

High Speed 2 - 1MC06 - Stage One C2 - MWCC –
North Portal of Chiltern Tunnels to Brackley

Aylesbury Embankment Landscape Earthworks Conceptual Site Model

1MC06-CEK-EV-NOT-CS04_CL18-000009

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Stakeholder review required (SRR)	Purpose of SRR
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1 Introduction

1.1 Terms of Reference

The Arcadis/Setec and COWI Design Joint Venture (ASC) has been appointed by Eiffage/Kier/Ferrovial Agroman and BAM Nuttall (EKFB) to present a conceptual site model in support of a Deposit for Recovery Permit (DfR) application for the re-use of remediated waste within a portion of the Aylesbury Embankment Landscape Earthworks (the “Site”) within section C2, of the Phase 1 High Speed 2 (HS2) development, as shown in *Figure 1-1* below.



Figure 1-1 Site and HS2 Scheme Plan

Planning permission has been granted by Buckinghamshire Council for the construction of a new embankment as part of the HS2 development; referred to as Aylesbury Embankment (Application Reference 22/01576/HS2). The Site (of reuse) falls within the wider Aylesbury Embankment, between the town of Aylesbury (north-east) and the hamlet of Sedrup (south-west), Buckinghamshire at approximately HP21 9NS.

1.2 Aims/Scope

This document has been prepared to present a conceptual site model in support of the submission of the DfR Permit for the Site within the Aylesbury Embankment Landscape Earthworks (AELE) as outlined within the Employer’s Instruction, EI-1609.

The scope of this CSM report comprises the following:

- The geological, hydrogeological, and hydrological setting of the re-use Site (from publicly available sources and the site-specific ground investigation).

- The material re-use strategy and criteria utilised for the Site and an overview of the derivation, including modelling of the waste as a source term.
- A summary of the source waste material
- The mitigation measures incorporated into the landscape earthworks design.
- A Conceptual Site Model to demonstrate the suitability/minimum requirements for the re-use of material at the Site.

This document has been produced in accordance with the Land Contamination Risk Management (LCRM) guidance [1], EA guidance for Deposit for Recovery permit applications [2] and the HS2 Technical Standard for Land Quality (LQ) [3].

1.3 Project Background Information

HS2 has set high sustainability standards for the project, which include the aim to re-use 100% of excavated materials. Therefore, excavated treated waste from LQ 11-03 nearby (Former Hartwell clay, brick, tileworks and landfill), will be re-used under the DfR permit within the Site that forms part of Aylesbury Embankment Landscape Earthworks.

A total of 5000m³ of landfill waste from LQ 11-03 will be excavated, remediated and reused .

The Site is a suitable re-use location for the treated waste due to its proximity to LQ 11-03 (approximately 450m northwest) and the site-specific ground conditions i.e. low permeability Kimmeridge Clay Formation underlying engineered fill clays which will form the Site and the surrounding area.

1.4 Information Sources

The following information sources have been utilised in the preparation of this report:

- Historical Hartwell Landfill Geoenvironmental Report [4]
- Historical Hartwell Landfill Remediation Outline Strategy [5]
- Historical Hartwell Landfill Remediation Verification Plan [6]
- Derivation of Made Ground Assessment Criteria for the Protection of Controlled Waters [7]
- Aylesbury South Cutting to Oxford Road Embankment: Hydrogeological Appraisal Report [8]
- Aylesbury Embankment Geotechnical Design Report (GDR) [9]
- IDR 207.1 Specification [10]
- Aylesbury Embankment Supplementary Ground Investigation Report (GIR) [11]
- Aylesbury Embankment Asset Specific Cross Section [12]

1.4.1 Remediation Strategy

Both LQ 11-03 and the Site fall within 1 reporting area and is assessed within the Historical Hartwell Landfill Remediation Outline Strategy [5] which summarises the geo-environmental assessment and presents the outline remedial measures required during excavation and handling of the material.

1.5 Proposed Development

The AELE (HS2-00002BVF8) - the proposed location of re-use, is located on the north-eastern side of the Aylesbury Embankment between chainages (Ch.) 61+090 to Ch. 61+760 and is designed to visually (and audibly) screen the HS2 line from the town of Aylesbury, located approximately 400m north-east [4].

POSA/POST and Alluvium are not considered geotechnically suitable within the embankment, and therefore where encountered during the works, these will be removed and replaced with a suitable cohesive material as per the GDR [9].

1.5.1 Design of Landscape Earthworks

The AELE within the Site (ch.61+600- ch.61+700) will be constructed of treated waste (from LQ 11-03) and natural materials as follows which is on Figure 1-2 below (adapted from *the Asset Specific Cross Sections* [9] [12]).

- Class 2 (cohesive fill) material:
 - Kimmeridge Clay Formation (KC)
- Class 4 (landscape fill) material:
 - Kimmeridge Clay Formation (KC)
 - Post-remediation Treated Waste related to the DfR (Class U1B)

The internal slope and core of landscape earthworks is formed from Class 2 Kimmeridge Clay material and the external slope of landscape earthworks from Class 4 material. Compaction will be in 100-200 mm lifts, sufficient to remove large voids and to produce a coherent mass whilst avoiding over-compaction and build-up of excess pore pressures.

A cover layer as per the landscaping specification and the agreed reuse requirements will be in place above the core of the landscape earthworks which will contain the treated waste. An orange demarcation layer, or similar, will be placed between the treated waste and clean cover.

The proposed landscape planting [13] (presented in Appendix I) will comprise a mixture of grasslands, wildflower meadows and woodlands.

Generalised Section at the Site



Figure 1-2 Annotated and Adapted Generalised Cross Section through Aylesbury Embankment and Landscape Earthworks

Not to Scale (for indicative purposes only)

1.5.2 Geotechnical Design Report

The design for the AELE (including the Site) is detailed within the Aylesbury Embankment Geotechnical Design Report (GDR) [9]. The following design details are for the Landscape Earthwork as a whole and not specific to the placement of the treated waste. The design information is as follows:

- **Maximum height:** +11.1m above track level.
- **Thickness:** Variable up to 11.1m above existing ground level.
- **Internal slope:** 1v:4H.
- **External slope:** 1v:4H.
- **Source of natural material:** Aylesbury South Cutting and Wendover Green Tunnel.
- **Fill classification:** High plasticity clays Class 4 and Class 2.

1.5.3 Earthworks Specification

The IDR 207.1 earthworks specification [10] states:

- The Made Ground (treated waste) can be re-used within the LOD / LLAU as landscape/engineering fill within the landscape earthworks subject to determination of acceptability against the appropriate material re-use criteria [7] (which are detailed in Appendix 6/14 & 6/15 of the earthworks specification).
- Material that exceeds the appropriate Material Re-use Criteria (Class U1B) can still be re-used if placed in an appropriate zone and depth within the works (in-line with the Material Re-use Zoning System, the proposed end-use of the land, and as previously agreed with the EA – October 2020) or managed by treatment and processing to meet suitability requirements under a permit (where applicable).
- Natural excavated arisings will be classified as inert when segregated from Made Ground materials and free from cross-contamination. Hence, once characterised they will be considered chemically suitable without the need for further chemical testing and classification. All materials will need to be tested to ensure they are geotechnically suitable. Arisings will be stored in an appropriate manner to prevent leaching from the material.
- Visible discrete asbestos-containing materials and fibrous materials shall be removed and disposed off-site to an appropriate licenced facility in accordance with the protocols set out in CAR-SOIL TM Control of Asbestos Regulations 2012 [14].
- Within the works in the Limit of Deviation (LOD) and in areas of ecological mitigation planting within the LLAU, only, trace asbestos fibres (<0.001% v/v) within soils may be placed at appropriate depths (>600 mm in LOD, below landscaping requirements in ecological planting areas, min. >300mm), separated by a demarcation layer (not for protective measures). The presence of ACM's or detectable asbestos fibres in the cover layer is not acceptable. This is in-line with the agreed reuse strategy outlined within the remediation strategy [5].

1.6 Limitations

- All chainages referred to are approximate with regards to the HS2 route and are based on the ASC Ground Engineering Viewer [15]. The Limit of Deviation (LOD) and Limits for Land Acquired and Used (LLAU) boundaries are based on information available at the time of writing.
- This document has been prepared for HS2 in accordance with the terms and conditions of the appointment. This Technical Note has been produced on behalf of EKFB for the sole purpose of supporting the DfR Permit application. The only third parties to review and/or utilise the information within the Technical Note are assumed to be Tetrathec (EKFB's chosen consultant) and HS2 Ltd (the ultimate Client) only.
- The production and technical expertise in relation to the DfR permit is the sole responsibility of Tetrathec (EKFB's chosen consultant). ASC are to provide specialist contaminated land support to Tetrathec for this task only.
- This assessment has been based on data available at the time of writing. ASC does not warrant, nor does it accept any responsibility or liability for, the accuracy or completeness of the content or for any loss which may arise from reliance on information provided in the reports and any other third-party information on which this report is based.
- This assessment has been based on the asset design drawings and information available at the time of writing. Should significant variations be made to the asset design as described, then further consideration or assessment is likely to be required.
- This assessment has been undertaken based on the design of HS2 assets and also considers the construction and post-construction operational phases.
- Ground investigations, by nature, only reveal a small percentage of the ground conditions present beneath the Site. The possibility of significant variation in ground conditions existing between sampling locations cannot be discounted.
- Groundwater conditions are based on observations made at the time of the investigation and during monitoring visits and may be subject to significant variation due to seasonal or other effects. The depths stated are based on levels at the time of the individual ground investigations.
- Post-remediation laboratory chemical testing will be carried out by the remediation contractor due to be appointed by EKFB.

2 Setting

2.1 Site Setting

Table 2-1 Site Setting Summary

Site Details [4] [15] [16] [17]	
Site Location	The Site (the proposed re-use area) is located within the short north/eastern side of the HS2 trace at Aylesbury Embankment Landscape Earthworks within Buckinghamshire, approximately 400m west/southwest of the town of Aylesbury. The wider embankment is situated between chainages Ch. 61+090 to Ch. 61+760, approximately 1,260m in length. The Site is roughly rectangular in shape and covers an area of approximately 0.71ha between Ch 61+600-61+700.
National Grid Reference	SP 80555, 11925 for the approximate centre of the Site.
Site Description & Surrounding Area	The Site is arable farmland bordering to the north and south, separated by hedgerows and treelines. HS2 preparatory works have commenced on the site at the time of writing this report. Located 70m east/northeast of the Site is the Sedrup Ditch, which is to be diverted in the south, and culverted beneath the HS2 trace at ch. 61+330. The surrounding area is generally arable farmland, with the villages of Bishopstone (~1.5km) and Sedrup (~700m) located to the south and southwest respectively, and the town of Aylesbury located to the north and east (~400m).
Topography	The site is generally flat, with a gentle upward slope noted from the southeast to the northwest (with levels rising from 78.8m AOD to 79.6m AOD).

2.2 Site History

The history of the Site and surrounding area has been summarised from the information reviewed as part of the Geoenvironmental Assessment Report [4] [16] [18]. It shows the Site and surrounding areas to be predominantly agricultural with no significant changes noted.

Table 2-2 Site History Summary

Year	Details [4] [16] [18]
1830	The Site and the surrounding areas are agricultural. The Sedrup Ditch (a watercourse leading to Stoke Brook) is mapped directly adjacent to the field boundary/treeline, some 70m to the east of the Site. The Sedrup Farm is mapped 650m to the west (Off-Site).
1888	A footpath is mapped running southwest to northeast across the north of the Site. The land use remains agricultural.
1892	A small, unnamed structure is mapped to the west within the corner of the agricultural field.
1944	Aylesbury has grown in size and its borders now extend to 1km to the northeast. The land use remains agricultural.
1985	Aylesbury has expanded further to its current extent (~400m northeast).

Year	Details [4] [16] [18]
2022	Preparatory works for HS2 are visible on-site (evidence of numerous Trial pits/trenches completed). The land use remains agricultural.
2024	HS2 earthworks are being undertaken.

2.3 Physical Setting

2.3.1 Published Geology

The published Geology has been summarised from the Geoenvironmental report [4]

Table 2-3 Geological Summary

Published Geology [4] [15]	
Artificial Ground	Not recorded within the Site.
Superficial Deposits	Not recorded within the Site. Off-Site (adjacent) - Alluvium (ALV), described as a slightly gravelly, slightly sandy, silty clay. - Recorded following the path of the Sedrup Ditch, 60m to the east. - Head (HEAD), - recorded 200m north of the site
Bedrock	On-Site - Portland Sands Formation (POSA), described as a slightly sandy silty clay. Off-Site - Portland Stone Formations (POST), described as a slightly gravelly sandy clay. - Bordering the site to the west (60m) and south (200m). - Kimmeridge Clay Formation (KC), described as a sandy silty clay. - Recorded 40m north of the Site.

