IV: 25-32 Grade III: 32-42 Grade II/I: >40	Grade IV: - Grade III: - Grade II/I: -	Grade IV: 2 Grade III: 2-5 Grade II/I: >25?
	Blue Anchor Formation	1V:2.5H to 1V:3H	As for Mercia Mudstone	2.0-2.1	-	-	-
	Arden Sandstone Formation	1V:2.5H to 1V:3H	As for Mercia Mudstone	2.0-2.1	36	-	-
Sherwood Sandstone Group	Bromsgrove Sandstone Formation	Generally 1V:2.5H, but sometimes compound slopes with lower slope at 1V:2H (see C223 Staffordshire Geotechnical Desk Study)	Potential for substantial inflow of water from the sandstone strata in deep cuttings, particularly where they rest on the beds on mudstone. Interceptor, herringbone or other shallow batter drains may be required to control water seepages / spring lines within more permeable strata.	2.0-2.1	34-36	-	-

			Ripping / blasting may be required to remove strong siltstone / sandstone horizons encountered in deeper sections of the cut.				
	Kidderminster Formation	Generally 1V:2.5H, but sometimes compound slopes with lower slope at 1V:2H (see C223 Staffordshire Geotechnical Desk Study)	Potential for substantial inflow of water from the sandstone strata in deep cuttings, particularly where they rest on beds of mudstone. Interceptor, herringbone or other shallow batter drains may be required to control water seepages / spring lines within more permeable strata. Ripping / blasting may be required to remove strong siltstone / sandstone horizons encountered in deeper sections of the cut.	2.0-2.1	34-40	-	-
	Hopwas Breccia Formation	Generally 1V:3.5H, but sometimes compound slopes with lower slope at 1V:2.5H (see C223 Staffordshire Geotechnical Desk Study)	Interceptor, herringbone or other shallow batter drains may be required to control water seepages / spring lines within more permeable strata. Ripping / blasting may be required to remove strong siltstone / sandstone horizons encountered in deeper sections of the cut.	2.1	32-40	-	-
Enville Group	Ashow Mudstone Formation	1V:2.5H to 1V:3.5H for weathered material. 1V:2H for unweathered material (see C223 Warwickshire Geotechnical Desk Study)	Drainage may be required in more permeable horizons. Stabilisation methods may be required if cuttings intersect discontinuities at unfavourable angles.	2.0-2.1	32	-	-
	Kenilworth Sandstone Formation	1V:2H to 1V:3H for weathered material. 1V:1.5H for unweathered material (see C223 Warwickshire Geotechnical Desk Study)	Drainage may be required depending upon groundwater regime. Stabilisation methods may be required if cuttings intersect discontinuities at unfavourable angles. Local slope stabilisation / grouting may be required where faults cross cuttings in this material. Ripping may be required to remove stronger horizons in deeper cuttings.	2.0-2.1	36	-	-
Warwickshire Group	Tile Hill Mudstone	1V:2.5H to 1V:4.5H for weathered material. 1V:1.5H for unweathered material (see C223 Warwickshire & C224 Geotechnical Desk Studies)	Drainage may be required in more permeable horizons. Stabilisation methods may be required if cuttings intersect discontinuities at unfavourable angles.	2.0	28	-	-
	Salop Formation – Enville Member	Generally 1V:3.5H, but sometimes compound slopes with lower slope at 1V:2.5H (see C223 Staffordshire Geotechnical Desk Study)	Potential for local inflow of water from permeable sandstone strata. Interceptor, herringbone or other shallow batter drains may be required to control water seepages / spring lines within more permeable strata. Ripping / blasting may be required to remove strong siltstone / sandstone horizons encountered in deeper sections of the cut.	2.1	Non-cohesive unit: 28 Cohesive unit: 22-30	-	-

Key to Geotechnical Parameters:

Italics = weathered solid geology

No italics = unweathered solid geology

Chalk: values in square brackets [ ] represent re-moulded material. Values without square brackets represent intact material.

Notes to Table A2:

1. Indicative slope gradients, comments and material parameters adopted for Preliminary Design purposes relate to the geological Group or Formation highlighted in **bold** type. Solid geology is generally provided at geological Formation level, except the White Chalk Subgroup, Grey Chalk Subgroup, Portland Group and Penarth Group, which are provided at the group level as insufficient information is currently available to divide them reliably to the Formation level.
2. For Preliminary Design purposes, all embankment side slopes were assumed at 1V: 2.5H.
3. False cuttings not included at Preliminary Design stage.

APPENDIX I TECHNICAL STANDARD – LANDSCAPE EARTHWORKS, DOCUMENT NO. HS2-HS2-EV-STD-000-000021 (P03)

Technical Standard - Landscape Earthworks Design

Document no.: HS2-HS2-EV-STD-000-000021

Revision	Author	Approved By	Date	Issued for/Revision details
P01	Christoph Brintrup	Mark Bailey	12/02/2016	First Issue
P02	Christoph Brintrup	Mark Bailey	28/03/17	Updated following Phase One page turn
P03	Christoph Brintrup	Mark Bailey	15/05/17	Updated following additional changes to the Phase One page turn

SECURITY CLASSIFICATION: OFFICIAL

Contents

List of figures

List of acronyms

1V:XH	1 (vertical): X (horizontal)
EIA	Environmental Impact Assessment
EIAC	EIA Consultant (HS2 team consultants)
EMMS	HS2 Routewide excavated materials management strategy
HS1	High Speed 1
HS2	High Speed 2
LDA	Landscape Design Approach
TN	Technical Note
TS	Technical Standard

References

Title	Reference
Environmental Minimum Requirements	
Landscape Design Approach	HS2-HS2-EV-STR-000-000010
Hs2 Design Vision	HS2-HS2-DS-STR-000-000005
Materials Management Plan	HS2-HS2-EV-STD-000-000006
Green Infrastructure & the Green Corridor	HS2 Ltd (2014) Information Paper E11
Sustainable Materials Strategy	HS2-HS2-SU-STR-000-000004
Construction Demolition and Excavation Waste Strategy	HS2-HS2-EV-STR-000-000004
Technical Standard – Landscape Maintenance, Management and Monitoring plan	HS2-HS2-EV-STD-000-000023
Technical Standard - Lineside Vegetation	HS2-HS2-EV-STD-000-000005
Technical Standard - Materials Management Plan Framework	HS2-HS2-EV-STD-000-000006
Technical Standard - Railway Drainage	HS2-HS2-DR-STD-000-000003
Technical Standard - Cross Drainage	HS2-HS2-DR-STD-000-000001
Technical Standard - Earthworks	HS2-HS2-GT-STD-000-000001
Technical Standard - Highway and Access Drainage	HS2-HS2-DR-STD-000-000002

Title	Reference
Technical Standard - HS2 Accesses	HS2-HS2-HW-STD-000-000003
Technical Standard - Roads	HS2-HS2-HW-STD-000-000001
Technical Standard - Fencing	HS2-HS2-CV-STD-000-000002
Technical Standard - Routewide Soil Resource Plan	HS2-HS2-EV-STD-000-000008
Excavated Materials Policy	HS2-HS2-EV-POL-000-000005

Project terminology

The project terminology used within this document can be found in the 'LWM Project dictionary' (HS2-HS2-PM-GDE-000-000002).

Conventions

Mandatory clauses

The following convention is used to indicate mandatory clauses.

Mandatory clauses are differentiated from the main text of this document by use of a 'black box'. They contain the word 'shall' to indicate their status as a requirement.

Departures

Any intention to not comply with a mandatory clause is considered to be a departure from this Technical Standard.

It is recommended that the designer discusses any proposed departures with the 'standard owner' at an early stage (Refer to section 5.1)

Guidance

Guidance (informative text) is differentiated by the use of the word 'should' or 'may'.

Glossary

Key descriptions relevant to this document are provided for in this section and cover the following key terms:

Earthworks - a general term used to describe both the process of constructing engineered earth structures and the general name used for sections of embankment, cuttings and at-grade infrastructure. These cover the earthworks required for the railway and its associated infrastructure including highways and restored watercourses etc.

Landscape earthworks design - the landscape earthworks design can be defined as modifications to the structural engineering earthworks (principally reusing excavated materials) for the railway and associated infrastructure including highways, watercourses etc. in order to fulfil a wide range of identified project design requirements including visual screening, landscape integration and so on and also to meet project sustainability objectives.

Designer - a term used to describe the person or group of people involved in the design of the landscape earthworks. The designer will need to understand the requirements and objectives as defined within this document but also the landscape context, key viewpoints and locations along the route that will require visual and / or noise reduction, integration and rationalisation of earthworks design. They will also need to be familiar with related Technical Standards and the requirements of the Environmental Impact Assessment (EIA) work and other requirements relating to other disciplines such as ecology and heritage etc. where they relate to interface with landscape design. The designer should work in liaison with other disciplines in the development of the landscape earthworks design i.e. - engineering, noise, ecology, agriculture and heritage etc. This is required to ensure that a balanced, justifiable final landscape earthworks design that fulfils the project requirements can be achieved.

Specialist – a term used to describe the person or group of people involved in a wide range of other discipline areas (e.g. noise, ecology, engineering, heritage etc) with whom the Designer should liaise in the development of the landscape earthworks design to ensure an integrated design is achieved.

Identified design requirements – a term used in this document as a catch all to describe HS2 design requirements that should be addressed directly with the landscape earthworks design or that interface with the design (e.g. noise, ecology etc.). These requirements relate to the full range of undertakings and responses to significant effects outlined in the EIA, relevant Technical Standards, design guidance and approach documents and all other HS2 requirements that form the Employer's Requirements.

HS2 and associated infrastructure – this term is used to clarify that landscape earthworks design applies to the whole HS2 project and thus includes the railway alignment and related highway realignments and works, watercourse alignments and the settings to infrastructure such as tunnel portals, HS2 buildings and power and communication facility sites.

Additional abbreviations, descriptions and project terminology used within this document can be found in the LWM Project dictionary' (HS2-HS2-PM-GDE-000-000002).

1 Executive summary

1.1.1 This Technical Standard should enable future contractors to develop landscape and environmental mitigation earthworks design critical to fulfilling HS2 design requirements as defined by the Employer's Requirements (including HS2 Design Vision and Landscape Design Approach) and to support the objective of achieving a fully integrated earthworks design for HS2 project.

1.1.2 The HS2 Landscape Design Approach (LDA) (HS2-HS2-EV-STR-000-000010) states that 'the landscape design of HS2 is pivotal in helping realise the HS2 Vision.' This document also states that it is the landscape design that will provide the 'unifying design mechanism (the "glue") to create a seamless and integrated scheme.' In combination with the networks of planting proposed, it is the landscape earthworks design that provides one of the principal and positive means to achieve many of the landscape and related design aspirations for the project.

1.1.3 The landscape earthworks design should be developed in liaison with other disciplines as stated in the LDA – 'landscape design will be used to merge and consolidate the work and designs of other HS2 disciplines including engineering, architecture, ecology, noise, heritage and agriculture.' The landscape earthworks design can also provide multifunctional benefits to the project, so for example an earthworks providing noise reduction or landscape integration can also provide visual screening.

1.1.4 Landscape earthworks design should be employed on the project - along the rail corridor and within the project (area of land to be acquired or used) to create a landscape design that meets the Employer's Requirements including the LDA and the HS2 design vision. This document should apply to all design development and construction stages.

1.1.5 The landscape earthworks design should be defined as modifications to the structural engineering earthworks (principally reusing excavated materials) for the railway and associated infrastructure including highways and watercourses in order to fulfil a wide range of identified project design requirements including meeting sustainability objectives. Designers should therefore look to refine existing landscape earthworks design without compromising their geotechnical requirements. Landscape earthworks design should respond positively to the environment and be designed to sensitively integrate with landscape character.

2 Landscape earthworks design approach

2.1 Introduction

2.1.1 This Technical Standard is provided to enable future contractors to develop landscape earthworks design critical to fulfilling agreed HS2 design requirements as defined by the Employer's Requirements and to support the objective of achieving a fully integrated earthworks design for HS2 project.

2.1.2 The objective is to ensure that each designer follows a coherent approach and philosophy to the design of the landscape earthworks for HS2. The design approach has been set out through the HS2 Design Vision (HS2-HS2-DS-STR-000-000005) and developed through the LDA (HS2-HS2-EV-GDE-000-0000010).

2.1.3 This technical standard provides:

- guidelines and requirements for the landscape earthworks design to complement other related Technical Standards concerning Earthworks design;
- more detailed information on landscape earthworks design to enable designers to produce appropriate design for the landscape earthworks; and
- route wide and location specific guidance and requirements (complying with HS2 landscape design approach information).

2.1.4 The design of all landscape earthworks should comply with the following documentation:

- HS2 Design Vision (HS2-HS2-DS-STR-000-000005)
- Landscape Design Approach (HS2-HS2-EV-STR-000-0000010);
- Information Paper D1: Design Policy
- Information Paper E11: Green Infrastructure and the green corridor;
- Environmental Minimum Requirements.(ESA 4.1)
- Technical Standard - Earthworks. (HS2-HS2-GT-STD-000-000001).
- Technical Standard - Routewide Soil Resource Plan (HS2-HS2-EV-STD-000-000008)
- Excavated Materials Policy (HS2-HS2-EV-POL-000-000005)

2.2 Design strategy

2.2.1 The landscape earthworks design should be defined as modifications to the structural engineering of earthworks (principally reusing excavated materials) in order to fulfil a wide range of project design requirements. This design approach has been outlined in the Excavated Materials Policy (HS2-HS2-EV-POL-000-000005).

2.2.2 Modifications and refinements shall not compromise the safety and stability of the earthworks.

2.2.3 The materials excavated during the construction of the works along the route should be reused wherever practicable and appropriate to achieve a sustainable approach to the project.

2.2.4 Designers shall modify and refine the basic 'engineering earthworks design' in order for the landform to respond positively to the surrounding environment and landscape character.

2.2.5 This document includes information on the requirement to reuse topsoil and agricultural subsoil as close to the point of excavation as practicable. An important distinction between agricultural topsoil and subsoil on the one hand, and excavated materials (which will largely consist of natural materials extracted from below agricultural subsoils) on the other is derived from the HS2 Ltd commitment to restore temporarily disturbed agricultural land to its original quality using the natural soils displaced during the construction of HS2. The agricultural topsoil and subsoil will be stripped and stored separately from each other, and away from other excavated materials. They will subsequently be used for the restoration of land to agriculture and other beneficial uses. The subset of displaced agricultural topsoil and subsoil will be reinstated on the surface of the excavated material.

2.2.6 The landscape earthworks design shall be developed in liaison with other project designers and specialists (as appropriate) to achieve integrated design requirements that include but will not be limited to:

- geotechnical stability;
- visual screening ;
- noise reduction;
- landscape integration of the railway and associated infrastructure;
- restoration of agricultural land;
- community features;
- safety;
- environmental and habitat compensation;
- settings for heritage assets (including historic landscape);
- watercourses and drainage;

- enhancing passenger experience;
- land art and landscape landmarks; and
- maintenance and management.

Figure 1 – Example of design from High Speed 1 (HS1): Engineering contours (before) the 1V:2H slopes would create a visually dominant element across this valley

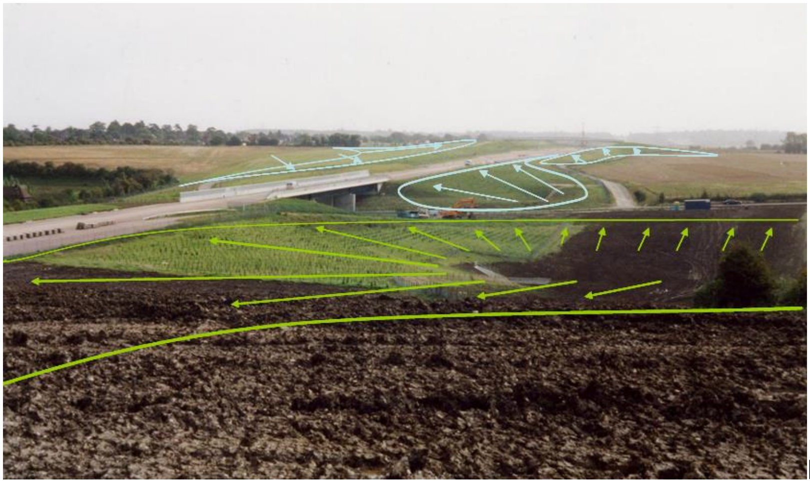


Figure 2 – Engineering integrated with landscape earthworks design to create an integrated engineering and environmental scheme that fits successfully with the local landscape character

Note: Arrows are intended to highlight the profiling of natural landform and do not indicate drainage or contour symbols.

2.2.7 The landscape earthworks design shall blend the railway and associated infrastructure, including highways and watercourses, into the landscape wherever possible. The earthworks shall be designed to respond to the local landscape character and terrain, and take account of sensitive and designated areas, important landscape features, ecological areas , flood plains and heritage assets along the route.

2.3 Design principles

2.3.1 The landscape earthworks shall match the scale of HS2 and its associated infrastructure. In places this will mean the designers shall need to take a bold approach to the landscape design.

2.3.2 Opportunities for ecological and habitat creation should also be considered including where areas are required for compensation works.

2.3.3 Where appropriate earthworks design should look to relax 'engineering' slope gradients to create useable agricultural land that can be returned for farming purposes up to the railway boundary.

2.3.4 The location and design of Landscape Earthworks should also take into account the passenger experience and should look to create opportunities for views, visual experiences of landmarks or points of interest in order to aid with orientation and the enhancement of the overall passenger experience.

2.3.5 Landscape earthworks design shall be employed to recreate and/or replace local landscape features that may have been removed during construction. This may include features like sunken lanes. Earthworks design may also involve works to enhance heritage settings and/or historic landscape e.g. framing views of historic buildings or improving the setting of historic landscapes.

2.3.6 In places and where conditions allow, landscape earthworks design may involve reducing the gradient of engineering earthworks slope to create better conditions for effective planting on sloped areas.

2.3.7 In places and where conditions allow and do not detract from the passenger experience, landscape earthworks design may involve steepening the slopes that face towards the rail corridor in order to reduce land take (or reduce excavated material volumes) to provide enhanced opportunities for adjacent land areas.

2.3.8 Where cutting and embankments are in chalk or rock, slopes may be left as features in their own right and left to colonise naturally, subject to geotechnical (i.e. slopes may need to be benched and/or netted to prevent rock fragments falling on the train/track) and operational requirements.

2.3.9 For the restoration of land to agriculture, design gradients shall aim for slopes no steeper than 1V:8H. This design approach shall allow for the restoration of agricultural land to its original quality, including best and most versatile land. It would also facilitate agricultural use to be brought up to the railway corridor thus maximising useable land.

2.3.10 The Designer shall include adequate provision for safe routine maintenance to be undertaken without disruption to the rail operation (e.g. drain clearance and vegetation management).

2.3.11 The design of the earthworks profile shall be directly influenced through the assessment of the existing geological conditions on site. The influence of the existing geological conditions on the construction, build-up of material and range of typical slope gradients shall form part of the developed Landscape Earthworks Design, as well as the long term use, access and maintenance of the slope.

3 Landscape earthworks design options

3.1 Introduction

3.1.1 To assist an understanding of the design approach required for the landscape earthworks the diagram and text below illustrates typical approaches to be explored to reach a successful balanced design solution for a section of the route. In this example the landscape earthworks have been designed to create an effective visual screen where the railway is at grade. The landscape earthworks have also been developed to be functional and allow the visual screen to be returned for future agricultural use. Refer to the Lineside Vegetation Technical Standard (HS2-HS2-EV-STD-000-000005) for further details of lineside planting proposals.

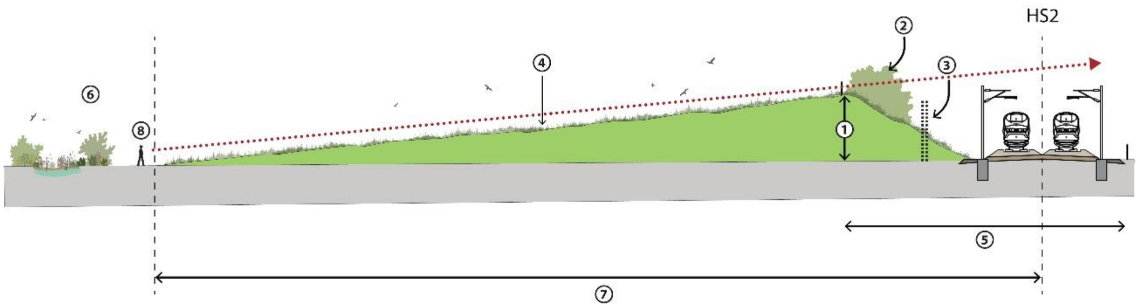


Figure 3 - Typical section (at grade) - approach to be taken for landscape earthworks design

The following approach (in Figure 3 Typical Section) shall be taken into consideration in developing and resolving the landscape earthworks design:

1. Build in visual screening and/or noise reduction. The height of screening required shall depend on the particular location, landscape character and type and the viewpoint location(s) that require screening. These factors are site specific and also relate to the requirements of the EIA.
2. Earthworks shall be designed in combination with landscape planting to achieve mutual design benefits such as enhanced visual screening, which should be taken into account during the design of the earthworks. Consult with engineering specialists on all aspects of the earthworks including geotechnical conditions, mass haul availability of excavated materials, technical construction of landforms and integration with engineering structures.
3. Consultation shall be carried out with the noise specialists to consider the use of landscape earthworks, rather than noise fence barriers to provide the required noise reduction (or to minimise the height of additional noise fence barriers) particularly within the rural sections of route.
4. Consultation shall be carried out with the agricultural specialists to explore maximising useable land by returning land to agricultural use up to the railway boundary. (Note, the gradient of the restored land should be designed for long-term agricultural use);
5. The design shall reduce operational and maintenance area of the railway for the rail operator by extending other land uses (e.g. agriculture) up to the railway boundary. In this example the scheme boundary is indicated by the arrows;
6. Consultation should be carried out with the ecology and/or heritage specialists to understand and take account of sensitive environments including designated landscapes, ecological and archaeological areas and historic landscape. The example cross sections shows that the land potentially required for construction has extended from the HS2 but still allows the retention of an important ecological area;
7. The land potentially required for construction has been established and it shall be the responsibility of the designer to highlight to the clientwhere adequate areas are not available to achieve the requirements as specified within this TS. The area may be required to allow for temporary storage of stockpiles and the provision of land stability bunds (toe-weights) where unstable slopes exist and/or removal of mass upslope;
8. The designers and contractors shall work closely to understand the integrated design parameters, landscape context, key viewpoints and locations along the route that will require visual and/or noise reduction, integration and rationalisation of earthworks design; and

9. Earthworks shall only be located where necessary to reduce the environmental impact and to integrate the project into the surrounding landscape. Areas where earthworks are not required for landscape or mitigation purposes, shall consider the opportunities for medium to long distance views, and safeguard existing vistas from the construction of earthworks to enhance the overall passenger experience.

3.2 Earthworks design options

3.2.1 In any one location there will be a number of options for the final earthworks design.

3.2.2 The landscape earthworks design shall positively reuse excavated materials as part of the design process. The scale and reuse of excavated materials shall be justified according to the identified design requirements, the local landscape context and engineering and environmental conditions.

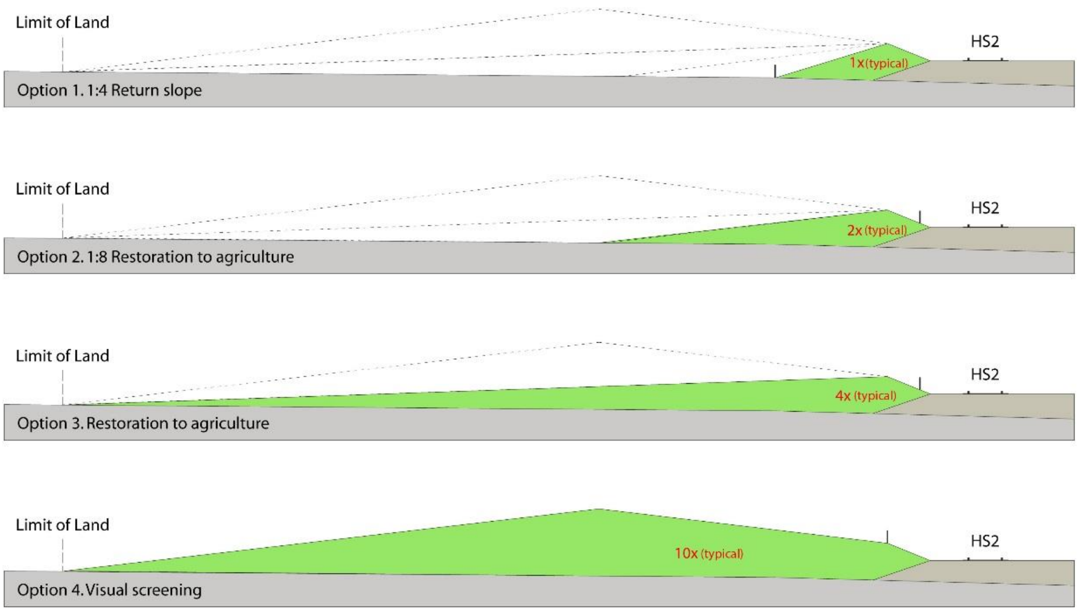


Figure 4 – Typical design options for landscape earthworks could range in scale depending on the identified design requirements, the local landscape context and engineering and environmental conditions. NB "Limit of Land" shown is the land potentially required for construction.

3.2.3 The four options above have been selected to demonstrate the typical solutions possible. It should be noted that these are not finite, but are intended to provide guidance for the scope required for the Landscape Earthworks design. The scope is also dictated by what was allowed for in the ES, or concessions to petitions, and or APs. In most cases the design approach will be guided by the scope of identified design requirements, the limit of land available, the vertical location of the track bed (or highway alignment) and the environmental and geological conditions to either side of Hs2 or its associated infrastructure.

3.2.4 The visual and physical design of earthworks shall remove the squared shoulders in both the cuttings and embankments (refer to figures 5) by the softening of these transitions through the use of concave and convex curves in the landform.

3.2.5 Earthworks design shall allow for the incorporation of planting in areas where adequate land is not available to allow for landscape earthwork design to mitigate the impact of engineered earthworks.

3.2.6 The landscape earthworks design shall maximise the return of land back to previous agricultural use. Land returned which is no longer suitable for agricultural purposes shall be considered as an opportunity for planting and or ecological corridors.

3.2.7 The landscape earthworks design shall respond to the place and context to reduce impact on all existing landscape features.

3.2.8 The landscape earthworks design shall also include screening of views of the catenary structures as well as the screening of views of the HS2 tracks and trains to the public wherever possible.

3.2.9 The design shall result in the softening of shoulders through the avoidance of squared cuts and implement natural curves as demonstrated in figures 5 – 7:

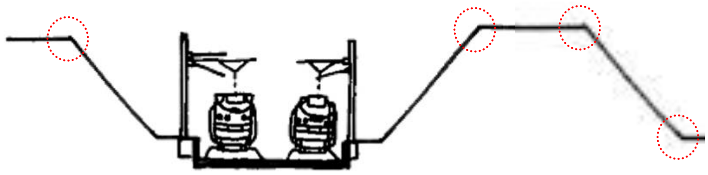


Figure 5 - In cuttings (and embankments) squared shoulders should be avoided.

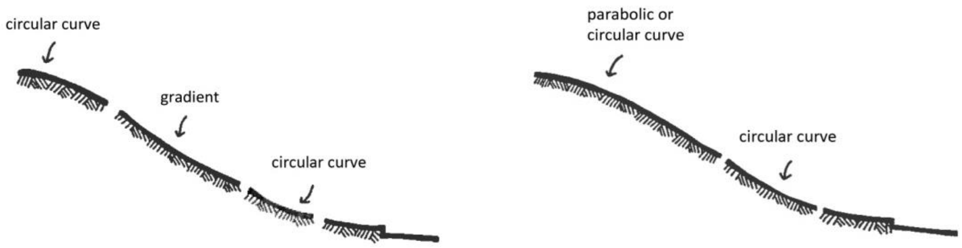


Figure 6 & 7 – Examples of cuttings (and embankments) softened through curves & flat gradients

3.3 Option 1 design review

3.3.1 This shows the addition of visual screening to the railway on an embankment section. The 1V:4H return slope shown in this example would be suitable for tree screen planting. This option would maximise the permanent agricultural land take, but it would minimise the temporary agricultural land take. The rail boundary would typically be at the toe of the 1V:4H earthworks (assume excavated materials volume required = 1);

Figure 8 – Earthworks design for a 1:4 return slope

3.4 Option 2 design review

3.4.1 This shows a more ambitious restoration to agriculture to a maximum 1V:8H gradient. This design would allow agricultural use to be brought up to the railway corridor thus maximising useable land. It also would act to minimise the operational railway area for the future rail operator (excavated materials volume required = 2 (typical) x Option 1);

Figure 9 – Earthworks design for a 1:8 return slope

3.5 Option 3 design review

3.5.1 This shows a fuller agricultural restoration using the full width of the land potentially required for construction and creating good integration of the railway into the landscape (excavated materials volume required = 4 (typical) x Option 1);

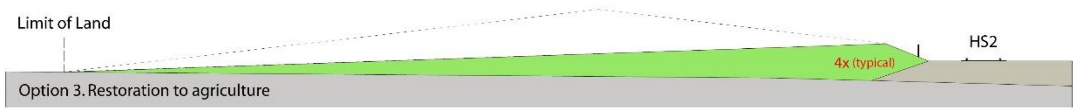


Figure 10 – Earthworks design for a 1:4 return slope

3.6 Option 4 design review

3.6.1 This design would be for the creation of a highly effective visual screen to the railway, and one where the landform could be used for agricultural use up to the railway boundary. Alternatively, designers could consider further options where artificial landforms can be created, (where appropriate) for future non-agricultural uses e.g. for new parkland, formal and informal recreation, habitat creation or the creation of landmarks and land art. This approach may be more applicable to urban or urban edge locations (excavated materials volume required = 10 (typical) x Option 1).

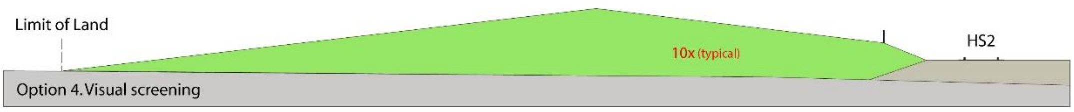


Figure 11 – Earthworks design for a 1:4 return slope

3.6.2 Where appropriate the design of earthworks in Option 4 should utilise the bulking of excavated material in the design and delivery of eye-catching landmarks such as below. These features are designed to provide visual references along the route thus enhancing the passenger experience.

Figure 12 – Earthworks landform design Sawtooth Ramps, Scotland and Northala Fields, London

3.7 Hs2 at grade: earthwork design approach

3.7.1 The diagram below illustrates the general approach to be taken in designing the landscape earthworks where HS2 is at grade, in the creation of false cuttings.

Figure 13 – Landscape earthworks where HS2 is at grade

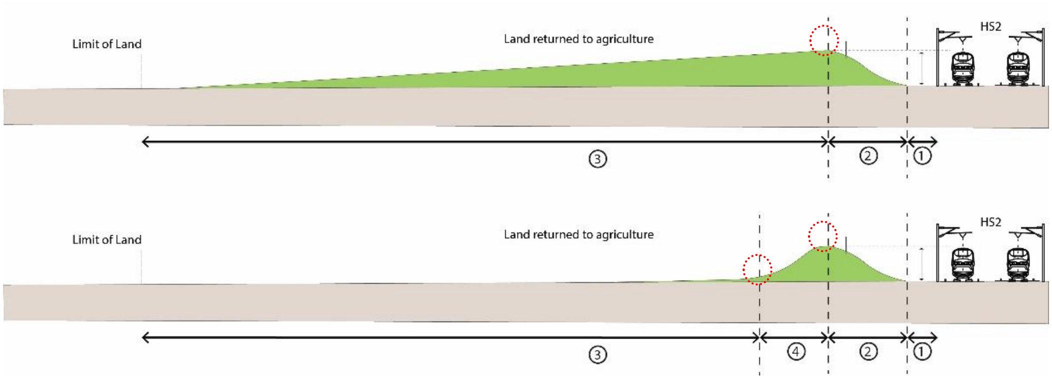


Figure 14 & 15 – At grade false cuttings softened demonstrating maximum and minimum footprint, and maximum and minimum use of excavated material through earthworks design to screen catenary structures and gantries

1. Minimum distance between track and toe of earthwork cutting to be observed.
2. Reduce operational and maintenance area of the railway for the rail operator by extending other land uses (e.g. agriculture) up to the railway boundary. In this example the HS2 boundary is indicated by the arrows.
3. Maximise useable land by returning land to agricultural use up to the railway boundary. (Note, the gradient of the restored land should reflect its probable long-term agricultural use).
4. Represents the minimum graded level of excavated fill used to return to original existing site levels, where fill is not deemed suitable due to geological assessment.

3.7.2 In designing the earthworks for at grade cutting scenarios (i.e. at the same level as surrounding context), the use of minimum excavated material and minimum footprint as demonstrated, shall be avoided and only implemented when driven by geological and site (limit of land) constraints to avoid the design of unnatural landscape.

3.7.3 In all cases the maximum footprint and maximum use of (or closest volume to) excavated material shall be championed to provide the most integrated landscape design that responds to the local landscape context.

3.8 Hs2 in cutting: earthwork design approach

3.8.1 The diagram below illustrates the general approach to be taken in designing the landscape earthworks where HS2 is in cutting.

Figure 16 – Landscape earthworks where HS2 is in cutting

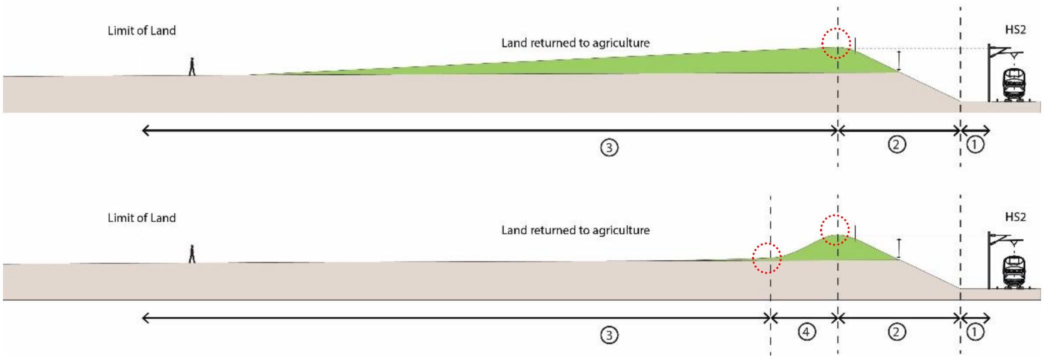


Figure 17 & 18 – Cuttings softened demonstrating maximum and minimum footprint, and the maximum and minimum use of excavated material through earthworks design to screen catenary structures and gantries

1. Minimum distance between track and toe of earthwork cutting to be observed.
2. Reduce operational and maintenance area of the railway for the rail operator by extending other land uses (e.g. agriculture) up to the railway boundary. In this example the HS2 boundary is indicated by the arrows.
3. Maximise useable land by returning land to agricultural use up to the railway boundary. (Note, the gradient of the restored land should reflect its probable long-term agricultural use).
4. Represents the minimum graded level of excavated fill used to return to original existing site levels

3.8.2 In designing the earthworks for cutting scenarios, the use of minimum excavated material and minimum footprint as demonstrated, shall be implemented to form a natural landscape design when driven by geological and site (limit of land) constraints.

3.8.3	Where the delivery of the scheme allows, the use of excavated material shall be championed to provide an integrated landscape design.

3.9 Hs2 on embankment: earthwork design approach

3.9.1 The diagram below illustrates the general approach to be taken in designing the landscape earthworks where HS2 is on embankment.