2.3.2 Hydrogeology

The hydrogeological setting (pre-construction) has been summarised from the Geoenvironmental Assessment Report [4] and Hydrogeological Appraisal Report [8]

Table 2-4 Hydrogeological Summary

Hydrogeology [4] [8] [15]	
Superficial Deposits	<u>Not recorded on-Site</u> <u>Secondary A Aquifer</u> - Alluvium (ALV) - Off-Site, recorded following the Sedrup Ditch, 60m to the east. <u>Secondary Undifferentiated</u> - Head (HEAD) - Off-Site (recorded 200m north of the site).

Hydrogeology [4] [8] [15]

Bedrock	<u>Principal Aquifer</u>
	Portland Stone Formation (POST) - On-Site.
	<u>Secondary A Aquifer</u>
	Portland Sands Formation (POSA) - Off-Site. bordering the site to the west (60m) and south (200m).
	<u>Unproductive Aquifer</u>
	Kimmeridge Clay Formation (KC) - Off-Site. recorded 40m north of the Site.
Source Protection Zones (SPZ)	None recorded within 250m of the Site

2.3.3 Hydrology

The hydrological setting has been summarised from the Geoenvironmental Assessment Report [4] and Hydrogeological Appraisal Report [8]

Table 2-5 Hydrological Features

Hydrology [4] [8] [15]

Surface Water Features	Sedrup Ditch is situated to the east of the site, approximately 70m away (outside of the proposed re-use location). This watercourse runs north into Stoke Brook (situated on the southern boundary of the town of Aylesbury). Directly adjacent to the Aylesbury Embankment Landscape Earthworks is the C2.L.26 Catchment, which provides Land drainage for structures and highways in the Aylesbury Embankment and Aylesbury North Cutting areas
Flooding	Stoke Brook/Sedrup Ditch and its associated tributaries are classified as being within Flood Zones 2 and 3.

2.3.4 Ecology

A review of satellite imagery [16], MAGIC Maps [19] and the Ground Engineering Viewer [15] (which includes environmental receptors) has identified the surrounding land within 250m of the Site is predominantly agricultural land with limited ecological receptors. To the north agricultural fields are present with a hedgerow and treeline which run adjacent to the Sedrup Ditch, however this is considered to be off-Site.

Given the site setting (distance, topography etc.) and the engineered design of the landscape earthworks, there is not considered to be a viable pathway to potential ecological receptors and therefore will not be considered further.

3 Ground Investigation Data

Two phases of Ground Investigation have been carried out across the Site and the surrounding area between 2016 and 2022 [11] [20]. The following GI information is available for the Site and within the immediate vicinity (within 50m):

- 1 Cable percussive borehole (CP) to a depth of 15.00m bgl.
- 1 Rotary cored borehole (RC) to a depth of 15.00m bgl.
- 3 Windowless sampling boreholes (WS) to depths of 0.70, 1.05 and 4.00m bgl.
- 3 Machine-excavated trial pits (TP) to depths of 1.20, 3.00 and 3.10m bgl.
- 2 Cone penetration test boreholes (CT) to depths of 1.00 and 1.04m bgl.

Key

Ground Investigation

TP / OP

RC

CP

WS

CT

HS2 Design

Embankment

Cutting

Chainage Markers



Figure 3-1 Exploratory Hole Location Plan (within 50m of the Site),

There is 1 exploratory hole within the footprint of the proposed re-use area (Site): ML061-TP461 and a further 9 exploratory hole locations within 50m of the Site (off-site) that have been reviewed. Ground conditions within the 10 exploratory holes on-site and off-site and considered to present similar ground conditions across the site. Ground conditions within the 10 exploratory holes are summarised in Table 2-5, and within the ground model in Section 3. Generalised geological cross sections and the exploratory hole logs are presented in Appendix II.

Table 3-1 Summary of Encountered Geology within 50m of the Site

Stratum	No. Exploratory Holes Encountered (Base Proven in)	Depth Top. (Range) mbgl	Depth Base. (Range) mbgl	Proven Thickness (Average) m	Description
On-site					
Topsoil (TOP)	1/1 (1/1)	0.00	0.20 – 0.40	0.20 – 0.40 (0.30)	Vegetation over soft brown slightly sandy silty clay or slightly sandy silt with frequent rootlets.
Portland Sand Formation (POSA)	1/1 (0/1)	0.20	>3.00	>2.80 (unproven)	Encountered only in ML061-TP461 underlying topsoil, as greyish brown locally mottled orange and brown gravelly clayey sand, and soft to firm greyish brown sandy silty clay. Gravel is angular and subangular fine to coarse of flint and sandstone. Occasional silt pockets are noted.
Off-site					
Topsoil (TOP)	7/9 (7/7)	0.00	0.20-0.40	0.20 – 0.40 (0.30)	Vegetation/grass over soft to firm dark brown sandy slightly silty clay; and slightly sandy silt with frequent rootlets.
Alluvium (ALV)	2/9 (2/2)	0.20-0.30	0.60-2.00	0.40-1.70 (1.05)	Underlying topsoil, Soft to firm yellowish brown slightly gravelly, slightly sandy, silty clay. Sand is fine to medium. Gravel is subrounded to subangular fine to medium of predominantly flint.
Portland Stone Formation (POST)	4/9 (1/4)	0.30-0.40	0.70->1.20	1.95 >0.90 (unproven)	Underlying topsoil, Firm to very stiff light bluish grey mottled light orangish brown slightly gravelly sandy clay. Sand is fine. Gravel is angular to subangular, fine to coarse of medium strong to strong limestone. Was recovered/logged at the base of ML060-TP402 as both a sandy silty gravel, and a weak to medium strong limestone.
Portland Sand Formation (POSA)	3/9 (0/3)	0.00-0.20	1.00->3.10	>2.90 (unproven)	Encountered from surface/underlying topsoil, Soft to firm orangish brown and grey mottled slightly sandy silty clay with occasional pockets of orangish brown silt with rare subangular fragments of extremely weak sandstone. Sand is fine to coarse. Also occasionally recorded as a Light yellowish brown sandy slightly clayey gravel, and an extremely weak dark grey sandstone at the base of 1 location (2.8m, ML060-TP460).
Kimmeridge Clay Formation (KC)	3/9 (0/3)	0.60-2.00	5.00->15.00	>14.40 (unproven)	Underlying alluvium, Firm and stiff becoming very stiff with depth dark grey and grey sandy silty clay with occasional locally frequent shell fragments. Sand is fine, grey, occurring within a mass of clay as irregular pockets and partings.

3.1 Discussion

The following sections discuss the site-specific ground conditions, hydrogeological, and hydrological setting:

3.1.1 Geology

3.1.1.1 Made Ground

Made Ground is not mapped or recorded within the investigation on site or the immediate vicinity. Visual and/or olfactory evidence of contamination was not encountered/recorded on the logs.

The historical review confirms long term agricultural uses on-site and in the surrounding area [16] [18] and the presence of Made Ground is not anticipated.

Land Quality (LQ) areas have not been identified within close proximity of the site, the nearest (LQ 11-03) is some 450m to the northwest.

3.1.1.2 Superficial Deposits

The published geology and ground investigation data show that the topsoil is underlain by the bedrock.

Alluvium is mapped adjacent to the northeastern boundary (approximately 5-20m NE) of the Site within ML061-CP012 and ML061-WS017, as shown below in Figure 3-2.

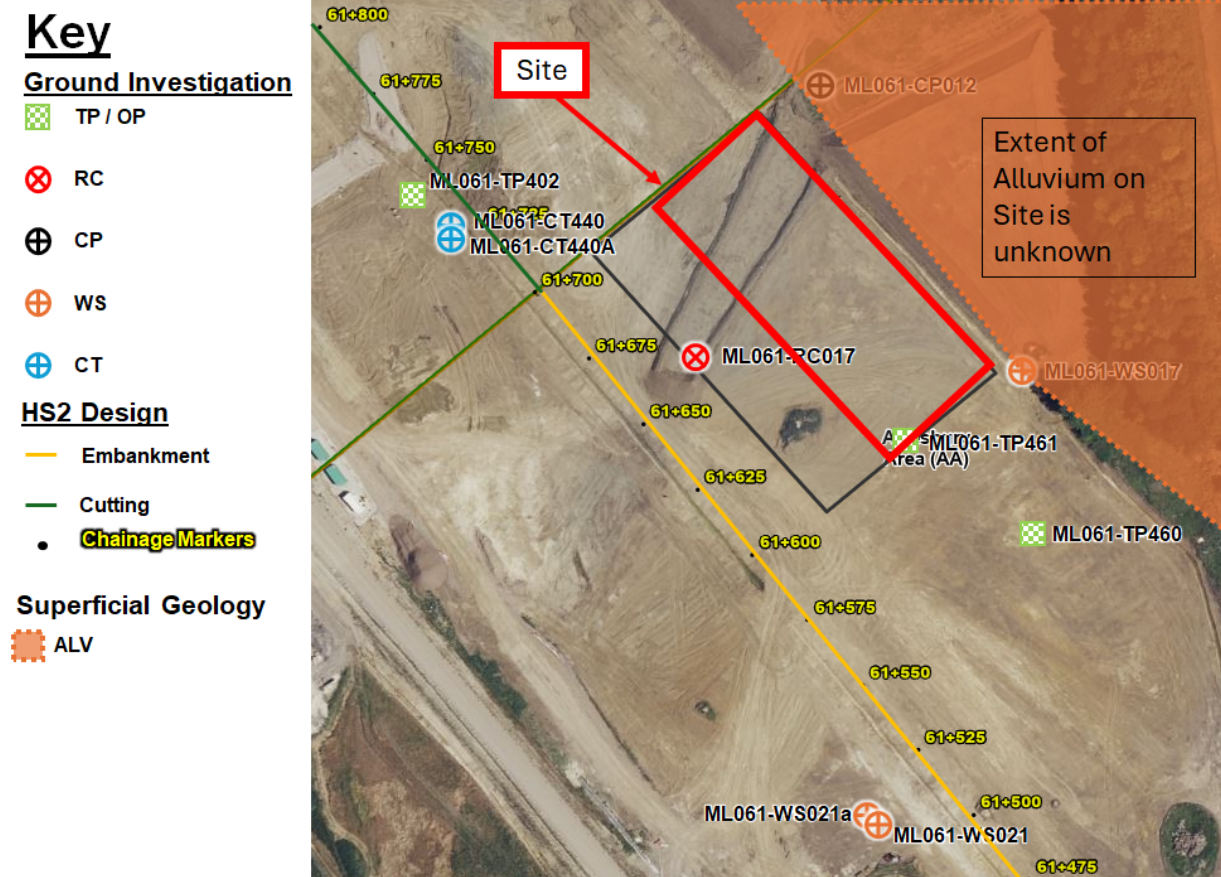


Figure 3-2 Superficial Deposits recorded at Ground Surface

The ALV was recorded at 2 locations adjacent to the northeastern boundary of the Site, associated with Sedrup Ditch. ALV was recorded between 0.40 and 1.70m in thickness (proven), at 2/10 locations underlying TOP. As per the Aylesbury Embankment GDR [9], the ALV will be removed on-site given that it is not geotechnically suitable and will be replaced with a suitable Class 2 material (parent bedrock material of KC).

3.1.1.3 Bedrock

The Site comprises of POSA and POST underlying Topsoil, KC has been encountered underlying the POST. For the purpose of this assessment, the POSA and POST units (which originate from the same parent unit) will be considered as one single unit due to the geologies presenting similar characteristics and properties.

Within the Site, the POSA/POST (comprised of clay, sand, gravel, limestone and sandstone) has been encountered to a maximum thickness of 2.90m. As per the Aylesbury Embankment GDR [9], due to the POST/POSA encountered within the area being geotechnically unsuitable, it is to be excavated and replaced (E&R) up to a point where material of sufficient strength is encountered (this is assumed to be ~2-3m of excavation). This deficit of material is then to be backfilled with geotechnically suitable Class 2 material, which, given the underlying geology, will likely be cohesive KC material.

It has been noted that further south/southeast, a more significant thickness of POSA/POST has been encountered (>7m); however, this is located off-site and outside the boundaries of the proposed re-use location.

KC is present on site underlying the POST, it is assumed that the KC underlies the entirety of the Site. Across the GI undertaken thicknesses of >3m->12.65m have been encountered across the Site and nearby area. The KC encountered within the Site and its vicinity has been described as stiff, becoming very stiff with depth, dark grey and grey sandy silty clay. The geological succession below the KC has not been recorded on-site, with the 2 deeper boreholes terminating within the KC.

Groundwater strikes were recorded in the east of the site within the POSA (this is discussed further in Section 3.1.2.1).

A generalised geological cross-section is presented below (Figure 3-3) and additional cross-sections in Appendix II-1.

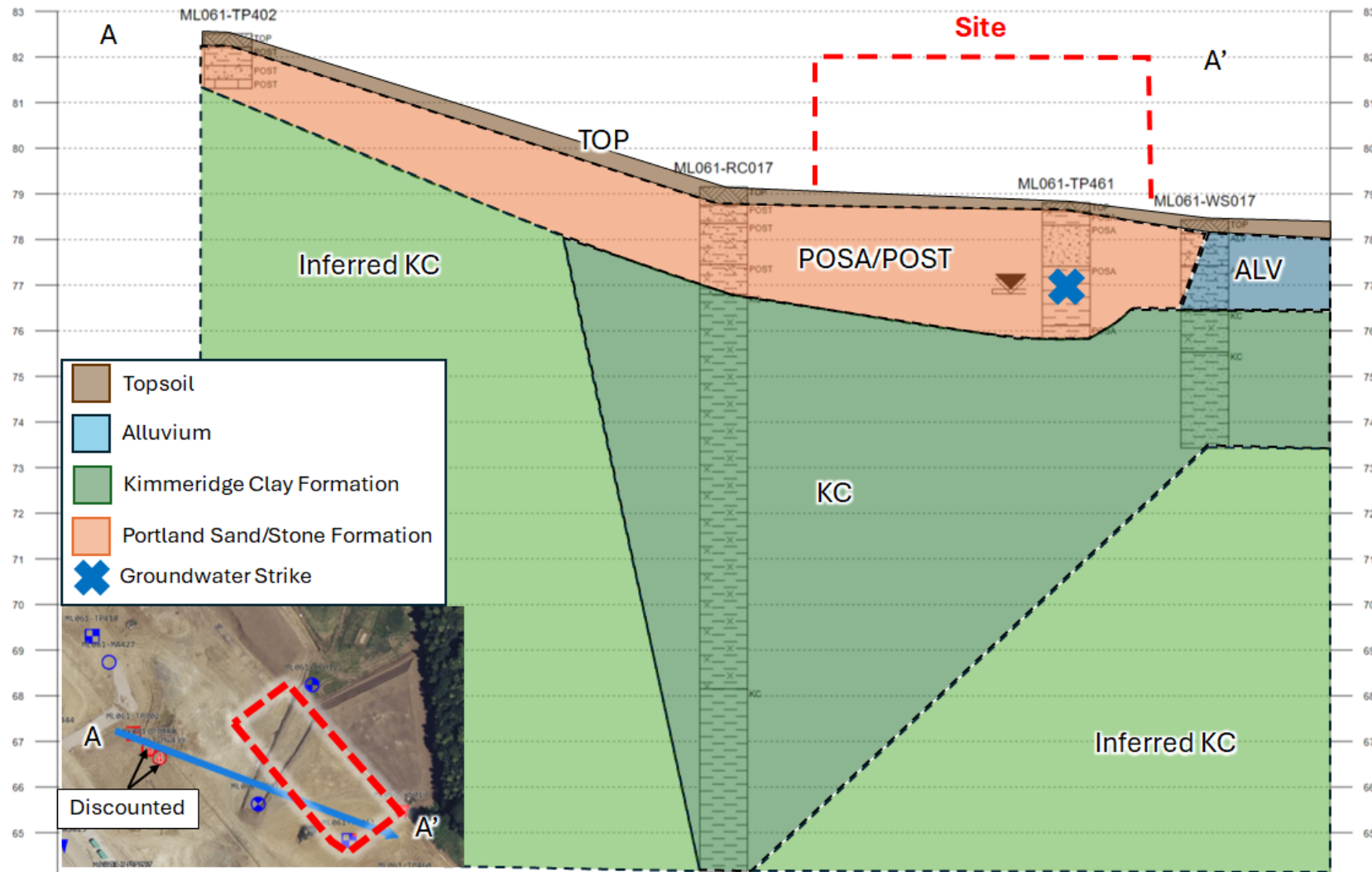


Figure 3-3 Generalised Geological Cross Section

3.1.1.4 KC Physical Parameters

Geotechnical laboratory testing has been undertaken on sample from 7 exploratory holes on-site and within 50m of the Site. As the ALV, POSA and POST are to be removed due to them being geotechnically unsuitable, only data for the KC is summarised below. On the basis of the testing and descriptions on the logs, the KC is considered likely to behave as a cohesive, low-permeability unit.

- The logs show the KC is described as silty sandy clay. Occasional fissuring and laminations have been noted at increasing depths, with interbedding of fossil remains noted.
- As shown in Table 3-2, Particle size distribution (PSD) testing undertaken shows that samples of the KC were described as a slightly sandy silt/clay.
- The average plasticity index recorded for the samples of KC is 27.5% (range of 20-33%), as shown in Table 3-3, with the samples showing a high Liquid Limit and a low Plastic Limit. This suggests that the KC situated on-site is formed primarily of intermediate plasticity clay.
- As such, from the results of both PSD testing and Atterberg Limit testing the KC on-site is likely to have a low overall permeability (discussed further in section 3.1.2.3), and therefore suitable for the placement of the treated waste.

PSD and Atterberg limits laboratory data is presented in Appendix II-2.

Table 3-2 Particle Size Distribution Testing Summary

Strata	Number of Samples Tested	Clay (%) Avg (range)	Silt (%) Avg (range)	Sand (%) Avg (range)	Gravel (%) Avg (range)
KC	2	33.85 (26.1 – 41.6)	41.55 (41.2 – 41.9)	24.55 (16.5 – 32.6)	0.05 (0 – 0.1)

Table 3-3 Atterberg Limit Testing Summary

Strata	Number of Samples Tested	Liquid Limit (%) Avg (range)	Plastic Limit (%) Avg (range)	Plasticity Index (%) Avg (range)
KC	10	44.5 (36 – 56)	17 (15 – 23)	27.5 (20 – 33)

3.1.2 Hydrogeology

3.1.2.1 Groundwater Strikes

On-site the following was noted:

- ML61-TP461 at 2.00mbgl / 76.81mAOD (POSA) with minimal rise recorded over 20 minutes (0.1m to 76.91mAOD).

Off-site the following was noted:

- ML61-TP460 at 2.30mbgl / 76.29mAOD (POSA) with no change in level recorded over 20 minutes.

3.1.2.2 Groundwater Monitoring

Groundwater elevation monitoring has been conducted in standpipes in the vicinity of the Site (3 off-site). Monitoring was conducted monthly over a 2-year period between April 2016 to March 2018 (All three standpipes were monitored over this period). The standpipes were installed in the following geological units:

- ML061-RC017- POST/KC [Off-Site] (3 readings)
- ML061-CP012- KC [Off-Site] (13 Readings)
- ML061-WS017- ALV/KC [Off-Site] (2 readings)

Although monitoring data is available for the three standpipes, due to the standpipes being vandalised, monitoring over an extended period of time is only available for one location ML061-CP012 (situated off-site).

Table 3-4 Details of the response zones of monitored wells on/off-site.

Location ID	Strata	Response Zone Top m AOD (mbgl)	Response Zone Base m AOD (mbgl)	Encountered Groundwater Range m AOD (mbgl)
ML061-RC017 (Off-site)	POST/KC	78.65 (0.5 mbgl)	64.15 (15 mbgl)	78.77 (0.99) - 78.16 (0.38)
ML061-CP012 (Off-site)	KC	76.87 (2 mbgl)	63.87 (15 mbgl)	77.97 (2.36) - 76.51 (0.90)
ML061-WS017 (Off-site)	ALV/KC	77.93 (0.5 mbgl)	74.43 (4 mbgl)	77.46 (1.70) - 76.73 (0.97)

Monitoring undertaken within the ALV/KC and POST/KC indicated that groundwaters were present only within the upper water-bearing strata (ALV- Secondary A aquifer, POST- Principal aquifer), with groundwater not encountered within the KC during the limited visits undertaken. These groundwaters are considered to be perched atop the KC.

The monitoring within the KC indicates there is limited groundwater present, with limited seasonal changes in elevation. It is considered that groundwater flow through the KC will be limited due to the cohesive nature of the unit [8].

Annotated groundwater elevation graphs are presented in Appendix II-3.

3.1.2.3 In-situ Permeability Testing

In-situ permeability tests were not conducted within the KC/POSA/POST on-site. Limited data is available across the route for these 3 geological units, with only 1 successful test conducted routewide (ML063-CR426, KC, 2km north of the site). The data from this position has been reviewed. The results of this test show that the KC has a **low permeability** (k) in the order of $\sim 10^{-8}$ m/s (8.8×10^{-8} m/s).

3.1.3 Hydrology

3.1.3.1 Surface Watercourses

The following summarises the watercourses identified within the vicinity of the Site.

Sedrup ditch (a channel of Stoke Brook) is present 70m northeast/east of the proposed Site. Further east (approximately 400m east), Stoke Brook is mapped. Sedrup Ditch is considered to be a Controlled Waters receptor within this assessment.

Sedrup Ditch will be partially diverted as it transitions into a culverted section where it crosses the HS2 scheme underneath Aylesbury Embankment (at Ch. 61+330, ~250 south of the site). Sedrup Ditch will then be further diverted as it exits the culverted section and returns to its original natural position.

These watercourses are shown below in Figure 3-5. The diversion, once completed will carry the watercourse ~175m to the southeast, compared to the watercourses original path, however the closest point to the Site will remain to be 70m east of the Site.

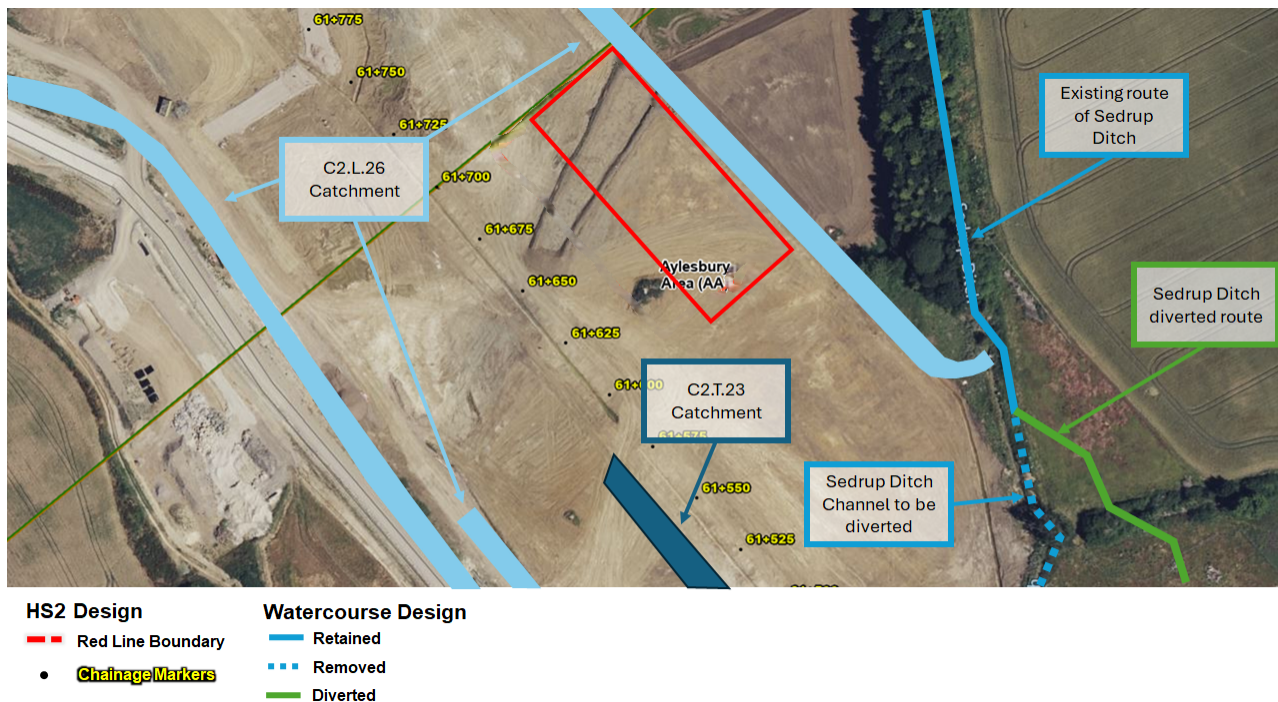


Figure 3-4 Proposed Surface Watercourse Diversions

3.1.3.2 HS2 Drainage Features/Catchment Ponds

Within the vicinity of the Site, on the opposing side of the HS2 trace, there is a catchment pond (C2.T.23 Catchment) located approximately 100m to the southeast of the Site. The catchment and its associated pond are in place for track drainage and to prevent the excess runoff generated from HS2 structures from directly entering the nearby environment.

To the northeast of the Site, directly adjacent to the Aylesbury Embankment Landscape Earthworks, is the C2.L.26 Catchment, which provides Land drainage for structures and highways in the Aylesbury Embankment and Aylesbury North Cutting area, including the SBH-34 overbridge and footpaths. This feature drains directly into Sedrup Ditch on both the upside and downside of the route trace. The drainage channel will be a sealed in a concrete channel. These assets are shown above on Figure 3-5.