Figure 19 – Landscape earthworks where HS2 is on embankment

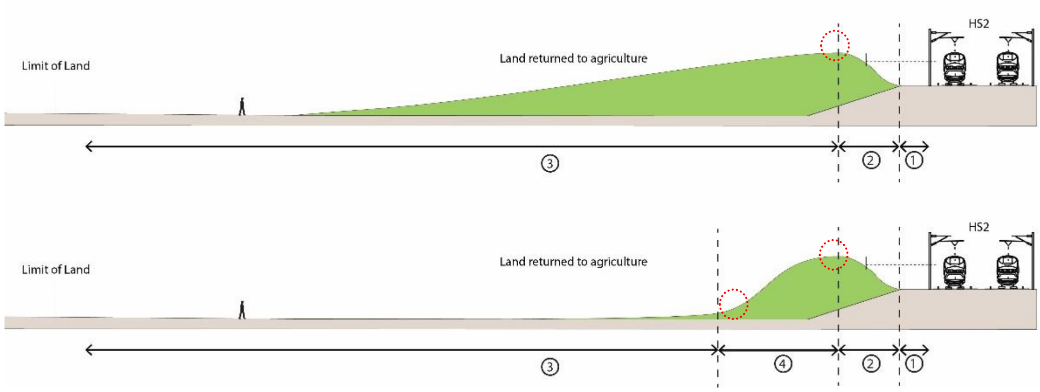


Figure 20 & 21 – Embankments softened demonstrating maximum and minimum footprint, and maximum and minimum use of excavated material through earthworks design to screen catenary structures and gantries

1. Minimum distance between track and toe of earthwork cutting to be observed.
2. Reduce operational and maintenance area of the railway for the rail operator by extending other land uses (e.g. agriculture) up to the railway boundary. In this example the HS2 boundary is indicated by the arrows.
3. Maximise useable land by returning land to agricultural use up to the railway boundary. (Note, the gradient of the restored land should reflect its probable long-term agricultural use).
4. Represents the minimum graded level of excavated fill used to return to original existing site levels.

3.9.2	In designing the earthworks for embankment scenarios, the use of minimum footprint and minimum excavated material as demonstrated shall be avoided and only implemented when driven by geological and site (limit of land) constraints to avoid the design of unnatural landscape.
3.9.3	In all cases the maximum footprint and maximum use of (or closest volume to) excavated material shall be championed to provide an integrated landscape design.

3.10 Hs2 internal profiling - earthwork design

3.10.1 The diagram below illustrates the general approach to be taken in reducing excavated material by steepening cuttings where practicable (i.e. relating to the site geology) and in keeping with local landscape.

3.10.2 The designer and engineering team should fully consider the initial cost and maintenance implications of these landscape earthwork design proposals.

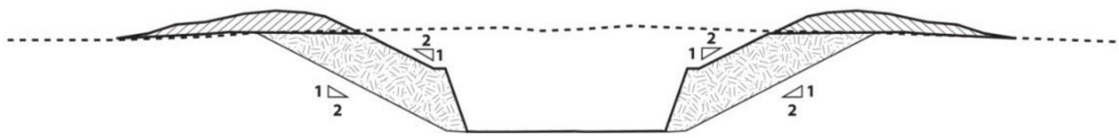


Figure 22 – Reducing excavated material by steepening cuttings. The 1V:2H slopes have been steepened to reduce the amount of cut and hence excavated materials required. Additional material can be used around the top of the cutting (hatched areas) to enhance and screen the cutting slopes from views within the surrounding landscape.

1. The geological conditions and landscape type will dictate whether it is possible to reduce excavated material by incorporating steeper railway cuttings. This is possible in material such as chalk;
2. Steepening cutting slopes can help with visual screening of the railway by reducing the width of the railway corridor and will also provide more efficient noise reduction; and
3. In addition to the above approach materials can also be reduced by considering optimising vertical alignments to limit unnecessary depth; use of green tunnels at depths to limit the excavation required.

3.11 Hs2 tunnel portals

3.11.1 The development of landscape earthworks around tunnel portals can be effective in screening and integrating these features as shown in this HS1 example.


Figure 23 & 24 - The reference design earthworks on HS1 at the North Downs Tunnel (country portal) was originally for 1:2 gradient slopes (shown red and in outline on the right). The form of these slopes would not have fitted well with the rolling character of the local landscape

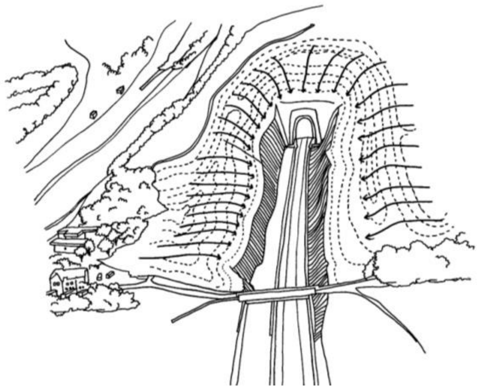



Figure 25 & 26 - The design was developed to include steeper chalk cuttings at the base of the cutting; thus saving on the amount of excavated material that needed to be cut. The addition of landscape earthworks around the tunnel portal (in green) created additional subtle screening and shaping to integrate the feature successfully into the local landscape

3.11.2 The designer and engineering team shall fully consider the local context of each tunnel portal and portal hood, and let the character and location guide the design and steepness of the cuttings to create locally sensitive landscape features.

3.12 HS2 temporary landscape earthworks

3.12.1 The layout, arrangement and location of earth stockpiles shall be considered as part of the landscape earthworks design.

3.12.2 Temporary stockpiles shall also serve a purpose in mitigating the visual effect during the construction period and should drive the layout, arrangement and location of these temporary earth structures.

3.12.3 Material that is to be stockpiled should be used to form locally distinctive land art where appropriate to context.

3.12.4 The designer shall in conjunction with the engineering team consider the suitable location of temporary stockpiles and ensure that all landscape earthworks designs comply with "BS 3882:2015 Specification for topsoil".

3.12.5 The design of all temporary landscape earthworks should comply with Technical Standard - Routewide Soil Resource Plan (HS2-HS2-EV-STD-000-000008).

3.13 Highway realignment

3.13.1 Landscape earthworks shall be used to successfully integrate HS2 highway realignments into the local landscape to form logical and smooth grading and design integration with the alignment of the railway.

3.13.2 Where possible, landscape earthworks shall be used to modify and rationalise levels between a realigned or new section of road and the railway to create a successful assimilation of engineering alignments with local topography.

3.13.3 This design principle should apply to the design integration of HS2 related highways and associated fencing, as well integration of the railway as outlined in this TS. All fencing proposals should comply with Technical Standard – Fencing (HS2-HS2-CV-STD-000-000002)

3.13.4 As with the railway examples shown in previous sections there will be opportunities to develop landscape earthworks design to return land to agriculture up to the realigned highway. This can be developed in design situations where the road goes over the railway or where the railway goes over a road.

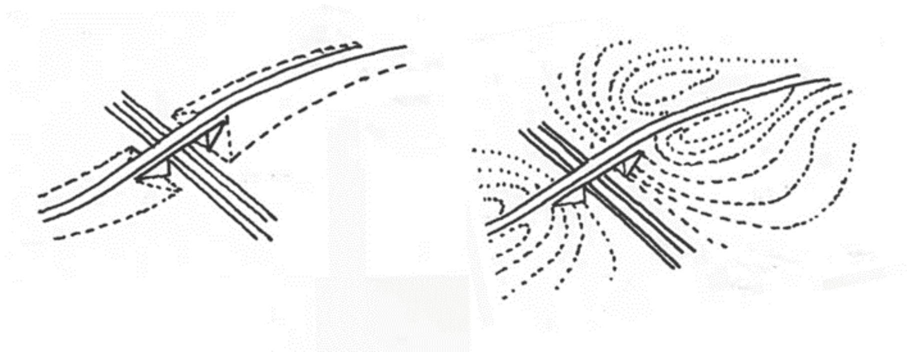


Figure 27 - The integration of highways – a road crossing is shown in this example. The drawing on the left shows a road crossing over HS2 with the engineering earthworks (required to create the horizontal and vertical alignment of the road). The drawing on the right shows modified landform to integrate the road with the local topography and take the opportunity to return adjacent land to agriculture.

3.13.5 Integrating a road realignment into the local topography is a good opportunity to positively reuse excavated materials, rationalise levels and improve the design fit between the railway and the realigned road;

3.13.6 The landscape earthworks should be designed in conjunction with planting proposals to create a justifiable, balanced and effective scheme design

3.14 Other infrastructure

3.14.1 Landscape earthworks shall be used to integrate HS2 with other infrastructure (e.g. existing or new roads, motorways, other railways and so on) by rationalising levels and developing landform design that sensitively complements and/or fits with the local landscape character.

3.14.2 The landscape earthworks should provide great flexibility to create effective visual screening and noise protection where HS2 is aligned in proximity to other infrastructure. Landscape earthworks can also be designed to be highly effective in rationalising levels, infilling and grading to create smooth transitions between HS2 and adjacent infrastructure projects.

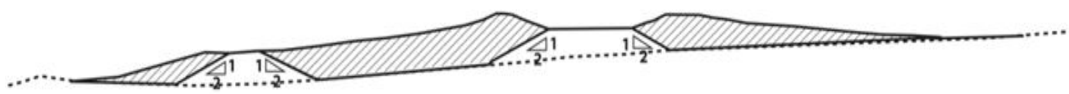


Figure 28 – Theoretical example with HS2 on the right and road infrastructure as an example on the left. The hatched area illustrates the positive use of excavated materials to create visual screening and rationalise levels between HS2 and adjacent infrastructure.

3.14.3 Where HS2 lies close to other infrastructure it is possible to smooth out and rationalise the earthworks levels as shown.

3.14.4 Look to infill land areas to create space for landform grading which can be combined with planting to create effective visual screening and/or sound protection.

3.15 Ecology and habitat creation

3.15.1 The landscape earthworks design shall deliver opportunities for habitat creation and related ecological compensation works and designers should discuss potential schemes with the ecology teams where earthworks can create mutual benefits as part of integrated landscape and ecological design solutions.

3.15.2 Factors to consider would include;

1. Consider extending the coverage of excavated material to maximise areas of new habitat in suitable areas;
2. Consider increasing gradients in some areas and within certain substrates to create hot, dry and sparsely vegetated
3. habitats of value to invertebrates and reptiles.
4. Variation in slope and creation of hollows may also provide seasonally wet areas of ecological interest;
5. Consider using appropriate landscape earthworks to link or extend existing habitats.

3.16 Recreation and leisure facilities

3.16.1 The landscape earthworks design should deliver opportunities for the creation of and enhancement of compensation recreation and leisure facilities.

3.17 Land art

3.17.1 The designers shall look to use sculptural landscape earthworks to create land art in suitable locations. These can provide landmarks that give visual references along the route to local attractions (viewing points). Sculptural earthworks can also enhance the passenger experience and deliver memorable points along the HS2 route (See also figure 12).

3.18 Hs2 soil/ growing medium to landscape earthworks

3.18.1 The designers and engineer teams should make reference to the requirements of Technical Standard - Routewide Soil Resource Plan (HS2-HS2-EV-STD-000-000008).

3.18.2 Temporary stockpiles of topsoil will be required to comply with "BS 3882:2015 Specification for topsoil" to obtain the quality of the growing medium required for the project.

4 Deliverables schedule

4.1.1 The mandatory clauses and guidance set out in this document provide design intent and aspirations for the landscape design of earthworks associated with the Proposed Scheme. However, there will be flexibility to develop the detailed designs at a later date and in light of the prevailing circumstances when the project is implemented.

4.1.2 To ensure that the correct design approach has been considered during design development and to help drive the quality of the design, construction and long term management of the scheme the following documents shall be submitted to HS2 Ltd at key stages of the project

4.1.3 **Level 4 Scheme design**

4.1.4 **At the start of scheme design -** a detailed appraisal of the local landscape character and topography in the vicinity of each earthwork element associated with the Proposed Scheme, summarised in a baseline sketchbook;

4.1.5 **In the first quarter of scheme design -** a technical note describing how the principles set out in this technical standard have been applied to site specific locations, including consideration of designated environmental areas and sensitive landscape, ecological, heritage, historic landscape, community features and rights of way.

4.1.6 **In the first quarter of scheme design and updated as necessary to reflect engineering changes -** sketch plans, sections and elevations as relevant to communicate the landscape design intent to the earthworks designer (where the earthworks design is led by others – e.g. engineering);

4.1.7 **By the middle of scheme design -** input to the specification of earthworks, in particular the surface treatment and any topsoil or subsoil requirements this may have;

4.1.8 **By the end of scheme design and prior to the designs being submitted for subsequent approvals -** 3D models, contour plans, cross sections and elevations of all landscape design led earthworks. Drawings to include annotation to confirm the requirements of other disciplines (e.g. engineering, acoustics) are covered by the design. Drawings also to include a design basis statement for each earthwork element describing the intent behind the design (e.g. return to agriculture, noise attenuation, landscape feature); and

4.1.9 **By the end of scheme design and prior to the designs being submitted for subsequent approvals -** diagrams indicating zones for placement of temporary stockpiles with annotations to give the design basis for these (e.g. to provide temporary visual screening during construction).

4.1.10 **Level 5 – detailed design and prior to construction commencing**

4.1.11 fully developed earthworks drawings to a detail design level of detail, coordinated amongst all relevant disciplines

4.1.12 fully developed earthworks specification to a detail design level of detail, coordinated amongst all relevant disciplines;

4.1.13 fully developed temporary landscape earthworks drawings and specification to a detail design level of detail, coordinated amongst all relevant disciplines; and

4.1.14 **Technical Design and Implementation (RIBA Work Stage 4+)**

4.1.15 All design information deliverables shall be in accordance with the HS2 Landscape Design Information Process Requirements.

5 Further information

5.1 Standard Owner

5.1.1 The 'standard owner' should be consulted in the event of any query about the requirements and guidance given in this document (refer to the 'Responsibilities' section of the eB webpage for this technical standard), with consultants and contractors using the applicable Technical Query procedure.

5.1.2 Where appropriate, the 'standard owner' will then consult relevant colleagues (e.g. other standards owners where there is a technical interface and/or Railway Operations Directorate for operational / maintenance aspects) or forward queries to them for answer.

APPENDIX J SPECIFICATION FOR CIVIL ENGINEERING WORKS – CONTRACT SPECIFIC APPENDICES SERIES 0600 EARTHWORKS: N1 & N2. DOCUMENT NO. 1MC08-BBV_MSD-GT-SPE-N000-100001

Contract No. 1MC13

Specification for Civil Engineering Works – Contract Specific Appendices – Series 0600 Earthworks: N1 & N2

Document Number: 1MC08-BBV_MSD-GT-SPE-N000-100001

Current Revision	Author	Reviewed By	Approved By	Date Approved	Reason for Review
C02	N Pye	S Cooper	I Farooq J Denis	01/12/2021	For HS2 Acceptance

Stakeholder Review Required (SRR)	Purpose of SRR
☐ Yes – Please Specify Below	☐ Comment
☒ No	☐ Information
Click or tap here to enter text.	☐ Approval

Handling Instructions: Standard

Review Required

Team	Yes/No	Name	Position	Date
Quality				
Health & Safety				
Environment & Sustainability				
Other teams if required				

Revision History

Previous Revision	Author	Reviewed By	Approved By	Date Approved	Reason for Review
P01	N Pye	I Farooq	R Dickson	02/03/2021	S2 – For Information
P02	N Pye	I Farooq C Brook	A Hocke	26/07/2021	S3 – For Review and Comment
P03	N Pye	I Farooq	A Hocke	10/09/2021	S4 – First Issue
P04	N Pye	I Farooq	A Hocke	20/10/2021	S4 – Second Issue
C01	N Pye	I Farooq	A Hocke J Denis	29/10/2021	For HS2 Acceptance
P05	N Pye	S Cooper	I Farooq	01/12/2021	S4 – Third Issue
C02	N Pye	S Cooper	I Farooq J Denis	01/12/2021	For HS2 Acceptance

Revision Summary

Paragraph Modified	Details of Modification
2.1	Additional documents stated.
6.1	Additional requirements with respect to material for landscape fill stated.
6.1	Additional requirements with respect to surplus topsoil stated.
6.1	Minor update to list of material Classes and their application.
6.1	Class 8A Fill to crest edge of mainline embankments stated.
6.1 Selected/Technical Backfill	Deletion of 'no lower than'.
6.1 Topsoil and Subsoil	Reference to SCEW 3100 stated.

HS2 Ltd - Code 1 - Accepted

6.4	Requirement for remediation o Class U1B stated.
6.5	Requirement to provide detailed of anticipated groundwater conditions in an asset specific specification appendix addendum stated.
7.2	Replace reference to the Geo-Environmental Reports with the MMP Route A risk assessments.
7.3	Reference to the MMP Route A risk assessments stated.
7.4	Reference to the MMP Route A Earthworks Remediation Strategy removed.
7.5	Reference to the MMP Route A Earthworks Remediation Strategy removed.
7.6	Reference to the MMP Route A Earthworks Remediation Strategy replaced by the MMP Route A risk assessments.
7.7	Reference to the MMP Route A Earthworks Remediation Strategy removed.
8.3	Minor updates to paragraph 11, 12 and 14.
8.6	Minor updates to paragraph 1 and 6.
8.9	Minor update to requirements for Clause 601.19.
8.19	Drawing references to be stated in the asset specific specification appendix addendum.
10.7	Section 'Requirements for geotextiles for watercourses using composite turf reinforcement mat' withdrawn from the specification.
10.7 (formally 10.8)	Design life for geotextiles provided.
12.4	Minor amendment to paragraph 8.
14.1	Minor amendment to paragraph 3.
14.7	Minor update to paragraph 2.
15.3	Alpha value reduced from 0.65 to 0.6.
18	Reference to Instrumentation & Monitoring Specification replaced by the Instrumentation Monitoring Statement
20	Reference to the MMP Route A Earthworks Remediation Strategy replaced by the MMP Route A risk assessments.
21.1	Reference to the MMP Route A risk assessments stated.
21.1	Minor update to paragraph 6.
21.1	Reference to testing for asbestos stated.
22	Testing requirements for Class 8A material stated.

Contents

1 SCOPE AND PURPOSE

This document is applicable to the earthworks construction required for HS2 Phase 1 Main Works Civils Contracts (MWCC) Contracts N1 and N2 and (project references 1MC08 and 1MC09) and referred to in this document as the Project. Under the provision of the Design and Construction Services in the Project requirements, this document includes the Specification for Civil Engineering Works, Series 0600: Earthworks, Appendix 6/1 to 6/15 to be implemented by the Balfour Beatty VINCI Joint Venture (BBV) and its supply chain. This document has been produced at Detailed Design stage of the project.

This specification details the overarching requirements to be adopted for all earthworks noting it shall be read in conjunction with the asset specific earthworks specification addendum. The asset specific earthworks specification addendum will provide details of any amendments to the requirements contained herein and any additional requirements associated with a specific asset.

The Specification Appendices shall be read in conjunction with the documents listed in section 2.2 and the following BBV documents:

- Basis of Design Earthworks Integration, 1MC08-BBV_MSD-GT-REP-N001-100164 ; and
- Sequence of Works, 1MC08-BBV-GT-GDE-N001-000001.

The Specification Appendices are written on the basis that BBV are able to undertake their business in the normal manner. Where significant disruption occurs that fundamentally affects the implementation of the Specification Appendices (e.g. health pandemic), an addendum will be prepared to describe how the requirements of this document shall be modified for the duration of the disruption. Once any period of disruption has ended, the addendum shall be withdrawn and BBV shall revert to the current version of this document.

2 REFERENCE DOCUMENTS

2.1 Contract

Document Title	Document Number
HS2 Specification for Civil Engineering Works, Series 0600 Earthworks	HS2-HS2-CV-SPE-000-010600
HS2 Notes for Guidance on the Specification for Civil Engineering Works, Series NG 0600 Earthworks	HS2-HS2-CV-SPE-000-020600
HS2 Specification for Civil Engineering Works, Series 0800 Road Pavements – Unbound, Cement and Other Hydraulically Bound Mixtures	HS2-HS2-CV-SPE-000-010800

HS2 Notes for Guidance on the Specification for Civil Engineering Works, Series HG 0800 Road Pavements – Unbound, Cement and Other Hydraulically Bound Mixtures	HS2-HS2-CV-SPE-000-020800
HS2 Specification for Civil Engineering Works Series 3000: Landscape and Ecology	HS2-HS2-CV-SPE-000-013000
HS2 Notes for Guidance on the Specification for Civil Engineering Works Series 3000: Landscape and Ecology	HS2-HS2-CV-SPE-000-023000
HS2 Specification for Civil Engineering Works Series 3100: Soil Handling for Land Restoration	HS2-HS2-CV-SPE-000-013100
HS2 Technical Standard – Soil Handling for Land Restoration	HS2-HS2-EV-STD-000-000008

2.2 Standards

ISO 9001: 2015 Quality Management System;
ISO 14001: 2015 Environmental Management System; and
ISO 45001: 2018 Occupational Health and Safety.

3 ABBREVIATIONS

HS2	High Speed Two Limited, also referred to as "HS2" or "EMPLOYER"
BBV	Balfour Beatty VINCI
LEF	Lower Embankment Fill
MWCC	Main Works Civils Contracts
SCEW	Specification for Civil Engineering Works, Series 0600 Earthworks
UEF	Upper Embankment Fill

4 RESPONSIBILITIES

Role	Main Responsibilities
Nigel Pye	Author
Imran Farooq	Checker
Imran Farooq	Discipline Lead

5 GENERAL

All earthworks shall be carried out in accordance with the HS2 Specification for Civil Engineering Works, Series 0600 – Earthworks, with particular requirements and amendments noted in the following appendices.

All Clauses, Tables and Appendices referenced in this Earthworks Specification relate to the SCEW, Series 0600 – Earthworks unless otherwise stated.

Several earthwork requirements are detailed as "not anticipated" in this Earthwork Specification. Should an unanticipated requirement become prevalent to the works, the Contractor shall identify this and make known to the Designer's Geotechnical Site Representative for consideration.

The Contractor is responsible for the design of temporary works. The Contractor shall ensure that any temporary excavations do not compromise Health and Safety and the stability of nearby/adjacent structures, roads, pavements, earthworks and services.

6 APPENDIX 6/1 – REQUIREMENTS FOR ACCEPTABILITY AND TESTING ETC. OF EARTHWORKS MATERIALS

6.1 Acceptable limits for the fills in Table 6/1 appropriate to the Contract

Acceptable limits for the earthwork materials and the testing required on these materials are presented in Tables 6/1 of this Earthworks Specification, which are based on Table 6/1 of the SCEW Series 0600: Earthworks.

The grading requirements for each class of fill are given in Table 6/2 and Table 6/5.

The frequency of testing is detailed in Appendix Table 1/5 (sections 22 and 23 of this specification).

Prior to the construction of mainline earthworks, site trials are to be undertaken to define the compaction methods associated with each of the geological materials being used.

Where non-HSR mainline materials classified as Class 2A/2B cannot be differentiated by their moisture content, due to their non plasticity, compaction shall be by the more onerous compaction method (Method 2).

Recycled bituminous planings and granulated asphalt used for fill shall not contain tar or tar-bitumen binders.

Material permitted for use as Class 4 Landscape fill shall have a maximum particle size of 500 mm except in the upper and outer 1 metre where the maximum size shall be 125 mm. Where landscape fill material includes particles exceeding 125 mm, the placement and compaction of materials shall ensure the removal of large voids and produce a coherent mass. Locations where a particle size exceeding 125 mm is not permitted are detailed in the asset specific earthworks specification.

Surplus site won topsoil shall be managed in accordance with HS2-HS2-EV-STD-000-000008 and the SCEW Series 3100 (HS2-HS2-CV-SPE-000-013100). Should there be a surplus of topsoil it shall considered as Class 4 Landscape Fill and placed on the outward facing slope of landscape bunds.

The principal permitted classes of earthwork materials for use in the works are as follows:

- Highways earthworks — Class 1A, 1B, 2A, 2B, 2C, 7E, 9J and 9J/1;
- HS2 Earthworks: LEF — Class 1A1, 1B1, 2A, 2B, 2C, 6E, 6R, 7E, 7F, 7I, 9G, 9G/1, 9H, 9J, 9J/1 and 9L;
- HS2 Earthworks UEF — Class 1A1, 1B1, 6E, 6R, 7E, 7F, 7I, 9G, 9G/1, 9H, 9J, 9J/1 and 9L;
- HS2 Earthworks: Fill to crest edge of embankment — Class 8A;
- Landscaping (slope ≤ 1v:3h) — Class 1A, 1B, 2A, 2B, 2C, 4 and 4A;
- Landscaping (1v:2.5 ≤ slope ≤ 1v:3h) — Class 1A, 1B, 1C, 6E, 9G, 9H, 9J, 9J/1 and 9L;
- Landscaping (1v:2 ≤ slope ≤ 1v:2.5h) — Class 1A, 1B, 1C, 6E, 9G, 9H, 9J,

9J/1 and 9L;

• Topsoil	Class 5A and 5B;
• Subsoil	Class 5S;
• Starter layers	Class 6B and 6C;
• Capping (non HSR earthworks)	Class 6F1, 6F2, 6F3, 6F4, 6F5, 9A, 9B, 9C, 9D, and 9E;
• Protection layer	Class 6F6 and CBGM;
• Prepared subgrade layer	Class 6F8, 6F9 and CBGM;
• Gabion fill	Class 6G;
• Rip rap filling / rock mattress	Class 6G/1
• Filter below subbase (no-HSR earthworks)	Class 6S;
• Drainage layers to reinforced soil and anchored earth structures	Class 6H;
• Lower bedding for precast concrete element	Class 6K or 6L;
• Overlying fill to precast concrete elements	Class 6M or 6Q;
• Fill to reinforced soil and anchored anchored earth structures	Class 6F5, 6I, 6J and 803;
• Load Transfer Platforms	Class 6C (flood compensation area only), 6F5 and 803 (Type 1);
• Selected Granular Fill retaining walls and abutments	Class 6N, 6N1, 6N2, 6P, 6P1 and 6P2;
• Mainline bridge abutment technical backfill (upper part)	Class 6F8 and CBGM;
• Mainline bridge abutment technical backfill (lower part)	Class 6N, 6P and 9H;
• Selected Cohesive Fill retaining walls	Class 7A;
• Clay lining to a watercourse diversion	Class 7A;
• Lower Trench Fill	Class 1 and Class 2;
• Slope drainage/counterforts	Class 6C;
• Damp and flood compensation	Class 6C; and
• Selected cohesive material below track drainage corridor on embankments	Class 9H, 9J, 9J/1 and 9L.

Where Unacceptable materials (Class U1A and U1B) are expected these will be detailed in the asset specific earthworks specification addendum.

HS2 Engineered earthworks

Material used for the protection layer shall be Class 6F6 material with a minimum E_{v2} of 120 MPa and a maximum of 500 MPa or CBGM.

Material used for the prepared subgrade layer shall be Class 6F8 or 6F9 material with a minimum E_{V2} of 60 MPa and a maximum of 500 MPa or CBGM.

Excavated material beneath the mainline embankment shall be replaced with Class 1A1, 1B1, 9G, 9G/1, 9H, 9J or 9L material.

The strength parameters for Class 1A1 and 1B1 material for UEF and LEF shall not be lower than a minimum drained angle of friction of 36°.

The strength parameters for Class 2A, 2B and material for LEF (where the material is used in the core of embankments) shall not be lower than a minimum drained cohesion of 1 kPa, drained angle of friction of 26°, minimum undrained shear strength of 75 kPa.

The strength parameters for Class 9H, 9J and 9J/1 material for UEF and LEF shall not be lower than a minimum drained cohesion of 10 kPa, drained angle of friction of 28°, minimum undrained shear strength of 75 kPa.

The strength parameters for Class 9G, 9G/1 and 9L material shall not be lower than a minimum drained cohesion of 1 kPa, drained angle of friction of 36°.

The E_{v2} of the UEF shall be a minimum of 60 MPa, a minimum 45 MPa 1.0 metre above LEF and a maximum of 500 MPa.

The E_{v2} of the ground improvement shall be a minimum of 60 MPa and a maximum of 500 MPa.

Minimum CBGM 'A' (transition zones and backfill to mainline structures) construction and testing to be in accordance with the SCEW Series 0800. The 7 day unconfined compressive strength test results to be within the range of 5 N/mm^2 and 10 N/mm^2 (cube strength).

Excavation of the track foundation in cuttings and at grade shall be undertaken to a maximum depth of 2.0 metres or to a depth less than 2.0 metres where the E_{v2} measured at the top of the foundation is no lower than 60 MPa. The requirements for testing are detailed in Appendix 1/5.

Highways earthworks

Highways earthworks to be built with a side slope of 1v:2.5h shall use either Class 1 or Class 2 materials. Class 1A or 1B shall have geotechnical strength parameters no lower than: drained friction angle of 33° and drained cohesion of 0 kPa. Class 2A, 2B or 2C shall have geotechnical strength parameters no lower than: drained friction angle of 26° and drained cohesion of 1 kPa.

Highways earthworks to be built at 1v:2h shall use Class 1 materials. Class 1A or 1B shall have geotechnical strength parameters no lower than: drained friction angle of 33° and drained cohesion of 0 kPa or Class 9H or 9J with geotechnical strength parameters no lower than: drained friction angle 28° and drained cohesion of 5 kPa.

A minimum long term equilibrium CBR of 3% is required at sub-formation level where constructed from Class 2 material or 10% where constructed from Class 1 material. If a CBR of 3% is not achieved, an improved sub-formation layer will be required. Field testing of CBR to be undertaken in accordance with Appendix 1/5. Testing to be undertaken by either Lightweight Deflectometer or Dynamic Cone Penetrometer. For requirements for testing refer to the Highways and Access Specification Appendix 7/1 (1MC08-BBV_MSD-HW-SPE-N001-107001) for requirements.

Landscape earthworks

Landscape earthworks and the underlying ground improvement are to be constructed with the following materials:

- Landscaping (slope ≤1v:3h): Class 1A, 1B, 2A, 2B, 2C, 4 and 4A;

- Landscaping (>1v:3h to slope ≤1v:2.5h) Class 1A, 1B, 1C, 6E, 9G, 9H, 9J, 9J/1 and 9L;
- Landscaping (>1v:2.5h to slope ≤1v:2h) Class 1A, 1B, 1C, 6E, 9G, 9H, 9J,

The materials are to have the following minimum geotechnical strength parameters:

- Class 1A and 1B: drained friction angle of 33° and drained cohesion of 0 kPa;
- Class 2A, 2B and 2C: drained friction angle of 26° and drained cohesion of 1 kPa and with a minimum undrained shear strength of 50 kN/m^2 (slopes up to 8.5 metres in height), 75 kN/m^2 (slopes up to 13.0 metres in height) and 100 kN/m^2 (slopes up to 17.5 metres in height);
- Class 4: drained friction angle of 25° and drained cohesion of 1 kPa and with a minimum undrained shear strength of 40 kN/m^2;
- Class 4A: drained friction angle of 20° and drained cohesion of 0 kPa and with a minimum undrained shear strength of 30 kN/m^2;
- Class 9H, 9J and 9J/1: drained friction angle of 28° and drained cohesion of 10 kPa; and
- Class 9G, 9G/1 and 9L: drained friction angle of 36° and drained cohesion of 1 kPa.

Landscape earthworks are to be zoned with differing material Classes and compaction requirements dependent upon the height of the earthwork, slope gradient, HSR or non-HSR asset and for HSR landscape earthworks the location of the slope (inward facing towards the mainline or outward facing away from the mainline) as detailed on the drawings.

Selected/Technical Backfill (Integral Structures)

The technical backfill to integral bridge abutments shall be constructed using Class 6N1/6P1. Geotechnical parameters to be: friction angle of 36° to 45° and E' at 0.1% strain of 60 MPa to 85 MPa.

The technical backfill behind the U-shaped box and portal frame retaining walls shall be constructed using Class 6N2/6P2. Geotechnical parameters to be: friction angle of 36° to 42° and E' at 0.1% strain of 60 MPa to 85 MPa.

Class 6F8 geotechnical parameters to be no lower than: friction angle of 36° and Class 9H a drained friction angle of no lower than 28° and drained cohesion of no lower than 10 kPa.

Selected/Technical Backfill (non-Integral Structures)

The technical backfill to structures (non-integral) and beneath foundations to be Class 6N/6P. Geotechnical properties to be no lower than: friction angle of 38°.

Class 6F8 geotechnical parameters to be no lower than: friction angle of 36° and Class 9H (HSR only) a drained friction angle of no lower than 28° and drained cohesion of no lower than 10 kPa.

Lime stabilisation to form capping (non-HSR earthworks only) and to form HSR earthworks materials

The acceptable limit for lime stabilisation are a maximum Liquid Limit of 65% and Plasticity Index of 40%.

Topsoil and Subsoil

The thickness of Topsoil and Subsoil on inward and outward facing slopes shall be placed to the thicknesses detailed in the following document:

- N1 & N2 – Soil Handling and Management Strategy, Document No.: 1MC08-BBV-CL-STR-N001-00002.

Excavated soils are stored, handled and placed according to the HS2 Technical Standard Handling for Land Restoration HS2-HS2-EV-STD-000-000008.

Soils sourced up to 1.2 metres deep may be used in the project for landscape mitigation planting, subject to compliance with the requirements of SCEW 3100 (HS2-HS2-CV-SPE-000-013100). However, the soils must be placed according to their original horizons, thus upper subsoils must not be placed below lower subsoils. Topsoil can only be used as a surface layer whereas upper subsoil may also be an upper surface layer where specified for specific ecological benefit.

The mixing of excess topsoil and subsoil into landscape berms shall not be undertaken unless agreed with the Designer's Geotechnical Site Representative.

Existing soils left in situ are to be treated according to Series 3000 SCEW Landscape and Ecology.

6.2 Special requirements for determining acceptability

The Contractor shall be responsible for the management and use of all earthwork materials and for providing the materials in accordance with this Specification. The classification and confirmation of acceptability of the earthwork materials shall be carried out by the Contractor where practicable and safe, at the point of excavation or deposition (where the material alters during transport and deposition only) or where a safe system of work for sampling dictates for on-site materials, and at the point of deposition for imported materials.

If, in the opinion of the Designer's Geotechnical Site Representative, the material has altered its classification or become unacceptable for whatever reason, the classification and acceptability tests given in Table 6/1 of Appendix 6/1 and Appendix Table 1/5 shall be repeated. Determination of acceptability of materials stockpiled on site shall be undertaken immediately prior to excavation from the stockpile.

Information on material acceptability shall be passed to the Designer's Geotechnical Site Representative for technical comment, which may incorporate a visit to the source if necessary. The information shall include the following where appropriate:

- location of fill source;
- method of extraction;
- classification of fill;
- data to show material meets specification criteria limits for acceptable fill; and
- amount of fill extracted.

Prior to granting approval for site won or imported materials, a full suite of acceptability tests shall be carried out by the Contractor, supported by the information available from ground investigations.

Final compliance testing of the earthwork materials shall be made by the Contractor after deposition. Where the properties of the materials change between source and deposition, or where the material undergoes significant deterioration during compaction, further testing and sampling will be carried out at the point of deposition. The Designer's Geotechnical Site Representative shall be informed of any changes in properties of earthwork materials.

The Contractor shall submit electronic copies of all compliance test results to the Designer's Geotechnical Site Representative within five workings days of the completion of each test. The copies shall be approved by the Contractor's responsible engineer or technician.

6.3 Designation of materials as Class 3

Not anticipated.

6.4 Any requirements for processing to render unacceptable materials acceptable

Except for unacceptable Class U1B, no site arising material, including surplus acceptable material, shall go off site. Where possible unacceptable Class U1B material shall be subject to remediation to render it suitable for use in the works. Requirements for management of Class U1B are detailed in Appendix 6/2 of this specification.

Some of the site arising material that has been classified as unacceptable U1A may be suitable for geotechnical processing to become acceptable general fill material.

If the Contractor chooses to render acceptable any unacceptable material, he shall produce a Method Statement which encompasses the location of materials to be processed, the means of processing and the classes of materials to be produced in accordance with the requirements of the Material Management Plan, Route A Remediation Strategy, document 1MC08-BBV_MSD-EV-REP-N001-100058.

Prior to any site processing, the Contractor shall agree the Method Statement with the Designer's Geotechnical Site Representative. The Environment Agency may need to be consulted if the Contractor proposes using chemicals in the process.