4 Made Ground Re-use Criteria.

4.1 Derivation of the Re-use Criteria

A materials re-use criteria for the whole route has been derived by ASC (using ConSim modelling) for Made Ground (which includes the treated waste) material [7] protective of controlled waters and summarised below:

- Derived for the re-use of Made Ground across 6 Zones within Section C23 of the HS2 route (Zones 1A, 1B, 2A, 2B, 2C, and 3) based on geology, aquifer classification, depth to groundwater, proximity to surface water and proposed thickness of clay cover.
- Zone 1 the most sensitive (e.g. chalk aquifer, Source Protection Zones with groundwater recorded <10mbgl (1A) or >10mbgl (1B)) and Zone 3 the least sensitive (non-aquifer areas).
- In Zone 3 areas, assessment will then be driven by human health risk (S4UL [21]/C4SL [22] screening values), as sensitive aquifer receptors are not present. Human health re-use criteria are also assessed within Zone 1A/B and 2A/B/C.

The human health re-use criteria consider the following 3 scenarios:

- >1.2m in parts of the LLAU to be returned to agriculture (S4UL/C4SL – Allotment criteria)
- ≤ 300mm in Ecological Planting Area (S4UL/C4SL – Public Open Space (park) criteria)
- ≤ 600mm in the LOD (S4UL/C4SL – Commercial / Industrial criteria)

In Zone 3 re-use below 300mm/600mm in planting areas/the LOD where there are no derived screening criteria is viable due to unproductive stratum and being below the depth which human health receptors are likely to interact with.

4.2 Testing Requirements

Made Ground materials will be tested at a rate of a minimum of 1 sample per 1,000m³ (in accordance with the approved strategy [5]). Samples will be collected under chain of custody and tested in a suitable laboratory which is UKAS accredited and MCERTS compliant.

An expected volume of 5,000m³ of material is expected to be excavated from LQ 11-03 and therefore given the sampling frequency outlined above a minimum of 5 samples taken for verification testing will be required to ensure sufficient sampling has been undertaken.

4.3 Site Specific Requirements

Based on the Made Ground zoning system, the Site falls within the re-use Zone 2A and 2C (Appendix IV) on the basis of the proximity to the Sedrup Ditch water course and the underlying principal aquifer within the POST. However, given the site-specific assessment undertaken within this report considering the site setting (section 2) and geological, hydrogeological and hydrological model of the re-use area (section 3), there is sufficient evidence to reclassify the re-use area as Zone 3, due to significant thickness of impermeable strata (KC) below the site following the mitigation works (the removal of the geotechnically unsuitable ALV, POSA and POST) undertaken as part of the construction of the AELE.

The treated waste re-used within the Site (within LOD and LLAU) will meet the chemical acceptance criteria for Zone 3 following the justified reclassification of the Site, in accordance with the re-use criteria presented in Appendix V.

5 Waste Assessment (Source material)

The following sections summarises the results of chemical testing of the pre-remediation landfill waste excavated from LQ 11-03 and assessment against the re-use criteria. This report will be updated when information on the post-remediation (treated waste) verification testing is undertaken.

The Site is situated within re-use Zones 3 and when the pre-remediation landfill waste was screened against the re-use criteria it was shown to be suitable for re-use within the Site below the restoration layer in the LOD (600mm thick) and in ecological planting areas (>300mm thick) but not suitable for areas to be returned to agriculture.

The remediation Strategy [5] requires the remediation of the wastes before re-use due to the significant encounters of anthropogenic material, presence of Asbestos Containing Materials (ACMs)/asbestos-free fibres and elevated chemical concentrations against the Human Health screening criteria. Therefore, in accordance with the Remediation Strategy [5], remediation of the material is required to ensure it is suitable for the sites end use and to mitigate the potential Human Health risks from the presence of asbestos free fibres/ACM's

The pre-remediation data is summarised below:

5.1 Pre-Remediation Chemical Data Summary

Characterisation of the Former Hartwell clay, brick, tileworks and landfill (LQ 11-03) during the HS2 ground investigations (in 2 phases) comprised the testing of 53 samples from a total of 15 exploratory holes, as presented within the Historical Hartwell Landfill Geoenvironmental Report [4] and the A418 and Hartwell Brickworks Material Classification Tech Note [23].

GI was undertaken within LQ 11-03 as part of the original phase of routewide GI to inform both scheme and detailed design of assets. In 2023, further trial pitting was undertaken to help characterise the waste material contained within LQ 11-03 to help inform on a suitable reuse pathway for the material. This data was reviewed within the A418 and Hartwell Brickworks Material Classification Tech Note [23]. The data from both the original GI within the area and supplementary GI for the material reuse classification is contained within this report.

The samples were tested for a range of determinands, including heavy metals, Polycyclic Aromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH), Volatile and Semi-Volatile Organic Hydrocarbons (VOC/SVOC), and inorganic determinands.

The screened pre-remediation landfill waste test results are presented in Appendix III-1 and summarised below. On the basis of the screening, it was determined that remediation of the landfill waste would be required.

5.1.1 Zone 3 (Protective of Human Health)

The pre-remediation landfill waste is considered suitable for re-use within Zone 3 below the restoration layer in the LOD (below 600mm) and within ecological planting below the landscaping cover (minimum 300mm). It would not be suitable within the LOD (above 600mm), ecological planting areas (above landscaping cover, min. 300mm) or within areas to be returned to agriculture at any depth.

The cover system is required on the basis of:

- Exceedances of metals and PAHs in 23/53 samples against the allotment end use criteria.
- A single exceedance of TPH (>EC₁₆-EC₂₁ aromatics) against the allotment end use criteria.
- Asbestos (4 Amosite, 5 Chrysotile) confirmed in 9/53 samples and a geotextile layer place at the boundary of the placed treated waste.

5.2 Remediation Activities

At the time of writing this report no remedial measures have been undertaken on the recovered material from LQ 11-03, and therefore verification testing on treated wastes are not available. It is assumed remediation will be carried out prior to reuse in accordance with the remediation strategy [5], with verification sampling (minimum of 5 samples based on the assumption of 5000m³ of material excavated) to be undertaken to confirm the suitability of the material.

6 Updated Conceptual Site Model

Based on the assessment of the Site setting, asset design, and minimum chemical testing requirements of the treated waste, the potential risk to the identified receptors has been evaluated in accordance with the Land Contamination Risk Management (LCRM) guidance [1] to identify the 'contaminant linkages' (contaminant source-pathway-receptor relationships) that may be present at the Site. The CSM assumes the use of the treated waste (placed as specified within the design of the landscape earthworks) and following the completion of the construction of the landscape earthworks.

6.1 CSM Risk Assessment

Risk assessment is the process of collating known information on a hazard or set of hazards (to determine the potential severity of any impact) along with details on the likelihood of impact on identified receptors. Risks are generally managed by isolating the sensitive receptor or by intercepting or interrupting the exposure pathway, thus no pollutant linkages are formed and there is no risk. The following risk assessment focuses on the potential contaminants identified on the Site and the proposed development.

CIRIA guidance (C552) [23] states that the designation of risk is based upon a consideration of both:

- The likelihood of an event (probability); (takes into account both the presence of the hazard and the receptor and the integrity of the pathway)
- The severity of the potential consequence (takes into account both the potential severity of the hazard and the sensitivity of the receptor).

Under such a classification system the following categorisation of risk has been developed and the terminology adopted as presented in Table 6-1 Summary of risk classification categories below.

Table 6-1 Summary of risk classification categories

Term	Description
Very High Risk	There is a high probability that significant harm could arise to a designated receptor from an identified hazard at the Site without appropriate remedial action.
High Risk	Significant harm is likely to arise to a designated receptor from an identified hazard at the Site without appropriate remedial action.
Moderate Risk	It is Possible that without appropriate remedial action, harm could arise to a designated receptor, but it is relatively unlikely that any such harm would be severe and if any harm were to occur, it is likely that such harm would be relatively mild.
Low Risk	It is Possible that significant harm could arise to a designated receptor from an identified hazard, but it is likely that at worst this harm if realised would normally be mild.
Very Low Risk	There is a low Possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

6.1.1 Sources

Based on the information presented in Section 5, for the purposes of this assessment the contaminative source is the treated waste from LQ 11-03, which is assumed will be suitable for re-use following remediation to meet the required re-use criteria.

It is acknowledged that placement of the material will be required below the restoration layer at depth. The designed placement of material is considered to be protective of Human Health and Controlled Water receptors.

6.1.2 Pathways

Based on the information presented in Section, 3.1 and 5, potential pathways (contaminant linkages) have not been identified as summarised below.

6.1.3 Receptors

6.1.3.1 Human Health

Based on the design of AELE the potential future human health receptors for the Site are as follows:

- Farmers and uptake from crops, within land returned for agricultural use within the LLAU.
- Visitors (recreational users e.g. walkers), within agricultural land or planting areas
- Employees / maintenance workers, within the LOD

However, given the proposals to re-use the treated waste (compacted in layers) below a clean cover and the proposed engineering design (use of a demarcation layer and emplaced within compacted low permeability KC clay) there is no viable contaminant linkage to human health.

In addition, within the LOD, the restoration layer will be a minimum 600mm thick, in landscaped areas of the LLAU a minimum of 300mm, and in agricultural areas a minimum of 1200mm with a demarcation layer at the top of the treated waste.

The placement of the deposited and treated waste will be recorded on an as-built drawing for inclusion within the Health and Safety file for the landscape earthworks.

Risks to workers during the construction of the AELE are considered to be low if appropriate mitigation measures (such as the use of suitable PPE/RPE) where necessary are employed.

6.1.3.2 Controlled Waters

Pathways to Controlled Waters are not considered viable during the construction works given the site setting and the risks post construction are mitigated by the placement of the treated waste within low permeability high plasticity clays.

Groundwater

There is limited groundwater within the Site and surrounding area and where encountered during monitoring/site works it has been limited to the POSA perched above the KC, but the POSA will be removed as part of the works. Given the thickness and cohesive nature of the KC the impact to groundwater is not considered significant (i.e. no viable contaminant pathway to groundwater).

Surface water

The nearest surface water receptor to the Site is the C2.L.26 Catchment and the Sedrup Ditch water channel which, once diverted (lined and partially culverted), at its closest it will be approximately 95m away and the treated waste will be placed within high plasticity cohesive and engineered clay which are in turn overlain by a clean cover system; this will sever the potential contaminant linkage.

6.2 Tabulated CSM and Cross Section

We have presented an CSM table (Table 6-2) and cross section (Figure 6-1) below however, viable S-P-R contaminant linkages have **not** been identified on-site.

Table 6-2 Conceptual Model Table

Contaminant Source	Sensitive Receptor	Pathway	Comments
S1 Remediated Landfill Waste (DfR) Treated waste recovered from the Former Hartwell clay, brick, tileworks and landfill (LQ 11-03))	R1 Human Health (future site users)	No linkage	The treated waste will be placed as structural fill below the restoration layer, natural soils (KC) will be placed underlying and overlying the treated waste. A demarcation layer will be placed between the treated waste and overlying soils (not for protective measures), and the re-use location recorded in the asset Health and Safety file. Management and re-use of excavated Made Ground and soils to be undertaken in accordance with the measures and re-use criteria outlined within the relevant Remediation Outline Strategy (as agreed with the Environment Agency) [5] and Earthworks Specification [10] including testing and appropriate placement of materials within the works.
	R2 Controlled Waters (underlying aquifers – POSA)	No linkage	The Site has been reclassified as re-use Zone 3 [7] (given the site's geological, hydrogeological and hydrological setting). A review of the ground investigation information has confirmed that once the ALV/POSA/POST are removed and replaced with engineered clays (KC) the underlying KC is some >10m thick, which is confirmed by nearby off-site boreholes. The KC encountered is of low permeability and considered to be cohesive. Groundwaters are not expected to be encountered on-site once the excavate and replace measures have been undertaken, as limited groundwater has been encountered on-site, and where encountered will be replaced by an impermeable clay layer. The design of the landscape earthworks, constructed from compacted low permeability high plasticity clays, will further mitigate the risk to groundwater. Furthermore, treated waste will be placed on compacted emplaced KC, further reducing potential infiltration.
	R3 Controlled Surface receptors Waters-water	No linkage	Following construction of the HS2 scheme the nearest surface watercourse will be the diverted Sedrup Ditch ~95m east of the Site, which will be lined and culverted where diverted. The CSM has demonstrated that there is no contaminant linkage between the treated waste and surface runoff into surface waters, due to the design of the landscape earthworks, constructed from compacted low permeability high plasticity clays, which will greatly reduce infiltration.



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Contaminant Source	Sensitive Receptor	Pathway	Comments
			Although there is limited leachate testing, the treated waste will be suitable for Zone 3. This is based on conservative Consim modelling [7], which models the leaching of a continuous source and migration to surface water receptors, which does not consider remediation and the absence of the linkage.