6.5 Requirements for groundwater lowering or other treatment

Groundwater can be expected to be encountered during the excavations for the works. Details of groundwater conditions shall be provided in the asset specific specification addendum.

The Contractor shall allow and be responsible for the control of groundwater in all temporary excavations and in all temporary situations during the works.

Pumping into existing watercourses or sewers shall only be permitted upon a) provision of a detailed method statement (which shall include the Contractor's methodology to limit silt, debris and other contamination entering the watercourse); and b) its subsequent approval by the relevant authorities, Environment Agency (EA) or Lead Local Flood Authority (LLFA).

The Contractor shall take all necessary measures to prevent any surface run-off from the construction works flowing directly into any of the watercourses, both existing and proposed, on the site. The contractor shall provide measures to channel surface water run-off to specific discharge points where silt traps, screens and any other measures deemed necessary will be employed to prevent any excessive clouding of the watercourses.

6.6 Minimum MCV required immediately before compaction for stabilised Class 9B or Class 9H material or lime stabilised Class 9D or Class 9J material or lime and cement stabilised Class 9E or Class 9K material

The minimum MCV required immediately before compaction of cement stabilised Class 9B or Class 9H or lime stabilised Class 9D, or Class 9J or lime and cement stabilised Class 9E shall be determined following laboratory and field trials and agreed with the Designer's Geotechnical Site Representative. Class 9K is not planned to be used.

6.7 Contract-specific requirements for acceptability and testing of unburnt colliery spoil

Not anticipated. The use of unburnt colliery spoil shall be subject to the agreement of the Designer's Geotechnical Site Representative.

6.8 Requirements for MCV testing. Any permitted use of the rapid assessment procedure for material acceptability

Where MCV testing is to be implemented it shall be correlated with index testing (moisture content/undrained shear strength/compaction testing/CBR tests).

6.9 Requirements (if any) for removal off site of excavated acceptable material or unacceptable material requiring processing or retention of surplus material on site

Requirements for removal off site of excavated acceptable material or unacceptable material requiring processing or retention of surplus material on site are detailed in the asset specific earthworks specification addendum.

6.10 Permitted use (if any) of acceptable or unacceptable material required to be processed for purposes other than general fill

Permitted use of acceptable or unacceptable material required to be processed for purposes other than general fill are detailed in the asset specific earthworks specification addendum.

6.11 Requirements for in-situ resistivity tests

Requirements for in-situ resistivity tests are detailed in the asset specific earthworks specification addendum. Resistivity testing to be undertaken in accordance with BS 7430 (Wenner method).

6.12 Requirements for in-situ redox potential tests

Not anticipated.

6.13 Bearing ratio requirement for Class 6E, 7F and 7G material, Class 9A, 9B and 9C material, Class 7E, Class 9D material, Class 6R and 7I material, Class 9E and 9F material

Where lime, cement or lime and cement is used to form capping for non-HSR earthworks the minimum CBR to be 10%.

Class 7G and 9C are not anticipated.

6.14 Requirements for the assessment of the effects of water soluble sulfate, oxidisable sulfides and total potential sulfate in accordance with TRL Report 447

The requirements for the assessment of the effects of water soluble sulfate, oxidizable sulphides and total potential sulfate are to comply with the requirements of the SCEW clause 644. The frequency of testing to be as detailed in Appendix 1/5.

6.15 Requirements for magnesium sulfate soundness test

The requirements for magnesium sulfate soundness tests shall be as detailed in Table 6/1, Appendix 1/5.

6.16 Requirements for testing interaction of ground anchor element and fill

Not anticipated.

6.17 Requirements for determination of permeability of earthworks materials

Where required the permeability of earthworks materials to be determined using BS1377 Part 6.

6.18 Requirements for determination of Constrained Soil Modulus of earthworks materials

Not anticipated.

6.19 Requirements for determination of Effective Friction Angle and Effective Cohesion of earthworks materials

The effective friction angle of granular materials to be determined by shear box testing adopting the methodology detailed in BS1377 Part 7, Clause 4 and 5. The effective friction angle and effective cohesion of cohesive materials to be determined by triaxial testing adopting the methodology detailed in BS1377 Part 8, Clause 7 and/or 8, unless specified otherwise.

6.20 Requirements for determination of Undrained Shear Strength of earthworks materials with hand held vane

Any testing using a hand vane (in-situ material and/or fill material) shall be undertaken to the requirements of the New Zealand Guideline for Hand Held Shear Vane Test, 2001. The average vane shear strength shall comprise the average of 4 vane shear strengths taken over a test site (a 1 m^2 area). Test must be performed in a location within the test area where the test is not influenced by the disturbance caused by previous tests. The hand vane shall be pushed into the soil to a depth at least twice the length of the vane blade. The depth of the vane embedment should not exceed the length of the vane blade shaft. The following information shall be provided as part of the reporting of the hand vane test results:

- a material description in accordance with BS 5930 (aligned with Table 7 of BS 5930, 2015);
- an index test of undrained shear strength as detailed in Table 7 of BS 5930;
- vane size;
- depth of vane tip;
- depth of penetration of vane below base of trial pit;
- the direct gauge dial reading of undrained shear strength from the hand vane;
- date;
- weather;
- observed groundwater; and
- vane instrument number.

Table 1: Appendix 6/1 Table 6/1 Acceptable Earthworks Materials: Classification and Compaction Requirements (see footnotes)

Class		General Material Description	Typical Use	Permitted Constituents (All subject to requirements of Clause 601 and contract specific Appendix 6/1)	Material Properties Required for Acceptability (in addition to requirements on use of fill materials in Clause 601 and testing in Clause 631)				Compaction Requirements in Clause 612
					Property (see exceptions in previous column)	Defined and Tested in Accordance with:	Acceptable Limits Within:		
							Lower	Upper	
GENERAL GRANULAR FILL	1A	Well Graded Granular Fill	General Fill for non-HSR earthworks	Any material, or combination of materials, other than glass waste. (Properties (i), (ii) and (iv) in next column shall not apply to chalk). Recycled aggregate. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except chalk); A (construction and demolition recycling industries); B1 (municipal incinerator bottom ash (MIBA)); D2 (air cooled blast furnace slag) D3 (basic oxygen furnace slag) D4 (electric arc furnace slag (EAF C)) E (non-ferrous steel industry – except E2 molybdenum slag) G (mining and quarry industry)	(i) grading	BS 1377: Part 2 or BS EN 13242	Tab 6/2	Tab 6/2	Tab 6/4 Method 2
					(ii) uniformity coefficient	See Note 5	10	-	
					(iii) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC +2%	
							Testing to be undertaken where a larger range to be adopted		
					(iv) effective angle of internal friction and effective cohesion	Clause 636	$\phi' = 33^{o}$, c' = 0 kPa	-	
					(v) water soluble (WS) sulfate content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping or metallic elements)	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	1500 mg/l as SO_4 (when 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping) 300 mg/l as SO_4 (when 500 mm of metallic elements)	
					(vi) oxidisable sulfides (OS) content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping or metallic elements)	TRL Report 477, Test No. 2 and 4	–	0.5% as SO_4 (when 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping) 0.06% as SO_4 (when 500 mm of metallic elements)	

HS2 Ltd - Code 1 - Accepted

	1A1	Well Graded Granular Fill	General Fill for HSR earthworks (see note 18)	Any material, or combination of materials, other than glass waste. (Properties (i), (ii) and (iv) in next column shall not apply to chalk). Recycled aggregate. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates); A (construction and demolition recycling industries); B1 (municipal incinerator bottom ash (MIBA)); G (mining and quarry industry). Property (vii) only applies to materials whose grading includes particle sizes appropriate for testing. Weak rocks may be tested after processing. See also Clause 4.3.10 in HS2-HS2-GT-STD-000-000001.	(i) grading	BS 1377: Part 2 or BS EN 13242	Tab 6/2	Tab 6/2	UEF: End product >98% of maximum dry density, <8% air voids BS1377: Part 4 (4.5 kg method), E_{v2}>60 MPa (see Note 12). LEF: End product >95% of maximum dry density, <10% air voids BS 1377: Part 4 (4.5 kg method), E_{v2}>45 MPa (see Note 12). Landscape earthworks End product >95% of maximum dry density and <10% Air Voids BS 1377: Part 4 (2.5 kg method.
					(ii) uniformity coefficient	See Note 5	10	-	
					(iii) mc	BS 1377: Part 2 See Note 4	OMC -2% Testing to be undertaken where a larger range to be adopted	OMC +2%	
					(iv) optimum mc	BS 1377: Part 4 (4.5 kg rammer method)	–	-	
					(v) Slake durability index (excluding landscape bunds)	ISRM (2007) / ASTM D4644	–	60%	
					(vi) effective angle of internal friction and effective cohesion	Clause 636	ϕ' = 36°, c' = 0 kPa	-	
					(vii) water soluble (WS) sulfate content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping or metallic elements)	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	1500 mg/l as SO_4 (when 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping) 300 mg/l as SO_4 (when 500 mm of metallic elements)	
					(viii) oxidisable sulfides (OS) content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping or metallic elements)	TRL Report 477, Test No. 2 and 4	–	0.5% as SO_4 (when 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping) 0.06% as SO_4 (when 500 mm of metallic elements)	
	1B	Uniformly Graded	General Fill for non-HSR	Any material, or combination of materials, other than glass waste. Recycled aggregate.	(i) grading	BS 1377: Part 2 or BS EN 13242	Tab 6/2	Tab 6/2	Tab 6/4 Method 3

HS2 Ltd - Code 1 - Accepted

		Granular Fill	earthworks	Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except chalk); A (construction and demolition recycling industries); B1 (municipal incinerator bottom ash (MIBA)); C1 (coal fly ash) C4 (coal bottom ash) D2 (air cooled blast furnace slag) D3 (basic oxygen furnace slag) D4 (electric arc furnace slag (EAF C)) E (non-ferrous steel industry – except E2 molybdenum slag) F (foundry industry) G (mining and quarry industry) H1 (dredge spoil sand)	(ii) uniformity coefficient	See Note 5	-	10	
					(iii) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC +2%	
							Testing to be undertaken where a larger range to be adopted		
					(iv) effective angle of internal friction and effective cohesion	Clause 636	$\phi' = 33^{o}$, c' = 0 kPa	-	
					(v) water soluble (WS) sulfate content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping or metallic elements)	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	1500 mg/l as SO_4 (when 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping) 300 mg/l as SO_4 (when 500 mm of metallic elements)	
					(vi) oxidisable sulfides (OS) content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping or metallic elements)	TRL Report 477, Test No. 2 and 4	–	0.5% as SO_4 (when 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping) 0.06% as SO_4 (when 500 mm of metallic elements)	
	1B1	Uniformly Graded Granular Fill	General Fill for HSR earthworks (see note 18)	Any material, or combination of materials, other than glass waste. Recycled aggregate. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except chalk); A (construction and demolition recycling industries); B1 (municipal incinerator bottom ash (MIBA)); C1 (coal fly ash);	(i) grading	BS 1377: Part 2 or BS EN 13242	Tab 6/2	Tab 6/2	UEF: End product >98% of maximum dry density, <8% air voids BS 1377: Part 4 (4.5 kg method), E_{v2}>60 MPa (see Note 12). LEF: End product >95% of maximum dry
					(ii) uniformity coefficient	See Note 5	-	10	
					(iii) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC +2%	
							Testing to be undertaken where a larger range to be adopted		
					(iv) optimum mc	BS 1377: Part 4 (4.5 kg rammer method)	-	-	

				C4 (coal bottom ash); E (non-ferrous steel industry – except E2 molybdenum slag); F (foundry industry); G (mining and quarry industry); H1 (dredge spoil sand).	(v) Slake durability index (excluding landscape bunds)	ISRM (2007) / ASTM D4644	–	60%	density, <10% air voids BS 1377: Part 4 (4.5 kg method), E_{v2}>45 MPa (see Note 12).
					(vi) effective angle of internal friction and effective cohesion	Clause 636	$\phi' = 36^o$, c' = 0 kPa	-	Landscape earthworks End product >95% of maximum dry density and <10% Air Voids BS 1377: Part 4 (2.5 kg method.
					(vii) water soluble (WS) sulfate content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping or metallic elements)	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	1500 mg/l as SO_4 (when 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping) 300 mg/l as SO_4 (when 500 mm of metallic elements)	
					(viii) oxidisable sulfides (OS) content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping or metallic elements)	TRL Report 477, Test No. 2 and 4	–	0.5% as SO_4 (when 500 mm of concrete, cement bound materials other cementitious materials, stabilised capping) 0.06% as SO_4 (when 500 mm of metallic elements)	

Class		General Material Description	Typical Use	Permitted Constituents (All subject to requirements of Clause 601 and contract specific Appendix 6/1)	Material Properties Required for Acceptability (in addition to requirements on use of fill materials in Clause 601 and testing in Clause 631)				Compaction Requirements in Clause 612
					Property (see exceptions in previous column)	Defined and Tested in Accordance with:	Acceptable Limits Within:		
							Lower	Upper	
GENERAL COHESIVE FILL	2A	Wet Cohesive Material	General Fill (non HSR Earthworks) and HSR Lower Embankment Fill (see Note 11 and 18)	Any material, or combination of materials.	(i) grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	Non HSR Earthworks: Tab 6/4 Method 1 except for materials with liquid limit greater than 50, determined by BS 1377: Part 2, only deadweight tamping or vibratory tamping rollers or grid rollers shall be used. HSR Earthworks LEF: End product >95% of maximum dry density and <5% (Air Voids BS 1377: Part 4 (4.5 kg method. Landscape earthworks End product >95% of maximum dry density and <10% Air Voids BS 1377: Part 4 (2.5 kg method.
					(ii) plastic limit (PL) (HSR LEF only excluding landscape bunds)	BS 1377: Part 2	-	-	
					(iii) mc	BS 1377: Part 2 See Note 4	PL -4%	-	
					(iv) MCV (Non-HSR only)	Clause 632	To be determined from trials	To be determined from trials	
					(v) Undrained shear strength of remoulded material	Hand vane – New Zealand Geotechnical Society 2001	Slopes up to 8.5 m: 50 kN/m^2 Slopes up to 13.0 m: 75 kN/m^2 Slopes up to 17.5 m 100 kN/m^2	-	
					(vi) optimum mc (HSR LEF only)	BS 1377: Part 4 (4.5 kg rammer method)	To be determined from trials	To be determined from trials	
					(vii) Argillaceous particles > 20 mm diameter (HSR LEF only excluding landscape bunds)	BS 1377: Part 2 including description	-	50%	
					(viii) liquid limit (HSR LEF only excluding landscape bunds)	BS 1377: Part 2	-	35 (See Note 14)	
					(ix) CBR Swell Limit (HSR LEF only excluding landscape bunds)	Cl. 7.3 BS 1377: Part 4	-	3% (28 days)	
					(x) effective angle of internal friction and effective cohesion	BS 1377: Part 8	$\phi' = 26^{o}$, c' = 1 kPa	-	
	2B	Dry Cohesive Material	General Fill (non HSR Earthworks) and HSR Lower	Any material, or combination of materials.	(i) grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	Non HSR Earthworks: Tab 6/4 Method 2. HSR Earthworks LEF:
					(ii) plastic limit (PL) (HSR LEF only excluding landscape bunds)	BS 1377: Part 2	-	-	

			Embankment Fill (see Note 11 and 18)		(iii) mc	BS 1377: Part 2 See Note 4	-	PL -4%	End product >95% of maximum dry density and <5% Air Voids BS 1377: Part 4 (4.5kg method. Landscape earthworks End product >95% of maximum dry density and <10% Air Voids BS 1377: Part 4 (2.5 kg method.
					(iv) MCV (Non-HSR only)	Clause 632	To be determined from trials	To be determined from trials	
					(v) Undrained shear strength of remoulded material	Hand vane – New Zealand Geotechnical Society 2001	Slopes up to 8.5 m: 50 kN/m² Slopes up to 13.0 m: 75 kN/m² Slopes up to 17.5 m 100 kN/m²	-	
					(vi) optimum mc (HSR LEF only)	BS 1377: Part 4 (4.5 kg rammer method)	To be determined from trials	To be determined from trials	
					(vii) Argillaceous particles > 20 mm diameter (HSR LED only excluding landscape bunds)	BS 1377: Part 2 including description	-	50%	
					(viii) liquid limit (HSR LEF only excluding landscape bunds)	BS 1377: Part 2	-	35 (See Note 14)	
					(ix) CBR Swell Limit (HSR LEF only excluding landscape bunds)	Cl. 7.3 BS 1377: Part 4	-	3%	
					(x) effective angle of internal friction and effective cohesion	BS 1377: Part 8	$\phi' = 26^{o}$, c' = 1 kPa	-	
	2C	Stony Cohesive Fill	General Fill (non HSR Earthworks) and HSR Lower Embankment Fill (see Note 11 and 18)	Any material, or combination of materials.	(i) grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	Non HSR Earthworks: Tab 6/4 Method 2. HSR Earthworks LEF: End product >95% of maximum dry density and <5% Air Voids BS 1377: Part 4 (4.5kg method. Landscape earthworks End product >95% of maximum dry density and <10% Air Voids BS 1377:
					(ii) plastic limit (PL) (HSR LEF only excluding landscape bunds)	BS 1377: Part 2	-	-	
					(iii) mc	BS 1377: Part 2 See Note 4	To be determined from trials	To be determined from trials	
					(iv) MCV (Non-HSR Only)	Clause 632	To be determined from trials	To be determined from trials	
					(v) Undrained shear strength of remoulded material	Clause 633	Slopes up to 8.5 m: 50 kN/m² Slopes up to 13.0 m: 75 kN/m² Slopes up to 17.5 m 100 kN/m²	-	

					(vi) optimum mc (HSR LEF only)	BS 1377: Part 4 (4.5 kg rammer method)	To be determined from trials	To be determined from trials	Part 4 (2.5 kg method.
					(vii) Argillaceous particles > 20 mm diameter (HSR LED only excluding landscape bunds)	BS 1377: Part 2 including description	-	50%	
					(viii) liquid limit (HSR LEF only excluding landscape bunds)	BS 1377: Part 2	-	35 (See Note 14)	
					(ix) CBR Swell Limit (HSR LEF only excluding landscape bunds)	Cl. 7.3 BS 1377: Part 4	-	3% (28 day)	
					(x) effective angle of internal friction and effective cohesion	BS 1377: Part 8	ϕ' = 26°, c' = 1 kPa	-	

Class		General Material Description	Typical Use	Permitted Constituents (All subject to requirements of Clause 601 and contract specific Appendix 6/1)	Material Properties Required for Acceptability (in addition to requirements on use of fill materials in Clause 601 and testing in Clause 631)				Compaction Requirements in Clause 612
					Property (see exceptions in previous column)	Defined and Tested in Accordance with:	Acceptable Limits Within:		
							Lower	Upper	
LANDSCAPE FILL	4	Various	Fill to landscape areas	Refer to asset specific details.	(i) gradings	BS 1377: Part 2	-	-	Refer to asset specific detail
					(ii) mc	BS 1377: Part 2 See Note 4	-	-	
					(iii) MCV (cohesive only)	Clause 632	-	-	
					(iv) undrained shear strength of remoulded material	Hand vane – New Zealand Geotechnical Society 2001	Slopes up to 4 m: 40 kN/m^2 Slopes up to 8.5 m: 50 kN/m^2 Slopes up to 13.0 m: 75 kN/m^2 Slopes up to 17.5 m 100 kN/m^2	-	
					(v) effective angle of internal friction and effective cohesion	Clause 636 (triaxial testing for cohesive materials)	ϕ' = 25^o, c' = 1 kPa	-	
	4A	Tunnel spoil, diaphragm wall, piling and trench arisings	Fill to landscape areas	Refer to asset specific details.	(i) gradings	BS 1377: Part 2	-	-	Refer to asset specific detail
					(ii) mc	BS 1377: Part 2 See Note 4	-	-	
					(iii) MCV (cohesive only)	Clause 632	-	-	
					(iv) undrained shear strength of remoulded material	Hand vane – New Zealand Geotechnical Society 2001	30 kN/m^2	-	
					(v) effective angle of internal friction and effective cohesion	Clause 636 (triaxial testing for cohesive materials)	ϕ' = 20^o, c' = 0 kPa	-	

HS2 Ltd - Code 1 - Accepted

Class		General Material Description	Typical Use	Permitted Constituents (All subject to requirements of Clause 601 and contract specific Appendix 6/1)	Material Properties Required for Acceptability (in addition to requirements on use of fill materials in Clause 601 and testing in Clause 631)				Compaction Requirements in Clause 612
					Property (see exceptions in previous column)	Defined and Tested in Accordance with:	Acceptable Limits Within:		
							Lower	Upper	
TOPSOIL	5A	Topsoil, or turf, existing on site	Top soiling	Topsoil or turf designated as Class 5A in the Contract.	(i) gradings	Clause 618	-	Clause 618	-
TOPSOIL	5B	Imported topsoil	Top soiling	General purpose grade complying with BS 3882.	-	-	-	-	-
TOPSOIL	5S	Agricultural Subsoil	Subsoil underlying topsoil	In accordance with Technical Standard – Soil Handling for Land Restoration HS2-HS2-EV-STD-000-000008.	-	-	-	-	-

Class		General Material Description	Typical Use	Permitted Constituents (All subject to requirements of Clause 601 and contract specific Appendix 6/1)	Material Properties Required for Acceptability (in addition to requirements on use of fill materials in Clause 601 and testing in Clause 631)				Compaction Requirements in Clause 612
					Property (see exceptions in previous column)	Defined and Tested in Accordance with:	Acceptable Limits Within:		
							Lower	Upper	
SELECTED GRANULAR FILL	6B	Selected coarse granular material	Flood protection starter layer (not to be used as starter layer for HSR earthworks)	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, well burnt colliery spoil, slag or any combination thereof. Recycled aggregate. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9, and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A (construction and demolition recycling industries); D2 (air cooled blast furnace slag) – not HSR earthworks; D3 (basic oxygen furnace slag) – not HSR earthworks; D4 (electric arc furnace slag (EAF C)) – not HSR earthworks; G1 (red coal shale) – not HSR earthworks; G3 (pre-selected all-in from quarrying/mining). Glass waste is not permitted	(i) grading	BS 1377: Part 2 (On-site)	Tab 6/2	Tab 6/2	Non HSR earthworks Tab 6/4 Method 5
						BS EN 933-2 (Imported onto site)	Tab 6/5	Tab 6/5	
					(ii) plasticity index	BS 1377: Part 2	Non-plastic		
					(iii) Los Angeles coefficient	Clause 635	-	50	
					(iv) mc	BS 1377: Part 2 See Note 4	To be determined from trials	To be determined from trials	
	6C	Selected uniformly graded granular material	Starter Layer / Cut slope drainage blanket / counterfort drainage / Load Transfer Platform (flood zone only)	Natural gravel, natural sand, crushed gravel, crushed rock other than argillaceous rock, crushed concrete, well burnt colliery spoil, slag or any combination thereof. Recycled aggregate. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9, and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A (construction and demolition recycling industries); D2 (air cooled blast furnace slag) – not HSR earthworks; D3 (basic oxygen furnace slag) – not HSR earthworks; D4 (electric arc furnace slag (EAF C)) – not HSR earthworks; G1 (red coal shale) – not HSR earthworks; G3 (pre-selected all-in from quarrying/mining). Glass waste is not permitted.	(i) grading	BS 1377: Part 2 (On-site)	Tab 6/2	Tab 6/2	HSR & Non HSR earthworks: Tab 6/4 Method 3 HSR earthworks – Max thickness 500 mm Not applicable: Cut slope drainage blanket / counterfort drainage
						BS EN 933-2 (Imported onto site)	Tab 6/5	Tab 6/5	
					(ii) uniformity coefficient	See Note 5	-	10	
					(iii) plasticity index	BS 1377: Part 2	Non-plastic		
					(iv) Los Angeles coefficient	Clause 635	-	50	
					(v) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC +1%	
					(vi) coefficient of friction and adhesion (fill/ elements) (Load Transfer Platform only)	Clause 639	0.65 (subject to geosynthetic manufacturers BBA certificate and basis of design)	–	
					(vii) effective angle of internal friction	Clause 636	$\phi' = 38°$, $c' = 0$ kPa	-	

				and effective cohesion (Load Transfer Platform only – see note 15)				
6E	Selected granular material (HSR embankment fill (Class 9G)	For stabilisation with cement to form HSR embankment fill (Class 9G)	Any material, or combination of materials, other than unburnt colliery spoil and argillaceous rock. Recycled aggregate. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9, and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A (construction and demolition recycling industries); D2 (air cooled blast furnace slag); G (mining and quarry industry – except G2 (black coal shale)). Glass waste is not permitted.	(i) grading	BS 1377: Part 2	Tab 6/2 & 6/5	Tab 6/2 & 6/5	Not applicable
				(ii) mc	BS 1377: Part 2 See Note 4	–	To be determined from trials	
				(iii) liquid limit	BS 1377: Part 2	–	45	
				(iv) plasticity index	BS 1377: Part 2	–	20	
				(v) organic matter	BS 1377: Part 3	–	<1%	
				(vi) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS 1377: Part 3 Clause 5 (not suitable for aggregates)	–	3000 mg/l as SO_4	
				(vii) oxidisable sulfides (OS) content	TRL Report 477, Test No. 2 and 4	–	0.6% as SO_4	
6E/1	Selected granular material (HSR embankment fill (Class 9G/1)	For stabilisation with lime to form HSR embankment fill (Class 9G/1)	Any material, or combination of materials, other than unburnt colliery spoil and argillaceous rock. Recycled aggregate. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9, and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A (construction and demolition recycling industries); D2 (air cooled blast furnace slag); G (mining and quarry industry – except G2 (black coal shale)). Glass waste is not permitted.	(i) grading	BS 1377: Part 2	Tab 6/2 & 6/5	Tab 6/2 & 6/5	Not applicable
				(ii) mc	BS 1377: Part 2 See Note 4	–	To be determined from trials	
				(iii) liquid limit	BS 1377: Part 2	–	45	
				(iv) plasticity index	BS 1377: Part 2	–	20	
				(v) organic matter	BS 1377: Part 3	–	<1%	
				(vi) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS 1377: Part 3 Clause 5 (not suitable for aggregates)	–	3000 mg/l as SO_4	
				(vii) oxidisable sulfides (OS) content	TRL Report 477, Test No. 2 and 4	–	0.6% as SO_4	
6F1	Selected granular material (fine	Capping	Any material, or combination of materials – including recycled aggregates with not more than 50% by mass of recycled bituminous planings and	(i) grading	BS 1377: Part 2 (On-site materials only)	Tab 6/2	Tab 6/2	Tab 6/4 Method 6

	grading)		granulated asphalt, but excluding materials contaminated with tar and tar- bitumen binders, unburnt colliery spoil and argillaceous rock. Property (vi) in the next column shall not apply if the Class Ra (asphalt) content of any recycled aggregate is 20% or less. Where material in this Class is imported onto site it shall be classified as Class 6F4 and comply with the requirements for that material. Glass waste is not permitted.	(ii) optimum mc	BS 1377: Part 4 (vibrating hammer only)	-	-	
				(iii) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC	
				(iv) Los Angeles coefficient	Clause 635	-	60	
				(v) Class Ra (asphalt) content	Clause 710	-	50%	
				(vi) bitumen content	BS EN 12697-1 or BS EN 12697-39	-	2.0%	
6F2	Selected granular material (coarse grading)	Capping	Any material, or combination of materials – including recycled aggregates with not more than 50% by mass of recycled bituminous planings and granulated asphalt, but excluding materials contaminated with tar and tar- bitumen binders, unburnt colliery spoil and argillaceous rock. Property (vi) in the next column shall not apply if the Class Ra (asphalt) content of any recycled aggregate is 20% or less. Where material in this Class is imported onto site it shall be classified as Class 6F5 and comply with the requirements for that material. Glass waste is not permitted.	(i) grading	BS 1377: Part 2 (On-site materials only)	Tab 6/2	Tab 6/2	Tab 6/4 Method 6
				(ii) optimum mc	BS 1377: Part 4 (vibrating hammer only)	-	-	
				(iii) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC	
				(iv) Los Angeles coefficient	Clause 635	-	50	
				(v) Class Ra (asphalt) content	Clause 710	-	50%	
				(vi) bitumen content	BS EN 12697-1 or BS EN 12697-39	-	2.0%	
6F3	Selected granular material	Capping	Any material, or combination of materials with not less than 50% by mass of recycled bituminous planings and granulated asphalt, but excluding materials contaminated with tar and tar-bitumen binders, unburnt colliery spoil and argillaceous rock. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN13242 from the following source codes, see Notes 8, 9 and 10: A1 (reclaimed asphalt); A4 (mixed recycled aggregate); Aggregates from source code A4 shall contain at least 50% of constituents in Class Ra (bituminous materials). Glass waste is not permitted.	(i) grading	BS 1377: Part 2 (On-site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 6 Maximum Compacted layer thickness shall be 200 mm
					BS EN 933-2 (Imported onto site)	Tab 6/5	Tab 6/5	
				(ii) optimum mc	Clause 613	-	-	
				(iii) mc	Clause 613 See Note 4	OMC -2%	OMC	
				(iv) Class Ra (asphalt) content	Clause 710	50%	-	
				(vi) bitumen content	BS EN 12697-1 or BS EN 12697-39	-	10%	
6F4	Selected granular material (fine	Capping	Unbound mixture complying with BS EN 13285 containing aggregate conforming to BS EN 13242 from one or more of the following source codes,	(i) Size designation and overall grading category	BS EN 13285 – 0/31.5 and GE	Tab 6/5	Tab 6/5	Tab 6/4 Method 6

	grading) – imported on to site		see Notes 8, 9 and 10: P (natural aggregates – except, shale, siltstone or slate, see Note 7); A2 (crushed concrete); A3 (crushed bricks, masonry); A4 (mixed recycled aggregate); B1 (municipal incinerator bottom ash (MIBA)); D2 (air cooled blast furnace slag); D3 (basic oxygen furnace slag); D4 (electric arc furnace slag (EAF C)); G (mining and quarry industry – except G2 (black coal shale)). Aggregates from source code A4 shall contain not more than 50% of constituents in Class Ra (bituminous materials). Property (x) in the next column shall not apply if the Class Ra (asphalt) content of any recycled aggregate is 20% or less. Glass waste is not permitted.	(ii) Maximum fines and oversize categories	BS EN 13285 – UF15 and OC75	Tab 6/5	Tab 6/5	
				(iii) Los Angeles Coefficient	BS EN 13242 – LA60	-	60	
				(iv) Volume stability of blast furnace slag	BS EN 13242 – free from dicalcium silicate and iron disintegration	-	-	
				(v) Volume stability of steel (BOF) and EAF) slag	BS EN 13242 – V5	-	-	
				(vi) Laboratory dry density and optimum water content	BS EN 13285,Clause 5.3 – declared values	-	-	
				(vii) Water content	BS EN 1097-5	OMC -2%	OMC	
				(viii) Class Ra (asphalt) content	Clause 710	-	50%	
				(ix) bitumen content	BS EN 12697-1 or BS EN 12697-39	-	2.0%	
6F5	Selected granular material (coarse grading) – imported on to site	Capping / Load Transfer Platform	Unbound mixture complying with BS EN 13285 containing aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except, shale, siltstone or slate, see Note 7); A2 (crushed concrete); A3 (crushed bricks, masonry); A4 (mixed recycled aggregate); B1 (municipal incinerator bottom ash (MIBA)); D2 (air cooled blast furnace slag); D3 (basic oxygen furnace slag); D4 (electric arc furnace slag (EAF C)); G (mining and quarry industry – except G2 (black coal shale)). Aggregates from source code A4 shall contain not more than 50% of constituents in Class Ra (bituminous materials). Property (x) in the next column shall not apply if the Class Ra (asphalt) content of any recycled aggregate	(i) Size designation and overall grading category	BS EN 13285 – 0/80 and GE	Tab 6/5	Tab 6/5	Tab 6/4 Method 6
				(ii) Maximum fines and oversize categories	BS EN 13285 – UF12 and OC75	Tab 6/5	Tab 6/5	
				(iii) Los Angeles Coefficient	BS EN 13242 – LA50	-	50	
				(iv) Volume stability of blast furnace slag	BS EN 13242 – free from dicalcium silicate and iron disintegration	-	-	
				(v) Volume stability of steel (BOF) and EAF) slag	BS EN 13242 – V5	-	-	
				(vi) Laboratory dry density and optimum water	BS EN 13285, Clause 5.3 – declared values	-	-	

			is 20% or less. Glass waste is not permitted.	content				
				(vii) Water content	BS EN 1097-5	OMC -2%	OMC	
				(viii) Class Ra (asphalt) content	Clause 710	-	50%	
				(ix) bitumen content	BS EN 12697-1 or BS EN 12697-39	-	2.0%	
				(x) coefficient of friction and adhesion (fill/ elements) (Load Transfer Platform only)	Clause 639	0.65 (subject to geosynthetic manufacturers BBA certificate and basis of design)	–	
				(xi) effective angle of internal friction and effective cohesion (Load Transfer Platform only)	Clause 636	$\phi' = 38^o$, c' = 0 kPa	-	
				(xii) pH value (Load Transfer Platform with geogrid only)	BS 1377: Part 3	Tab 6/3	Tab 6/3	
6F6	Selected Granular Material	Protection Layer for HSR Earthworks (Granular)	Any material, or combination of materials, other than material designated as Class 3 in the Contract. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates). Glass waste is not permitted.	(i) grading	BS 1377: Part 2	Tab 6/2 & Tab 6/2	Tab 6/2 & 6/5	End product >100% of maximum dry density, <8% air voids BS 1377: Part 4 (4.5 kg method). Modulus of deformation 120 MPa < E_{v2} <500 MPa (see Note 12).
				(ii) plasticity index	BS 1377: Part 2	Non-plastic	-	
				(iii) mc	BS 1377: Part 2 (see note 4)	To be determined from testing	To be determined from testing	
				(iv) optimum mc	BS 1377: Part 4 (4.5 kg rammer method)	To be determined from trials	To be determined from trials	
				(v) Flakiness Index	BS EN 933-3	-	35	
				(vi) Los Angeles abrasion	Clause 635	-	20	
				(vii) Micro-Deval	BS EN 1097-1	–	15%	
				(viii) Freeze-thaw (magnesium sulphate soundness test) Where the source rock is any of those identified in BS EN 13242:2002+A1: 2007, Clause B2.2.	BS EN 1367-2	–	35	

6F8	Selected Granular Material (fine grading)	Prepared Subgrade for HSR earthworks	Any material, of combination of materials – including crushed concrete, but excluding materials contaminated with tar and tar-bitumen binders, unburnt colliery spoil, red shale, crushed bricks, masonry, recycled bituminous planings and granulated asphalt and argillaceous rock, slag, municipal incinerator bottom ash, mining and quarry industry waste. Where material is imported onto site which is not 'as dug' it shall be aggregate confirming to BS EN 13242 from one of more of the following course codes, se Notes 8, 9 and 10: P (natural aggregates – except, shale, siltstone or slate); A2 (crushed concrete). Glass waste is not permitted.	(i) grading	BS EN 13285	Table 8/1 (Sub-Base Type 1) G_p Overall Grading	Table 8/1 (Sub-Base Type 1) G_p Overall Grading	End product >100% of maximum dry density, <8% air voids BS 1377: Part 4 (4.5 kg rammer method), Modulus of deformation E_{v2} >80 MPa (slabtrack); > 60 MPa (ballast); <500 MPa (see Note 12).
				(ii) optimum mc	BS 1377: Part 4 (4.5 kg rammer method)	To be determined from trials	To be determined from trials	
				(iii) mc	BS 1377: Part 2	To be determined from trials	To be determined from trials	
				(iv) Los Angeles coefficient	Clause 635	-	60 (Combined LA + MDE)	
				(v) Micro-Deval Value (MDE)	BS EN 1097-1 10-14 mm sample grading	–	60 (Combined LA + MDE)	
				(vi) Flakiness Index	BS EN 933-3	-	30%	
				(vii) Methylene Blue Value	BS EN 933-9	-	2	
				(viii) Frost Susceptibility	Clause 602.20	Non frost susceptible	-	
				(ix) plasticity of fraction of material passing 425 micron sieve	BS 1377: Part 2	Non plastic	-	
				(x) effective angle of internal friction (ϕ') and effective cohesion (c') (only required when used in HSR embankments)	Clause 636	ϕ' = 36°, c' = 0 kPa	-	
				(xi) water soluble (WS) sulfate content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping)	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	1500 mg/l as SO_4	
				(xii) oxidisable sulfides (OS) content (when material is deposited within 500 mm of	TRL Report 477, Test No. 2 and 4	–	0.5% as SO_4	

				concrete, cement bound materials other cementitious materials or stabilised capping)				
6F9	Selected Granular Material (coarser grading)	Prepared Subgrade for HSR earthworks	Any material, of combination of materials – including crushed concrete, but excluding materials contaminated with tar and tar-bitumen binders, unburnt colliery spoil, red shale, crushed bricks, masonry, recycled bituminous planings and granulated asphalt, argillaceous rock, slag, municipal incinerator bottom ash, mining and quarry industry waste. Where material is imported onto site which is not 'as dug' it shall be aggregate confirming to BS EN 13242 from one of more of the following course codes, se Notes 8,9 and 10: P (natural aggregates – except, shale, siltstone or slate); A2 (crushed concrete). Glass waste is not permitted.	(i) grading	BS 1377: Part 2	Tab 6/2 (as per Class 6F2) & Tab 6/5 (as per Class 6F5)	Tab 6/2 (as per Class 6F2) & Tab 6/5 (as per Class 6F5)	End product >100% of maximum dry density and <8% Air Voids BS 1377: Part 4 (4.5 kg rammer method). Modulus of deformation E_{v2} (see Note 12): >60 MPa (slabtrack); >80 MPa (ballast); <500 MPa
				(ii) optimum mc	BS 1377: Part 4 (4.5 kg rammer method)	To be determined from trials	To be determined from trials	
				(iii) mc	BS 1377: Part 2	To be determined from trials	To be determined from trials	
				(iv) Los Angeles coefficient	Clause 635	-	60 (Combined LA + MDE)	
				(v) Micro-Deval Value (MDE)	BS EN 1097-1 10-14 mm sample grading	–	60 (Combined LA + MDE)	
				(vi) Flakiness Index	BS EN 933-3	-	30%	
				(vii) Methylene Blue Value	BS EN 933-9	-	2	
				(viii) Frost Susceptibility	Clause 602.20	Non frost susceptible	-	
				(ix) plasticity of fraction of material passing 425 micron sieve	BS 1377: Part 2	Non plastic	-	
6G	Selected granular material	Gabion filling	Natural gravel, crushed rock, crushed concrete or any combination thereof. None of these constituents shall include any argillaceous rock. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, se e Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete).	(i) grading		Clause 626	Clause 626	None
				(ii) Los Angeles coefficient	Clause 635	-	50	
6G/1	Selected granular material	Riprap filling / rock fill mattress	Natural gravel, crushed rock, crushed concrete or any combination thereof. None of these constituents shall include any argillaceous rock. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13383 Parts 1 and 2	(i) grading		BS EN 13383 Parts 1 and 2 Tables 1 to 4	BS EN 13383 Parts 1 and 2 Tables 1 to 4	None
				(ii) Los Angeles coefficient	Clause 635	-	50	

6H	Selected granular material	Drainage layer to reinforced soil and anchored earth structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. (Properties (vi), (vii), (viii), (ix), (x), (xi) and (xii) in next column only apply when metallic reinforcing or anchor elements, facing units or fastenings are used.) .Recycled aggregate except recycled asphalt. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete); A3 (crushed bricks, masonry); G1 (red coal shale) – not HSR earthworks.	(i) grading	BS 1377: Part 2 (On-site)	Tab 6/2	Tab 6/2	Tab 6/4 Method 3
					BS EN 933-2 (Imported onto site)	Tab 6/5	Tab 6/5	
				(ii) plasticity index	BS 1377: Part 2	Non-plastic		
				(iii) Los Angeles coefficient	Clause 635	-	50	
				(iv) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC	
						Testing to be undertaken where a larger range to be adopted		
				(v) pH value	BS 1377: Part 3	Tab 6/3	Tab 6/3	
				(vi) chloride ion content	BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1	-	Tab 6/3	
				(vii) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	-	Tab 6/3	
				(viii) oxidisable sulfides (OS) content	TRL Report 477, Test No. 2 and 4	-	Tab 6/3	
				(ix) resistivity	Clause 637	Tab 6/3	-	
				(x) redox potential	Clause 638	Tab 6/3	-	
				(xi) organic content	BS 1377: Part 3	-	Tab 6/3	
				(xii) microbial activity index	Table 6/3	-	Tab 6/3	
6I	Selected well graded granular material	Fill to reinforced earth soil and anchored earth structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, slag, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. (Properties (viii), (ix), (x), (xi), (xii), (xiii) and (xiv) only apply when metallic reinforcing or anchor elements, facing units or fastenings are used.) Recycled aggregate except recycled asphalt. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source	(i) grading	BS 1377: Part 2 or BS EN 933-2	Tab 6/2 & 6/5	Tab 6/2 & 6/5	Tab 6/4 Method 2
				(ii) uniformity coefficient	See Note 5	10	–	
				(iii) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC +1%	
						Testing to be undertaken where a larger range to be adopted		
				(iv) effective angle of friction (φ') and	Clause 636	φ' = 37°, c' = 0 kPa	–	

			codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete); A3 (crushed bricks, masonry); D2 (air cooled blast furnace slag) – not HSR earthworks; G1 (red coal shale) – not HSR earthworks.	effective cohesion (c′)				
				(v) coefficient of friction and adhesion (fill/ elements)	Clause 639	0.65 (subject to geosynthetic manufacturers BBA certificate and basis of design)	–	
				(vi) pH value	BS 1377: Part 3	Tab 6/3	Tab 6/3	
				(vii) chloride ion content	BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1	–	Tab 6/3	
				(viii) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	Tab 6/3	
				(ix) oxidisable sulfides (OS) content	TRL Report 477, Test No. 2 and 4	–	Tab 6/3	
				(x) resistivity	Clause 637	Tab 6/3	–	
				(xi) redox potential	Clause 638	Tab 6/3	–	
				(xii) organic content	BS 1377: Part 3	–	Tab 6/3	
				(xiii) microbial activity index	Table 6/3	–	Tab 6/3	
6J	Selected uniformly graded granular material	Fill to reinforced soil and anchored earth	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, slag, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. (Properties (viii), (ix), (x), (xi), (xii), (xiii) and (xiv) in next column only apply when metallic reinforcing or anchor elements, facing units or fastenings are used.) (Properties (i), (ii) and (v) in next column shall not apply to chalk.) Recycled aggregate except recycled asphalt. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source	(i) grading	BS 1377: Part 2 (On-site) or BS EN 933-2 (Imported onto site)	Tab 6/2 & 6/5	Tab 6/2 & 6/5	Tab 6/4 Method 3
				(ii) uniformity coefficient	See Note 5	5	10	
				(iii) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC +1%	
						Testing to be undertaken where a larger range to be adopted		
				(iv) effective angle of friction (φ′) and	Clause 636	φ′ = 37°, c′ = 0 kPa	–	

				codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete); A3 (crushed bricks, masonry); D2 (air cooled blast furnace slag) – not HSR earthworks; G1 (red coal shale) – not HSR earthworks	effective cohesion (c')				
					(v) coefficient of friction and adhesion (fill/ elements)	Clause 639	0.65 (subject to geosynthetic manufacturers BBA certificate and basis of design)	–	
					(vi) pH value	BS 1377: Part 3	Tab 6/3	Tab 6/3	
					(vii) chloride ion content	BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1	–	Tab 6/3	
					(viii) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	Tab 6/3	
					(ix) oxidisable sulfides (OS) content	TRL Report 477, Test No. 2 and 4	–	Tab 6/3	
					(x) resistivity	Clause 637	Tab 6/3	–	
					(xi) redox potential	Clause 638	Tab 6/3	–	
					(xii) organic content	BS 1377: Part 3	–	Tab 6/3	
					(xiii) microbial activity index	Table 6/3	–	Tab 6/3	
	6K	Selected granular material	Lower bedding for pre-cast concrete elements	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt. Where material is imported onto which is not 'as dug' site it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10:	(i) grading	BS 1377: Part 2 (On-site)	Tab 6/2	Tab 6/2	Not applicable
						BS EN 933-2 (Imported onto site)	Tab 6/5	Tab 6/5	
					(ii) uniformity coefficient	See Note 5	5	–	
					(iii) plasticity index	BS 1377: Part 2	–	6	

			P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete); A3 (crushed bricks, masonry); G1 (red coal shale) – not HSR earthworks.	(iv) optimum mc	BS 1377: Part 4 (vibrating hammer method)	–	–	
				(v) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC +1%	
				(vi) Los Angeles coefficient	Clause 635	–	40	
6L	Selected uniformly graded granular material	Upper bedding for corrugated steel buried structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete); A3 (crushed bricks, masonry); G1 (red coal shale) – not HSR earthworks.	(i) grading	BS 1377: Part 2 (On-site)	Tab 6/2	Tab 6/2	Not applicable
					BS EN 933-2 (Imported onto site)	Tab 6/5	Tab 6/5	
				(ii) resistivity	Clause 637	2000 ohm cm	–	
				(iii) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	300 mg/ l as SO_4	
				(iv) oxidisable sulfides (OS) content	TRL Report 477, Test No. 2 and 4	–	0.06% as SO_4	
				(v) chloride ion content	BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1	–	0.025%	
				(vi) pH value	BS 1377: Part 3	6	9	
6M	Selected granular material	Surround to corrugated steel buried structures	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete); A3 (crushed bricks, masonry); G1 (red coal shale) – not HSR earthworks.	(i) grading	BS 1377: Part 2 (On-site)	Tab 6/2	Tab 6/2	End product 90% of maximum dry density of BS 1377: Part 4 (Vibrating hammer method) unless otherwise stated in App 6/1
					BS EN 933-2 (Imported onto site)	Tab 6/5	Tab 6/5	
				(ii) uniformity coefficient	See Note 5	5	–	
				(iii) plasticity index	BS 1377: Part 2	–	6	
				(iv) optimum mc	BS 1377: Part 4 (vibrating hammer method)	–	–	
				(v) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC +1%	

					(vi) Los Angeles coefficient	Clause 635	–	40	
					(vii) resistivity	Clause 637	2000 ohm cm	–	
					(viii) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	300 mg/l as SO_4	
					(ix) oxidisable sulfides (OS) content	TRL Report 477, Test No. 2 and 4	–	0.06% as SO_4	
					(x) chloride ion content	BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1	–	0.025%	
	6N	Selected well graded granular material	Fill to structures (backfill to non integral structure)	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, study slag, well-burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete) A3 (crushed bricks, masonry); G1 (red coal shale) – not HSR earthworks.	(i) grading	BS 1377: Part 2	Tab 6/2 & 6/5	Tab 6/2 & 6/5	Non HSR End product 95% of maximum dry density BS1377: part 4 (vibrating hammer method) HSR: End product 98% of maximum dry density of BS 1377: Part 4 (vibrating hammer method)
					(ii) uniformity coefficient	See Note 5	10	-	
					(iii) Los Angeles coefficient	Clause 635	-	40	
					(iv) effective angle of internal friction (ϕ') and effective cohesion (c')	Clause 636	$\phi' = 38^{o}$, c' = 0 kPa	-	
					(v) permeability	Clause 640	-	-	
					(vi) mc	BS 1377: Part 2 (see Note 4)	OMC -2% Testing to be undertaken where a larger range to be adopted	OMC +1%	
					(vii) slope stability test (where required in App 6/6)	Clause 610	Not used		
					(viii) water soluble (WS) sulfate content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not	–	1500 mg/l as SO_4	

					materials or stabilised capping)	suitable for aggregates)			
					(ix) oxidisable sulfides (OS) content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping)	TRL Report 477, Test No. 2 and 4	–	0.5% as SO_4	
	6N1	Selected Well Graded Granular Material	Fill to structures (backfill to integral structure)	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, slag, well burnt colliery spoil or any combination thereof. None of these constituents shall include argillaceous rock. Recycled aggregate except recycled asphalt. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7) A2 (crushed concrete) A3 (crushed bricks, masonry) D2 (air cooled blast furnace slag) G1 (red coal shale)	(i) grading	BS 1377: Part 2	Tab 6/2 & 6/5	Tab 6/2 & 6/5	End product 95% of maximum dry density of BS 1377: Part 4 (vibrating hammer method)
					(ii) uniformity coefficient	See Note 5	10	-	
					(iii) Los Angeles coefficient	Clause 635	-	40	
					(iv) effective angle of internal friction (ϕ') and effective cohesion (c')	Clause 636 (shear box method)	ϕ' = 36, c' = 0 kPa	ϕ' = 45, c' = 0 kPa	
					(v) permeability	Clause 640	-	-	
					(vi) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC +1%	
							Testing to be undertaken where a larger range to be adopted		
					(vii) slope stability test (where required in App 6/6)	Clause 610	Not Used		
					(viii) Stiffness at E' at 0.1% strain	BS 1377: Part 9	60 MPa	85 MPa	
					(ix) water soluble (WS) sulfate content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping)	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	1500 mg/l as SO_4	
					(x) oxidisable sulfides (OS) content (when	TRL Report 477, Test No. 2 and 4	–	0.5% as SO_4	

				material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping)				
6N2	Selected well graded granular material	Fill to structures (tunnel portal structure)	Natural gravel, natural sand, crushed gravel, crushed rock, slag, well-burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete) A3 (crushed bricks, masonry); G1 (red coal shale) – not HSR earthworks.	(i) grading	BS 1377: Part 2	Tab 6/2 & 6/5	Tab 6/2 & 6/5	Non HSR End product 95% of maximum dry density BS 1377: part 4 (vibrating hammer method) HSR: End product 98% of maximum dry density of BS 1377: Part 4 (vibrating hammer method)
				(ii) uniformity coefficient	See Note 5	10	-	
				(iii) Los Angeles coefficient	Clause 635	-	40	
				(iv) effective angle of internal friction (ϕ') and effective cohesion (c')	Clause 636 (shear box method)	ϕ' = 36°, c' = 0 kPa	ϕ' = 42°, c' = 0 kPa	
				(v) permeability	Clause 640	-	-	
				(vi) mc	BS 1377: Part 2 (see Note 4)	OMC -2% Testing to be undertaken where a larger range to be adopted	OMC +1%	
				(vii) slope stability test (where required in App 6/6)	Clause 610	Not used		
				(viii) Stiffness E' at 0.1% strain	BS 1377: Part 9	60 MPa	80 MPa	
				(ix) water soluble (WS) sulfate content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping)	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	1500 mg/l as SO_4	
				(x) oxidisable sulfides (OS) content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious	TRL Report 477, Test No. 2 and 4	–	0.5% as SO_4	

				materials or stabilised capping)				
6P	Selected granular material	Fill to structures (backfill to non integral structure)	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, slag, well-burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete) A3 (crushed bricks, masonry); G1 (red coal shale) – not HSR earthworks.	(i) grading	BS 1377: Part 2	Tab 6/2 & 6/5	Tab 6/2 & 6/5	Non HSR End product 95% of maximum dry density BS1377: part 4 (vibrating hammer method) HSR: End product 98% of maximum dry density of BS 1377: Part 4 (vibrating hammer method)
				(ii) uniformity coefficient	See Note 5	5	-	
				(iii) Los Angeles coefficient	Clause 635	-	60	
				(iv) effective angle of internal friction (ϕ') and effective cohesion (c')	Clause 636	ϕ' = 38°, c' = 0 kPa	-	
				(v) permeability	Clause 640	-	-	
				(vi) mc	BS 1377: Part 2 (see Note 4)	OMC -2%	OMC +1%	
						Testing to be undertaken where a larger range to be adopted		
				(vii) slope stability test (where required in App 6/6)	Clause 610	Not used		
				(viii) water soluble (WS) sulfate content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping)	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	1500 mg/l as SO_4	
				(ix) oxidisable sulfides (OS) content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping)	TRL Report 477, Test No. 2 and 4	–	0.5% as SO_4	
6P1	Selected Granular Material	Fill to structures (backfill to integral structure)	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, slag, well burnt colliery spoil or any combination thereof. None of these constituents shall include argillaceous rock. Recycled aggregate except recycled asphalt. Where material is imported onto site which is not	(i) grading	BS 1377: Part 2	Tab 6/2 & 6/5	Tab 6/2 & 6/5	End product 95% of maximum dry density of BS 1377: Part 4 (vibrating hammer method) unless otherwise
				(ii) uniformity coefficient	See Note 5	5	-	
				(iii) Los Angeles coefficient	Clause 635	-	60	

			'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7) A2 (crushed concrete) A3 (crushed bricks, masonry) D2 (air cooled blast furnace slag) G1 (red coal shale)	(iv) effective angle of internal friction (ϕ') and effective cohesion (c')	Clause 636 (shear box method)	ϕ' = 36, c' = 0 kPa	ϕ' = 45, c' = 0 kPa	stated in App 6/1
				(v) permeability	Clause 640	-	-	
				(vi) mc	BS 1377: Part 2 See Note 4	OMC -2%	OMC +1%	
						Testing to be undertaken where a larger range to be adopted		
				(vii) slope stability test (where required in App 6/6)	Clause 610	Not Used		
				(viii) Stiffness at E' at 0.1% strain	BS 1377: Part 9	60 MPa	85 MPa	
				(ix) water soluble (WS) sulfate content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping)	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	1500 mg/l as SO_4	
				(x) oxidisable sulfides (OS) content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping)	TRL Report 477, Test No. 2 and 4	–	0.5% as SO_4	
6P2	Selected granular material	Fill to structures (tunnel portal structures)	Natural gravel, natural sand, crushed gravel, crushed rock, slag, well-burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. Recycled aggregate except recycled asphalt. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete)	(i) grading	BS 1377: Part 2	Tab 6/2 & 6/5	Tab 6/2 & 6/5	Non HSR End product 95% of maximum dry density BS 1377: part 4 (vibrating hammer method) HSR: End product 98% of maximum dry density of BS 1377: Part 4 (vibrating hammer method)
				(ii) uniformity coefficient	See Note 5	5	-	
				(iii) Los Angeles coefficient	Clause 635	-	60	
				(iv) effective angle of internal friction (ϕ') and effective cohesion (c')	Clause 636 (shear box method)	ϕ' = 36º, c' = 0 kPa	ϕ' = 42º, c' = 0 kPa	
				(v) permeability	Clause 640	-	-	
				(vi) mc	BS 1377: Part 2	OMC -2%	OMC +1%	

			A3 (crushed bricks, masonry); G1 (red coal shale) – not HSR earthworks.		(see Note 4)	Testing to be undertaken where a larger range to be adopted		
				(vii) slope stability test (where required in App 6/6)	Clause 610	Not used		
				(viii) Stiffness at E' at 0.1% strain	BS 1377: Part 9	60 MPa	80 MPa	
				(ix) water soluble (WS) sulfate content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping)	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	1500 mg/l as SO_4	
				(x) oxidisable sulfides (OS) content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping)	TRL Report 477, Test No. 2 and 4	–	0.5% as SO_4	
6Q	Selected granular material	Overlying fill to corrugated steel buried structures – not for use on HSR	Natural gravel, natural sand, crushed gravel, crushed rock, crushed concrete, slag, chalk, well burnt colliery spoil or any combination thereof. None of these constituents shall include any argillaceous rock. (Properties (i), (ii) and (ix) in next column shall not apply to chalk.) Recycled aggregate except recycled asphalt. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except shale, siltstone or slate, see Note 7); A2 (crushed concrete); A3 (crushed bricks, masonry); D2 (air cooled blast furnace slag) – not HSR earthworks; G1 (red coal shale) – not HSR earthworks.	As for Class 1A, 1B or 1C with the addition of the following: Selected granular material				End product 95% of maximum dry density of BS 1377: Part 4 (vibrating hammer method)
				(i) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–		
				(ii) oxidisable sulfides (OS) content	TRL Report 477, Test No. 2 and 4	–		
				(iii) chloride ion content	BS EN 1744-1 or equivalent test in accordance with	–		

						BRE Special Digest 1			
					(iv) pH value	BS 1377: Part 3	6		
					(v) sulfide and hydrogen sulfide	Standard textbook of qualitative inorganic analysis	–		
	6R	Selected granular material	For stabilisation with lime and cement to form HSR embankment fill (Class 9L)	Any material, or combination of materials, other than unburnt colliery spoil and argillaceous rock. Glass waste is not permitted.	(i) grading	BS 1377: Part 2 (On-site) or BS EN 933-2 (Imported onto site)	Tab 6/2 & 6/5	Tab 6/2 & 6/5	Not applicable
					(ii) mc	BS 1377: Part 2 See Note 4	To be determined from trials	To be determined from trials	
					(iii) liquid limit	BS 1377: Part 2	-	45	
					(iv) Plasticity index	BS 1377: Part 2	-	20	
					(v) organic matter	BS 1377: Part 3	-	<1%	
					(vi) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS 1377-3 Clause 5 (not suitable for aggregates)	–	3000 mg/l as SO_4	
					(vii) oxidisable sulfides (OS) content	TRL Report 447, Test No. 2 and 4	-	0.06% as SO_4	
	6S	Selected well graded granular material	Filter Layer below subbase	Crushed rock or sand. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN 13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates – except chalk, shale, siltstone or slate, see Note 7).	(i) grading	BS 1377: Part 2 (On-site) or BS EN 933-2 (Imported onto site)	Tab 6/2 & 6/5	Tab 6/2 & 6/5	
					(ii) plasticity index	BS 1377: Part 2	-	Non-plastic	

Class		General Material Description	Typical Use	Permitted Constituents (All subject to requirements of Clause 601 and contract specific Appendix 6/1)	Material Properties Required for Acceptability (in addition to requirements on use of fill materials in Clause 601 and testing in Clause 631)				Compaction Requirements in Clause 612
					Property (see exceptions in previous column)	Defined and Tested in Accordance with:	Acceptable Limits Within:		
							Lower	Upper	
SELECTED COHESIVE FILL	7A	Selected cohesive material	Fill to structures / containment barrier / lining to a watercourse	Any material or combination of materials, other than argillaceous rock (Properties (vii) and (viii) may be increased to 54% and 31% respectively for Lias Clay only and subject to the requirements of contract specific Appendix 6/6).	(i) grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	End product: 100% of maximum dry density of BS 1377: Part 4 (2.5 kg rammer method, 4.5 kg rammer method for HSR) or a dry density corresponding to 5% air voids at field mc whichever is lower
					(ii) mc	BS 1377: Part 2 See Note 4	To be determined from trials	To be determined from trials	
					(iii) MCV	Clause 632	To be determined from trials	To be determined from trials	
					(iv) undrained shear parameters	Clause 633	50 kPa, 75 kPa or 100 kPa	-	
					(v) effective angle of internal friction (φ') and effective cohesion (c')	Clause 636	ϕ' = 26°, c' = 1 kPa	-	
					(vi) liquid limit	BS 1377: Part 2	–	45% for non-HSR 35% for HSR	
					(vii) plasticity index	BS 1377: Part 2	–	25%	
					(viii) permeability (only required where 7A is required as a containment barrier to contamination or lining to a watercourse)	Clause 640	-	1x10^{-8} m/s (containment barrier) 1x10^{-9} m/s (watercourse)	
	7E	Selected cohesive material	For stabilisation with lime to form HSR embankment/ landscape fill (Class 9J)	Any material, or combination of materials other than unburnt colliery spoil. Glass waste is not permitted.	(i) grading	BS 1377: Part 2 (on site)	Tab 6/2	Tab 6/2	Not applicable
					(ii) mc	BS 1377: Part 2 See Note 4	To be determined from trials	To be determined from trials	
					(iii) MCV	Clause 632	To be determined from laboratory/ field trials	To be determined from field trials	
					(iv) Plasticity index	BS 1377: Part 2	10	-	
					(v) organic matter	BS 1377: Part 3	-	<1%	

					(vi) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS 1377: Part 3 Clause 5 (not suitable for aggregates)	-	3000 mg/l as SO_4	
					(vii) oxidizable sulphides (OS) content	TRL Report 477, Test No. 2 and 4	-	To be determined from trials	
					(viii) total potential sulfate (TPS) content	TRL Report 477, Test No. 4	-	<1% (exceedance of 1% subject to trials)	
					(ix) liquid limit (HSR emb fill only)	BS 1377: Part 2	-	65%	
					(x) plasticity index (HSR emb fill only)	BS 1377: Part 2	-	40%	
	7E/1	Selected cohesive material	For stabilisation with lime and GGBS to form HSR embankment fill (Class 9J/1)	Any material including GGBS, or combination of materials other than unburnt colliery spoil. Glass waste is not permitted.	(i) grading	BS 1377: Part 2 (on site)	Tab 6/2	Tab 6/2	Not applicable
					(ii) mc	BS 1377: Part 2 See Note 4	To be determined from trials	To be determined from trials	
					(iii) MCV	Clause 632	To be determined from laboratory/ field trials	To be determined from field trials	
					(iv) Plasticity index	BS 1377: Part 2	10	-	
					(v) organic matter	BS 1377: Part 3	-	<1%	
					(vi) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS 1377: Part 3 Clause 5 (not suitable for aggregates)	-	To be determined from trials	
					(vii) oxidizable sulphides (OS) content	TRL Report 477, Test No. 2 and 4	-	To be determined from trials	
					(viii) total potential sulfate (TPS) content	TRL Report 477, Test No. 4	-	<1% (exceedance of 1% subject to trials)	
					(ix) liquid limit (HSR emb fill only)	BS 1377: Part 2	-	65%	

					(x) plasticity index (HSR emb fill only)	BS 1377: Part 2	-	40%	
	7F	Selected silty cohesive material	For stabilisation with cement to form capping (Class 9B or HSR embankment fill (Class 9H)	Any material, or combination of materials, other than chalk, unburnt colliery spoil and argillaceous rock. Glass waste is not permitted.	(i) grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	Not applicable
					(ii) uniformity coefficient	See Note 5	5	-	
					(iii) mc	BS 1377: Part 2 See Note 4	–	To be determined from trials	
					(iv) MCV	Clause 632	To be determined from trials	–	
					(v) liquid limit	BS 1377: Part 2	-	45	
					(vi) plasticity index	BS 1377: Part 2	-	20	
					(vii) organic matter	BS 1377: Part 2	-		
					(viii) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	-	To be determined from trials	
					(ix) oxidisable sulfides (OS) content	TRL Report 477, Test No. 2 and 4	--	To be determined from trials	
					(x) total potential sulfate (TPS) content	TRL Report 477, Test No. 4	-	<1% (exceedance of 1% subject to trials)	
	7I	Selected cohesive material	For stabilisation with lime and cement to form HSR embankment fill (Class 9K)	Any material, or combination of materials, other than unburnt colliery spoil.	(i) grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	Not applicable
					(ii) mc	BS 1377: Part 2 See Note 4	–	To be determined from trials	
					(iii) MCV	Clause 632	To be determined from trials	–	
					(iv) plasticity index	BS 1377: Part 2	10	–	
					(v) organic matter	BS 1377: Part 3	–	<1%	
					(vi) water soluble (WS) sulfate content	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	To be determined from trials	

					(vii) oxidisable sulfides (OS) content	TRL Report 477, Test No. 2 and 4	–	To be determined from trials	
					(viii) total potential sulfate (TPS) content	TRL Report 477, Test No. 4	–	<1% (exceedance of 1% subject to trials)	
					(ix) liquid limit (HSR emb fill only)	BS 1377: Part 2	-	65%	
					(x) plasticity index (HSR emb fill only)	BS 1377: Part 2	-	40%	

Class		General Material Description	Typical Use	Permitted Constituents (All subject to requirements of Clause 601 and contract specific Appendix 6/1)	Material Properties Required for Acceptability (in addition to requirements on use of fill materials in Clause 601 and testing in Clause 631): Property (see exceptions in previous column)	Defined and Tested in Accordance with:	Acceptable Limits Within: Lower	Upper	Compaction Requirements in Clause 612
MISCELLANEOUS FILL	8	Class 1, Class 2, or Class 3 material	Lower trench fill	Any material; except no stones or lumps of clay shall be retained on the 40 mm test sieve. Recycled aggregate. Where material is imported onto site which is not 'as dug' it shall be aggregate conforming to BS EN13242 from one or more of the following source codes, see Notes 8, 9 and 10: P (natural aggregates); A (construction and demolition recycling industries); B1 (municipal incinerator bottom ash (MIBA)) D2 (air cooled blast furnace slag) – not HSR earthworks; D3 (basic oxygen furnace slag) – not HSR earthworks; D4 (electric arc furnace slag (EAF C)) – not HSR earthworks; G (mining and quarry industry). Glass waste is not permitted.	(i) mc	BS 1377: Part 2 See Note 4			Tab 6/4
					(ii) MCV	Clause 632			
	803 (Type 1)	Unbound Mixtures	Load Transfer Platform	Unbound mixture complying with BS EN 13285 containing aggregate conforming to BS EN 13242: Crushed rock, crushed manufactured and crushed recycled aggregates. Crushed gravel. Property (viii) in the next column shall not apply if the Class Ra (asphalt) content of any recycled aggregate is 20% or less. Glass waste is not permitted.	(i) Size designation and maximum fines Overall grading	BS EN 13285 – 0/31.5 UF_9 OC_{75} G_P	Tab 5 SCEW Series 0800	Tab 5 SCEW Series 0800	Tab 8/4 SCEW Series 0800
					(ii) Water content	BS EN 1097-5	OMC -2%	OMC +2%	
					(iii) Plastic Limit	BS 1377: Part 2	Non-plastic		
					(iv) Los Angeles abrasion	Clause 635	-	50	
					(v) Micro-Deval	BS EN 1097-1	Supplier to state the value for the aggregate used		
					(vi) Freeze-thaw (magnesium sulphate soundness test) Where the source rock is any of those identified in BS EN 13242:2002+A1: 2007, Clause B2.2.	BS EN 1367-2	–	35	

(vii) Water absorption	BS EN 13242	Supplier to state the value for the aggregate used	
(viii) Class Ra (asphalt) content	Clause 710	-	50%
(ix) Class Rg (glass) content	Clause 710	-	1%
(x) Optimum mc	BS EN 13285	-	-
(xi) Water Soluble sulphate (WS) content	BS EN 1744-1 Clause 10		Within: 500 mm or metallic element <300 mg/l 500 mm of cementitious element <1500 mg/l
(xii) Total Sulphur (TS) content	BS EN 1744-1 Clause 11		Within: 500 mm of metallic element <1% 500 mm of cementitious element <1%
(xiii) Sulphide (S) content	BS EN 1744-1 Clause 13		Within: 500 mm of metallic element <0.5% 500 mm of cementitious element <0.5%
(xiv) pH	BS 1377: Part 3	Supplier to state the value for the aggregate used	
(xv) coefficient of friction and adhesion (fill/ elements)	Clause 639	0.65 (subject to geosynthetic manufacturers BBA certificate and basis of design)	–
(xvi) effective angle of internal friction and effective cohesion	Clause 636	$\phi' = 38^{o}$, c' = 0 kPa	-
(xvii) Frost heave	BS 812 Part 124	Non frost susceptible	

	8A		Fill to crest edge of mainline embankment	Natural or recycles coarse aggregate or recycled concrete aggregate complying with BS EN 13242. Rounded aggregate not permitted.	(i) Grading	BS 1377: Part 2 or BS EN 13242	Tab 6/5	Tab 6/5	Tab 6/4 Method 3
					(ii) uniformity coefficient	See Note 5	2		
					(iii) plasticity index	BS 1377: Part 2	Non-plastic		
					(iv) Los Angeles Coefficient	BS EN 13242 – LA_{50}	-	50	
					(v) effective angle of internal friction and effective cohesion (see note 15)	Clause 636	$\phi' = 35^o$, c' = 0 kPa	-	
					(ix) water soluble (WS) sulfate content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping or metallic structural elements)	TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)	–	1500 mg/l as SO_4 (metallic structural elements 500 mg/l as SO_4)	
					(x) oxidisable sulfides (OS) content (when material is deposited within 500 mm of concrete, cement bound materials other cementitious materials or stabilised capping, or metallic structural elements)	TRL Report 477, Test No. 2 and 4	–	0.5% as SO_4 (metallic structural elements 0.06% as SO_4)	

	Class	General Material Description	Typical Use	Permitted Constituents (All subject to requirements of Clause 601 and contract specific Appendix 6/1)	Material Properties Required for Acceptability (in addition to requirements on use of fill materials in Clause 601 and testing in Clause 631)				Compaction Requirements in Clause 612
					Property (see exceptions in previous column)	Defined and Tested in Accordance with:	Acceptable Limits Within:		
							Lower	Upper	
STABILISED MATERIALS	9A	Cement stabilised well graded granular material	Capping (Non HSR)	Class 6E with addition of cement according to Clause 614	(i) pulverisation	BS EN 13286-48	60%	-	Tab 6/4 Method 6
					(ii) bearing ratio	BS EN 13286-47	10%	-	
					(iii) mc	BS EN 13286-2	To be determined from laboratory/ field testing	To be determined from laboratory/ field testing	
	9B	Cement stabilised cohesive materials	Capping (Non HSR)	Class 7F with addition of cement according to Clause 614	(i) pulverisation	BS EN 13286-48	30%	-	Tab 6/4 Method 7
					(ii) MCV immediately before compaction	Clause 632	To be determined from laboratory/field trials to achieve dry density	To be determined from laboratory/field trials to achieve dry density	
					(iii) bearing ratio	BS EN 13286-47	10%	-	
					(iv) mc	BS EN 13286-2	To be determined from laboratory/ field testing	-	
	9D	Lime stabilised cohesive material	Capping (Non HSR)	Class 7E with addition of lime according to Clause 615	(i) pulverisation	BS EN 13286-48	30%	-	Tab 6/4 Method 7
					(ii) MCV immediately before compaction	Clause 632	To be determined from laboratory/ field trials to achieve dry density	To be determined from laboratory/field trials to achieve dry density	
					(iii) bearing ratio	BS EN 13286-47	10%	-	
					(iv) mc	BS EN 13286-2	To be determined from laboratory/ field testing	-	
	9E	Lime and cement stabilised cohesive material	Capping (Non HSR)	Class 7I with addition of lime and cement according to Clause 643	(i) pulverisation	BS EN 13286-48	30%	-	Tab 6/4 Method 7
					(ii) MCV immediately before compaction	Clause 632	To be determined from laboratory/field trials to achieve dry density	To be determined from laboratory/field trials to achieve dry density	
					(iii) bearing ratio	BS EN 13286-47	10%	-	
					(iv) mc	BS EN 13286-2	To be determined from laboratory/ field trials	To be determined from laboratory/ field trials	

	9F	Lime and cement stabilised well graded granular material	Capping (Non HSR)	Class 6R with addition of lime and cement according to Clause 643	(i) pulverisation	BS EN 13286-48	60%	-	Tab 6/4 Method 6
					(ii) bearing ratio	BS EN 13286-47	10%	-	
					(iii) mc	BS EN 13286-2 See Note 4	To be determined from trials	To be determined from trials	
	9G	Cement stabilised well graded granular material	HSR embankment fill (including transitions)	Class 6E with addition of cement according to Clause 647	(i) pulverisation	BS EN 13286-48	60%	-	UEF: End product >98% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method / 2.5 kg method – see note 17), Ev2>60 MPa at surface of UEF, Ev2>45 MPa at 1 m above LEF (see Note 12). LEF: End product >95% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method / 2.5 kg method – see note 17) Depot track area: End product >98% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method / 2.5 kg – see note 17), Ev2>80 MPa at surface of Formation (see Note 12).
					(ii) mc	BS EN 13286-2	To be determined from laboratory/ field trials	To be determined from laboratory/ field trials	
					(iii) optimum mc	BS 1377: Part 4 (4.5kg rammer method)	To be determined from laboratory/ field trials	To be determined from laboratory/ field trials	
					(iv) effective angle of internal friction and effective cohesion	BS 1377: Part 8	$\phi' = 36^{o}$, c' = 1 kPa	-	
	9G/ 1	Lime stabilised granular material	HSR embankment fill (including transitions)	Class 6E/1 with addition of lime according to Clause 648	(i) pulverisation	BS EN 13286-48	60%	-	UEF: End product >98% of maximum dry density, <8% Air Voids BS 1377: Part 4 (4.5 kg method), Ev2>60 MPa at surface of UEF, Ev2>45 MPa at
					(ii) mc immediately before compaction	BS EN 13286-2	To be determined from laboratory/ field trials	To be determined from laboratory/ field trials	
					(iii) optimum mc	BS 1377: Part 4 (4.5 kg rammer method)	To be determined from laboratory/ field trials	To be determined from laboratory/ field trials	