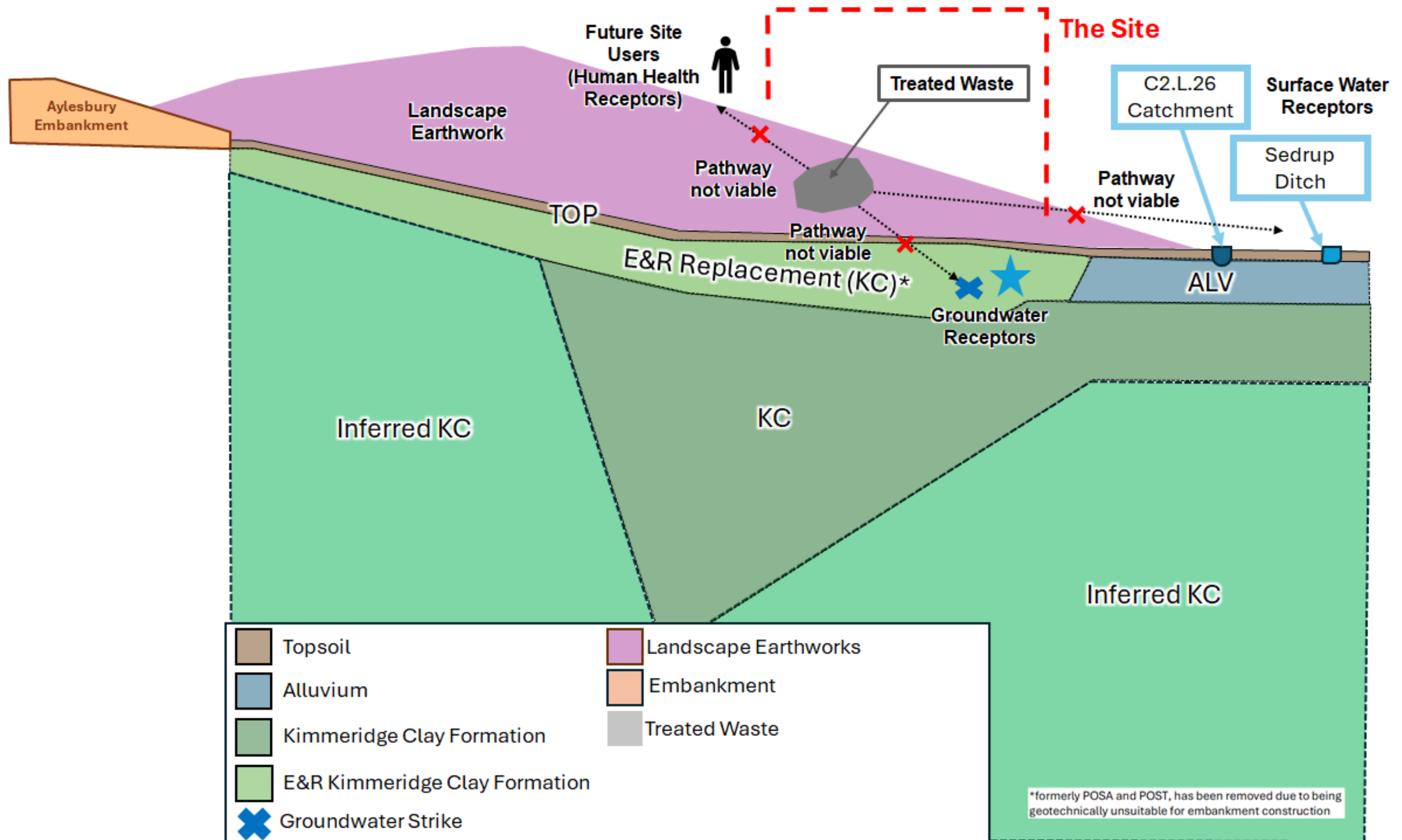


Figure 6-1 Conceptual Site Model Cross Section

6.3 Notes

Once remedial measures have been conducted and verification testing undertaken, the samples that have been tested, will be screened (by EKFB) against the re-use criteria in line with this report. If the screened results indicate significant variation/exceedances of the respective re-use zone (Zone 3), then further assessment may be required. Where the results demonstrate similar properties to those described as being expected post-remediation in this report then further assessment will not be required.

During the construction of the Aylesbury Embankment Landscape Earthworks, should ground conditions vary from the geological model and assumptions within this report, further assessment (e.g. updated CSM) may be required.

7 References

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- [22] CL:AIRE, “Contaminated Land: Applications in Real Environments, 2014. Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination - SP1010. Environmental quality standards applicable to surface water, 2008. Directive 2008/105/EC”.
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APPENDIX I

Drawings

Number of Pages: 01



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High Speed 2 - 1MC06 - Stage One C2 - MWCC –
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APPENDIX II

II-1 Exploratory Hole Logs

II-2 KC Physical Laboratory Testing Figures

II-3 Annotated Groundwater Elevation Graphs

Number of Pages: 17

Appendix II-1

Exploratory Hole Logs

12 pages

Project ASC C2 & C3 Controlled Data Client HS2	Project No. C2-C3-CONT-ASC Easting (SnakeGrid) 480509.90	Ground Level (mAOD) 79.15 Northing (SnakeGrid) 211985.33	GI Phase HS2 Main GI Asset Group Aylesbury Embankment Group	Chainage (SG Grid) 61656.000 Offset (m) 24	Start Date 05/04/2016 End Date 07/04/2016	Scale 1:50 Sheet 1 of 2
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Samples	TCR SCR RQD	FI	PI	Results	Water	Progress		Strata				Depth (Thick ness)	Level	Install/ Backfill
						Date & Time	Casing & Water	Description	Legend	Geol Code1				
(C1) 2.33-2.58						05/04/2016 07:30	0.00 0.00	TOPSOIL: Soft dark brown slightly sandy silty CLAY. Sand is fine and medium. Factual Geolcode [TOP] Factual Geolcode 2 [C] Geology Code 3 [TOP-C Z]			(0.40)	78.75		
						07/04/2016 07:30	0.00	Light greyish brown slightly gravelly slightly sandy silty CLAY. Gravel is subangular fine of limestone and sandstone. Factual Geolcode [POST] Factual Geolcode 2 [C] Geology Code 3 [POST-C Z]			(0.40)			
						07/04/2016 17:40	Dry Dry Dry	Soft and firm locally very soft light greenish brown grey locally mottled light brown slightly sandy gravelly silty calcareous CLAY. Gravel is subangular to subrounded fine to coarse of medium strong limestone. Factual Geolcode [POST] Factual Geolcode 2 [C] Geology Code 3 [POST-C Z]			(0.90)			
(C2) 6.06-6.38						05/04/2016 18:00	1.50	Firm slightly fissured/laminated brown locally mottled orange slightly shelly gravelly silty CLAY. Gravel is subangular fine and medium of medium strong limestone. Factual Geolcode [POST] Factual Geolcode 2 [C] Geology Code 3 [POST-C Z]			1.70	77.45		
						06/04/2016 07:30	1.50				(0.65)			
(C3) 9.08-9.36								Firm to stiff strongly fissured dark grey slightly shelly silty CLAY. Factual Geolcode [KC] Factual Geolcode 2 [C] Geology Code 3 [KC-C Z]			2.35	76.80		

Remarks	
THIS LOG HAS BEEN REPRODUCED FROM AGS DATA. FOR THE ORIGINAL LOG PLEASE CHECK THE RELEVANT FACTUAL REPORT.	
Termination Depth:	15.00m
Reached scheduled depth	

THIS LOG HAS BEEN REPRODUCED FROM AGS DATA. FOR THE ORIGINAL LOG PLEASE CHECK THE RELEVANT FACTUAL REPORT.

Termination Depth: 15.00m
Reached scheduled depth

AGS
Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm),
Thickness (m), Level (mOD).

Equipment Used
Knebel HY79

Contractor

Logged By
D. Dowling

Checked By

Project ASC C2 & C3 Controlled Data Client HS2	Project No. C2-C3-CONT-ASC Easting (SnakeGrid) 480509.90	Ground Level (mAOD) 79.15 Northing (SankeGrid) 211985.33	GI Phase HS2 Main GI Asset Group Aylesbury Embankment Group	Chainage (SG Grid) 61656.000 Offset (m) 24	Start Date 05/04/2016 End Date 07/04/2016	Scale 1:50 Sheet 2 of 2
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Samples	TCR SCR RQD	FI	PI	Results	Water	Progress		Strata				Depth (Thick- ness)	Level	Install/ Backfill																																																																																																		
						Date & Time	Casing & Water	Description	Legend	Geol Code1																																																																																																						
(C4) 12.08-12.40						06/04/2016 17:35	15.00 Dry	Firm to stiff strongly fissured dark grey slightly shelly silty CLAY. Factual Geolcode [KC] Factual Geolcode 2 [C] Geology Code 3 [KC-C Z]			11.00	68.15																																																																																																				
			Stiff and very stiff locally fissured dark grey slightly shelly plastic CLAY with closely spaced fossiliferous partings/interbeds of preserved iridescent ammonites and bivalves. Factual Geolcode [KC] Factual Geolcode 2 [C] Geology Code 3 [KC-C Z]																																																																																																													
								(4.00)																																																																																																								
								15.00	64.15																																																																																																							
<table><tr><th colspan="2">SAMPLES</th><th>TCR SCR RQD</th><th>Fracture Index</th><th colspan="2">RESULTS</th><th>Water</th><th>Date Time</th><th>Casing Water</th><th colspan="4">Description</th><th>Legend</th><th>Depth (Thickness)</th><th>Level</th><th>Install/Backfill</th></tr><tr><th colspan="4">DRILLING TECHNIQUE</th><th colspan="4">FLUSH DETAILS</th><th colspan="4">WATER OBSERVATIONS</th><th colspan="4">HOLE/CASING DIAMETER</th><th colspan="2">WATER ADDED</th></tr><tr><th>From</th><th>To</th><th colspan="2">Type</th><th>From</th><th>To</th><th>Rtn%</th><th>Flush Type</th><th>Date/Time</th><th>Strike At</th><th>Time (mins)</th><th>Rise To</th><th>Casing</th><th>Sealed</th><th>Hole Dia.</th><th>Depth</th><th>Casing Dia.</th><th>Depth</th><th>From</th><th>To</th><th>Volume (ltr)</th></tr><tr><td>0.00</td><td>1.20</td><td colspan="2">Inspection Pit Rotary Core</td><td>0.80</td><td>15.00</td><td>100</td><td>Air/Mist</td><td></td><td></td><td></td><td></td><td></td><td></td><td>200</td><td>1.50</td><td>200</td><td>1.50</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td colspan="2"></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>146</td><td>15.00</td><td>146</td><td>15.00</td><td></td><td></td><td></td></tr></table>															SAMPLES		TCR SCR RQD	Fracture Index	RESULTS		Water	Date Time	Casing Water	Description				Legend	Depth (Thickness)	Level	Install/Backfill	DRILLING TECHNIQUE				FLUSH DETAILS				WATER OBSERVATIONS				HOLE/CASING DIAMETER				WATER ADDED		From	To	Type		From	To	Rtn%	Flush Type	Date/Time	Strike At	Time (mins)	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	From	To	Volume (ltr)	0.00	1.20	Inspection Pit Rotary Core		0.80	15.00	100	Air/Mist							200	1.50	200	1.50																		146	15.00	146	15.00			
SAMPLES		TCR SCR RQD	Fracture Index	RESULTS		Water	Date Time	Casing Water	Description				Legend	Depth (Thickness)	Level	Install/Backfill																																																																																																
DRILLING TECHNIQUE				FLUSH DETAILS				WATER OBSERVATIONS				HOLE/CASING DIAMETER				WATER ADDED																																																																																																
From	To	Type		From	To	Rtn%	Flush Type	Date/Time	Strike At	Time (mins)	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	From	To	Volume (ltr)																																																																																												
0.00	1.20	Inspection Pit Rotary Core		0.80	15.00	100	Air/Mist							200	1.50	200	1.50																																																																																															
														146	15.00	146	15.00																																																																																															

Remarks

THIS LOG HAS BEEN REPRODUCED FROM AGS DATA. FOR THE ORIGINAL LOG PLEASE CHECK THE RELEVANT FACTUAL REPORT.