					(iv) effective angle of internal friction and effective cohesion	BS 1377: Part 8	$\phi' = 36^o$, c' = 1 kPa	-	1 m above LEF (see Note 12). LEF: End product >95% of maximum dry density, <10% Air Voids BS 1377: Part 4 (4.5 kg method). Depots track area: End product >95% of maximum dry density, <10% Air Voids BS 1377: Part 4 (4.5 kg method), Ev2>80 MPa at surface of Formation (see Note 12). Refer to note 17 for UEF, LEF and Depot fill and requirement for 4.5 kg rammer.
	9H	Cement stabilised silty cohesive material	HSR embankment fill (including transitions)	Class 7F with addition of cement according to Clause 647	(i) pulverisation	BS EN 13286-48	30%	-	UEF: End product >98% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method / 2.5 kg method – see note 17), Ev2>60 MPa at surface of UEF, Ev2>45 MPa at 1 m above LEF (see Note 12). LEF: End product >95% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method / 2.5 kg method)
					(ii) MCV immediately before compaction	Clause 632	To be determined from laboratory/field trials to achieve dry density, air voids and Ev2 criteria	To be determined from laboratory/field trials to achieve dry density, air voids and Ev2 criteria	
					(iii) mc	BS EN 13286-2	To be determined from laboratory/ field trials	To be determined from laboratory/ field trials	
					(iv) optimum mc	BS 1377: Part 4 (4.5 kg rammer method)	To be determined from laboratory/ field trials	To be determined from laboratory/ field trials	

					(v) effective angle of internal friction and effective cohesion	BS 1377: Part 8	ϕ' = 28°, c' = 10 kPa	-	Depot track area: End product >98% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method / 2.5 kg method – see note 17), Ev2>80 MPa at surface of Formation (see Note 12).
	9J	Lime stabilised cohesive material	HSR embankment fill (including transitions)	Class 7E with addition of lime according to Clause 648	(i) pulverisation	BS EN 13286-48	30%	-	UEF: End product >98% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method), Ev2>60 MPa at surface of UEF, Ev2>45 MPa at 1 m above LEF (see Note 12). LEF: End product >95% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method). Depot track area: End product >98% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method), Ev2>80 MPa at surface of Formation (see Note 12). Refer to note 17 for UEF, LEF and Depot fill and requirement for 4.5 kg rammer.
					(ii) MCV/mc immediately before compaction	Clause 632/ BS 1377: Part 4 (4.5 kg rammer method)	To be determined from laboratory/field trials to achieve dry density, air voids and Ev2 criteria	To be determined from laboratory/field trials to achieve dry density, air voids and Ev2 criteria	
					(iii) mc immediately before compaction	BS EN 13286-2	To be determined from laboratory/ field trials	To be determined from laboratory/ field trials	
					(iv) optimum mc	BS 1377: Part 4 (4.5 kg rammer method)	To be determined from laboratory/ field trials	To be determined from laboratory/ field trials	
					(v) effective angle of internal friction and effective cohesion	BS 1377: Part 8	ϕ' = 28°, c' = 10 kPa	-	
	9J/1	Lime and GGBS stabilised cohesive	HSR embankment fill (including transitions)	Class 7E/1 with addition of lime and GGBS according to Clause 650	(i) pulverisation	BS EN 13286-48	30%		UEF: End product >98% of maximum dry density, <5% Air Voids BS

		material			(ii) MCV immediately before compaction	Clause 632	To be determined from laboratory/field trials to achieve dry density, air voids and Ev2 criteria	To be determined from laboratory/field trials to achieve dry density, air voids and Ev2 criteria	1377: Part 4 (4.5 kg method), Ev2>60 MPa at surface of UEF, Ev2>45 MPa at 1 m above LEF (see Note 12). LEF: End product >95% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method). Depot track area: End product >98% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method), Ev2>80 MPa at surface of Formation (see Note 12). Refer to note 17 for UEF, LEF and Depot fill and requirement for 4.5 kg rammer.
					(iii) mc immediately before compaction	BS EN 13286-2	To be determined from laboratory/ field trials	To be determined from laboratory/ field trials	
					(iv) optimum mc	BS 1377: Part 4 (4.5 kg rammer method)	To be determined from laboratory/ field trials	To be determined from laboratory/ field trials	
					(v) effective angle of internal friction and effective cohesion	BS 1377: Part 8	$\phi' = 28^{o}$, c' = 10 kPa	-	
	9L	Lime and cement stabilised well graded granular material	HSR embankment fill (including transitions)	Class 6R with addition of lime and cement according to Clause 649	(i) pulverisation	BS EN 13286-48	60%	-	UEF: End product >98% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method), Ev2>60 MPa at surface of UEF, Ev2>45 MPa at 1 m above LEF (see Note 12). LEF: End product >95% of maximum dry density, <5% Air Voids BS 1377: Part 4 (4.5 kg method).
					(ii) effective angle of internal friction and effective cohesion	BS 1377: Part 8	$\phi' = 36^{o}$, c' = 1 kPa	-	

Footnotes to Table 6/1:

1	App = contract specific Appendix
2	Tab = Table
3	Where in the Acceptable Limits column reference is made to App 6/1, only those properties having limits ascribed to them in contract specific Appendix 6/1 shall apply. Where contract specific Appendix 6/1 gives limits for other properties not listed in this Table such limits shall also apply.
4	Where BS 1377: Part 2 is specified for mc, this shall mean BS 1377: Part 2 where the material is a soil or BS EN 1097-5 where the material is required to conform to a harmonised European Standard.
5	Uniformity coefficient is defined as the ratio of the particle diameters D_{60} to D_{10} on the particle-size distribution curve, where: D_{60} = particle diameter at which 60% of the soil by weight is finer D_{10} = particle diameter at which 10% of the soil by weight is finer.
6.	The limiting values for Class U1B material are given in contract specific Appendix 6/14 and contract specific Appendix 6/15.
7	Not Used.
8	Where material source codes are referenced these are as listed in Table 6/7.
9	Where materials are required to be aggregates conforming to BS EN 13242 materials certificated as being compliant with BS EN 13285 are acceptable for use provided that they meet all the specification requirements and the Declaration of Performance for constituent parts to BS EN 13242 are provided to the Lead Designer.
10	Materials shall comply with the current Environmental Regulations at the time of use. Reference shall be made to Annex ZA (informative) of BS EN 13242.
11	General Cohesive fill with > 15% passing the 63 µm sieve is not to be used for HSR earthworks Upper Embankment Fill.
12	The Modulus of Deformation shall be measured following the requirements in Clause 612.14.
13	Liquid limit of cohesive fills for use as Lower Embankment Fill shall be nominally less than 35%. However, this is subject to a source approval process described in Table 4.3.1 in the Technical Standard – Earthworks HS2-HS2-GT-STD-000-000001, and the actual values to be used shall be specified by the Designer in contract specific Appendix 6/1.
14	Moisture content and compaction testing required for Class 6B, 6B1 and 6C where no more than 30% by mass of material retained on the 20 mm test sieve, which may include some particles retained on the 37.5 mm test sieve, otherwise moisture content and compaction testing is not required.
15	Shear box testing for Class 6C materials included in Load Transfer Platforms and 8A in embankments only required where the particle size is no greater than 20 mm.
16	Hand vanes shall be calibrated and at the frequency stated in Appendix 1/5 as per the New Zealand Geotechnical Society Guideline for Hand Held Shear Vane Test, 2001. The average vane shear strength shall comprise the average of 4 vane shear strengths taken over the test site (a 1 m^2 area). Test must be performed in a location within the test area where the test is not influenced by the disturbance caused by previous tests.
17	Class 9J and 9J/1: subject to the provision of laboratory and field trials undertaken by BBV; demonstration by BBV that the HS2 requirements with respect to air voids, dry density, Ev_2 and Rayleigh wave criteria are obtained; and with the approval of the Designer's Geotechnical Site Representative BS 1377 Part 4 2.5 kg method can be adopted in lieu of the 4.5 kg method. The scope of laboratory and field trials to be agreed with the Designer's Geotechnical Site Representative prior to commencement of trials. A review of the suitability of the 2.5 kg method to be undertaken on an geology specific basis and subject to consideration of the materials to be treated with lime. Where variation within each geology exists, consideration to be given to further trials that may be required, the scope of which to be agreed with the Designer's Geotechnical Site Representative.
18	Class 1 HSR fill landscape bunds: requirement for slake durability not required. Class 2 HS2 fill landscape bunds: requirements for argillaceous particles >20 mm diameter; liquid limit; and CBR swell limit not required.
19	Grading of 6B and 6G may be undertaken by visual inspection where the minimum particle size exceeds the maximum sieve size of BS1377 or BS EN 933-2.

Table 2: Appendix 6/1 Table 6/2 Grading Requirements for Acceptable Earthworks Materials Other Than Class 6F4, 6F5 and 6S

Percentage by Mass Passing the Size Shown																					
Class	Size (mm)		Size (mm) BS Series												Size (microns) BS Series						Class
	500	300	125	90	75	37.5	28	20	14	10	6.3	5	3.35	2	1.18	600	300	150	63	2	
1A & 1A1		100	95-100																<15		1A & 1A1
1B & 1B1			100																<15		1B & 1B1
2A & 2B			100											80-100					15-100		2A & 2B
2C			100											15-80					15-80		2C
5A, 5B & 5S	In accordance with Technical Standard – Soil Handling for Land Restoration HS2-HS2-EV-STD-000-000008																				5A, 5B & 5S
6B	100		0-10																		6B
6C			100			0-100					0-100		0-35	0-10		0-2					6C
6E, 6E/1 & 6R			100	85-100						25-100						10-100			<15		6E, 6E/1 & 6R
6F1					100	75-100				40-95		30-85				10-50			<15		6F1
6F3			100	80-100	65-100	45-100				15-60		10-45				0-25			0-12		6F3
6F6[a]								85-100		40-70		25-45				8-22			<8		6F6[a]
6F2 & 6F9			100	80-100	65-100	45-100				15-60		10-45				0-25			0-12		6F2 & 6F9
6H								100				60-100			15-45	0-25		0-5			6H
6I & 6J			100		85-100				25-100					15-100		9-100			<15		6I
6K								100											0-10		6K
6L										100		89-100		60-100	30-100	15-100	5-70	0-15 except 0-20 for crushed rock			6L
6M					100														0-10		6M
6N, 6N1. 6N2, 6P, 6P1 & 6P2					100														<15		6N, 6N1. 6N2, 6P, 6P1 & 6P2
6S			100											60-100		30-90		4-45	0-16		6S
7A					100														15-100		7A
7E					100		95-100												15-100		7E
7F			100																15-100		7F
7I					100		95-100												15-100		7I
8	See Class 1, Class 2 or Class 3																				8

Footnotes to Table 6/2:

1	The grading analysis for 6F6 must also include sizes 150 um, 212 um, 425 um, 1.18 mm, 2 mm, 3.35 mm and 6.3 mm. When plotted the grading curves must be smooth and contain only a single point of inflection.

Table 3: Appendix 6/1 Table 6/3 Limits of Material Properties of Fill for Use With Metal Components in Reinforced Soil and Anchored Earth Structures for Class 6I Material

Reinforcing Element Material	Properties of Fill								
	pH Value		Max Chloride Ion Content %	Max Organic Content %	Max Water Soluble (WS) Sulfate Content mg/l as SO4	Maximum Oxidisable Sulfides (OS) Content % as SO4	Minimum Restivity Ohm.cm	Minimum Redox Potential volts	Microbial Activity Index
	Min	Max							
Galvanised Steel	5	10	0.02	0.2	300	0.06	5000	0.40	Less than 5
Stainless Steel	5	10	0.025	0.2	600	0.12	3000	0.35	Less than 5

Footnotes to Table 6/3:

1	A method of calculating the Microbial Activity Index may be obtained by reference to TRRL Contractor Report 54 'Soil Corrosivity Assessment'.
2	The corrosion potential of frictional fill shall be assessed from resistivity, pH, chloride, water soluble sulfate and oxidisable sulfides tests. For cohesive soil it will be necessary to test additionally for organic content. Should either organic content or sulfate be in excess of the specified levels, then tests shall also be included for Redox Potential and Microbial Activity Index.
3	The water soluble sulfate content and oxidisable sulfides content shall be determined in accordance with the methods described in TRL Report 447, Tests Nos 1, 2 and 4.
4	Methods of test (except for Microbial Activity Index, water soluble sulfate content and oxidisable sulfides content) are given in BS 1377: Part 3.

Table 4: Appendix 6/1 Table 6/5 Imported Onto Site Grading Requirements for Class 6 Acceptable Earthworks Materials

Percentage by Mass Passing the Size Shown																				
Class	Size (mm)		Size (mm) BS EN 933-2 Series													Size (microns) BS EN 933-2 Series				Class
	500	300	125	80	63	40	31.5	20	16	10	8	6.3	4	2	1	500	250	125	63	
6B	100		0-10																	6B
6C			100			0-100						0-100	0-35	0-10		0-2				6C
6E & 6R			100	85-100						25-100						10-100			<15	6E & 6R
6F3			100	75-99		50-90		30-75		15-60				0-35		10-100			<15	6F3
6F4					100		75-99		50-90		30-75		15-60		0-35				<15	6F4
6F5 & 6F9			100	75-99		50-90		30-75		15-60				0-35					0-12	6F5 & 6F9
6F6						100		85-100		40-70			25-45			8-22			<8	6F6[a]
6H								100				60-100			15-45	0-25		0-5		6H
6I & 6J			100	85-100					25-100					15-100		9-100			<15	6I & 6J
6K								100											0-10	6K
6L										100			85-100	60-100	30-100	15-100	5-70	0-15 except 0-20 for crushed rock		6L
6M				100															0-10	6M
6N, 6N1. 6N2, 6P, 6P1 & 6P2				100															<15	6N, 6N1. 6N2, 6P, 6P1 & 6P2
6S					100									60-100		30-90		8-45	0-16	6S
8A				100	98-100	80-99		0-20		0-5										8A

Footnotes to Table 6/5:

1	The grading analysis for 6F6 must also include seize sizes 150 µm, 212 µm, 425 µm, 1.18 mm, 2 mm, 3.35 mm and 6.3 mm. When plotted, the grading curves must be smooth and contain only a single point of inflection.

Table 5: Appendix 6/1 Table 8/1 Summary grading requirement for Series 0800 803 (Type 1)

Sieve size, mm	Percentage by mass passing		
	Overall grading range	Supplier declared value grading range	Tolerance on the supplier declared value
63	100		
31.5	75-99		
16	43-81	54-72	+/-15
8	23-66	33-52	+/-15
4	12-53	21-38	+/-15
2	6-42	14-27	+/-15
1	3-32	9-20	+/-15
0.063	0-9		
Grading of individual batches – differences in values passing selected sieves			
Retained sieve size, mm	Passing sieve size, mm	Percentage by mass passing	
		Not less than	Not more than
8	16	7	30
4	8	7	30

7 APPENDIX 6/2 – REQUIREMENTS FOR DEALING WITH CLASS U1B AND CLASS U2 UNACCEPTABLE MATERIALS

7.1 Drawing references for excavation and disposal of known Class U1B and Class U2 material

Drawing references for excavation and disposal of known Class U1B and Class U2 material are detailed in the asset specific earthworks specification addendum.

7.2 Pre-agreed requirements of the environmental authority for disposal including specific sites

Off-site treatment or disposal of Class U1B and Class U2 materials shall be undertaken in accordance with the requirements of the Environment Agency and as detailed in the Contractor's Site Waste Management Plan.

Prior to disposal, unacceptable Class U1B and U2 materials are to be classified in accordance with the risk based criteria detailed in the MMP Route A risk assessments (1MC08-BBV_MSD-EV-RIA-N001-100001).

Unacceptable Class U1B and/or U2 Material, as defined in the SCEW, Series 0600, Clause 601, shall be removed from the works unless otherwise agreed with the Designer's Geotechnical Site Representative.

7.3 List of known hazardous materials likely to be encountered

A list of known hazardous materials likely to be encountered is detailed in the following geo-environmental reports:

- SL1 Geo-Environmental Report 1MC08-BBV_MSD-EV-REP-N001-100025;
- SL2 Geo-Environmental Report 1MC08-BBV_MSD-EV-REP-N001-100026;
- SL4 Geo-Environmental Report 1MC08-BBV_MSD-EV-REP-NS03_NL09-10001;
- SL5/6 Geo-Environmental Report 1MC08-BBV_MSD-EV-REP-N002-100042;
- SL7/8 Geo-Environmental Report 1MC08-BBV_MSD-EV-REP-N002-100003; and
- MMP Route A risk assessments 1MC08-BBV_MSD-EV-RIA-N001-100001.

7.4 Methods of excavation, precautions and requirements for handling

The Contractor is responsible for keeping records of the location, volumes, extent, nature and test results for all Class U1B and/or U2 materials encountered. In the event that potentially contaminated ground is encountered during the works, the Designer's Geotechnical Site Representative shall be contacted immediately to complete a further examination and confirm the material class.

Suspected Class U1B and Class U2 material shall be excavated and stockpiled in a secure, covered area. The material may be held in the holding area whilst the appropriate chemical testing is undertaken. Measures to be provided to prevent the migration of contaminants into the natural ground at the base of stockpiles.

Excavation and transportation of U1B and/or U2 materials shall consider the health and safety and environmental implications at each location. Method Statements detailing proposed mitigation measures will be required for each location.

Proposals for the treatment or disposal of any contaminated materials shall meet with the approval and requirements of the Environment Agency and the Local Authority.

The Contractor shall be responsible for ensuring that appropriate Personal Protective Equipment, procedures and safe systems of work are followed by all personnel at all times when working with suspected contaminated materials.

7.5 Special requirements for dealing with leachate and contaminated water

Where contaminated groundwater is encountered during the construction of works and requires disposal, the Contractor shall discharge to surface waters in accordance with a schedule 33.5 consent, or if discharge is to the foul sewer, to a trade effluent consent.

If dewatering is required, the Contractor shall test the water for contaminants prior to dewatering works commencing.

7.6 Requirements for special drainage and for sealing exposed surfaces of contaminated materials

Requirements for special drainage and for sealing exposed surfaces of contaminated materials are detailed in the MMP Route A risk assessments (1MC08-BBV_MSD-EV-RIA-N001-100001).

7.7 Test methods to be used for chemical analysis of hazardous materials, leachate and contaminated water

The methods to be used for chemical analysis of hazardous materials, leachate and contaminated water are detailed in the following documents:

- SL1 Geo-Environmental Report 1MC08-BBV_MSD-EV-REP-N001-100025;
- SL2 Geo-Environmental Report 1MC08-BBV_MSD-EV-REP-N001-100026;
- SL4 Geo-Environmental Report 1MC08-BBV_MSD-EV-REP-NS03_NL09-10001;
- SL5/6 Geo-Environmental Report 1MC08-BBV_MSD-EV-REP-N002-100042; and
- SL7/8 Geo-Environmental Report 1MC08-BBV_MSD-EV-REP-N002-100003.

8 APPENDIX 6/3 – REQUIREMENTS FOR EXCAVATION, DEPOSITION, COMPACTION (OTHER THAN DYNAMIC COMPACTION)

8.1 The drawing numbers of all drawings which give related earthworks requirements including line and level

The drawing numbers of all drawings which give related earthworks requirements including line and level are detailed in the asset specific earthworks specification addendum.

8.2 Blasting for excavations

The requirements for blasting are detailed in the asset specific earthworks specification addendum.

8.3 Cuttings

No excavations are permitted below footing levels other than required to form the permanent works to the line and levels described in the Contract and presented in the earthwork drawings referenced in Appendix 6/3 (Section 8.1).

Any requirement for the temporary undercutting of existing or formed slopes shall be restricted in excavation extent and period of exposure to that required to ensure that no instability of adjacent ground occurs. Proposals identifying the extent of any such excavation shall be submitted to the Designer's Geotechnical Site Representative for approval.

Any groundwater seepages revealed during excavation shall be notified to the Designer's Geotechnical Site Representative for possible design amendments.

If groundwater is encountered within a cut slope, the Contractor shall deal with this during construction by localised pumping/dewatering, earthworks drainage or other measures as determined by the Contractor to keep the earthworks free of water. If water ingress is found to be a persistent problem, adequate drainage measures may be required as directed and agreed by the Designer's Geotechnical Site Representative, such as slope drainage blanket, overdeepened toe drain, slope drains or counterfort drains. The Contactor shall keep the earthworks free of water in accordance with the SCEW, Series 0600 Clause 602.16 and 602.17.

During excavation inspection of the cut slopes to be undertaken by an appropriately experienced ground engineering professional from the Contractor to confirm that the exposed materials conform to the expected conditions. Where ground conditions deviate from those expected, the Contractor to bring this to the attention of the Designer's Geotechnical Site Representative. The Contractors staff undertaking inspection of the cut slopes to be familiar with the nature of the materials being encountered (e.g. glacial deposits, mudstones and sandstones) and how their physical properties and the presence of groundwater can impact on temporary and permanent stability.

The unforeseen exposure of any potentially hazardous material shall immediately be drawn to the attention of the Designer's Geotechnical Site representative. Precautions shall be taken by the Contractor to ensure the safety of all site staff and that such materials are not handled, or any associated dusts or vapours inhaled.

Protection of the formation or sub-formation in the base of the cutting against weather shall be carried out in accordance with the SCEW, Series 0600 Clause 608.9(ii) using the same material as used to form the foundation ground treatment and be undertaken across the full width of the base of the cutting.

A hold point shall be provided by the Contractor prior to the placement of topsoil to allow cuttings to be inspected by the Designer's Geotechnical Site Representative upon completion to assess whether ground conditions are as assumed in the design and to ensure the cut slopes have been excavated to form the design requirements. Should the ground conditions encountered not meet the design assumptions the Designer's Geotechnical Site Representative shall inform BBV and agree the implementation of appropriate measures to stabilise the slope.

Temporary slopes in cutting excavations shall be formed at safe angles to ensure stability and safety for all operatives and plant and equipment, as well as to ensure the stability of the permanent works.

Temporary slopes may be formed as a series of steps with steeply cut faces. The height of each step and the width of each berm shall be such that the required overall slope for the full height of the cutting is not exceeded. At the final stage of excavation the steps are trimmed back to the final design profile.

A drone survey of the cutting shall be undertaken prior to placement of the subsoil and topsoil to provide a visual record of the ground conditions. The specification for the drone survey to be agreed with the Designer's Geotechnical Site Representative and BBV.

Following topsoil stripping and benching, exposed sub-formations shall be proof rolled by the Contractor and inspected by the Designer's Geotechnical Site Representative. Any identified soft spots shall be notified immediately by the Contractor to the Designer's Geotechnical Site Representative. Isolated patches of soft, fragments or otherwise unsuitable material (e.g. obstructions within made ground) shall be excavated and backfilled with the same Class of material as the sub-formation.

Where necessary, the Contractor shall incorporate slope drainage (slope drains or counterfort drains or both) to ensure the stability of the cut slope as directed by the Designer's Geotechnical Site Representative to ensure the long term stability of the cut slopes. An observational approach shall be adopted during the construction and maintenance periods, with drainage only being installed where seepages or instability are identified. Where seepage or existing land drains are encountered in a cutting face, appropriate drainage measures will be agreed between the Contractor and the Designer's Geotechnical Site Representative.

The Contractor shall ensure that all finished slope surfaces are no steeper than detailed on the earthwork drawings unless agreed with the Designer's Geotechnical Site Representative. Steeper cutting slopes shall not be permitted unless agreement has been provided by the Designer's Geotechnical Site Representative.

All temporary drains and ditches alongside cuttings shall be completed and outfalls provided, prior to commencement of any adjacent earthworks.

Cutting faces to receive topsoil shall be made good by the Contractor in accordance with Appendix 6/8 (Section 14) to remove patches of soft, fragmented or insecure material and shall be treated by the Contractor in accordance with Clause 603.7 (iii). Local measures to ensure stable placement where slopes are locally steeper (steeper than 1:2.5 (v:h)) are to be agreed with the Designer's Geotechnical Site Representative.

All temporary excavations shall be supported where required. No temporary supports shall be left in position upon completion of the works unless previously agreed with the Designer's Geotechnical Site Representative.

The proposed cutting design is based on the available ground investigation data. Slopes shall be monitored during excavation by the Contractor as detailed in Appendix 6/12.

8.4 Cuttings in rock

In addition to the requirements detailed above the following shall be implemented for cuttings in rock.

In areas of excavated rock, all loose material shall be cleared from the finished rock face.

An observational approach is to be implemented by the Designer's Geotechnical Site Representative to review the design during the construction of rock cuttings as the prediction of geotechnical behaviour is difficult for the encountered rock mass conditions. The design cut slope angles as set out in the design reports and drawings are to be confirmed through an observational approach.

The observational approach will take the form of a visual inspection by an appropriately experienced ground engineering professional to confirm the design slope angle.

A hold point shall be provided by the Contractor to allow the cutting to be inspected by the Designer's Geotechnical Site Representative within four days of the slope face being made safe to inspect by the Contractor. Visual inspections shall not be carried out during or up to 12 hours after heavy rainfall. After every heavy rainfall event, cutting faces are to be inspected by the Contractor for degradation and the findings recorded with a photographic record where slope degradation has been identified.

After completion of the visual inspection by the Designer's Geotechnical Site Representative, the Designer's Geotechnical Site Representative will advise the Contractor if additional measures are required to ensure stability of the cut slope. Any additional measures are to be agreed between the Designer's Geotechnical Site Representative and the Contractor.

8.5 Watercourses including ditches

Existing drainage ditches (excluding watercourses) within the boundary of works, that are to be retained as open ditches, shall be cleaned out in order to improve their hydraulic capacity. The cleaning out shall consist of removing vegetation, organic and silt deposits generally to a maximum thickness of 200 mm. A greater thickness shall be removed, if necessary, to produce an even grade along the ditch. Where further soft and/or silty material is present beyond the above stated limits of excavation, further excavation shall take place at the direction of the Designer's Geotechnical Site Representative.

The excavated material shall be assessed for re-use, treatment, or disposal in accordance with re-use criteria and corresponding risk assessments.

Requirements for watercourses to be retained within the boundary of the works are detailed in SCEW Series 3000 landscape and ecology or in asset specific earthworks specification addendum.

Should an old infilled watercourse be identified during earthworks, the Contractor shall inform the Designer's Geotechnical Site Representative immediately for further guidance. Cleaning out of the ditch shall be undertaken to the requirements of this clause and backfilled with materials defined by the Designer's Geotechnical Site Representative.

Ditches or watercourses to be covered by earthworks shall initially be drained and cleared in accordance with Clause 606 of unacceptable materials excavated as instructed by the Designer's

Geotechnical Site Representative below the existing watercourse profile. The materials to be used to infill the ditch or watercourse to be detailed in the asset specific earthworks specification addendum.

In addition to the foregoing, where the translocation of materials is required this shall be detailed in the asset specific earthworks specification addendum.

8.6 Embankment construction

Prior to embankment construction, the sub-formation level shall be proof rolled and inspected by the Contractor to identify soft spots. Soft spots in the foundation to be replaced by the same materials as used for the embankment construction, including starter layers.
Spots of loose or very loose granular material shall be 'ripped' and 'rolled' prior to commencement of the embankment construction as per Clause 616.3.
Excavation and embankment construction underwater are not permitted.
The suitability of the sub-formation level shall be confirmed with the Designer's Geotechnical Site Representative prior to placing the embankment fill.
The Contactor shall keep the earthworks free of water in accordance with the SCEW, Series 0600 Clause 602.16 and 602.17.
Protection of the formation or sub-formation against weather shall be carried out in accordance with the SCEW, Series 0600 Clause 608.9(ii) using the same material as used to form the embankment and be undertaken across the full width of the embankment with a thickness of weather protection material no less than 300 mm.

All cohesive/granular fill layer interfaces shall be constructed such that drainage of the interface is towards the edge of the embankment. The slope of this interface shall be such that any water shall drain to the outside of the embankment. Granular material shall be free to drain where it has access to water.

The Contractor shall not allow temporary works fill of more than 2 metres height to remain at side slopes steeper than the design slope for more than 48 hours before trimming back to the design slope. In any event, temporary works side slopes shall not be formed steeper than 1v:1h.

During construction, surcharge loads at the top of the embankment slopes shall not exceed 20 kPa and shall be set at a minimum of 1.5 metres back from the edge of the slope. Should additional surcharge loads or reduced distance to the edge of the slope be required, the Contractor must seek agreement from the Designer's Geotechnical Site Representative prior to the works.

Overfilling of side slopes and trimming back to achieve adequate compaction of the shoulders of embankments is permitted.

Clause 608.13 shall be adopted on all final unstrengthened slopes.

Any temporary increase in width of embankments to permit adequate compaction of side slopes and edges before trimming back shall not exceed 1 metre.

Oversteepening of permanent works embankment slopes is not permitted in the contract without the agreement of the Designer.

Records shall be maintained detailing the following with respect to the materials used for embankment construction:

- site won material: cutting asset, approximate chainage and date of excavation;
- imported material: name and location of quarry;
- material class;

- material description (cohesive fill and rock); and
- date of placement and compaction where different from the date of excavation.

A maximum level difference of 2.0 metres is permitted between a mainline embankment constructed with a side slope of 1v:1h and a landscape bund.

On completion of the HSR embankment a hold period shall be implemented prior to construction of the prepared subgrade and protection layer. The duration of the hold periods shall be as detailed in the asset specific earthworks specification addendum and follow the requirements of the following documents:

- Basis of Design Earthworks Integration, 1MC08-BBV_MSD-GT-REP-N001-100164; and
- Sequence of Works, 1MC08-BBV-GT-GDE-N001-000001.

Where there is a requirement for a hold period for non-HSR embankments this shall be detailed in the asset specific earthworks specification addendum.

Requirements for staged construction for embankments and landscape bund and surcharging of embankments to satisfy temporary stability requirements are as detailed in the asset specific earthworks specification addendum.

All temporary ditches alongside embankments shall be completed and outfalls provided, prior to commencement of any adjacent earthworks.

8.7 Compaction

General

The Contractor is required to comply with the requirements detailed in Clause 612 for Mainline earthworks.

For landscape earthworks compaction shall be in accordance with the Clause 620 and 612 as detailed on the drawings.

Any testing using a nuclear density gauge (NDG) shall be undertaken to the requirements of BS 1377 : Part 9 section 2.5 using the direct transmission mode. Calibration tests against in-situ density test results shall be undertaken to the requirements of BS 1377 : Part 9 test 2.5.5.3.2 (calibration by container method) on an area of constructed material. Separate calibration tests shall be undertaken for each Class of material used in construction. Additional calibration testing shall be undertaken where the material may be different from that originally used for calibration purposes.

Compaction trials

Before placing any fill material in the permanent works, the Contractor shall demonstrate the methods, equipment and materials he proposes to use by constructing an area or areas as appropriate of embankment fill material on a typical prepared sub-formation to the same layer thickness as required in the permanent works. The area of each construction demonstration shall be not less than 700 m^2 placed and compacted in at least three layers.

After completion of each demonstration area the Contractor shall within a period of not greater than 5 days and before commencing the main construction of the appropriate embankment in the permanent works, carry out a minimum of 6 sets of tests and provide the Designer's Geotechnical Site

Representative with records for acceptance. The scope of testing to be agreed with the Designer's Geotechnical Site Representative.

The demonstration area shall, if it does not meet the requirements for the permanent works or is located elsewhere on site, be removed and the area reinstated. Material successfully placed may be incorporated into the permanent works.

The Contractor shall provide a method statement for the trial areas to the Designer's Geotechnical Site Representative for agreement at least 7 days in advance of undertaking the trial.

Method compaction (non HSR earthworks)

Compaction shall fully comply with the requirements of the SCEW Tables 6/1 and Clauses 602 and 612, unless otherwise instructed by the Designer's Geotechnical Site Representative.

Double compaction of the top 600 mm for Classes 1A, 1B, 2A, 2B and 2C is required for the full width of embankment or between the outer extremities of verges.

The frequency of field dry density testing shall be in accordance with Appendix 1/5. Unless specified otherwise in the SCEW or this document, where laboratory optimum moisture content and maximum dry density testing of materials is to be undertaken (as detailed in Appendix 1/5) for method compaction, testing to be undertaken with a 2.5 kg rammer.

End-product compaction

A nuclear density gauge is permitted for use to measure in situ densities provided that it is calibrated, well maintained and shown to be suitable, to the satisfaction of the Designer's Geotechnical Site Representative, for each material being tested. For determination of the moisture content (and hence the dry density), correlation against the 'oven dried' moisture content (BS 1377 (1990) Part 2, Clause 3.2) is required for each material type encountered.

Any testing using a nuclear density gauge (NDG) shall be undertaken to the requirements of BS 1377 : Part 9 section 2.5 using the direct transmission mode. Calibration tests against in-situ density test results shall be undertaken to the requirements of BS 1377 : Part 9 test 2.5.5.3.2 (calibration by container method) on an area of constructed material. Separate calibration tests shall be undertaken for each Class of material used in construction. Additional calibration testing shall be undertaken where the material may be different from that originally used for calibration purposes.

The NDG to penetrate the layer such that readings are taken mid-height or deeper within the compacted layer.

In situ dry density testing for nuclear density gauge calibration purposes shall be undertaken to BS 1377 : Part 9 tests 2.1 or 2.2 as appropriate to the material being tested.

The equipment must be operated and stored in accordance with the manufacturer's recommendations and current safety legislation. It must be used only by personnel fully trained and experienced in its operation.

The NDG shall be calibrated at the frequency stated in Appendix 1/5. Calibration shall be carried out in accordance with BS 1377: Part 9, Section 2.5.5. A certificate of calibration shall be issued to the Designer's Geotechnical Site Representative prior to the instrumentation.

8.8 Requirements for HSR Foundation

The foundation to the HSR shall be subject to inspection and testing by the Contractor as follows:

- visual inspection by a suitably experienced ground engineering professional and recording of the ground conditions encountered (including, but not limited to: soft spots; loose materials; and unsuitable materials), in accordance with BS 5930;
- measurement of the undrained shear strength of the foundation at the frequency defined in Appendix 1/5; and
- the modulus of deformation (E_{v2}) shall be measured using the French Standard NF P 94-117.1 using a static test with a plate of diameter of 600 mm and a maximum pressure of 250 kN/m^2. It shall be undertaken at the foundation surface, on top of the Prepared Sub-grade and on top of the Protection Layer. The frequency of testing shall be as detailed in Appendix 1/5.

  The corresponding E_{v2} value shall be as follows:

  - foundation: no lower than E_{v2} = 60 MPa when the depth of excavation to foundation is less than 1.6 metres below the base of the Prepared Subgrade;
  - Prepared Subgrade: E_{v2} in the range of 60 MPa to 500 MPa; and
  - Protection Layer: E_{v2} in the range of 120 MPa to 500 MPa.

Excavation beneath the track support zone shall be undertaken to a depth where the E_{v2} is not less than 60 MPa to a maximum depth of 1.6 metres below the Prepared Subgrade. Indicative depths of excavation are shown on the drawing of the detailed design.

The sequencing of the works for the HSR foundation and adjacent drainage to follow the requirements of the following BBV documents:

- Basis of Design Earthworks Integration, 1MC08-BBV_MSD-GT-REP-N001-100164 ; and
- Sequence of Works, 1MC08-BBV-GT-GDE-N001-000001.