Termination Depth: 15.00m
Reached scheduled depth

Project
ASC C2 & C3 Controlled
Data
HS2

Project No.
C2-C3-CONT-ASC
Easting (OSGB)
480544.63

Ground Level (mAOD)
78.87
Northing (SnakeGrid)
212065.20

GI Phase
HS2 Main GI
Asset Group
Aylesbury Embankment Group

Chainage (SG Grid)
103 m

Start Date
07/04/2016
End Date
08/04/2016

Scale
1:50
Sheet 1 of 2

SAMPLES		TESTS			PROGRESS		STRATA				Depth (Thickness)	Level	Install/ Backfill							
Type + Depth	Type + Depth	Results	PI	Water Depth	Date & Time	Casing & Water Depth	Description	Legend	Geol Code1											
(B1) 0.00-0.20	SPT(S) 1.70	UT7 35 blows 80% rec.			07/04/2016 12:57	0.00 Dry	TOPSOIL: Firm friable brown slightly gravelly silty CLAY with frequent root fibres and rootlets (<1mm diam.). Gravel is subangular and subrounded fine and medium of flint.			(0.20)	78.67									
(B3) 0.30-0.60							Factual Geolcode [TOP] Factual Geolcode 2 [C] Geology Code 3 [TOP-C Z]			(0.40)										
(B5) 0.70-1.20							Soft and firm brown mottled grey speckled white slightly gravelly silty CLAY with occasional root fibres and rootlets (<1mm diam.). Gravel is subangular and subrounded fine of flint.			(0.60)										
(UT7) 1.20-1.65							Factual Geolcode [ALV] Factual Geolcode 2 [C] Geology Code 3 [ALV-C Z]			(1.70)										
(D8) 1.65-1.70 (B10) 1.70-2.15 (D9) 1.70-2.15							Soft becoming firm with depth bluish grey mottled orange brown speckled white silty CLAY. Plastic behaviour.													
(UT11) 2.15-2.70							Factual Geolcode [KC] Factual Geolcode 2 [C] Geology Code 3 [KC-C Z]													
							Firm, stronger colours with more distinct mottling. Possibly colour banded/laminated.													
(D12) 2.70-2.75 (B14) 2.75-3.20 (D13) 2.75-3.20							SPT(S) 2.75	N=18 (3,3/4,4,5,5)					07/04/2016 18:00	4.70 Dry	Firm and stiff becoming very stiff with depth dark grey and grey sandy silty CLAY with occasional locally frequent shell fragments (<20mm). Sand is fine, grey, occurring within mass of clay and as irregular pockets and partings (bioturbation). Shell fragments are off white to light pinkish brown, sometimes multicoloured with iridescent lustre. Semi-plastic.			2.30	76.57	
(UT15) 3.20-3.65							UT15 63 blows 80% rec.													
(D16) 3.65-3.70 (B18) 3.70-4.15 (D17) 3.70-4.15							SPT(S) 3.70	N=34 (4,5/7,9,7,11)							Generally stiff.					
(UT19) 4.15-4.60	UT19 67 blows 100% rec.																			
(B22) 4.60-5.05 (D20) 4.60-4.65 (D21) 4.60-5.05	SPT(S) 4.60	N=35 (4,5/10,7,9,9)	Some poorly developed fissures, listric/curved. Locally firm.																	
			Stiff and very stiff.																	
(UT23) 5.05-5.50	UT23 75 blows 80% rec.																			
(D24) 5.50-5.55 (B26) 5.55-6.00 (D25) 5.55-6.00	SPT(S) 5.55	N=35 (3,5/7,9,9,10)	Fewer shell fragments.																	
(UT27) 6.50-6.95	UT27 77 blows 100% rec.																			
(D28) 6.95-7.00 (B30) 7.00-7.45 (D29) 7.00-7.45	SPT(S) 7.00	N=35 (5,7/7,8,9,11)	Very sandy, to a silty clayey fine SAND.																	
			Between 7.0 and 7.45m, pocket or lens of light greyish-brown mudstone.			(9.20)														
(UT31) 8.00-8.45	UT31 105 blows 100% rec.																			
(D32) 8.45-8.50 (B34) 8.50-8.95 (D33) 8.50-8.95	SPT(S) 8.50	N=37 (3,4/6,9,9,13)	At 8.45 to 8.50m, very sandy.																	
(UT35) 9.50-9.95	UT35 96 blows 100% rec.																			
(D36) 9.95-10.00 (B38) 10.00-10.45	SPT(S) 10.00	N=33 (5,7,9,9,11)	At 9.95 to 10.0m, occasional subvertical infilled burrows (<1mm dia.)																	
DRILLING TECHNIQUE		CHISELLING			WATER OBSERVATIONS						HOLE/CASING DIAMETER			WATER ADDED						
From	To	Type	From	To	Duration	Date/Time	Strike At	Time Elapsed (mins)	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	From	To	Volume (ltr)		
0.00	1.20	Inspection Pit Cable Percussion										150	15.00	150	15.00					
Remarks																SPT Hammer: BRW0003				
																Energy Ratio (%): 72				
THIS LOG HAS BEEN REPRODUCED FROM FACTUAL AGS DATA. CHANGES TO GEOLOGY CODES WILL NOT BE REFLECTED ON THIS LOG.																Termination Depth: 15.00m				
																Reached scheduled depth				

Project
ASC C2 & C3 Controlled Data
HS2

Project No.
C2-C3-CONT-ASC
Easting (OSGB)
480544.63

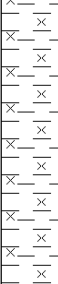
Ground Level (mAOD)
78.87
Northing (SnakeGrid)
212065.20

GI Phase
HS2 Main GI
Asset Group
Aylesbury Embankment Group

Chainage (SG Grid)
103 m

Start Date
07/04/2016
End Date
08/04/2016

Scale
1:50
Sheet 2 of 2

SAMPLES		TESTS			PROGRESS		STRATA				Depth (Thickness)	Level	Install/ Backfill					
Type + Depth	Type + Depth	Results	PI	Water Depth	Date & Time	Casing & Water Depth	Description	Legend	Geol Code1									
(D37) 10.00-10.45							Firm and stiff becoming very stiff with depth dark grey and grey sandy silty CLAY with occasional locally frequent shell fragments (<20mm). Sand is fine, grey, occurring within mass of clay and as irregular pockets and partings (bioturbation). Shell fragments are off white to light pinkish brown, sometimes multicoloured with iridescent lustre. Semi-plastic. Factual Geolcode [KC] Factual Geolcode 2 [C] Geology Code 3 [KC-C Z]			11.50	67.37							
(UT39) 11.00-11.45		UT39 107 blows 80% rec.					From 11.0 to 11.45m, abundant shell fragments (<15mm)											
(D40) 11.45-11.50 (B42) 11.50-11.95 (D41) 11.50-11.95	SPT(S) 11.50	N=39 (6,7/10,9,10, 10)					Stiff to very stiff dark grey silty CLAY locally slightly sandy with occasional to frequent shell fragments (<70mm). Sand is fine and content decreasing with depth, and clay becoming texturally laminated. Shell fragments are off white to pinkish brown to multicoloured iridescent. Plastic.. Factual Geolcode [KC] Factual Geolcode 2 [C] Geology Code 3 [KC-C Z]			(3.50)								
(UT43) 12.50-12.95		UT43 107 blows 100% rec.																
(D44) 12.95-13.00 (B46) 13.00-13.45 (D45) 13.00-13.45	SPT(S) 13.00	N=40 (6,7/9,10,10, 11)																
(UT47) 14.00-14.45		UT47 115 blows 100% rec.																
(D48) 14.45-14.50 (B50) 14.50-14.95 (D49) 14.50-14.95	SPT(S) 14.50	N=45 (7,10/10,10,1 1,14)			08/04/2016 14:39	15.00 6.40					15.00	63.87						
Type	Type	Results		Water	Date Time	Casing Water	Description	Legend		Depth (Thickness)	Level	Install/Backfill						
DRILLING TECHNIQUE			CHISELLING			WATER OBSERVATIONS				HOLE/CASING DIAMETER			WATER ADDED					
From	To	Type	From	To	Duration	Date/Time	Strike At	Time Elapsed (mins)	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	From	To	Volume (ltr)
0.00 1.20	1.20 15.00	Inspection Pit Cable Percussion										150	15.00	150	15.00			
Remarks										SPT Hammer: BRW0003				Energy Ratio (%): 72				
THIS LOG HAS BEEN REPRODUCED FROM FACTUAL AGS DATA. CHANGES TO GEOLOGY CODES WILL NOT BE REFLECTED ON THIS LOG.										Termination Depth: 15.00m				Reached scheduled depth				

Project
ASC C2 & C3 Construction
Data

Project No.
C2-C3-
CONSTRUCTION-ASC
Easting (OSGB)
480609.02

Ground Level (mAOD)
78.59
Northing (OSGB)
211934.21

GI Phase
Asset Group

Chainage (SG Grid)
Offset

Start Date
12/04/2022
End Date
12/04/2022

Scale
1:25

Sheet 1 of 1

SAMPLES		TESTS				Water Strikes	STRATA			Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results	PI		Description	Legend	Geol Code1			
0.10 - 0.20	D1						TOPSOIL. Vegetation over dark brown slightly sandy SILT with occasional rootlets (<10mm x 15mm)			(0.20)		
0.30 - 0.40	D2	0.30 0.30 0.30	HV(1) HV(2) HV(3)	20.00(6.00) kPa 22.00 (10.00)kPa 22.00(8.00) kPa			Soft orangish brown and grey mottled slightly sandy silty CLAY with occasional pockets (<8mm x 10mm) of orangish brown silt. Sand is fine to coarse. Possibly Portland Sand Formation.			0.20 (0.70)	78.39	
0.80 - 0.90	D3	0.80 0.80 0.80	HV(1) HV(2) HV(3)	20.00(8.00) kPa 22.00 (12.00)kPa 22.00(8.00) kPa						0.90	77.69	
1.00 - 1.10	D4						Soft locally firm orangish brown and grey mottled slightly sandy silty CLAY with occasional pockets (<8mm x 10mm) of orangish brown silt and with rare subangular fragments (<10mm x 15mm) of extremely weak sandstone. Sand is fine to coarse. Possibly Portland Sand Formation.					
1.50 - 1.60	D5	1.30 1.30 1.30	HV(1) HV(2) HV(3)	18.00 (10.00)kPa 18.00 (10.00)kPa 18.00 (12.00)kPa						(1.60)		
2.60 - 2.70	D6	1.80 1.80 1.80	HV(1) HV(2) HV(3)	24.00 (12.00)kPa 24.00 (14.00)kPa 26.00 (12.00)kPa			Very soft orangish brown sandy CLAY with frequent subangular fragments (<20mm x 30mm) of extremely weak sandstone. Sand is fine to coarse. Possibly Portland Sand Formation.			2.50 (0.30)	76.09	
2.90 - 3.00	D7	2.70 2.70 2.70	HV(1) HV(2) HV(3)	10.00(0.00) kPa 6.00(0.00) kPa 8.00(0.00) kPa			Extremely weak dark grey SANDSTONE. Recovered as subangular fragments (<40mm x 50mm) of extremely weak sandstone.			2.80 (0.30)	75.79	
										3.10	75.49	

PLAN DETAILS					Remarks
					1. Prior to boring, a Cable Avoidance Tool (CAT) survey was undertaken, using the CAT to check for services; services were not located. 2. Hand vane testing carried out in situ and on excavated material using a 19mm vane (DR3301). 3. Trial pit terminated below scheduled depth of 3.00m to assess geology. THIS LOG HAS BEEN REPRODUCED FROM FACTUAL AGS DATA. CHANGES TO GEOLOGY CODES WILL NOT BE REFLECTED ON THIS LOG. Termination Depth: 3.10m Extended to assess geology

Project
ASC C2 & C3 Construction
Data

Project No.
C2-C3-
CONSTRUCTION-ASC
Easting (OSGB)
480571.02

Ground Level (mAOD)
78.81
Northing (OSGB)
211962.11

GI Phase
Asset Group

Chainage (SG Grid)
Offset

Start Date
12/04/2022
End Date
12/04/2022

Scale
1:25

Sheet 1 of 1

SAMPLES		TESTS				Water Strikes	STRATA			Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results	PI		Description	Legend	Geol Code1			
0.10 - 0.20	D1						TOPSOIL. Vegetation over brown slightly sandy SILT with frequent rootlets (<5mm x 5mm). Sand is fine to coarse.			(0.20)		
0.30 - 0.40	D2	0.30 0.30 0.30	HV(1) HV(2) HV(3)	16.00(6.00) kPa 18.00(6.00) kPa 18.00(8.00) kPa			Soft orangish brown slightly sandy silty CLAY. Sand is fine to coarse. Possibly Portland Sand Formation.			0.20 (0.30)	78.61	
0.60 - 0.70	D3						Greyish brown locally mottled orange and brown gravelly slightly clayey SAND. Sand is fine to coarse. Gravel is angular and subangular fine to coarse of flint with occasional fragments (<20mm x 30mm) of possibly sandstone. Possibly Portland Sand Formation.			0.50 (0.90)	78.31	
1.10 - 1.20	D4											
1.50 - 1.60	D5	1.40 1.40 1.40	HV(1) HV(2) HV(3)	58.00 (20.00)kPa 60.00 (22.00)kPa 64.00 (20.00)kPa			Firm orangish brown and grey mottled orange and brown slightly sandy CLAY with occasional pockets (<8mm x 10mm) of orangish brown silt and rare pockets (<3mm x 5mm) of whitish calcrete. Sand is fine to coarse. Possibly Portland Sand Formation.			1.40	77.41	
2.00 - 2.10	D6	1.90 1.90 1.90	HV(1) HV(2) HV(3)	62.00 (22.00)kPa 64.00 (18.00)kPa 66.00 (18.00)kPa						(1.30)		
2.50 - 2.60	D7	2.50 2.50 2.50	HV(1) HV(2) HV(3)	64.00 (16.00)kPa 68.00 (18.00)kPa 68.00 (20.00)kPa								
2.80 - 2.90	D8						Firm bluish grey sandy silty CLAY with occasional pockets (<8mm x 10mm) of orangish brown fine sand. Sand is fine to coarse Possibly Portland Sand Formation.			2.70 (0.30)	76.11	
										3.00	75.81	