Trials of alternative techniques to measure the modulus of deformation (E_{v2}) are permitted. The scope of the trials, the suitability of alternative techniques and correlations are to be agreed with the Designer's Geotechnical Site Representative. The agreement of HS2 to be sought prior to replacement of the French Standard NF P 94-117.1 with an alternative.

8.9 Limiting distance for deposition of materials referred to in sub-clause 601.19, 601.20 or 601.21 and 601.23

- 601.19 – the requirements of 601.19 shall apply;
- 601.20 – the requirements of 601.20 shall apply;
- 601.21 – not anticipated; and
- 601.23 – not anticipated.

8.10 Locations of excavations that are permitted to be battered and requirements for benching prior to backfilling and compaction

Whenever fill is to be deposited on, or against, ground (natural or earthworks) sloping at more than 1v:4.5h, benches shall be cut into the surface which is to receive the fill. Benches to be a maximum of 1.0 metre in depth at slopes of 1v:1h and comply with the requirements of the following BBV documents:

- Basis of Design Earthworks Integration, 1MC08-BBV_MSD-GT-REP-N001-100164; and
- Sequence of Works, 1MC08-BBV-GT-GDE-N001-000001.

8.11 Locations where excavation supports are left in position

Not anticipated.

8.12 Requirements for benching or shaping of natural or earthwork slope faces to receive fill. Location of and benching requirements for cutting slopes to receive topsoil, and areas of cutting slopes which do not need harrowing or harrowing depth if not 50 mm

Whenever fill is to be deposited on, or against, ground (natural or earthworks) sloping at more than 1v:6.5h, benches shall be cut into the surface which is to receive the fill. Benches to be a maximum of 1.0 metre in depth at slopes of 1v:1h.

Benching of topsoil to be placed on slopes is not required.

8.13 Permitted variation in the maximum difference in fill levels of Class 6M material on opposite sides of corrugated steel buried structures from 250 mm

Not anticipated.

8.14 Contract-specific permitted depth of any protection layer over corrugated steel buried structures

Not anticipated.

8.15 Contract-specific permitted mixing of excavated materials where a combination of acceptable and unacceptable material is revealed in excavations

Not anticipated.

8.16 Fill to excavate voids or natural voids in excavations for foundations where ST1 concrete is not required or an alternative is permitted or required

Not anticipated.

8.17 Additional requirements for corrugated steel buried structures

Not anticipated.

8.18 Requirements for lime used for lime or lime and cement stabilisation, including form of lime and performance requirements to be included in the manufacturer's Declaration of Performance provided by the Contractor

Lime used for bulk fill treatment shall be quicklime complying with BS EN 459-1. The amount of lime or cement addition, the method and timing of working shall be sufficient to render the material acceptable in accordance with Appendix 6/1, Table 6/1.

Lime and/or cement treatment of bulk fills shall not be carried out during periods of rain. If rainfall occurs during lime stabilisation the surface shall be compacted and sealed against rainwater ingress. Earthworks shall be shaped to falls to facilitate shedding of water.

Where treated materials are to be used below the groundwater table measures shall be taken to ensure that a pathway for groundwater to enter treated materials shall not be created during the curing period.

Areas for lime treatment shall be maintained free of groundwater during the treatment process.

Temporary measures to minimise the impact of lime stabilisation on surface waters shall be adopted where pollution risks are identified by the Contractor. Lime and/or cement shall not be used at any location until the required temporary measures are installed and operational.

The Contractor shall demonstrate all plant involved in the operation to satisfy the Designer's Geotechnical Site Representative of compliance with the above.

Waste lime and lime treated waste soils shall not be temporarily stored within the top 1.5 metres of finished levels or topsoil stockpiles.

Lime treated waste soils shall be compacted, sealed and shaped to minimise water ingress.

Protection of the sub-formation and formation in accordance with SCEW Clause 608.9(ii) shall consist of treated materials for lime and/or cement treated layers.

To ensure thorough mixing of soils improved with lime and/or cement, the following measures shall be adopted:

- use shall be made of a purpose built mechanical spreader or combined spreader and rotavator;

- the spreader discharge rate shall be constant no matter what the speed of movement. The spread rate shall be checked at the rate defined in Appendix 1/5;
- mixing shall be undertaken by a powerful purpose built rotovator or combined spreader and rotovator;
- a consistent and homogenous mix shall be achieved;
- the material shall be stabilised in a single layer of compacted thickness no more than 300 mm; and
- to avoid leaving untreated material, adjacent strips shall be overlapped by 150 mm and cut into the previously stabilised layer below by at least 20 mm.

8.19 Locations where treated material will be placed in the HSR earthworks

Treated materials are to be placed in the following locations for HSR earthworks:

- embankments including ground treatment;
- ground improvement in the base of cuttings;
- technical backfill to bridge abutments;
- landscape earthworks; and
- capping to highway earthworks.

Drawing references for locations where treated material will be placed in HSR earthworks are detailed in the asset specific specification addendum.

8.20 Details of any additional tests for rate of spread of lime

Tests for the rate of spread of lime to be undertaken in accordance with Appendix 1/5.

8.21 Intervals for testing for available lime if different from weekly

Intervals for testing for available lime to be undertaken in accordance with Appendix 1/5.

8.22 Requirements for cement type in used for cement or lime and cement stabilisation including performance requirements to be included in the manufacturer's Declaration of Performance provided by the Contractor

Cement used for cement or lime and cement stabilisation shall be Portland cement complying with the requirements of the BS EN 197-1.

8.23 Requirements for alternative thickness of layers to be stabilised

Layer thickness to stabilise lime treated materials shall not exceed 300 mm.

8.24 Alternative treatment requirements for layers to be stabilised

Treatment requirements for layers to be stabilised to be in accordance with the SCEW Clause 647.7, 648.9, 649.10 and 649.16.

8.25 Requirements for dates of treatment if different from sub-Clause 648.8

Dates of treatment are to be in accordance with the SCEW Clause 648.8.

8.26 Stabilisation to form HSR earthworks materials using lime and Ground Granulated Blast Furnace Slag

Material to be stabilised with lime and GGBS shall be Class 7E/1 material complying with Clause 601 and Table 6/1.

Requirements for lime used for lime and GGBS stabilisation, including form of lime and performance requirements to be included in the manufacturer’s Declaration of Performance provided by the Contractor shall be as Clause 8.18.

The Contractor shall carry out testing of the lime as installed for available lime in accordance with Appendix 1/5.

GGBS for lime and GGBS stabilisation shall be either granulated blast furnace slag conforming to EN 15167-1 or partially-ground granulated blast furnace slag conforming to EN 14227-2.

Class 7E/1 material to be stabilised shall have added to it, at any point, the percentage of its dry weight of lime and GGBS as determined by laboratory and field trials and following completion of demonstration areas, to meet the performance requirements in Table 6/1.

The Contractor shall not carry out lime and GGBS stabilisation when the shade temperature is below 3°C unless on a rising thermometer above 0°C and the materials to be stabilised are frost free. Lime and GGBS stabilisation shall not be carried out during periods of rain or when rain is imminent.

Lime shall be uniformly spread by a suitable spreading machine on top of the layer to be stabilised. Using a collecting tray and balance the Contractor shall check the rate of spread by weight. Intervals for testing for available lime to be undertaken in accordance with Appendix 1/5.

The material shall be stabilised in a single layer of compacted thickness no more than 300 mm.

The material forming the layer to be stabilised shall be processed by pulverising and mixing in the lime by means of sufficient number of passes of a suitable mobile stabilising machine until 95% of the Class 9J/1 processed material passes a BS 28 mm sieve after dry sieving and the pulverisation complies with Table 6/1.

During processing sufficient water shall be available in the material to slake the quicklime and to enable satisfactory mixing and compaction to be achieved. Any added water shall be through an integral spray-bar on the stabilising machine. Any added water shall have a sulfate content not exceeding 1400 mg/l as SO_4 when tested in accordance with Test No. 1 of TRL Report 447 (or equivalent test in accordance with BRE Special Digest 1).

Field trials, and laboratory trials as appropriate, shall be undertaken to confirm requirements for pulverization, mellowing and compaction to achieve the performance requirements.

The stabilising machine shall be equipped with a device for controlling the depth of processing which shall be maintained at the correct setting at all times. An overlap of 150 mm shall be made between adjacent passes of the stabilising machine. Where a subsequent layer of material is placed on a layer previously stabilised the tines or blades of the stabilising machine shall be set so that they cut into the previously stabilised layer below by at least 20 mm.

The appropriate quantity of GGBS shall be uniformly spread, by a suitable spreading machine, on top of the layer previously processed with lime. Using a collecting tray and balance the Contractor shall check the rate of spread of the machine in accordance with Appendix 1/5.

The material previously mixed with lime shall be stabilised with GGBS in a single layer or in layers of the same compacted thickness as for the lime mixed material layers, including any cutting-in required.

During processing, sufficient water shall be available in the material to hydrate the GGBS and enable satisfactory mixing and compaction to be achieved. Any added water shall be through an integral spray-bar on the stabilising machine. Any added water shall have a sulfate content not exceeding 1400 mg/l as SO_4 when tested in accordance with Test No. 1 of TRL Report 447 (or equivalent test in accordance with BRE Special Digest 1).

The stabilising machine shall be equipped with a device for controlling the depth of processing which shall be maintained at the correct setting at all times. An overlap of 150 mm shall be made between adjacent passes of the stabilising machine. Where a subsequent layer of material is placed on a layer previously stabilised the tines or blades of the stabilising machine shall be set so that they cut into the previously stabilised layer below by at least 20 mm.

Each layer of Class 9J/1 processed material shall be compacted as soon as possible after the final pass of the stabilising machine. Compaction shall be completed within 2 hours following the mixing of the GGBS into the material to be stabilised. Any added water shall have a sulfate content not exceeding 1400 mg/l as SO_4 when tested in accordance with Test No. 1 of TRL Report 447 (or equivalent test in accordance with BRE Special Digest 1).

The compaction of Class 9J/1 material shall comply with Clause 612, end product compaction, to satisfy the compaction requirements given in Table 6/1 of the Class.

On completion of compaction the Contractor shall take measures to prevent drying to ensure adequate curing takes place, in accordance with a Method Statement that has been agreed in advance with the Designer's Geotechnical Site Representative. During periods when the air temperature is forecast to drop below 3°C or when ground frost is forecast Class 9J/1 material shall be protected, to prevent freezing, for a period of 7 days from the time of completion of compaction. Such protection shall be sealed to prevent the ingress of moisture.

Class 9J/1 materials shall not have other material deposited or compacted above them, or be trafficked, either (i) until such time as the required end-product and end-performance requirements have been achieved, or (ii) interim target values demonstrated by field trials to the satisfaction of the Designer's Geotechnical Site Representative have been achieved provided that end product compaction and air voids compliance are demonstrated.

The use of binders other than lime, cement or GGBS to be brought to the attention of the Designer's Geotechnical Site Representative for agreement on specification requirements and requirements for laboratory and field trials and demonstration area.

9 APPENDIX 6/4 – REQUIREMENTS FOR CLASS 3 MATERIAL

Not anticipated.

10 APPENDIX 6/5 – GEOTEXTILES USED TO SEPARATE EARTHWORK MATERIALS

10.1 General

Geotextiles shall not be placed during periods of extreme cold, extreme heat, when frost is likely and or where there is heavy rainfall.

The material on which the geotextiles are installed on shall be free of any sharp protrusions which may damage the fabric. The geotextile shall not be dragged into position or pulled once laid but shall be rolled out across the site such that it shall be in continuous contact with the surface on which it is to be installed and shall not bridge or be stretched over hollows or lumps.

Adjacent sheets of the geotextile shall be jointed according to the Manufacturer's recommendations.

Topsoil to be placed upon the geotextile shall not be dropped from a height but shall be placed for a height no greater than 0.8 metres.

10.2 Characteristics

Terram 1000 geotextile membrane, or similar approved by the Designer's Geotechnical Site Representative, to have the characteristics detailed in Table 6: Appendix 6/5.

Table 6: Appendix 6/5 Geotextile characteristics

Characteristics	Test Standard	Value and unit
Tensile Strength	BS EN ISO 10319	Minimum 8.0 kN/m
Elongation at Maximum Load	BS EN ISO 10319	60%
Static Puncture Resistance (CBR test)	BS EN ISO 12236	1500 N
Dynamic Perforation Resistance (cone drop test)	BS EN 918	-
Characteristic Opening Size	BS EN ISO 12956	75 υm
Cell Wall Permeability	BS EN ISO 11058	90 l/m²s
Durability	BS EN 13251	120 years

Geotextiles shall be protected at all times against mechanical or chemical damage and shall not be uncovered between manufacture and incorporation in the works. Unless demonstrated otherwise by performing resistance to weathering tests in accordance with EN ISO 12224, all geotextiles shall be completely covered within three days of installation.

Requirements for other geotextiles (excluding watercourses) shall be detailed in the asset specific earthworks specification addendum.

10.3 Drawing references for locations where geotextiles and geotextile related products are to be used including details of laying and lapping

Drawing references for locations where geotextiles and geotextile related products are to be used including details of laying and lapping are detailed in the asset specific specification addendum.

10.4 Required Attestation of Conformity system (or Assessment and verification of consistency of performance (AVCP) as detailed in BS EN 13251)

A Declaration of Performance for each product stating compliance with BS EN 13251 and the required levels of performance detailed in Table 6 shall be submitted to the Designer's Geotechnical Site Representative prior to placement in the works.

10.5 Contract compliance testing details

The Contractor shall provide test results confirming that all relevant materials comply with Clause 609 and Table 6.

10.6 Minimum depth of fill over geotextile prior to trafficking if different from 500 mm

No trafficking shall take place upon the geotextile until a minimum fill thickness of 500 mm has been placed.

10.7 Requirements for geotextiles for watercourses using filter fabric

A geotextile separator/filter shall be placed between the rip rap and natural ground or embankment fill. The geotextile shall be non-woven, needle punched fabric composed of continuous filament of 100% UV stabilised polypropylene. Geotextiles manufactured from fibres of more than one polymer will not be permitted. Thermally Bonded Non Woven Geotextiles shall have the following minimum properties as per EA Minimum Technical Requirements – Operational Instruction 412_13_SD01 (2018).

Table 7: Appendix 6/5 Filter fabric

Characteristics	Unit	Specification
Mechanical Properties - control		

Wide width strip tensile EN ISO 10319		
Mean peak strength	kN/m	8.0
Elongation	%	28
CBR Puncture resistance EN ISO 12236		
Mean peak strength	N	1500
Mechanical Properties – consequential		
Wide width strip tensile EN ISO 10319		
Strength at 5% strain	kN/m	3.4
Hydraulic Properties		
Pore size EN ISO 12956		
Mean AOS 0_{90}	µm	150
Mass per unit area	g/m²	125

For permeability, criteria of CIRIA C742 are used, i.e. $k_g \geq 500k_s$ stating that the permeability of the non-woven geotextile should be greater than or equal 500 times the base soil permeability. The following categories of geotextile are to be adopted.

Table 8: Appendix 6/5 Geotextile characteristics for watercourses

Test	Method	Units	222-235 gsm	250-267 gsm	300-325 gsm	349-385 gsm	400-422 gsm	450-475 gsm	500 gsm	650 gsm
Minimum CBR Puncture resistance	BS EN ISO 12236	kN	2.9	3.3	4.0	4.1	4.3	4.8	6.5	8.0
Minimum tensile strength [md/cmd]	BS EN ISO 10319	kN/m	17.3	18.9	25.5	24.6	26.0	29.3	40.0	45.0
Maximum apparent pore size – 90% fined (O90)	EN ISO 12956	µm	67.5	73.3	65.0	74.0	60.0	77.5	65.0	65.0
Minimum permeability	EN ISO 11058	l/m².s	60.0	60.0	50.0	49.0	57.5	47.5	30.0	30.0

The design life of the geotextile shall be 120 years.

10.8 Requirements for biodegradable erosion control matting

Biodegradable erosion control matting protection shall be made from 100% natural and biodegradable material. It must withstand a velocities up to at least 1.5 m/s. The erosion control mat must be suitable for vegetation establishment and should be supplied either as pre-seeded or without seeding, depending on the site specific requirements shown in drawings. Seeding mixes are detailed in Landscape SCEW Series 3000 Appendix 30/5.

11 APPENDIX 6/6 – FILL TO STRUCTURES AND FILL ABOVE STRUCTURAL FOUNDATIONS

11.1 Drawing references for fill to structures and fill above structural foundations

Drawing references for fill to structures and fill above structural foundations are detailed in the asset specific earthworks specification addendum.

11.2 Whether Classes 6N, 6P and 7B require full scale determination of stable slope, and value of slope if not 1 to 1.5

Full scale determination of stable slopes constructed from Class 6N, 6N1, 6N2 or Class 6P, 6P1, 6P2 will not be required provided that the material complies with the requirements of Appendix 6/1 Table 6.1 of this Specification and that the Designer's Geotechnical Site Representative is satisfied with the material following inspection.

Class 7B not anticipated.

11.3 Plate Load Testing

Plate loading tests are to be carried out to determine the in-situ deformation characteristics of Selected Granular Material placed behind the retaining walls and integral bridge abutments.

Test locations shall be evenly distributed both in plan area and vertical profile and agreed with the Designers Geotechnical Site Representative.

The tests shall be in accordance with BS 1377-9:1990 as amended and added to in this specification. The tests shall be undertaken as incremental load tests with the Modulus of Deformation calculated for each load/unload loop in accordance with HD25/94.

The load will be applied in increments and released in decrements on a representative section of the ground using a plate and loading device. The form of apparatus and the testing procedure selected shall provide a safe method for conducting the tests. The Contractor shall submit a method statement detailing all aspects of the test method, equipment, set up and procedure to allow the test requirements to be met safely prior to commencing the work.

All test locations shall be surveyed and levelled to an accuracy of +/-1 m and +/- 0.1 metres, respectively.

The plate size shall be the largest possible diameter chosen with regard to the required test load and suitable reaction (taken to be a tracked excavator of approximate weight of 5 tonnes). A minimum plate size of 600 mm diameter shall be adopted.

The minimum accuracy for the load measuring devices shall be 0.5 kPa.

Measuring devices shall be located such that the deformation measurements are made to the required accuracy, independently of the loading column and from a datum independent of the other components of the test apparatus.

All measurement devices shall consist of electronic transducers. Dial gauges shall not be permitted. . These shall be protected from sunlight and wind, and care is to be taken to ensure that devices and reaction loading system are not subject to vibration.

The minimum accuracy of the settlement measuring devices shall be 0.01 mm.

All measuring devices and load systems shall be maintained according to manufacturer's instructions. Copies of the current calibration certificates shall be included with the Contractor's method statement.

The test area shall be prepared in accordance with BS1377-9 1990. The maximum depth of indentations of the test surface shall be 50 mm.

The test locations are to be prepared by applying a level layer of sand 5 mm to 10 mm thick over an area slightly larger than the diameter of the plate.

The plate is to be placed on the top of the sand layer with the centre of the plate directly beneath a suitable jacking point on the mobile kentledge.

The plate shall be thoroughly bedded by using a slight downwards pressure and twisting action.

The area of preparation shall extend to twice the plate diameter.

The test equipment and test area shall be protected against any adverse weather conditions that may be detrimental to the equipment and test results.

A preload shall be applied as 5% of the Maximum Design Load. The plate will be preloaded until movement ceases. The settlement reading at this load shall then be taken as the zero reading.

The load at each stage shall be held constant and the plate settlement monitored against time commencing on application of the load. Continuous readings shall be taken at a minimum frequency of 5 second intervals until consecutive measurements over a minimum 5 minute period indicate that penetration has ceased. The adoption by the Contractor of automated equipment shall be subject to agreement with the Designer's Geotechnical Site Representative.

If a test proceeds in an unexpected manner, the loading and deformation shall be recorded and the test will be stopped and re-applied at another location with the agreement of the Designer's Geotechnical Site Representative.

If a higher load than intended is inadvertently applied during any loading stage the load shall be maintained and recorded.

The loading and unloading increments for each vertical test will be as detailed in Table 9. These are related to the design load values for each structure provided on the drawings. Two repeat cycles shall be undertaken.

Table 9: Appendix 6/6 Plate bearing test loading and unloading cycles

Loading Cycle	Stage	Percentage of Design Load
2 repeat cycles	Preloading	5%
	1	20%
	2	40%
	3	60%
	4	80%
	5	100%

	6	120%
	7	100%
	8	80%
	9	60%
	10	40%
	11	20%
	Seating	5%

The maximum load shall be defined in the asset specific earthworks specification.

Following the test, the area beneath the plate shall be excavated and the tested ground conditions recorded. A sample shall be taken of the excavated material for particle size distribution testing and the results provided to the Designer's Geotechnical Site Representative. At least three density and moisture content determinations shall be made at different locations within 1 metre of the test location on the same material. These may be undertaken using a nuclear density gauge providing initial calibration trials have been undertaken.

The reporting requirements shall be as detailed in BS1377-9:1990. In addition to these requirements, the report shall also contain descriptions of excavated material, test equipment, deviations from the procedure detailed herein, calibration certificates, in-situ and laboratory testing.

Preliminary results of each test shall be provided to the Designer's Geotechnical Site Representative within 24 hours of completion of the test.

An electronic copy of the complete draft and final reports will be submitted to Designer's Geotechnical Site Representative within one week of completion testing and one week after receipt of comments respectively. Final reports shall be provided. Test data shall also be provided digitally in a format to be used in Excel. The Designer's Geotechnical Site Representative shall interpret the test results and advise the Contractor whether the design conditions have been verified or whether replacement of any of the foundation material is required.

The stiffness modulus shall be computes for each test point, using the following formula:

$$E = \pi \times (1-v^2) \times r \times q / (2 \times 1000\delta_h)$$

Where:

E = Young's Modulus (in MN/m² or MPa);

v = Poisson's Ratio (approximately 0.3);

r = Load plate radius (in mm);

q = net foundation working load (in kN/m² or kPa); and

δ_h = deflection under the centre of the plate (in mm) at the working load.

The Young's Modulus of the structural fill shall be determined from the deflections recorded at 100% of the working load to calculate an E' at a strain of 0.1%.

11.4 Trial demonstration of alternative techniques to measuring stiffness with plate bearing tests

In areas where structural backfill is placed, trials of alternative techniques to the use of plate bearing tests to measure stiffness are permitted. The scope of the trials, the suitability of alternative techniques and correlations are to be agreed with the Designer's Geotechnical Site Representative.

11.5 Compaction of fill to structures

The Contractor shall restrict compaction plant used on fill to structures, within 2 metres of a structure, to the following items as described in sub-Clause 612.10 and listed in Table 6/4:

- vibratory roller having a mass per metre width of roll, as determined by sub-Clause 612.10, not exceeding 1,300 kg with a total mass not exceeding 1,000 kg;
- vibrating plate compactor having a mass not exceeding 1,000 kg; and
- vibro-tamper having a mass not exceeding 75 kg.

The compacted level of the fill within this zone shall not differ during construction from the compacted level of the remainder of the adjoining fill to structures by more than 250 mm.

12 APPENDIX 6/7 (NON HSR EARTHWORKS) – SUB-FORMATION AND CAPPING AND PREPARATION AND SURFACE TREATMENT OF FORMATION

12.1 Drawing references which show locations where capping is required and its thickness and where capping will only be required when one of the pavement types is adopted

Drawing references which show locations where capping is required and its thickness and where capping will only be required when one of the pavement types is adopted are detailed in the asset specific earthworks specification addendum.

12.2 Allowed surface level of tolerance

Tolerances shall be as Clause 616.1.

12.3 Permitted Classes of capping (highways) singly and in combination

Permitted classes of capping shall comprise of:

- granular materials: 6F1, 6F2, 6F3, 6F4 or 6F5; and
- treated materials: 9A, 9B, 9D and 9E.

12.4 In cuttings and on embankments, the procedure to be adopted for construction of capping or which alternative are permitted

The procedure to be adopted in cuttings is to follow the requirements of 613.11 (i).

The procedure to be adopted on embankments is to follow the requirements of 613.12 (i).

CBR compliance testing on the sub-formation shall be carried out using in-situ CBR tests in accordance with BS 1377: Part 9. Compliance testing is required to confirm that the in-situ CBR is no less than the design equilibrium CBR. CBR compliance testing shall be carried out prior to placement of the pavement construction to confirm design values. This testing shall not be used to increase the design equilibrium CBR values.

Where in-situ CBR tests are carried out the test location shall be selected where possible to avoid particles of more than 20 mm diameter and particular attention shall be given to the requirements of BS 1377: Part 9 Clause 4.3.4.10.

The frequency of CBR testing shall be in accordance with the frequency stated in Appendix 1/5, subject to local modification to reflect site conditions and agreement with the Designer's Geotechnical Site Representative.

The results of the in-situ testing shall be made available to the Designer's Geotechnical Site Representative within 48 hours of the testing being completed.

Where the in-situ CBR is lower than the design equilibrium CBR, either the capping thickness is to be increased accordingly as determined by the Designer's Geotechnical Site Representative or if a localised soft spot the material removed and replaced with material with a CBR that meets the sub-formation CBR requirements, similar to the surrounding material. If any degradation of the capping is noted prior to placement of pavement material, remedial measures shall be undertaken as agreed by the Designer's Geotechnical Site Representative.

The sub-formation shall be protected at all times. Excavation of cuttings may be halted at any stage providing no less than 300 mm of material as weather protection is left in place above the formation or sub-formation level.

Shaping requirements of sub-formation shall be to Clause 613.

A minimum CBR of 3% is required at the top of the sub-formation layer (i.e. top of earthworks (cutting, at grade or embankment), below subbase). On excavation to formation level the ground conditions and CBR to be verified against the design assumptions. Where the verification testing identifies granular material at the top of the sub-formation and a minimum CBR of 10%, subject to the agreement of the Designer's Geotechnical Site Representative the pavement design may be revised. The expected CBR of the sub-formation layer is detailed in the asset specific specification addendum.

12.5 Requirements for a demonstration area or areas including location and protection

Requirements for a demonstration area or areas including location and protection are detailed in the asset specific earthworks specification addendum.

12.6 Drawing references

Drawing references are detailed in the asset specific earthworks specification addendum.

12.7 Requirements for lime used for lime or lime and cement stabilisation, including form of lime and performance requirements to be included in the manufacturer's Declaration of Performance provided by the Contractor

Lime and/or cement used for capping stabilisation improvement shall be quicklime complying with BS EN 459-1. The amount of lime or cement addition, the method and timing of working shall be sufficient to render the material acceptable in accordance with Appendix 6/1, Table 6/1.

Lime and/or cement treatment of bulk fills shall not be carried out during periods of rain. If rainfall occurs during lime stabilisation the surface shall be compacted and sealed against rainwater ingress. Earthworks shall be shaped to falls to facilitate shedding of water.

Where treated materials are to be used below the groundwater table measures shall be taken to ensure that a pathway for groundwater to enter treated materials shall not be created during the curing period.

Areas for lime treatment shall be maintained free of groundwater during the treatment process.

Temporary measures to minimise the impact of lime stabilisation on surface waters shall be adopted where pollution risks are identified by the Contractor. Lime and/or cement shall not be used at any location until the required temporary measures are installed and operational.

The Contractor shall demonstrate all plant involved in the operation to satisfy the Designer's Geotechnical Site Representative of compliance with the above.

Waste lime and lime treated waste soils shall not be temporarily stored within the top 1.5 metres of finished levels or topsoil stockpiles.

Lime treated waste soils shall be compacted, sealed and shaped to minimise water ingress.

Protection of the formation in accordance with SCEW Clause 608.9(ii) shall consist of treated materials for lime and/or cement treated layers.

To ensure thorough mixing of soils improved with lime and/or cement, the following measures shall be adopted:

- use shall be made of a purpose built mechanical spreader or combined spreader and rotavator;
- the spreader discharge rate shall be constant no matter what the speed of movement. The spread rate shall be checked at the rate defined in Appendix 1/5;
- mixing shall be undertaken by a powerful purpose built rotovator or combined spreader and rotovator;
- a consistent and homogenous mix shall be achieved;
- the material shall be stabilised in a single layer of compacted thickness no more than 300 mm; and
- to avoid leaving untreated material, adjacent strips shall be overlapped by 150 mm and cut into the previously stabilised layer below by at least 20 mm.

12.8 Locations where treatment of formation in accordance with sub-Clause 616.4(i) or 616.4(ii)

Locations where treatment of the formation in accordance with sub-clause 616.4(i) or 616.4(ii) are detailed in the asset specific earthworks specification addendum.

12.9 Details of any additional tests for rate of spread of lime

Tests for the rate of spread of lime to be undertaken in accordance with Appendix 1/5.

12.10 Intervals for the testing for available lime if different from weekly

Intervals for the testing for available lime to be undertaken in accordance with Appendix 1/5.

12.11 Preparation of formation on existing sub-base material

Where existing highway surface pavement is present below the works, it shall be removed to foundation/formation level. There is no specific need to remove existing subbase below formation/foundation level provided it achieves the design CBR.

12.12 Requirements for cement type in lime and cement stabilisation including performance requirements to be included in the manufacturer's Declaration of Performance provided by the Contractor

Lime used for lime or lime and cement capping stabilisation shall be quicklime complying with BS EN 459-1. Cement used for cement or lime and cement capping stabilisation shall be Portland cement complying with the requirements of BS EN 197-1.

12.13 Requirements for alternative thickness of layers to be stabilised

Requirements for alternative thickness of layers to be stabilised are detailed in the asset specific earthworks specification addendum.

12.14 Alternative treatment requirements for layers to be stabilised

Layer thickness to stabilise lime treated materials shall not exceed 300 mm.

12.15 Requirements for dates of treatment if different from sub-Clause 615.8

Dates of treatment are to be in accordance with the SCEW Clause 615.8.

13 APPENDIX 6/7 (HSR) – SUB-FORMATION, PREPARED SUBGRADE AND PROTECTION LAYER PLUS PREPARATION AND SURFACE TREATMENT OF FORMATION AND PROTECTION LAYER

13.1 Drawing references which show locations where Prepared Subgrade and the Protection Layer is required and their thickness

Drawing references which show locations where Prepared Subgrade and Protection Layer is required are detailed in the asset specific earthworks specification addendum.

13.2 Allowed surface level of tolerance

Tolerances shall be as Clause 616.1.

13.3 Permitted Classes of capping singly and in combination

Permitted classes of capping shall comprise of:

- Protection layer: Class 6F6 and CBGM; and
- Prepared subgrade layer: Class 6F8, 6F9 and CBGM.

13.4 Requirements for a demonstration area or areas including location and protection. Requirements for removal and reinstatement of demonstration area if not forming part of the permanent works

Before commencing construction of the Prepared Subgrade and the Protection Layer in the permanent works, the Contractor shall demonstrate the methods, equipment and materials he proposes to use by constructing an area, or areas as appropriate, of Prepared Subgrade and the Protection Layer on a typical prepared sub-formation to the same thickness as required in the permanent works. The area of each construction demonstration shall be not less than 700 m^2.

The materials placed during the demonstration may form part of the permanent works, provided they meet the requirements of the contract, or the demonstration may be carried out elsewhere on the site.

After completion of each demonstration area the Contractor shall within a period of not greater than 5 days and before commencing the main construction of the appropriate Prepared Subgrade and the Protection Layer in the permanent works, carry out tests on each demonstration area and provide the Designer's Geotechnical Site Representative with records for acceptance.

The demonstration area shall, if it does not meet the requirements for the permanent works or is located elsewhere on site, be removed and the area reinstated.

13.5 Drawing references

Drawing references for the Prepared Subgrade and the Protection Layer are detailed in the asset specific earthworks specification addendum.

13.6 Locations where treatment of formation in accordance with sub-clause 616.4(i) or 616.4(ii)

Locations where treatment of the formations in rock shall be in accordance with sub-clause 616.4(i) or 6164(ii) are detailed in the asset specific earthworks specification addendum.

14 APPENDIX 6/8 – TOPSOILING

14.1 General

Topsoil shall be stripped to the base of topsoil in accordance with Clause 602.10.

The thickness of topsoil and subsoil are detailed in the Farm Pack Soil Resource Plan documents.

The Contractor shall comply with the requirements of the HS2 Technical Standard for Soil Handling and Land Restoration (HS2-HS2-EV-STD-000-000008) when excavating topsoil from stockpiles.

Where the Contractor identifies topsoil from a particular source that shall be intended for re-use in a specific location within the works, the Contractor shall stockpile the topsoil separately and record the storage location on a drawing. Topsoil re-use shall be undertaken in accordance with Clause 602.

Stockpiles of vegetation and upper subsoil horizons shall be stored separately from lower subsoil horizons.

Stockpiles shall not be placed over rooting zones of mature trees in areas where existing trees/habitats may be damaged or where surface run-off may cause pollution.

Planting of topsoil, or topsoil in abandoned watercourses shall be in accordance with the clauses set out in SCEW Series 3000 – Landscape and Ecology (document number HS2-HS2-CV-SPE-000-013000) and/or as detailed in the asset specific earthworks specification appendices.

14.2 Drawing references which show areas of Class 5A material

Drawings references showing which show areas of Class 5A material are detailed in the asset specific earthworks specification addendum.

14.3 Drawing references which show the locations where topsoil and vegetation is to be left in place and where topsoil is to be stripped as turf

Drawings references which show the locations where topsoil and vegetation is to be left in place and where topsoil is to be stripped as turf are detailed in the asset specific earthworks specification addendum.

14.4 Drawing references which show depths to which topsoil is to be stripped

Drawings references which show depths to which topsoil is to be stripped are detailed in the asset specific earthworks specification addendum along with the relevant Farm Pack Soil Resource Plan.

14.5 Height limits of topsoil stockpiles permitted, if other than 5 m

The maximum height of topsoil stockpiles shall be 5 metres unless otherwise agreed with the Designer's Geotechnical Site Representative.

The following stockpile heights are stated:

- Soil Handling Unit A – stockpiles up to 5 metres;
- Soil Handling Unit B – stockpiles up to 4 metres; and
- Soil Handling Unit C – stockpiles up to 3 metres.

14.6 Reference period of time for when topsoil can be stockpiled if different from sub-Clause 602.10

The Contractor shall adhere to the requirements of sub-Clause 602.10 unless otherwise agreed with the Designer's Geotechnical Site Representative.

If soils are to be stockpiled for in excess of six months, stockpiles shall be seeded with a grass/clover mixture to minimise soil erosion and reduce the spread of weeds. Stockpiles with seeded grass cover during the summer months shall be maintained by spraying, mowing or strimming to control, minimising the spread of weeds. Stockpiles without seeded grass cover shall be sprayed with water when necessary to prevent the generation of dust.

14.7 Whether surplus topsoil is to be stored or disposed of by the Contractor. Details of topsoil storage areas such as location, height, contours and batter slopes

It is anticipated that all acceptable topsoil will be re-used as part of the works.

Should surplus topsoil be accumulated during the works, the Contractor shall liaise with the Designer's Geotechnical Site Representative regarding storage and/or disposing of the surplus material. Surplus site won topsoil shall be managed in accordance with HS2-HS2-EV-STD-000-000008 and the SCEW Series 3100 (HS2-HS2-CV-SPE-000-013100). Should there be a surplus of topsoil it shall considered as Class 4 Landscape Fill and placed on the outward facing slope of landscape bunds.Surplus topsoil is permitted to be placed on the surface of outward facing slopes.

14.8 Details of slopes of Class 2E and 7B material to be immediately covered by topsoil

Not anticipated.

14.9 Whether imported topsoil Class 5B is required or permitted

It is expected that there is sufficient topsoil available on-site, however Class 5B material imported is permitted as part of the Contract.

14.10 Details of topsoil treatment in areas to be turfed

Details of topsoil treatment in areas to be turfed are detailed in the asset specific earthworks specification addendum.

14.11 When topsoil is not to be excavated from stockpiles, whether on site or imported

Topsoil shall not be excavated from stockpiles, whether on site or imported:

- which has been exposed to a cumulative rainfall exceeding 100 mm, over the preceding 28 days;
- when heavy rain is falling;
- which are frozen; or
- in the case of topsoil which has been stockpiled for more than 6 months, unless the stockpile has been treated with a total, non-residual herbicide as recently as is seasonally possible (allowing the period of time recommended by the manufacturer to elapse prior to excavation).