PLAN DETAILS						Remarks
						1. Prior to boring, a Cable Avoidance Tool (CAT) survey was undertaken, using the CAT to check for services; services were not located. 2. Hand vane testing carried out in situ and on excavated material using a 19mm vane (DR3301). 3. Trial pit terminated at scheduled depth of 3.00m.
Shoring / Support: N/A Stability: Stable Groundwater (description):						THIS LOG HAS BEEN REPRODUCED FROM FACTUAL AGS DATA. CHANGES TO GEOLOGY CODES WILL NOT BE REFLECTED ON THIS LOG. Termination Depth: 3.00m Terminated at scheduled depth

Project ASC C2 & C3 Controlled Data Client HS2	Project No. C2-C3-CONT-ASC Easting (OSGB) 480565.00	Ground Level (mAOD) 78.26 Northing (SnakeGrid) 211849.00	GI Phase HS2 Main GI Asset Group Aylesbury Embankment Group	Chainage (Snake grid) Offset -24	Start Date 25/04/2016 End Date 25/04/2016	Scale 1:50 Sheet 1 of 1
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SAMPLES		TESTS			PROGRESS		STRATA				Depth (Thickness)	Level	Install/ Backfill
Type + Depth	Type + Depth	Results	PI	Water Depth	Date & Time	Casing & Water Depth	Description	Legend	Geol Code1				
(B1) 0.00-0.40	SPT(S) 0.60	N=50 (4,12/16,17,11 ,6)			25/04/2016 14:20	0.00 Dry	TOPSOIL: Soft dark brown sandy CLAY with rootlets throughout. Sand is fine to coarse. Factual Geolcode [TOP] Factual Geolcode 2 [C] Geology Code 3 [TOP-C Z] Firm to very stiff light bluish grey mottled light orangish brown slightly gravelly sandy CLAY. Sand is fine. Gravel is angular to subangular fine of predominantly limestone. Factual Geolcode [POST] Factual Geolcode 2 [C] Geology Code 3 [POST-C Z] Becoming very weak and weak light bluish grey (white) mottled light orangish brown LIMESTONE. Very high calcium carbonate content.			(0.40)	77.86		
(B2) 0.40-0.60					0.40								
(B3) 0.60-1.05					(0.65)								
					25/04/2016 15:20	0.00 Dry				1.05	77.21		

THIS LOG HAS BEEN REPRODUCED FROM FACTUAL AGS DATA. CHANGES TO GEOLOGY CODES WILL NOT BE REFLECTED ON THIS LOG.



Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm),
Thickness (m), Level (mOD).

Equipment Used
Insulated digging tools

Contractor

Logged By
Checked By
J. Manas



Dynamic Sample Borehole Log

FINAL

ML061-WS021

Project ASC C2 & C3 Controlled Data Client HS2	Project No. C2-C3-CONT-ASC Easting (OSGB) 480564.67	Ground Level (mAOD) 78.14 Northing (SnakeGrid) 211848.56	GI Phase HS2 Main GI Asset Group Aylesbury Embankment Group	Chainage (Snake grid) Offset -24	Start Date 25/04/2016 End Date 25/04/2016	Scale 1:50 Sheet 1 of 1
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SAMPLES		TESTS			PROGRESS		STRATA				Depth (Thickness)	Level	Install/ Backfill
Type + Depth	Type + Depth	Results	PI	Water Depth	Date & Time	Casing & Water Depth	Description	Legend	Geol Code1				
(B1) 0.00-0.40					25/04/2016 13:50	0.00 Dry	TOPSOIL: Soft dark brown sandy CLAY with rootlets throughout. Sand is fine to coarse. Factual Geolcode [TOP] Factual Geolcode 2 [C] Geology Code 3 [TOP-C Z] Firm to very stiff light bluish grey mottled light orangish brown slightly gravelly sandy CLAY. Sand is fine. Gravel is angular and subangular fine of predominantly limestone. Factual Geolcode [POST] Factual Geolcode 2 [C] Geology Code 3 [POST-C Z]			(0.40)			
(B2) 0.40-0.70										0.40	77.74		
					25/04/2016 14:20	0.00 Dry				0.30	77.44		
										0.70			



Unless otherwise stated:
Depth (m), Diameter (mm), Time (hhmm),
Thickness (m), Level (mOD).

Equipment Used
T820-642

Contractor

Logged By
Checked By
J. Manas

Project ASC C2 & C3 Controlled Data Client HS2	Project No. C2-C3-CONT-ASC Easting (OSGB) 480605.99	Ground Level (mAOD) 78.43 Northing (SnakeGrid) 211981.45	GI Phase HS2 Main GI Asset Group Aylesbury Embankment Group	Chainage (Snake grid) Offset 95	Start Date 22/04/2016 End Date 22/04/2016	Scale 1:50 Sheet 1 of 1
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SAMPLES		TESTS			PROGRESS		STRATA					Depth (Thickness)	Level	Install/ Backfill					
Type + Depth	Type + Depth	Results	PI	Water Depth	Date & Time	Casing & Water Depth	Description	Legend	Geol Code1										
(B1) 0.00-0.30 (B2) 0.30-1.00					22/04/2016 10:20	0.00 Dry	TOPSOIL: Soft dark brown slightly gravelly sandy CLAY with rootlets throughout. Sand is fine and medium. Gravel is subangular and subrounded fine of limestone and coal. Factual Geolcode [TOP] Factual Geolcode 2 [C] Geology Code 3 [TOP-C Z]			(0.30) 0.30	78.13								
(B3) 1.00-1.20 (B5) 1.20-2.00 (D4) 1.20-1.65	SPT(S) 1.20	N=0 (1,0/0,0,0,0)		1.15			Soft light yellowish brown slightly gravelly slightly sandy silty CLAY. Sand is fine to medium. Gravel is subrounded to subangular fine to medium of predominantly flint. Factual Geolcode [ALV] Factual Geolcode 2 [C] Geology Code 3 [ALV-C Z]			(0.70) 1.00		77.43							
(D6) 2.00-2.45 (D7) 2.00-2.90	SPT(S) 2.00	N=12 (1,1/2,3,3,4)		1.95			Soft light greenish grey mottled dark orangish brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is subangular and subrounded fine to coarse of glauconitic limestone, calcilutite, and flint. Factual Geolcode [ALV] Factual Geolcode 2 [C] Geology Code 3 [ALV-C Z]			(1.00) 2.00	76.43								
(D8) 3.00-3.45 (D9) 3.00-4.00	SPT(S) 3.00	N=18 (3,2/3,4,5,6)					Becoming dark yellowish brown and dark reddish brown sandy CLAY with one medium gravel size pocket of light grey and black very sandy clay. Firm light bluish grey mottled dark orangish brown slightly sandy silty CLAY with occasional coarse sand size to fine gravel size shell fragments. Sand is fine. Factual Geolcode [KC] Factual Geolcode 2 [C] Geology Code 3 [KC-C Z]			(0.90) 2.90	75.53								
(D10) 4.00-4.45 (D11) 4.00-5.00	SPT(S) 4.00	N=15 (1,2/3,3,4,5)		3.85			Stiff dark grey sandy CLAY with abundant coarse sand size to fine gravel size shell fragments. Sand is fine. Factual Geolcode [KC] Factual Geolcode 2 [C] Geology Code 3 [KC-C Z]			(2.10) 5.00									
							22/04/2016 11:34	5.00 4.80				5.00	73.43						
Type	Type	Results		Water	Date Time	Casing Water	Description	Legend		Depth (Thickness)	Level	Install/Backfill							
DRILLING TECHNIQUE			CHISELLING			WATER OBSERVATIONS				HOLE/CASING DIAMETER				WATER ADDED					
From	To	Type	From	To	Duration	Date/Time	Depth	Strike	Duration (min)	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	From	To	Volume (ltr)
0.00 1.20	1.20 5.00	Inspection Pit Dynamic Sample											102	5.00	102	5.00			
Remarks																			
THIS LOG HAS BEEN REPRODUCED FROM FACTUAL AGS DATA. CHANGES TO GEOLOGY CODES WILL NOT BE REFLECTED ON THIS LOG.																	Termination Depth:		5.00m
																	Reached scheduled depth		

Project
ASC C2 & C3 Controlled
Data
HS2

Project No.
C2-C3-CONT-ASC
Easting (OSGB)
480436.44

Ground Level (mAOD)
82.09
Northing (SnakeGrid)
212020.93

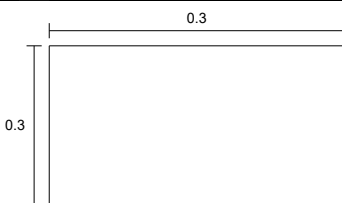
GI Phase
ASC Detailed GI
Asset Group
Aylesbury North Cutting Group

Chainage (SG Grid)
-8 m

Start Date
27/08/2021
End Date
27/08/2021

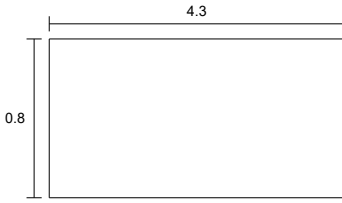
Scale
1:10
Sheet 1 of 1

SAMPLES		TESTS				Water Strikes	STRATA			Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results	PI		Description	Legend	Geol Code1			
0.20 - 0.30	D1						Firm dark greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular and subrounded fine to coarse of flint. Possibly Portland Sand Formation. Factual Geolcode [POSA] Factual Geolcode 2 [C] Geology Code 3 [POSA-C Z]					
0.30 - 0.60	B2									(0.60)		
0.60 - 0.70	D3									0.60	81.49	
0.70 - 1.00	B4						Light yellowish brown sandy slightly clayey GRAVEL. Sand is fine to coarse. Gravel is subangular fine to coarse of very weak to weak greyish white locally stained orange limestone. Possibly Portland Sand Formation. Factual Geolcode [POSA] Factual Geolcode 2 [V] Geology Code 3 [POSA-S V SV]			(0.44)		
1.00	EW5									1.04	81.05	

PLAN DETAILS						Remarks
 Long Axis Orientation: 0 Shoring / Support: N/A Stability: Stable Groundwater (description): Seepage at 0.90m						1. Prior to boring, a Cable Avoidance Tool (CAT) survey was undertaken, an inspection pit was hand-dug to 1.04m and rescanned using the CAT to check for services; services were not located. 2. Material unsuitable for hand vane testing. 3. Inspection pit terminated at a depth of 1.04m due to hard strata. Relocated to ML061-CT440A. THIS LOG HAS BEEN REPRODUCED FROM FACTUAL AGS DATA. CHANGES TO GEOLOGY CODES WILL NOT BE REFLECTED ON THIS LOG.
						Termination Depth: 1.04m Inspection pit terminated due to hard strata; CPT relocated to ML061-CT440A

Project ASC C2 & C3 Controlled Data	Project No. C2-C3-CONT-ASC	Ground Level (mAOD) 82.51	GI Phase ASC Scheme GI	Chainage (SG Grid) -	Start Date 24/07/2019	Scale 1:25
Client HS2	Easting (OSGB) 480425.73	Northing (OSGB) 212030.70	Asset Group Aylesbury North Cutting Group	Offset -10	End Date 24/07/2019	Sheet 1 of 1