14.12 Permitted areas of non-removal and disposal off-site of stones or other debris with dimensions greater than 100 mm equivalent diameter

Not anticipated.

14.13 Thickness of topsoil to be deposited and when a tracked vehicle may not be used for spreading

The requirements of sub-Clause 618.4 shall apply and, in addition:

- where sowing grass seeds, the thickness shall be a minimum of 150 mm;
- in areas to be planted with trees and shrubs, the thickness shall be a minimum of 300 mm;
- thicker layers may be permitted if approved by the Designer's Geotechnical Site Representative;
- tracked vehicles may be used for spreading topsoil; and
- requirements for topsoil thickness above abandoned watercourses are detailed in SCEW Series 3000 – Landscape and Ecology and/or the asset specific earthworks specification.

15 APPENDIX 6/9 – EARTHWORK ENVIRONMENTAL BUNDS, LANDSCAPE AREAS AND STRENGTHENED EMBANKMENTS

15.1 Earthwork Environmental Bunds

Drawings references showing the location of the earthwork environmental bunds are detailed in the asset specific earthworks specification addendum.

Requirements for early construction and topsoiling are detailed in the asset specific earthworks specification addendum.

15.2 Landscape areas

Drawings references showing the location of the landscape area are detailed in the asset specific earthworks specification addendum.

The material Classes and compaction requirements for landscape areas are detailed in section 6.1 of this specification.

Following completion of filling of landscape areas, Class 5 material shall be shaped to achieve gently rounded shoulders and toes of earthworks that fit within the envelope of parameters shown in the design model. The Contractor shall observe the requirements of the HS2 Technical Standard for Landscape Earthworks Design (HS2-HS2-EV-STD-000-000021). Planar and angular earthworks are to be avoided unless designed as such.

Curves within the soil profile may be concave or convex depending on context. The objective is to blend earthworks in with the existing landform character so that the join between them is as seamless as possible.

The locations where the landscape areas may be constructed simultaneously with adjoining embankments are detailed in the asset specific earthworks specification addendum. The maximum level difference between the mainline embankment construction and the landscape bund to be 2.0 metres unless stated otherwise in the asset specific earthworks specification addendum.

Landscape areas shall be topsoiled in accordance with Clause 618 and seeded, turfed or planted in accordance with Series 3000 and the requirements of the asset specific earthworks specification addendum.

The requirements for topsoiling shall be as per Appendix 6/8.

15.3 Strengthened Embankments

Drawings references showing the location of the strengthened embankments are detailed in the asset specific earthworks specification addendum.

The areas where strengthened embankments using geogrid reinforcement are typically required are associated with ground improvement with rigid inclusions and load transfer platforms.

Geogrids shall have a current BBA certificate for Roads and Bridges certifying the appropriate material properties.

Reinforcing elements shall be uniaxial HDPE (High Density Polyethylene) geogrid or woven reinforcement fabric manufactured in accordance with the Quality Assurance requirements BS EN ISO 9001.

The Contractor shall provide full documentation of each proposed geogrid to the Designer prior to installation. The documentation shall include the manufacturer's specification, quality assurance procedures, test records, durability certificates and BBA Certificates.

The geogrid shall be protected at all times against mechanical or chemical damage. Any damaged portion shall be repaired or replaced.

The geogrid shall be inert to all chemicals naturally found in soils and shall have no adverse effect to solvents at ambient temperature. It shall be resistant to aqueous solutions of salts, acids and alkalis, be non-biodegradable and have an optimum quantity of finely divided carbon black to inhibit attack by ultra violet light.

The orientation of uniaxial geogrids shall be as detailed on the drawings.

Bodkin Joints in the geogrid shall be capable of carrying in excess of 90% of the Quality Control Strength when tested in accordance with BS EN ISO 10321:1996.

The design strength is determined for a 120 year design life by the following:

T_D = design strength for the ultimate limit state*

$$T_D = T_{CR} / (RF_{ID} \times RF_w \times RF_{CH} \times f_s)$$

Where:

T_{CR} = extrapolated creep rupture strength at the end of the design life;

RF_{ID} = reduction factor for installation damage taken from BBA certificate;

RF_W = reduction factor for weathering taken from BBA certificate;

RF_{CH} = reduction factor for chemical / environment effects taken from BBA certificate; and

f_s = factor of safety for the extrapolation of data (PD ISO/TR 20432).

Note * The design strength (T_D) to be taken for 20˚C from the BBA certificate for the product.

The interface sliding factor (α as defined in HA 68/94 and a' in BS 8006) shall be at least 0.6 and the soil peak friction at least 38˚. These values shall be demonstrated by undertaking shear box testing of reinforced soil fill material and reinforcement to SCEW Clauses 636 and 639 or reference to the BBA certificate where testing has been undertaken on comparable materials as those being used as part of the works. Tests shall be undertaken for each type of geogrid reinforcement to be used and any change in source of material.

Requirements for strengthening materials are detailed in the asset specific earthworks specification addendum.

The Contractor shall prepare a construction methodology for placement of a load transfer platform to prevent any damage to the executed rigid inclusions. Care shall in particular be taken in placement and compaction of initial earthworks layers.

16 APPENDIX 6/10 – GROUND ANCHORS, CRIB WALLING AND GABIONS

16.1 Ground Anchors

Not anticipated.

16.2 Crib Walling

Not anticipated.

16.3 Gabions

Drawings references showing the location of the gabions are detailed in the asset specific earthworks specification addendum.

The Contractor shall construct the Gabion retaining walls in commensurate with the requirements set out in Clause 626 unless otherwise agreed with the Designer's Geotechnical Site Representative.

Gabion baskets to be Maccaferri system or similar.

The design life of the gabions to be 120 years.

The gabions shall be constructed of PVC coated galvanised wire in accordance with SCEW Clause 626.

The mesh size shall have an aperture of 80 mm by 80 mm or as agreed with the Designer's Geotechnical Site Representative.

The minimum face dimension of a gabion unit shall be 500 mm.

Gabions shall have a current BBA certificate for Roads and Bridges certifying the appropriate material properties.

The gabions shall be infilled with material complying with SCEW Clause 626 and Table 6/1 unless indicated otherwise in the asset specific earthworks specification addendum. Where locally sourced Class 6G is required this shall be detailed in the asset specific earthworks specification addendum.

Samples of proposed Class 6G material shall be provided to the Designer's Geotechnical Site Representative for acceptance. Samples shall be submitted at least one month prior to delivery at site. Where is it not possible to utilise local stone, the Contractor to propose an alternative to be accepted by the Designer's Geotechnical Site Representative.

The front exposed faces of the gabions shall be filled by hand prior to machine filling the remainder.

A non woven geotextile shall be provided between the 6G fill and adjacent fill and placed outside of the gabion structure. This geotextile is specified in Appendix 6/5.

Tolerances of +/-5% are permitted in basket size. Vertical tolerance shall be +/-75 mm.

The maximum size of fill material shall not exceed two thirds of the minimum dimensions of the gabion compartment or 200 mm whichever is smaller and the minimum size of the fill material shall not be less than the size of the mesh opening.

16.4 Rock filled mattresses

Rock filled mattresses to only be specified in certain circumstances e.g. where loose riprap is envisaged not suitable due to likely vandalism. Specification is to be assessed on a site basis. Approval for use by the asset owner will be required.

16.5 Rip Rap

Rock for rip-rap shall be natural, hard, sound homogenous, non-argillaceous rock of good durability. It shall be free from laminations and weak cleavage planes and shall be of such character that it shall not disintegrate or erode when exposed to frost attack or the actions of air, water, wetting and drying, freezing and thawing. The rock shall have a monolithic structure and shall not contain cellular, honeycombed or other voids and shall be free from cracks, seams or similar defects. The rock shall not contain harmful materials such as iron pyrites, coal, mica, laminated material or any materials in sufficient quantity to adversely affect the strength and durability of the material. It shall be capable of being handled and placed without undue fracture or damage. It shall be free from coating of clays or other deleterious material.

The rock supplied for any single grade at any one asset shall be from a single quarry.

The grading of the rip raps is defined on the asset specific drawings ((D_{50}), riprap grading: $CP_{63/180}$, $CP_{90/250}$, $LMA_{5/40}$, $LMA_{15/120}$, $LMA_{40/200}$, $LMA_{60/300}$ and $HMA_{300/1000}$ (defined as per Tables 1 to 4, BS EN 13383-1, 2013)).

All rock types shall also comply with the requirements detailed in Table 10.

Table 10: Appendix 6/16 Rip Rap properties

Property	Rip rap	Sampled, tested and reported in accordance with:
Grading	As above	BS EN13383 Part 1 – Clause 5 (coarse grading) & Clause 6 (light and heavy gradings)
Shape	$LT_{Declared}$	BS EN13383 Part 2 – Clause 7
Crushed or broken surfaces	RO_{NR}	BS EN13383 Part 1 – Clause 4.4
Minimum particle density (Mg/m^3)	2.6	BS EN13383 Part 2 – Clause 4 and Clause 8
Resistance to breakage	CS_{60}	Test with EN 1926:1999 annex A
Resistance to wear	$M_{DE}30$	EN 1097 Part 1:1996 – Clause 7
Water absorption	$WA_{0.5}$	BS EN 13383 Part 2 – clause 8
Resistance to salt crystallisation (if WA >0.5%)	MS_{25}	EN 1367 Part 2 :1998 – clause 8

The test requirements detailed in the Table 10 shall be carried out on representative samples of rip rap. The tests shall be carried out at the frequency as detailed in Appendix 1/5.

The source location, type and colour should be chosen to obtain consistency with local stone. Where is it not possible to utilise local stone, the Contractor to propose an alternative to be accepted by the Designer's Geotechnical Site Representative.

Where necessary, a representative sample of large rock should be crushed to provide sizes acceptable for testing by these procedures.

The Contractor to provide a photographic record of the rip rap to the Designer's Geotechnical Site Representative for acceptance two weeks prior to commencement of materials placement. Where requested the Contractor shall facilitate visual inspection of materials by the Designer's Geotechnical Site Representative at their source location.

Rock quality shall be carefully monitored throughout the quarrying process and the *Contractor* shall ensure that quarried materials are produced to the size, quality, weight and shape required. The *Contractor* shall ensure that damage to the rip rap during stockpiling, transportation and handling is kept to a minimum.

For each grade the contractor shall demonstrate that the method of selecting rocks in the quarry will meet the grading requirements specified in BS EN 13383-1:2013. The bulk sample should consist at least three samples from a stream of material or six samples from a static batch. For Heavy gradings a selection of these weighed rocks should be kept as examples if visual grading of the rocks is adopted.

Rock quality shall be carefully monitored throughout the quarrying process and the Contractor shall ensure that quarried materials are produced to the size, quality, weight and shape required. The Contractor shall ensure that damage to the rip rap during stockpiling, transportation and handling is kept to a minimum.

The rip rap system shall have a design life of 120 years with maintenance.

16.5.1 Placement

Coarse and Light gradings ($CP_{63/180}$, $CP_{90/250}$, $LMA_{5/40}$, $LMA_{15/120}$, $LMA_{40/200}$, $LMA_{60/300}$):

- coarse gradings and light gradings may be placed in bulk by a machine, with care, so as to minimise disturbance to any already-placed rocks and to avoid damage to the rocks, surface below or geotextiles; and
- rip rap shall be placed to achieve homogeneous layer but shall not be compacted.

Heavy gradings ($HMA_{300/1000}$):

- heavy gradings (to BS EN 13383-1) shall be constructed by placing the rocks, individually by a machine with care ensuring a random orientation and weight distribution and so that the structure has a large void ratio of 35% to 40%; and
- the rocks shall be placed to achieve a minimum 'three-point support' and shall not be placed so that they can move or obtain their stability on a plane solely by frictional resistance prior to placing further rock. The rock shall be placed so that the adjacent faces of abutting rocks are not parallel and that each rock is stable against wave and current action.

In addition to the above, no rocks shall be dropped from a height greater than 2 metres during placement, to avoid damage to geotextile.

16.5.2 Tolerances

Tolerances shall be as set out in Table 11.

Notwithstanding any accumulation of positive tolerances on the excavated profile, the thickness of the rip-rap layer shall not be less than 80% of the nominal thickness shown in the drawings when calculated using actual mean profiles.

Table 11: Appendix 6/16 Rip Rap properties

Surface	Level or location		Tolerance Any point to design profile
Formation (underside of rip rap and rock (heavy grading))	Trimmed in dry Trimmed below water		±0.3 m ±0.3 m
Top of rip rap (light gradings)	Placed in dry Placed below water		±0.3 m ±0.3 m
		Individual stone to actual mean profile	**Actual mean profile to design profile**
Top of rock (heavy grading)	Placed above water Placed below water	±0.20 m ±0.25 m	±0.3 m ±0.3 m

The source location, type and colour should be chosen to obtain consistency with local stone. Where is it not possible to utilise local stone, the Contractor to propose an alternative to be accepted by the Designer's Geotechnical Site Representative.

Where necessary, a representative sample of large rock should be crushed to provide sizes acceptable for testing by these procedures.

The visual impact of the rip rap shall be submitted for acceptance by the Designer's Geotechnical Site Representative.

17 APPENDIX 6/11 – SWALLOW HOLES AND OTHER NATURALLY OCCURRING CAVITIES AND DISUSED MINE WORKINGS

17.1 General

The Contractor is required to carry out a thorough inspection of the ground improvement footprint for swallow holes and other naturally occurring cavities, disused mine workings and other surface anomalies after topsoil has been stripped. Should an anomaly be discovered, the Contractor shall inform the Designer's Geotechnical Site Representative and agree an appropriate mitigation measure.

17.2 Drawing references showing locations of voided ground or abandoned workings

Drawings references showing the location of voided ground or abandoned workings are detailed in the asset specific earthworks specification addendum.

17.3 Location methods for identifying and inspecting shallow workings or voids where required

Location methods for identifying and inspecting shallow workings or voids where required are detailed in the asset specific earthworks specification addendum.

17.4 Requirements for bulk fill and methods of placement

Requirements for bulk fill and methods of placement are detailed in the asset specific earthworks specification addendum.

17.5 Grouting, types and procedures

Grouting, types and procedures are detailed in the asset specific earthworks specification addendum.

17.6 Details of excavation, clearance and flushing of soft infilling

Details of excavation, clearance and flushing of soft infilling are detailed in the asset specific earthworks specification addendum.

17.7 Details of other treatments or support requirements

Details of other treatment or support requirements are detailed in the asset specific earthworks specification addendum.

17.8 Requirements for concrete caps to voids or soft areas

Requirements for concrete caps to voids or soft areas are detailed in the asset specific earthworks specification addendum.

17.9 Requirements for inspecting, monitoring, clearing, flushing, filling, caps or other treatments of disused mine workings

Requirements for inspecting, monitoring, cleaning, flushing, filing, caps or other treatments of discussed mine workings are detailed in the asset specific earthworks specification addendum.

17.10 Details of any project specific risks

Details of any project specific risk relating to swallow holes and other naturally occurring cavities and disused mine workings are detailed in the asset specific earthworks specification addendum.

18 APPENDIX 6/12 – INSTRUMENTATION AND MONITORING

18.1 General

All instruments shall be labelled with their reference number at the location where the readings or measurements are to be taken. The labelling shall be permanent, using method or material to be agreed with the Designer's Geotechnical Site Representative.

Instrumentation shall be set out and installed to within 100 mm of the locations shown on the drawings. Changes in the locations shall be agreed beforehand with the Designer's Site Geotechnical Representative.

Additionally, the Contractor shall undertake visual inspections of all earthworks following commencement of construction for early identification of signs of distress. These shall be undertaken daily on an active part of the site and weekly elsewhere.

The readings are to be taken by the Contractor. The frequency of reading shall be as detailed in the asset specific Designers Monitoring Plan, noting that the frequency of readings may be varied at the discretion of the Designer's Geotechnical Site Representative based on actual earth structure performance at any given location.

18.2 Drawing references showing locations and extent of instrumentation including that required for staged construction

Drawing references detailing the location and extent of instrumentation is detailed in the asset specific earthworks specification addendum.

18.3 Schedules of instruments by type and description with alternatives where possible

The schedule of instrumentation is detailed in the asset specific earthworks specification addendum. The proposed instrumentation and monitoring details can also be found in the corresponding asset specific Designer's Monitoring Plan and the following document:

- 1MC08 & 1MC09 Sectors N1 & N2 Instrumentation Monitoring Statement, document no.: 1MC08-BBV-EN-STA-N000-000001.

The instrumentation for monitoring the settlement of embankments, the heave in the base of cuttings and slope stability will comprise of the following:

- settlement/heave monitoring points;
- inclinometers (manual and in-place);

- shape accel array;
- distributed fibre optic sensing;
- standpipe piezometer;
- vibrating wire piezometers;
- submersible pressure transducer; and
- rod extensometer.

18.4 Details of housings required

Details of housings required are detailed in the following document

- 1MC08 & 1MC09 Sectors N1 & N2 Instrumentation Monitoring Statement, document no.: 1MC08-BBV-EN-STA-N000-000001..

Asset specific requirements are detailed in the asset specific Designers Monitoring Plan.

18.5 Installation techniques

Installation techniques are detailed in the following document:

- 1MC08 & 1MC09 Sectors N1 & N2 Instrumentation Monitoring Statement, document no.: 1MC08-BBV-EN-STA-N000-000001..

18.6 Calibration requirements

Instrument calibration requirements are detailed in the following document:

- 1MC08 & 1MC09 Sectors N1 & N2 Instrumentation Monitoring Statement, document no.: 1MC08-BBV-EN-STA-N000-000001..

18.7 Protection to instruments, connections and housing

The Contractor shall take all necessary precautions to protect the instruments and maintain the instruments in good working order after installation and commissioning. Special precautions shall be taken to provide protection from vehicles and plant, including substantial and readily visible barriers at a distance of 750 mm around each instrument.

Damaged instruments shall be reported to the Designer's Geotechnical Site Representative and replaced or repaired by the Contractor where possible within seven days of the date at which the damaged occurred.

18.8 Requirements for electric power

Requirements for electrical power for the differing instrumentation are detailed in the following document:

- 1MC08 & 1MC09 Sectors N1 & N2 Instrumentation Monitoring Statement, document no.: 1MC08-BBV-EN-STA-N000-000001..

18.9 Frequency of reading and method of reporting readings where the Contractor is required to carry out these tasks

The frequency of reading are contained within the asset specific Designers Monitoring Plan. The method of reporting readings are detailed in the following document

- 1MC08 & 1MC09 Sectors N1 & N2 Instrumentation Monitoring Statement, document no.: 1MC08-BBV-EN-STA-N000-000001..

19 APPENDIX 6/13 – GROUND IMPROVEMENT

19.1 Dynamic Compaction

Not anticipated.

19.2 Vibrated Stone Columns

Not anticipated.

19.3 Excavation and Replacement

Drawing references showing the location and depth of ground treatment by excavation and replacement are included in the asset specific earthworks specification addendum.

The minimum depth of excavation shall comply with the following requirements:

- where required, the removal of all topsoil and subsoil;
- removal of all 'Unacceptable' Class 'U' material; and
- excavation to a prescribed undrained strength for cohesive materials or elevation.

Placement, compaction and testing of the materials used for 'replacement' are to conform to the requirements of this specification and the asset specific requirements detailed in the asset specific earthworks specification addendum, design drawings and Appendix 1/5.

Class 1, 2 or 9 materials, as directed by the drawings shall be used where material can be placed in dry conditions. No materials shall be placed in wet conditions.

In areas prone to flooding a starter layer Class 6B or Class 6C shall be placed to a height of 500 mm above the waterline. Note that a geotextile separation layer is required between Class 2, Class 9J and Class 6B or 6C materials.

The works shall be sequenced to ensure there are no delays between excavation and backfilling.

The backfill for structures is indicated on the relevant structures drawings.

All excavation backfill shall be compacted in accordance with Table 6/1, Table 6/4, Clause 612 and 620 of the SCEW Series 0600 and the requirements of this specification.

The excavation works shall be undertaken to a depth where a minimum strength is achieved. The depth of material to be excavated is estimated on the drawings.

Should any signs of instability be observed or occur within or beyond the excavated area, the excavation sides shall be immediately backfilled.

If instability continues or complete failure occurs, Excavation and Replacement works shall halt immediately. Excavation and Replacement works shall either be relocated to another area in advance of the unstable face or directed a safe distance around the area of instability. In either case, Excavation and Replacement works shall then be undertaken back towards the failure area.

The Contractor shall notify the Designer's Geotechnical Site Representative when excavation to foundation level has been completed to allow inspection. The Contractor will facilitate reasonable requests by the Designer's Geotechnical Site Representative for additional survey points in the base of any excavated area.

The Contractor shall keep daily records of the works carried out and shall make these available to the Designer's Geotechnical Site Representative. The records shall include:

- date, point reference;
- depth and extent of excavation;
- the quantity and nature of the backfill;
- plant used for compaction and number of passes; and
- the number and type of tests undertaken.

Within two weeks of the completion of the works at each location, the Contractor shall submit to the Designer's Geotechnical Site Representative an electronic 3D drawing model giving a complete record of the position, depth and extent of treatment.

19.4 Rigid inclusions

Requirements for ground improvement by rigid inclusions are detailed in the Specification Appendix Series 1600 (1MC08-BBV_MSD-GT-SPE-N001-100009).

19.5 Band drains

Drawing references showing the locations where band drains are required are detailed in the earthworks asset specific specification appendices.

Band drains shall be installed through the specified drainage layer and shall terminate in the underlying materials at a depth detailed on the Drawings. The Contractor shall verify that this requirement has been achieved.

The Contractor shall submit his proposed band drain type to the Designer's Geotechnical Site Representative for his approval. Band drains shall have the following properties:

- width not less than 100 mm +5 mm;
- discharge capacity 50 x 10-6 m^3/s;
- tensile strength > 1000 kN; and
- synthetic geotextile filter with apparent opening size <90 υm.

The band drains shall comprise membrane enclosed finned synthetic material installed within a closed mandrel with a detachable shoe.

The band drains supplied to the works shall be accompanied by the appropriate British Board of Agreement Roads and Bridges Certificates for the size of the band drains to be installed.

Vertical band drains shall be installed with equipment of a type which will cause a minimum of disturbance of the subsoil during the installation operation.

Band drains shall be installed to the depths and at the spacing indicated on the Drawings detailed in the asset specific earthworks specification addendum.

Prior to the installation of band drains within the designated areas, the Contractor shall demonstrate that his equipment, method and materials produce a satisfactory installation in accordance with these specifications. For this purpose, the Contractor will be required to install trial band drains at locations designated by the Designer's Geotechnical Site Representative generally adjacent to but outside the main treatment areas.

The Contractor shall maintain the unique reference number of each band drain within the areas and at the spacings shown on the plans by reference to the mainline / ramp centreline chainage and appropriate offset distance or agreed lettering system.

Replacement band drains required due to defective materials or installation shall be designated with suffix "R". The Contractor shall submit a typical plan showing the agreed referencing system in advance of commencing band drain installation work.

Band drains shall be located, numbered and staked out by the Contractor whom shall take all reasonable precautions to preserve the stakes. The location of the band drains shall not vary by more than 150 mm from the locations indicated on the drawings or as directed by the Designer's Geotechnical Site Representative and shall not deviate from the vertical by more than 1 in 50 (v:h).

At least two weeks prior to the installation of band drains, the Contractor shall submit to the Designer's Geotechnical Site Representative for his review and approval, details of equipment proposed plus the sequence and method of installation. Approval by the Designer's Geotechnical Site Representative will not relieve the Contractor of his responsibility to install band drains in accordance with these specifications.

The Contractor shall satisfy himself that soil conditions as disclosed in relevant soils reports for the project plus the proposed working platform layer can be readily penetrated by his proposed equipment.

Band drains that are out of their proper plan location at working platform level or are damaged during installation, or band drains are improperly completed shall be brought to the attention of the Designer's Geotechnical Site Representative. The Contractor shall properly install replacement drains in the correct location to the correct verticality tolerance for all rejected drains as directed by the Designer's Geotechnical Site Representative.

The Contractor shall provide the Designer's Geotechnical Site Representative with suitable means of readily making a visual determination of the linear quantity of band drain material used at each location. If automated recorders are used they shall initially calibrated against the drain depths independently assessed during installation of the trial drains. The readers shall be suitably clearly marked in depth increments of 0.1 m such that the installed depth of drain below the working platform can be independently verified.

The Contractor shall submit a daily log to the Designer's Geotechnical Site Representative for approval indicating the reference number and length of each band drain plus any other comments regarding accuracy of plan location, plumbness, soil conditions etc.

Where obstructions are encountered below the working surface which cannot be penetrated using normal and accepted procedures, the Contractor shall complete the drain form the elevation of the obstruction to the working surface and notify the Designer's Geotechnical Site Representative.

At the direction of the Designer's Geotechnical Site Representative, the Contractor shall then install a new drain(s) within 500 mm of the obstructed drain.

The Contractor shall observe precautions necessary for protection of instrumentation and other surveying devices installed by others. After instrumentation devices have been installed, the Contractor shall replace at his cost any equipment that is damaged or becomes unreliable as a result of his operations.

The Contractor shall prepare daily reports on all band drain installations. A copy of the proposed daily report shall be submitted to the Designer's Geotechnical Site Representative for approval prior to commencement of work on site. Reports shall include the following information as a minimum:

- earthwork and approximate chainage;
- date;
- weather conditions;
- type and manufacturer of band drain material installed;
- reference number / chainage / offset letter for individual drains;
- installed depth below working platform for individual drain;
- elevation of working platform (to nearest 0.1 mAOD);
- tip elevation of individual installed drain (to nearest 0.1 mAOD);
- total length of drain installed daily; and
- comments on plan position, verticality, soil conditions, obstruction etc.

Report shall be submitted directly to the Designer's Geotechnical Site Representative no later than 1 day after completion of each day's work.

19.6 Surcharging

Ground improvement may include treatment by surcharging. The areas and heights of surcharging where specified will be included in the asset specific earthworks specification addendum.

Monitoring of settlement will be undertaken by the Contractor during staged embankment construction as specified in the asset specific earthworks specification addendum. The results of the monitoring will be assessed by the Designer's Geotechnical Site Representative during embankment construction and during the hold periods to ensure acceptable performance and stability.

The Contractor shall evaluate the ground response as the fill height is increased and stop filling as necessary to maintain temporary stability. The evaluation shall be based on monitoring instrumentation described in the asset specific earthworks specification addendum. If the ground is displaying signs of instability, filling will need to be stopped temporarily while the soil is allowed to consolidate further before placing additional fill.

There are locations where the stability of the embankment may be compromised by overfilling above the specified heigh of surcharge. Consequently, the surcharge fill shall be placed above the earthworks outline only detailed on the drawings.

Where using a surcharge fill over an embankment to be included in the permanent works, prior to placing the surcharge, the embankment should be filled up to the required level, including he estimated settlements so that when the surcharge material is trimmed off the embankment no poorly compacted material is left in place in the permanent works. The estimated settlements are to be provided in the asset specific earthworks specification addendum.

The approval of the Designer's Geotechnical Site Representative shall be obtained prior to the removal of the surcharge. Following removal of the surcharge, where required the fill material shall be trimmed to form the slopes to the permanent works shown on the drawings.

The surcharge shall comprise acceptable general fill Class 1, Class 2, Class 4 or Class 9J or other materials which can be incorporated into the permanent works at a later stage and satisfy the surcharge requirements at the discretion of the Designer's Geotechnical Site Representative and shall have a minimum bulk density of 18 kN/m^3. A minimum of 1 bulk density test per week and source of surcharge material is required to verify the minimum density of the as placed material.

The Contractor shall keep records of the works carried out and shall make these available to the Designer's Geotechnical Site Representative. The frequency of monitoring and reporting for individual areas will be specified in the asset specific earthworks specification addendum. The records shall include:

- date;
- instrument reference;
- height of surcharge;
- number and type of tests carried out; and
- monitoring results.

The frequency of monitoring of the height of the surcharge and related settlements is defined in the asset specific earthworks specification addendum.

Within one week of the completion of the works the Contractor shall submit to the Designer's Geotechnical Site Representative a drawing or drawings giving a complete record of the position and height of the surcharge.

On effective cessation of settlement, as defined by the Designer's Geotechnical Site Representative, the surcharge shall be removed in an even and controlled rate to the underside of the temporary surcharge fill without causing any damage to any monitoring instrumentation. The monitoring instrumentation shall be continued to be read at the frequency detailed in the asset specific earthworks specification addendum as the surcharge is removed and the embankment is unloaded and as required by the Designer's Geotechnical Site Representative.

20 APPENDIX 6/14 – LIMITING VALUES FOR POLLUTION OF CONTROLLED WATERS

Ground investigation data indicates that the majority of excavated materials are chemically acceptable for re-use without further testing as the material comprises either naturally occurring soils and / or chemical testing indicates that levels of contamination are low.

Class U1B soils may be improved by treatment and re-assessment of acceptable for re-use in specific locations. If material is not acceptable, or remains unacceptable following treatment for re-use on-site, it shall be removed for off-site disposal.

Imported materials from a recycled source shall not be incorporated into the permanent works unless it has been produced in compliance with the WRAP Quality Protocol and also agreed with the Designer.

Natural materials generated within the Northern Contract area and conforming to Development Route B shall be re-used in accordance with the MMP Route B Design Statement. Any materials imported into the Northern Contract area shall be selected to ensure that they do not introduce new or higher soil contaminant concentrations to the receptor location. This would require further risk assessment to be carried out, approval from the Designer and where appropriate Regulators.

Any Made Ground or existing material for re-use which has any evidence of potential contamination will be subject to leachate and / or characterisation testing. This will be subject to agreement with the Designer's Geotechnical Site Representative / Contractor and possibly Regulators.

Notwithstanding this, any unexpected contamination of site won materials will be subject to the requirements outlined in Appendix 6/15 to confirm whether it is acceptable for retention, treatment or off-site disposal. Appendix 6/15 also outlines the anticipated minimum frequency of testing.

Where soil leachate testing is required, this shall include the following HS2 suites from the HS2 Specification for Ground Investigation (Document number: HS2-HS2-GT-SPE-000-00001) as a minimum, although depending on the source additional supplementary testing could also be required:

- Suite F – general leachate samples: arsenic, barium, boron, cadmium, chromium III, chromium VI, copper, cyanide, lead, mercury, nickel, selenium, vanadium, zinc and pH; and
- Suite G – leachate organic suite: BTEX, total TPH (with TPHCWG species banding), USEPA 16 PAH's, Phenol (total monohydric).

Testing to be undertaken in accordance with the HS2 Specification for Ground Investigation (Document number: HS2-HS2-GT-SPE-000-00001).

The results shall be provided to the Designer for comparison with the investigation test results and against thresholds found within the MMP Route A risk assessments (1MC08-BBV_MSD-EV-RIA-N001-100001).

21 APPENDIX 6/15 – LIMITING VALUES FOR HARM TO HUMAN HEALTH AND THE ENVIRONMENT

21.1 Re-use

Ground investigation data indicates that the majority of excavated materials are chemically suitable for re-use without further testing as the material comprises either naturally occurring soils and / or chemical testing indicates that levels of contamination are low.

Class U1B soils may be improved by treatment and re-assessment of their acceptability for re-use in specific locations. If material is not acceptable, or remains unacceptable following treatment for re-use on-site, it shall be removed for off-site disposal.

If any unexpected contamination is encountered during excavations (visual and / or olfactory evidence of possible contamination), this material shall be segregated and subject to chemical testing to confirm whether it is suitable for re-use, treatment or requires off-site disposal (with agreement from the Designer, Contractor and Regulators). The testing required will depend on the nature of the contaminants encountered.

The chemical testing results for unexpected contamination shall be reviewed against the acceptability criteria (provided for imported material below and in Appendix 6/14, if required and the MMP Route A risk assessment 1MC08-BBV_MSD-EV-RIA-N001-100001) along with the range of results obtained for similar contaminants from ground investigations at the site. Testing to be undertaken to determine the suitability of materials for reuse and the likely risks from material being re-used.

If concentrations of contaminants exceed the criteria, then subject to agreement with the Designer, Contractor and Regulators, further consideration of the conceptual site model and possibly quantitative risk assessment may be undertaken along with consideration as to whether treatment could be required or the material removed offsite for disposal.

The identification and re-use of naturally occurring shallow soils shall also be managed as detailed in the following document:

- N1 and N2 Earthworks Risk Assessment and Design Statement for MMP Route B Materials, document number: 1MC08-BBV_MSD-EV-RIA-N001-100002.

Recovered acceptable fill shall be re-used in accordance with the MMP Route A Site Specific Acceptability Criteria (SSAC's) and in earthworks designed in accordance with the risk assessment assumptions (document reference 1MC08-BBV_MSD-EV-RIA-N001-100001). The SSAC's define limiting values which shall not be exceeded for acceptable fill at the point of placement. For materials not subject to solidification / stabilisation, SSAC's for organic contaminants shall be those defined in the Risk Assessment for the soil matrix. For materials not subject to solidification / stabilisation, SSAC's for inorganic contaminants shall be those defined in the Risk Assessment for the soil and leachate matrices.

For materials subject to solidification / stabilisation, acceptability shall be defined by leachate SSAC's provided that the material is used in accordance with the Risk Assessment Design Assumptions including a clean cover layer.

Within recycled imported materials asbestos quantities shall not exceed 0.001% and below trace.

21.2 Imported Material

Frequency of testing

Imported materials are to be split into two categories:

- imported aggregate (quarried and recycled); and
- transfer of material (soils from greenfield site/s).

All aggregates imported from quarried sources shall be deemed clean / inert and require no further chemical testing by the Contractor. All aggregates from recycled sources shall be produced under a WRAP Quality Protocol: aggregates from inert waste and shall be deemed clean / inert. Notwithstanding this, both quarried and recycled sources will still need to be geotechnically suitable for their intended use.

For the transfer of material, namely the importing of soils from greenfield sources the following shall apply:

- all sources used will be non-waste and supported by appropriate documentary evidence and certification to this effect;
- must be under a Materials Management Plan; and
- a material specific review and risk assessment shall be undertaken by the Designer and where appropriate a testing regime agreed with the Contractor.

Chemical testing suites that are required will be taken from the HS2 Specification for Ground Investigation (Document no.: HS2-HS2-GT-SPE-000-00001). Chemical testing results for imported engineering fill material shall as a minimum be compared against assessment criteria based upon:

- Material Management Plan, Route A Remediation Strategy, document 1MC08-BBV_MSD-EV-REP-N001-100058.

Further assessment criteria and testing may be defined by the Designer depending upon the source of the material and deposition location

If any topsoil or subsoil is imported, this shall comply with the requirements of BS 3882:2015 Specification for Topsoil and BS 8601: 2013 Specification for Subsoil.

Notwithstanding the above, the Contractor shall ensure that imported materials, which included any material derived from other parts of the HS2 works, do not introduce new or higher concentrations of soil contaminants to the site, in particular to greenfield / agricultural areas for materials derived from a brownfield source.

22 APPENDIX TABLE 1/5 HSR EARTHWORKS

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
601, 631 to 637, 640	Acceptable material				Required	
	Class	General Description				
	1A1, 1B1	General Fill (HSR earthworks)	Grading/ uniformity coefficient (On-site)	1 per 2000 m^3 up to max of 3 per day Landscape bunds 1 per day	Required	
			Grading/ uniformity coefficient (Imported)	1 per day		
			mc/MCV (N)	1 per 2000 m^3 up to max 5 per day Landscape bunds 1 per day		
			Slake Durability Index (N)	Approval only (5 per source)		
			Water soluble sulfate (WS), (N)	Source approval minimum 5 tests (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)] Only required for if placed within 500 mm of steel or cementitious material
			Oxidisable sulfides (OS) (N)	Source approval, minimum 5 tests (then annually)		[TRL Report 477, Test No. 2 and 4] Only required for if placed within 500 mm of steel or cementitious material

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			pH (N)	Source approval, minimum 5 tests (then annually)		Only required for if placed within 500 mm of steel or cementitious material
			Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval[6]		
	2A, 2B, 2C	General cohesive fill (HSR LEF earthworks)	Grading	1 per 2000 m^3 (max 3 per day) Landscape bunds 1 per day	Required	
			mc/MCV (N)	1 per 500 m^3 up to max of 5 per day Landscape bunds 1 per day		
			Undrained shear strength (N)	2A, 2B, 2C 1 per 500 m^3 (max 5 per day)		
			LL/PL (N)	1 per day		
			Water soluble sulfate (WS), (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)] Only required for landscape bunds if placed within 500 mm of steel or cementitious material
			Oxidisable sulfides (OS)	Source approval (then annually)		[TRL Report 477, Test No. 2 and 4] Only required for landscape bunds if placed within 500 mm of steel or concrete
			pH (N)	Source approval (then annually)		Only required for landscape bunds if placed within 500 mm of steel or concrete
			Organic matter (N)	Source approval (then annually)		
			CBR swell limit (N)	Source approval testing		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
		Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval(6)		
4, 4A	Landscape fill	Grading	1 per day	Required	
		mc (N)	1 per day		
		Undrained shear strength (N)	1 per 500 m^3 up to max of 5 per day		
		Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval(6)		Method of sampling Class 4, 4A materials to be agreed with the Designer's Geotechnical Site Representative.
5A	Topsoil or turf, existing on site	Grading	Weekly per-source (during re-soiling)	Required	[See HS2-HS2-EV-STD-000-000008 for further details for Classes 5.]
5B	Imported Topsoil	Grading	Weekly per-source (during re-soiling)	Required	
		Chemical parameters	Source approval		
6B, 6B1	Starter layer	Grading	1 per day	Required	
		PI (N)	1 per day		PI testing only required where no more than 30% by mass of material retained on the 20 mm test sieve, which may include some particles retained on the 37.5 mm test sieve, otherwise testing is not required. [Plasticity of fraction of material passing 425 micron sieve]
		Los Angeles Coefficient (N)	On-site: Weekly until trend (then monthly) Imported: Source approval (then 3 monthly)		
6C	Starter layer	Grading/ uniformity coefficient	On-site: 1 per 1000 m^3 up to max of 5 per day Imported: 1 per day,	Required	

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			PI (N)	1 per day		PI testing only required where no more than 30% by mass of material retained on the 20 mm test sieve, which may include some particles retained on the 37.5 mm test sieve, otherwise testing is not required. [Plasticity of fraction of material passing 425 micron sieve]
			Los Angeles Coefficient (N)	On-site: Weekly until trend (then monthly) Imported: Source approval (then 3 monthly)		
			Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval(6)		Only required when 6C is used in Load Transfer Platforms. Shear box testing for Class 6C materials required where the particle size is no greater than 20 mm.
	6E, 6R	For stabilisation	Grading	1 per 2000 m^3 (max of 3 per day)	Required	
			mc (N)	1 per 2000 m^3 (max of 3 per day)		
			LL and PI (when fines >10%) (N)	1 per day		
			Organic matter (N)	1 per 200 m linear (max 1 m depth)		Testing at frequency stated or equivalent quantum of testing from the source material prior to placement

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
		Water soluble sulfate (WS) (N)	1 per 200 m linear (max 1.0 m depth)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)] Testing at frequency stated or equivalent quantum of testing from the source material prior to placement
		oxidisable sulfides (OS) (N)	1 per 200 m linear (max 1.0 m depth)		[TRL Report 477, Test No. 2 and 4] Testing at frequency stated or equivalent quantum of testing from the source material prior to placement
6F4	Capping	Size designation and overall grading category	1 per 1000 m^3 (max of 5 per day)	Required	
		Maximum fines and oversize categories	1 per 1000 m^3 (max of 2 per day)		
		Los Angeles Coefficient (N)	Source Approval then quarterly		
		Volume of stability of blast furnace slag	Source approval (if required)		
		Volume of stability of steel (BOF) and (EAF) slag	Source approval (if required)		
		Water content	1 per 1000 m^3 (max of 2 per day)		
		Class Ra (asphalt) content (N)	1 per week		
		Bitumen content (N)	1 per week		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
	6F5	Capping	Size designation and overall grading category	1 per 1000 m^3 (max of 5 per day)	Required	
			Maximum fines and oversize categories	1 per 1000 m^3 (max of 5 per day)		
			Los Angeles Coefficient (N)	Source Approval then quarterly		
			Volume of stability of blast furnace slag	Source approval (if required)		
			Volume of stability of steel (BOF) and (EAF) slag	Source approval (if required)		
			Water content	1 per 1000 m^3 (max of 2 per day)		
			Class Ra (asphalt) content (N)	1 per week		
			Bitumen content (N)	1 per week		
			Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval(6)		Only required when 6F5 is used in Load Transfer Platforms
			pH (N)	Source approval		Only required when 6F5 is used in Load Transfer Platforms
	6F6	Protection layer	Grading	On-site: 1 per 1000 m^3 up to max of 5 per day Imported: 1 per 1000 m^3 up to max of 5 per day	Required	
			PI (when fines >10%) (N)	1 per day		
			mc (N)	1 per 1000 m^3 (max of 5 per day)		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			Flakiness index (N)	1 day		
			Los Angeles Coefficient (N)	Source approval then quarterly		
			Micro-Deval (N)	Source approval then quarterly		
			Freeze-thaw (magnesium sulphate soundness test) where the source rock is any of those identified in BBS EN 13242:2002+A 1:2007, Clause 82.2 (N)	Source approval		[Where the source rock is any of those identified in BS EN 13242:2002+A1: 2007, Clause B2.2]
	6F8	Selected granular material	Grading/ uniformity coefficient	On-site: 1 per 1000 m^3 up to max of 5 per day Imported: 1 per 1000 m^3 up to max of 5 per day	Required	
			mc (N)	1 per 1000 m^3 up to max of 5 per day		
			Los Angeles Coefficient (N)	Source approval		
			Micro-Deval (N)	Source approval		
			Flakiness Index (N)	1 per day		
			Methylene Blue value (N)	Source approval		
			Frost Susceptibility (N)	Source approval		
			PI (N)	1 per day		[Plasticity of fraction of material passing 425 micron sieve]
			Water absorption	Information only		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			Water soluble sulfate (WS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
			Oxidisable sulfides (OS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 2 and 4]
			pH (N)	Source approval (then annually)		
			Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	On-site: Source approval (then quarterly Imported: Source approval (then 6 monthly)		Only required 6F8 is used as HSR embankment fill
	6F9	Selected granular material	Grading/ uniformity coefficient	On-site: 1 per 1000 m^3 up to max of 5 per day Imported: 1 per 1000 m^3 up to max of 5 per day	Required	
			mc (N)	1 per 1000 m^3 up to max of 5 per day		
			Los Angeles Coefficient (N)	Source approval		
			Micro-Deval (N)	Source approval		
			Flakiness Index (N)	1 per day		
			Methylene Blue value (N)	Source approval		
			Frost Susceptibility (N)	Source approval		
			PI (N)	1 per day		[Plasticity of fraction of material passing 425 micron sieve]
			Water absorption	Information only		
	6G	Gabion filling	Grading	On-site: 1 per day Imported: 1 per day	Required	

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
		Los Angeles Abrasion	Source approval		
6N, 6N1, 6N2, 6P, 6P1, 6P2	Selected granular material	Grading/ uniformity coefficient	On-site: 1 per 1000 m^3 up to max of 5 per day Imported: 1 per 1000 m^3 up to max of 5 per day Imported: 1 per day,	Required	
		Los Angeles Coefficient (N)	Source approval (then annually)		
		Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	On-site: Source approval (then quarterly Imported: Source approval (then 6 monthly)		
		Permeability (N)	On-site: Source approval (then quarterly) Imported: Source approval (then 6 monthly)		
		mc (N)	1 per 1000 m^3 (max 5 per day)		
		Water soluble sulfate (WS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
		Oxidisable sulfides (OS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 2 and 4]
7A	Selected cohesive fill	Grading/mc/MCV (N)	1 per 500 m^3 (max 3 per day)	Required	
		Undrained shear strength (N)	1 per 500 m^3 (max 3 per day)		
		Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			LL/PL (N)	1 per 500 m^3 up to max of 3 per day		
			Organic matter (N)	Source approval		
			Water soluble sulfate (WS) (N)	Source approval		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
			Oxidisable sulfides (OS) (N)	Source approval		[TRL Report 477, Test No. 2 and 4]
			Total Potential Sulphate (TPS) (N)	Source approval		[TRL Report 477, Test No. 2 and 4]
			Permeability	Source approval		Only required where 7A is required as a containment barrier to contamination or as a lining to a watercourse
	7E, 7E/1, 7F, 7I	Selected cohesive fill	Grading/ MCV (N)	1 per 200 m linear (max 1 m depth)	Required	
			mc (N)	Min 2 per day (or as required by subcontractor)		
			Organic matter (N)	1 per 200 m linear (max 1 m depth)		Testing at frequency stated or equivalent quantum of testing from the source material prior to placement
			Water soluble sulfate (WS) (N)	1 per 200 m linear (max 1 m depth)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)] Testing at frequency stated or equivalent quantum of testing from the source material prior to placement

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			Oxidisable sulfides (OS)	1 per 200 m linear (max 1 m depth)		[TRL Report 477, Test No. 2 and 4] Testing at frequency stated or equivalent quantum of testing from the source material prior to placement
			Total Potential Sulphate (TPS) (N)	1 per 200 m linear (max 1 m depth)		[TRL Report 477, Test No. 2 and 4] Testing at frequency stated or equivalent quantum of testing from the source material prior to placement
			pH (N)	1 per 200 m linear (max 1 m depth)		Testing at frequency stated or equivalent quantum of testing from the source material prior to placement
			LL/PL (N)	1 per 200 m linear (max 1 m depth)		
	803 Type 1	Selected granular fill	Grading (N)	1 per 1000 m^3 (max 5 per day)	Required	
			Water content (N)	1 per 1000 m^3 (max 5 per day)		
			Plastic Limit (N)	1 per week		
			Los Angeles Coefficient (N)	Source approval (then annually)		
			Water soluble sulfate (WS) (N)	Source approval (then annually)		[BS EN 1744-1 Clause 10]
			Total Sulphur (TS) (N)	Source approval (then annually)		[BS EN 1744-1 Clause 11]
			Sulfide Content (S) (N)	Source approval (then annually)		[BS EN 1744-1 Clause 13]
			pH (N)	Source approval (then annually)		
			Frost Susceptibility (N)	Source approval		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval(6)		Only required when 803 (Type 1) is used in Load Transfer Platforms
	8A	Fill to crest edge of mainline embankment	Grading (N)	1 per day		
			Plasticity index (N)	1 per day		
			Los Angeles Coefficient (N)	On-site: Weekly until trend (then monthly) Imported: Source approval (then 3 monthly)		
			Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval		Shear box testing for Class 8A materials required where the particle size is no greater than 20 mm.
			Water soluble sulfate (WS) (N)	Source approval		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
			Oxidisable sulfides (OS) (N)	Source approval		[TRL Report 477, Test No. 2 and 4]
	9G, 9G/1	Stabilised materials	Pulverisation (5.6 mm) Pulverisation (28 mm)	1 per 5000 m^3	Required	
			Bearing ratio (LEF) Bearing ratio (UEF)	Daily per Gang - IBI - 28 day unsoaked - 28 soaked		
			mc (N)	1 per 500 m^3 (max 5 per day)		
			CBR swell limit (N)	Source approval (then annually)		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			Effective angle of internal friction (ϕ') and effective cohesion (c')	Source approval		
	9H	Stabilised materials	Pulverisation (5.6 mm) Pulverisation (28 mm)	1 per 5000 m^3	Required	
			mc	LEF: 1 per 5000 m^3 UEF: 1 per 500 m^3 (max 5 per day)		
			MCV (immediately before compaction)	1 per 500 m^3 (max 5 per day)		
			Bearing ratio (LEF) Bearing ratio (UEF)	Daily per Gang - IBI - 7 day soaked		
			CBR swell limit (N)	Source approval (then annually)		
			Effective angle of internal friction (ϕ') and effective cohesion (c')	Source approval		
			Water soluble sulfate (WS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
			Oxidisable sulfides (OS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 2 and 4]
			pH (N)	Source approval (then annually)		
	9J, 9J/1, 9L	Stabilised materials	Pulverisation (5.6 mm) Pulverisation (28 mm)	1 per 5000 m^3	Required	
			mc	LEF: 1 per 5000 m^3 UEF: 1 per 500 m^3 (max 5 per day)		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			MCV (immediately before compaction)	1 per 500 m^3 (max 5 per day)		
			Bearing ratio (LEF) Bearing ratio (UEF)	9J, 9J/1 Daily per Gang - IBI 7 day soaked		
			CBR swell limit (N)	Source approval (then annually)		
			Effective angle of internal friction (ϕ') and effective cohesion (c')	Source approval		
	Rip rap		Grading	1 per 2500 tonnes (coarse and light grading) Source approval (heavy grading)	Required	
			Shape	Source approval then quarterly during production		Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.
			Crushed or broken surfaces (N)	Source approval then quarterly during production		Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.
			Minimum particle density (t/m^3) (N)	Source approval then quarterly during production		Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			Resistance to breakage (N)	Source approval then quarterly during production		Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.
			Resistance to wear (N)	Source approval then quarterly during production		Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.
			Water absorption (N)	Source approval then quarterly during production		Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.
			Resistance to salt crystallization (N)	Source approval then quarterly during production		Only required if WA >0.5%. Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.
	CBGM		Grading/ uniformity coefficient	On-site: 1 per day Imported: 1 per day	Required	
			Los Angeles Coefficient (N)	Source approval (then annually)		
			mc (N)	1 per day		
	Lime		Compliance with relevant standards	Source approval (then annually)	Required	
	Cement		Compliance with relevant standards	Source approval (then annually)	Required	

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
	Available lime content		Compliance with relevant standards	Source approval (then annually)	Required	
609, 621	Geotextiles		Tensile strength	Source approval	Required	BBA Certification
			Elongation			
			Tensile strength of seams and joints			
			Static puncture			
			Characteristic opening size			
			Water permeability			
			Durability			
			Tensile strength			
610	Slope stability		Slope stability test	6N, 6N1, 6N2, 6P, 6P1, 6P2: Source approval	Refer to comments	Only required where stated in the asset specific earthworks specification addendum
626	Gabions	Fill	Grading	Source approval (visual daily inspection)	Required	
			Los Angeles coefficient	Source approval		
		Wire and mesh		Source approval		
612	Compaction of fills		NDG calibration	1A1, 1B1: Onsite: weekly until trend vs PSD/ UC then monthly) Imported: weekly until trend vs PSD/ UC then 3 monthly)	Required	
				2A, 2B, 2C: Weekly until trend vs PSD/ UC then monthly)		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
				6F4, 6F5, 6F6, 6F8, 6F9: Weekly until trend vs PSD/UC (then monthly to quarterly)		
				6N, 6N1, 6N2, 6P, 6P1, 6P2: Onsite: weekly until trend vs PSD/ UC then monthly) Imported: weekly until trend vs PSD/ UC then 3 monthly)		
				9: Weekly until trend vs PSD/UC (then monthly)		
			Hand Vane calibration	Annually		
		Method compaction (non-HSR)	Field dry density (N)	As required		
		End product compaction (HSR)	Optimum mc (2.5 kg rammer / 4.5 kg rammer / vibrating hammer method) (N)	1A1, 1B1: Daily until trend vs PSD/ UC then weekly to monthly 1A1, 1B1: Landscape earthworks: Weekly until trend vs PSD/ UC then monthly		Granular fills: Reduction permissible with correlations from CCC, to be confirmed from trials
				2A, 2B, 2C Mainline: Daily until trend vs PSD/ UC then weekly to monthly 2A, 2B, 2C: Landscape earthworks: Weekly until trend vs PSD/ UC then monthly		
				6F4, 6F5: 1 per month (reduced to quarterly once trend established)		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
			6F6, 6F8, 6F9: Weekly until trend vs PSD/UC (then 3 monthly)		
			6N, 6N1, 6N2, 6P, 6P1, 6P2: On-site: Daily until trend vs PSD/UC (then weekly to monthly) Imported: Weekly until trend vs PSD/UC (then monthly)		
			7A: Daily until trend vs PSD/UC then monthly		
			9 UEF: Daily until trend vs PSD/UC (then weekly)		
			9 LEF: Weekly until trend vs PSD/UC (then monthly)		
			CBGM: Daily until trend vs PSD/UC (then weekly)		
		Field dry density (N)	1A1, 1B1: 1 per 500 m^3 (maximum 5 per day) 1A1, 1B1 Landscape earthworks: Weekly		Granular fills: Reduction permissible with correlations from CCC, to be confirmed from trials
			2A, 2B, 2C Mainline: 1 per 500 m^3 (maximum 5 per day) 2A, 2B, 2C Landscape earthworks: Weekly		
			6F4: Only if required when outside wc range		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
				6F5, 6F6, 6F8, 6F9: 1 per 500 m^3 (maximum 5 per day)		
				6N, 6N1, 6N2, 6P, 6P1, 6P2: 1 per 500 m^3 (maximum 5 per day)		
				7A: Weekly 1 per 500 m^3 (maximum 5 per day)		
				9 UEF: 1 per 500 m^3 (maximum 5 per day)		
				9 LEF: 1 per 500 m^3 (maximum 5 per day)		
				CBGM: 1 per 500 m^3 (maximum 5 per day)		
			Ev_2	1A1, 1B1: Surface of UEF: 1 per 200 m centre line 1 m above LEF: 1 per 200 m centre line		Granular fills: Reduction permissible with correlations from CCC, to be confirmed from trials
				6F8, 6F9: 1 per track every 100 m		
				9: Surface of UEF: 1 per 200 m centre line 1 m above LEF: 3 per 1 m in height 9G, 9H, 9J, 9J/1: Depot formation: 1 per 200 m in alternate tracks		
				CBGM: Surface		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
				Mainline foundation (dig and replace) line speed ≥ 230 kph where top of Foundation is <2.0 metres (slab) or 1.5 metres (ballast) below Formation Level: 1 per 100 m centre line Mainline foundation (dig and replace) line speed <230 kph where top of Foundation is <1.5 metres (slab) or 1.0 metres (ballast) below Formation Level: 1 per 100 m centre line		
			Rayleigh wave velocity	6F8, 6F9: Periodic control checks where required		Measured at the Formation Field demonstration trial area to be undertaken for each of source of 6F8 and 6F9, in both cuttings and embankments.
				CBGM: 1 per 50 m up to 2 tracks 2 per 50 m up to 4 tracks		
			Argillaceous particles >20 mm diameter (N)	1 per 2000 m^3 (max 3 per day)		
			Plate Load Testing	6N1, 6N2, 6P1, 6P2:	Refer to comments	Only required where stated in the asset specific earthworks specification addendum

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
		Undrained shear strength	Mainline foundation cohesive materials (below dig and replace): 1 set of shear vane tests per 25 m per track Landscape embankment foundations (below dig and replace): 1 set of shear vane tests on a 25 m grid		
641	Determination of Available Lime Content of Lime	Available lime content	Source approval (then annually)	Required	
647, 648, 649, 650	Stabilisation of HSR earthworks	Rate of spread of binder	1 per 500 m^2	Required	

Key

1 (N) indicates that a UKAS or equivalent accredited laboratory sampling and test report or certificate is required. See Clause NG 104 for a definition of 'UKAS or equivalent'.

2 Unless otherwise stated above, all sampling and testing in this Appendix shall be by the Contractor.

3 Tests comparable to those specified in this Appendix will be necessary for any equivalent work, goods or materials proposed by the Contractor.

4 Unless otherwise shown in this Appendix tests for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.

5 Unless otherwise shown in this Appendix test certificates for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.

6 Where material specific strength test data is available from ground investigations this may be utilised to negate source approval testing during construction.

23 APPENDIX TABLE 1/5 NON-HSR EARTHWORKS

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
601, 631 to 637, 640	Acceptable material				Required	
	Class	General Description				
	1A, 1B	General Fill (non-HSR earthworks)	Grading/ uniformity coefficient (On-site & Imported)	2 per week	Required	
			mc (N)	1 per 500^3 m up to max 5 per day		
			Water soluble sulfate (WS), (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)] Only required for if placed within 500 mm of steel or cementitious material
			Oxidisable sulfides (OS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 2 and 4] Only required for if placed within 500 mm of steel or cementitious material
			pH (N)	Source approval (then annually)		Only required for if placed within 500 mm of steel or cementitious material
			Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval(6)		
	2A, 2B,	General	Grading	2 per week	Required	

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
	2C	cohesive fill (non-HSR earthworks)	mc/MCV (N)	1 per 500 m^3 up to max of 5 per day		
			Undrained shear strength (N)	1 per 500 m^3 (max 5 per day)		
			LL/PL (N)	[As required]		
			Water soluble sulfate (WS), (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
			Oxidisable sulfides (OS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 2 and 4]
			pH (N)	Source approval (then annually)		
			Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval$^{(6)}$		
	4, 4A	Landscape fill	Grading	1 per day	Required	
			mc/MCV (N)	1 per day		
			Undrained shear strength (N)	1 per 500 m^3 up to max of 5 per day		
			Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval$^{(6)}$		Method of sampling Class 4, 4A materials to be agreed with the Designer's Geotechnical Site Representative.
	5A	Topsoil or turf, existing on site	Grading	Weekly per-source (during re-soiling)	Required	[See HS2-HS2-EV-STD-000-000008 for further details for Classes 5.]
	5B	Imported Topsoil	Grading	Weekly per-source (during re-soiling)	Required	
			Chemical parameters (N)	Source approval		
	6B	Starter layer	Grading	2 per week	Required	

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			PI (N)	2 per week		PI testing only required where no more than 30% by mass of material retained on the 20 mm test sieve, which may include some particles retained on the 37.5 mm test sieve, otherwise testing is not required. [Plasticity of fraction of material passing 425 micron sieve]
			Los Angeles Coefficient (N)	On-site: Weekly until trend (then monthly) Imported: Source approval (then monthly)		
	6C	Starter layer	Grading/ uniformity coefficient	2 per week	Required	
			PI (N)	2 per week		PI testing only required fwhere no more than 30% by mass of material retained on the 20 mm test sieve, which may include some particles retained on the 37.5 mm test sieve, otherwise testing is not required. [Plasticity of fraction of material passing 425 micron sieve]
			Los Angeles Coefficient (N)	On-site: Weekly until trend (then monthly) Imported: Source approval (then monthly)		
			Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval(3)		Only required when 6C is used in Load Transfer Platforms
	6E, 6R	For stabilisation	Grading	1 per 2000 m^3 (max of 3 per day)	Required	

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			mc (N)	1 per 2000 m^3 (max of 3 per day)		
			LL and PI (when fines >10%) (N)	1 per day		
			Organic matter (N)	Source approval		
			Water soluble sulfate (WS) (N)	Source approval		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
			oxidisable sulfides (OS) (N)	Source approval		[TRL Report 477, Test No. 2 and 4]
	6F1, 6F2	Capping	Grading/ uniformity coefficient	2 per week	Required	
			mc (N)	2 per week		
			Class Ra (asphalt content) (N)	1 per week		
			Bitumen content (N)	1 per week		
	6F3	Capping	Grading/ uniformity coefficient	2 per week	Required	
			mc (N)	2 per week		[Temperature 40-50°C as per clause 613.13)]
			Los Angeles Coefficient (N)	Source approval (then quarterly)		
			Class Ra (asphalt content) (N)	1 per week		
			Bitumen content (N)	1 per week		
	6F4, 6F5	Capping	Size designation and overall grading category	2 per week	Required	
			Maximum fines and oversize categories	2 per week		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
		Los Angeles Coefficient (N)	Source Approval		
		Volume of stability of blast furnace slag (N)	Source approval (if required)		
		Volume of stability of steel (BOF) and (EAF) slag (N)	Source approval (if required)		
		Water content (N)	2 per week		
		Class Ra (asphalt) content (N)	1 per week		
		Bitumen content (N)	1 per week		
		Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval(6)		Only required when 6F5 is used in Load Transfer Platforms
		pH (N)	Source approval		Only required when 6F5 is used in Load Transfer Platforms
6G	Gabion filling	Grading/ uniformity coefficient	Source approval (visual inspection daily)	Required	
		Los Angeles Coefficient (N)	Source approval		
6H	Drainage layer to reinforced soil	Grading/ uniformity coefficient	2 per week	Required	
		PI (N)	2 per week		
		Los Angeles Coefficient (N)	Source approval		
		mc (N)	2 per week		
		pH (N)	Source approval (then annually)		[BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1]
		Chloride ion content (N)	Source approval (then annually)		[BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1]

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
		Water soluble sulfate (WS), (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
		Oxidisable sulfides (OS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 2 and 4]
		Resistivity (N)	Source approval		
		Redox potential (N)	Source approval		
		Organic matter (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
		Microbial activity index (N)	Source approval (then annually)		
6I, 6J	Fill to reinforced soil	Grading/ uniformity coefficient	1 per 1000 m^3 up to max of 5 per day	Required	
		mc (N)	1 per 1000 m^3 up to max of 5 per day		
		Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	On-site: Source approval (then quarterly)[6] Imported: Source approval (then 6 monthly)[6]		
		Water soluble sulfate (WS), (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
		Oxidisable sulfides (OS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 2 and 4]

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			pH (N)	Source approval (then annually)		[BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1]
			Chloride ion content (N)	Source approval (then annually)		[BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1]
			Resistivity (N)	Source approval		
			Redox potential (N)	Source approval		
			Organic matter (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
			Microbial activity index (N)	Source approval (then annually)		
	6K, 6M	Lower bedding for corrugated steel buried structures Surround to corrugated steel structures	Grading/ uniformity coefficient	2 per week	Required	
			PI (N)	2 per week		
			mc (N)	2 per week		
			Los Angeles Coefficient (N)	Source approval		
			Resistivity (N)	Source approval		Refer to asset specific earthworks specification for requirement to undertake test
			Water soluble sulfate (WS), (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
			Oxidisable sulfides (OS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 2 and 4]

Clause		Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			Chloride ion content (N)	Source approval (then annually)		[BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1]
			pH (N)	Source approval (then annually)		[BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1]
			Sulphide and hydrogen sulphide (N)	Source approval (then annually)		
	6L	Upper bedding for corrugated steel buried structures	Grading/ uniformity coefficient	2 per week	Required	
			Resistivity (N)	Source approval		Refer to asset specific earthworks specification for requirement to undertake test
			Water soluble sulfate (WS), (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
			Oxidisable sulfides (OS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 2 and 4]
			Chloride ion content (N)	Source approval (then annually)		[BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1]
			pH (N)	Source approval (then annually)		[BS EN 1744-1 or equivalent test in accordance with BRE Special Digest 1]
			Sulphide and hydrogen sulphide (N)	Source approval (then annually)		
	6N, 6N1, 6P, 6P1	Fill to structures	Grading/ uniformity coefficient	1 per 1000 m^3 up to max of 5 per day	Required	
			Los Angeles Coefficient (N)	Source approval		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	On-site: Source approval (then quarterly) Imported: Source approval (then 6 monthly)		
			Permeability (N)	On-site: Source approval (then quarterly) Imported: Source approval (then 6 monthly)		
			mc (N)	1 per 1000 m^3 up to max of 5 per day		
			Water soluble sulfate (WS), (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
			Oxidisable sulfides (OS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 2 and 4]
	6Q	Overlying fill to corrugated steel buried structures	Grading/ uniformity coefficient (On-site & Imported)	2 per week	Required	
			Water soluble sulfate (WS), (N)	Source approval (then annually)		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
			Oxidisable sulfides (OS) (N)	Source approval (then annually)		[TRL Report 477, Test No. 2 and 4]
			Chloride ion content (N)	Source approval (then annually)		
			pH (N)	Source approval (then annually)		
			Sulphide and hydrogen sulphide (N)	Source approval (then annually)		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
	6S	Filter layer below subbase	Grading/ uniformity coefficient (On-site & Imported)	2 per week	Required	
			PI (N)	2 per week		
	7E, 7F, 7I	Selected cohesive fill	Grading/ MCV (N)	1 per 2000 m^3 (max 3 per day)	Required	
			mc (N)	1 per 2000 m^3 (max 3 per day)		
			Organic matter (N)	Source approval		
			Water soluble sulfate (WS) (N)	Source approval		[TRL Report 477, Test No. 1 (suitable for sands, silts, clays, weak rocks and aggregates) or BS1377-3 Clause 5 (not suitable for aggregates)]
			Oxidisable sulfides (OS)	Source approval		[TRL Report 477, Test No. 2 and 4]
			Total Potential Sulphate (TPS) (N)	Source approval		[TRL Report 477, Test No. 2 and 4]
			LL/PL (N)	1 per day		
			MCV	1 per 500 m^3 (max 5 per day)	Refer to comments	Only required where stated in the asset specific earthworks specification addendum
	8	Lower trench fill	Grading	Weekly	Required	
			mc (N)	Weekly		
			MCV (N)	Weekly		
	803 Type 1	Selected granular fill	Grading (N)	1 per 1000 m^3 (max 5 per day)	Required	
			Water content (N)	1 per 1000 m^3 (max 5 per day)		
			Plastic Limit (N)	1 per week		
			Los Angeles Coefficient (N)	Source approval (then annually)		
			Water soluble sulfate (WS) (N)	Source approval (then annually)		[BS EN 1744-1 Clause 10]

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			Total Sulphur (TS) (N)	Source approval (then annually)		[BS EN 1744-1 Clause 11]
			Sulfide Content (S) (N)	Source approval (then annually)		[BS EN 1744-1 Clause 13]
			pH (N)	Source approval (then annually)		
			Frost Susceptibility (N)	Source approval		
			Effective angle of internal friction (ϕ') and effective cohesion (c') (N)	Source approval(6)		Only required when 803 (Type 1) is used in Load Transfer Platforms
	9A, 9B, 9D, 9E, 9F	Stabilised materials	Pulverisation	1 per lane width per 200 m length	Required	
			Bearing ratio	Daily per Gang		
			MCV / mc	1 per lane width per 200 m length		
	9H, 9J, 9J/1, 9L	Stabilised materials	Pulverisation	1 per lane width per 200 m length	Required	
			Bearing ratio	Daily per Gang		
			MCV / mc	1 per lane width per 200 m length		
			Effective angle of internal friction (ϕ') and effective cohesion (c')	Source approval		
	Rip rap		Grading	1 per 1000 m^3 (coarse and light grading) Source approval (heavy grading)	Required	
			Shape	Source approval then quarterly during production		Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
			Crushed or broken surfaces (N)	Source approval then quarterly during production		Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.
			Minimum particle density (t/m^3) (N)	Source approval then quarterly during production		Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.
			Resistance to breakage (N)	Source approval then quarterly during production		Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.
			Resistance to wear (N)	Source approval then quarterly during production		Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.
			Water absorption	Source approval then quarterly during production		Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
		Resistance to salt crystallisation	Source approval then quarterly during production		Only required if WA >0.5%. Frequency of testing to be reviewed by the Contractor and Designer's Geotechnical Site Representative in consideration of the production requirements.
609, 621	Geotextiles	Tensile strength	Source Approval	Required	BBA Certificate
		Elongation			
		Tensile strength of seams and joints			
		Static puncture			
		Characteristic opening size			
		Water permeability			
		Durability			
610	Slope stability	Slope stability test	6N1, 6P1: Source approval	Refer to comments	Only required where stated in the asset specific earthworks specification addendum
612	Compaction of fills	NDG calibration	1A, 1B: On-site: weekly until trend vs PSD/UC (then monthly)	Required	
			2A, 2B, 2C: On-site: weekly until trend vs PSD/UC (then monthly to quarterly)		
			6F1, 6F2, 6F3, 6F4, 6F5: Weekly until trend vs PSD/UC (then monthly to quarterly)		

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
				6I, 6J: On-site: weekly until trend vs PSD/UC (then monthly to quarterly) Imported: weekly until trend vs PSD/UC (then quarterly)		
				6K: On-site: monthly until trend vs PSD/UC (then quarterly) Imported: monthly until trend vs PSD/UC (then 6 monthly)		
				6M, 6N, 6N1, 6P, 6P1, 6Q: On-site: weekly until trend vs PSD/UC (then monthly to quarterly) Imported: weekly until trend vs PSD/UC (then quarterly)		
				9A, 9B, 9D, 9E, 9F: Source approval (then annually)		
			Hand Vane calibration	On-site: Annual		
		Method compaction (non-HSR)	Field dry density (N)	[As required]	Required	
		Method compaction and End product compaction (non-HSR)	Optimum mc and maximum dry density (compaction method to suit plant) (N)	1A, 1B: Weekly until trend vs PSD/UC (then monthly)	Required	
				2A, 2B, 2C: Weekly until trend vs PSD/UC (then monthly)		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
			6F1, 6F2, 6F3, 6F4 6F5: 1 per month (reduce to quarterly once trend established)		
			6I, 6J: On-site: Daily until trend vs PSD/UC (then weekly to monthly) Imported: Weekly until trend vs PSD/ UC (then monthly)		
			6K: On-site: Weekly until trend vs PSD/UC (then monthly to quarterly) Imported: Monthly until trend vs PSD/ UC (then quarterly)		
			6M: On-site: Weekly until trend vs PSD/UC (then monthly to quarterly) Imported: Monthly until trend vs PSD/ UC (then quarterly)		
			6N, 6N1, 6P, 6P1: On-site: Daily until trend vs PSD/UC (then weekly to monthly) Imported: Weekly until trend vs PSD/ UC (then monthly)		
			6Q: On-site: Daily until trend vs PSD/UC (then weekly to monthly) Imported: Weekly until trend vs PSD/UC (hen monthly)		

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 600					
			9A, : Weekly until trend vs PSD/UC (hen monthly)		
		Field dry density (N)	1A, 1B: Weekly check		Granular fills: Reduction permissible with correlations from CCC, to be confirmed from trials
			2A, 2B, 2C: Weekly check		
			6F1. 6F2, 6F3, 6F4, 6F5: Only required when outside wc range		
			6I, 6J: 1 per 500 m^3 up to max of 5 per day		
			6K, 6M, 6N, 6N1, 6P, 6P1, 6Q: 1 per 1000 m^3 up to max of 5 per day		
			803 (Type 1): Weekly		
		Plate Load Testing	6N1, 6P1: As per asset specific specification addendum	Refer to comments	Only required where stated in the asset specific earthworks specification addendum
		Surface modulus	9A, 9B, 9D, 9E, 9F: 1 per 20 m in alternative layers	Required	
		Undrained shear strength	Highway and landscape foundation cohesive material (below dig and replace): 1 set of shear vane tests on a 25 m grid	Required	
622, 638,	Earthworks for reinforced	Redox potential	Source approval	Required	

Clause	Work, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments
Series 600						
639	soil		Optimum mc (compaction method to suit proposed plant (N)	6I, 6J: On-site: Daily until trend vs PSD/UC (then weekly to monthly) Imported: Weekly until trend vs PSD/ UC (then monthly)		
		Drainage layers	Grading	1 per 500 m^3 up to max of 5 per day		
			Chemical analysis	Source approval (then annually)		
		Reinforcing elements	Tensile strength	Source approval		BBA Certificate
			Coefficient of friction	Each type of element with each type of fill		Tests to include both 'soil' and 'soil and geogrid' where particle size of soil is no greater than 20 mm or as stated in the manufacturers BBA Certificate.
626	Gabions	Fill	Grading	Source approval (visual daily inspection)	Required	
			Los Angeles coefficient	Source approval		
		Wire and mesh		Source approval		
614, 615, 643	Cement, lime or lime and cement stabilisation to form capping	Rate of spread of binder	1 per 1000 m^2		Required	
641	Determination of Available Lime Content of Lime	Available lime content	Source approval (then annually)		Required	

Key

1 (N) indicates that a UKAS or equivalent accredited laboratory sampling and test report or certificate is required. See Clause NG 104 for a definition of 'UKAS or equivalent'.

2 Unless otherwise stated above, all sampling and testing in this Appendix shall be by the Contractor.

3 Tests comparable to those specified in this Appendix will be necessary for any equivalent work, goods or materials proposed by the Contractor.

4 Unless otherwise shown in this Appendix tests for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.

5 Unless otherwise shown in this Appendix test certificates for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.

6 Where material specific strength test data is available from ground investigations this may be utilised to negate source approval testing during construction.