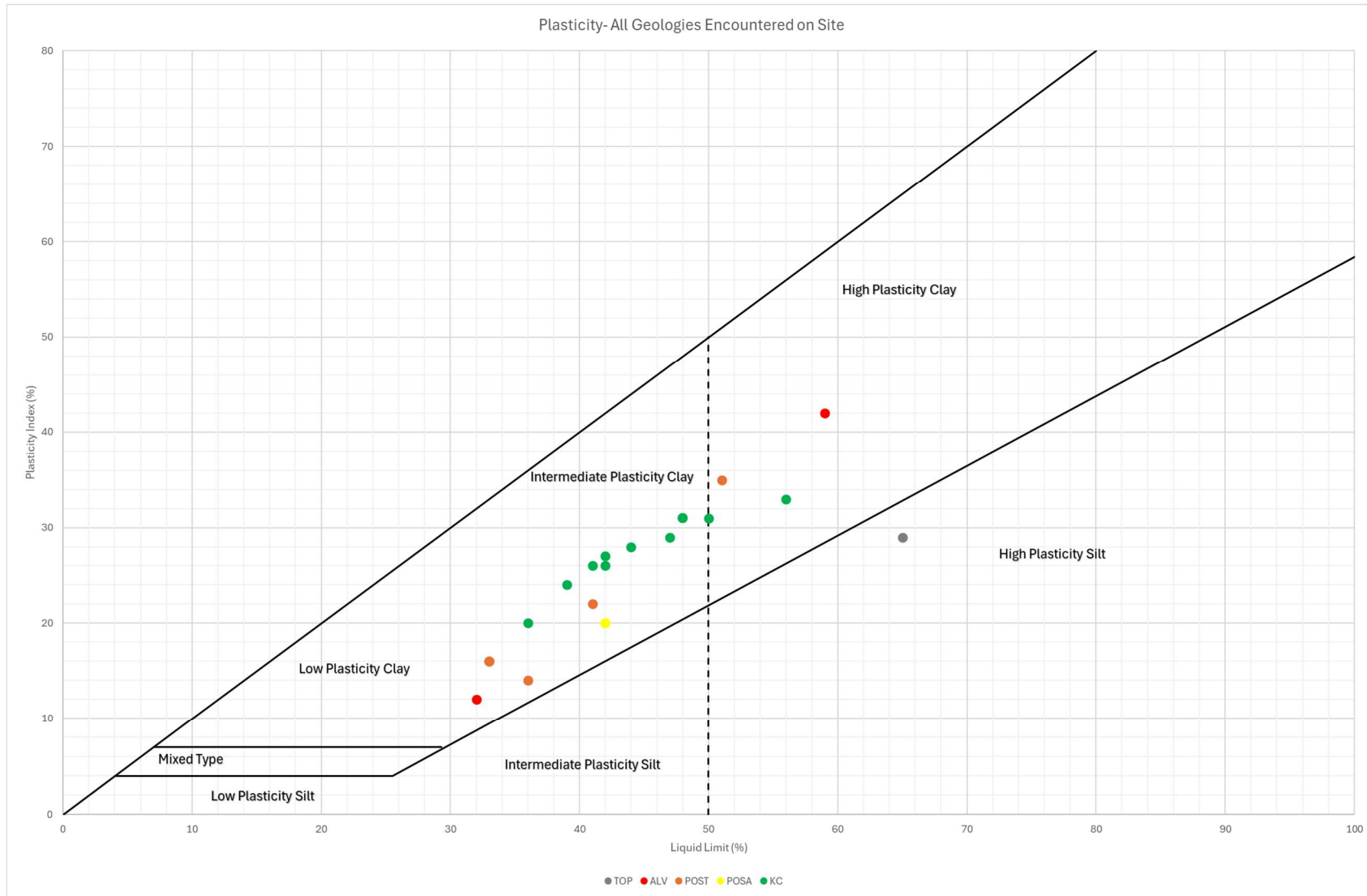
SAMPLES		TESTS				Water Strikes	STRATA			Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results	PI		Description	Legend	Geol Code1			
0.00 - 0.30	LB2.00						TOPSOIL: Grass over dark brownish grey slightly gravelly sandy silt with occasional rootlets (<2mm). Sand is fine. Gravel is subangular to subrounded fine of flint.			(0.30)		
0.10 - 0.20	D1.00						Factual Geolcode [TOP] Factual Geolcode 2 [Z] Geology Code 3 [TOP-C Z]			0.30	82.21	
0.40 - 0.70	LB4.00						Firm orangish light brown and locally dark brown slightly gravelly CLAY with occasional selenite crystals (2mm).			(0.40)		
0.50 - 0.60	D3.00	0.50 0.50 0.50	HV(1) HV(2) HV(3)	50(30)kPa 53(32)kPa 60(28)kPa	PL 17 LL 33 PI 16 NMC 10		Factual Geolcode [ALV] Factual Geolcode 2 [C] Geology Code 3 [POST-CZ]			0.70	81.81	
0.80 - 0.90	D5.00						Yellowish brown very sandy silty subangular to subrounded fine to coarse GRAVEL of limestone with low cobble content. Sand is fine.			(0.30)		
0.80 - 1.00	LB6.00						Cobbles are of brownish grey limestone. Factual Geolcode [POSA] Factual Geolcode 2 [V] Geology Code 3 [POST-S V SV]			1.00	81.51	
1.00 - 1.10	D7.00						Weak to medium strong brownish grey fine grained LIMESTONE with calcite veins (5mm x 10mm).			(0.20)		
1.00 - 1.20	LB8.00						Factual Geolcode [POSA] Factual Geolcode 2 [LMST] Geology Code 3 [POST-LMST]			1.20	81.31	

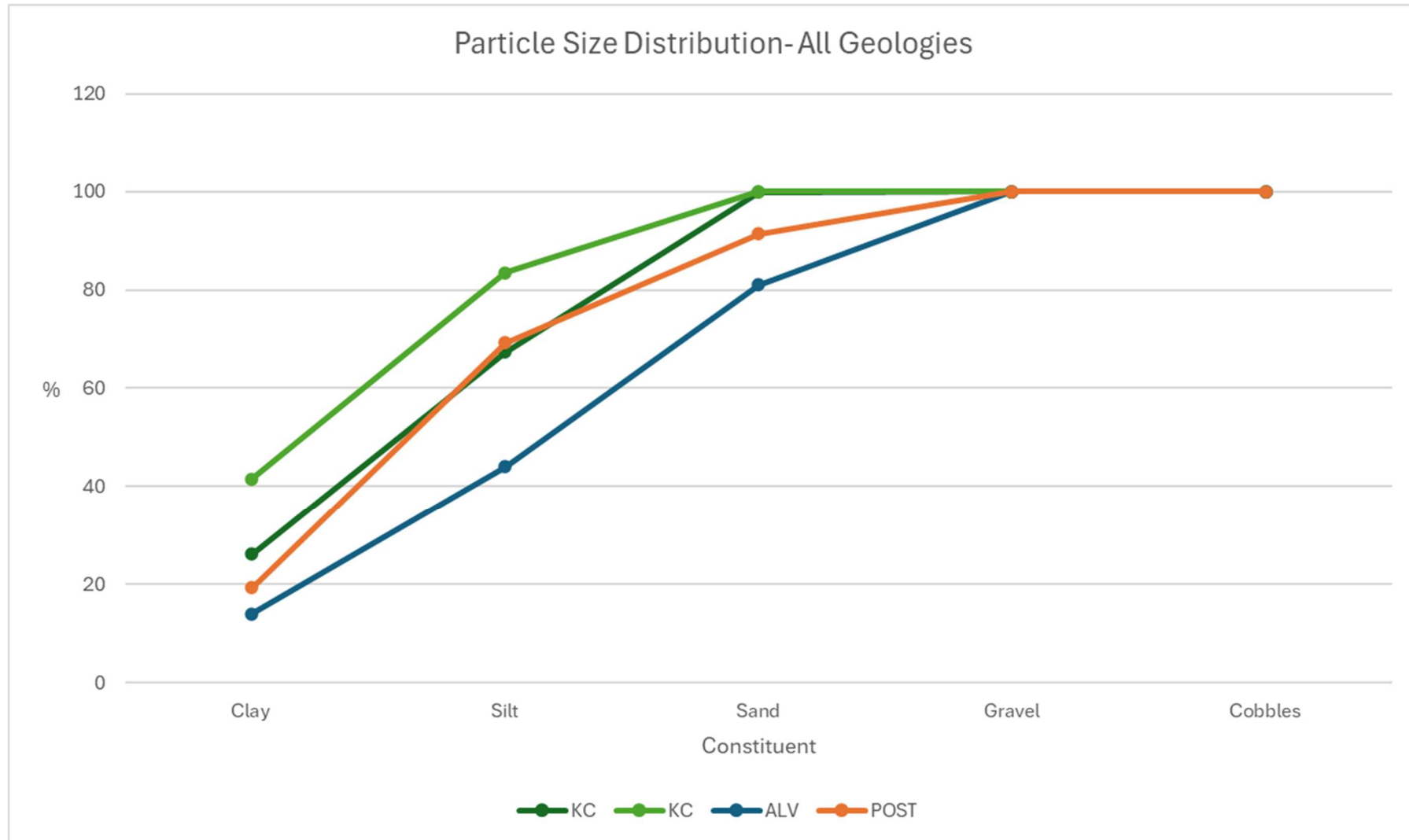
PLAN DETAILS						Remarks	
 Long Axis Orientation: 213 Shoring / Support: None Stability: All faces stable Groundwater (description):						1. PAS 128 Type B survey conducted over position. 2. No groundwater encountered. THIS LOG HAS BEEN REPRODUCED FROM FACTUAL AGS DATA. CHANGES TO GEOLOGY CODES WILL NOT BE REFLECTED ON THIS LOG. Termination Depth: 1.20m Encountered Bedrock.	

Appendix II-2

KC Soil Classification Figures

02 pages

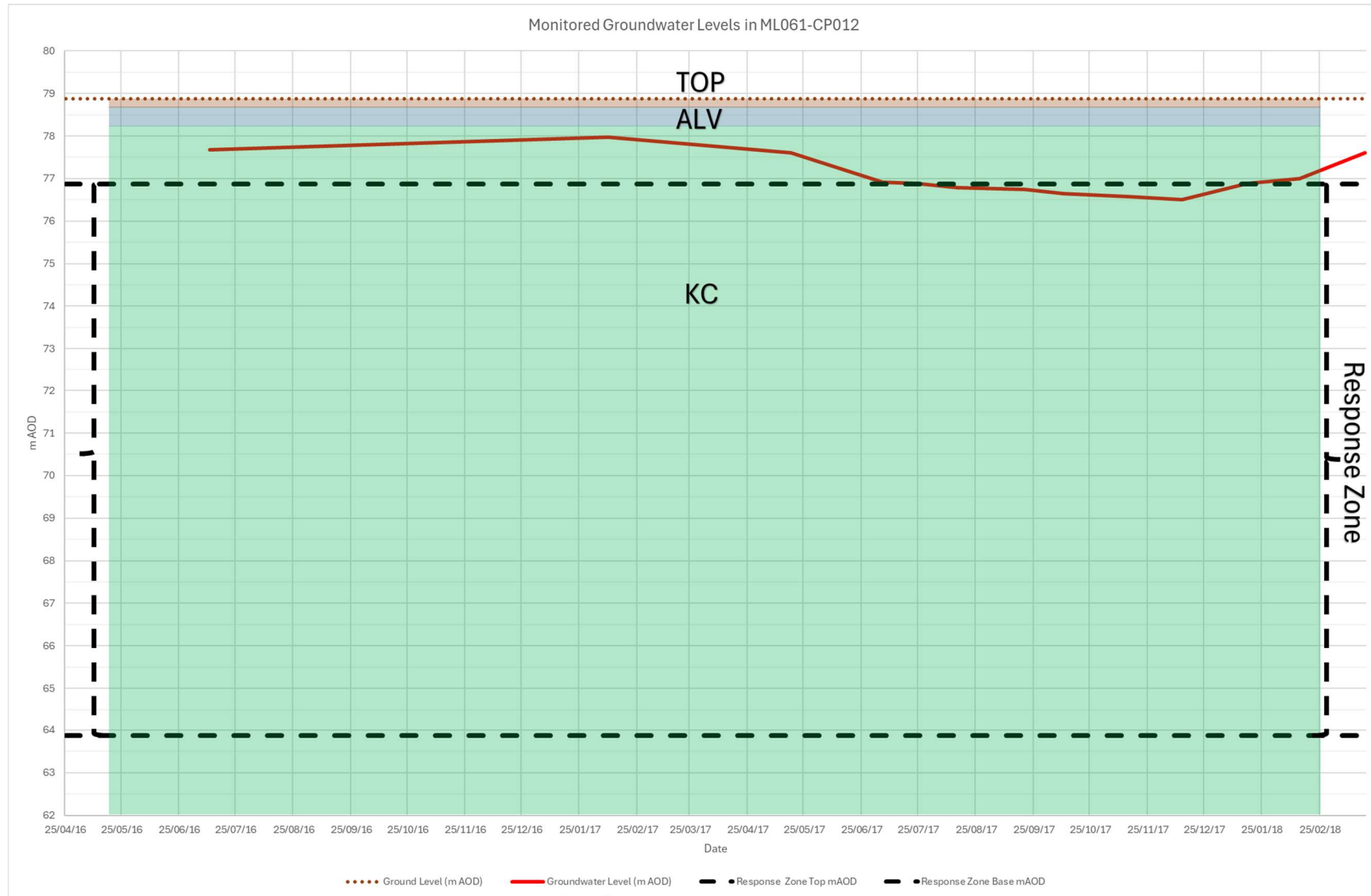


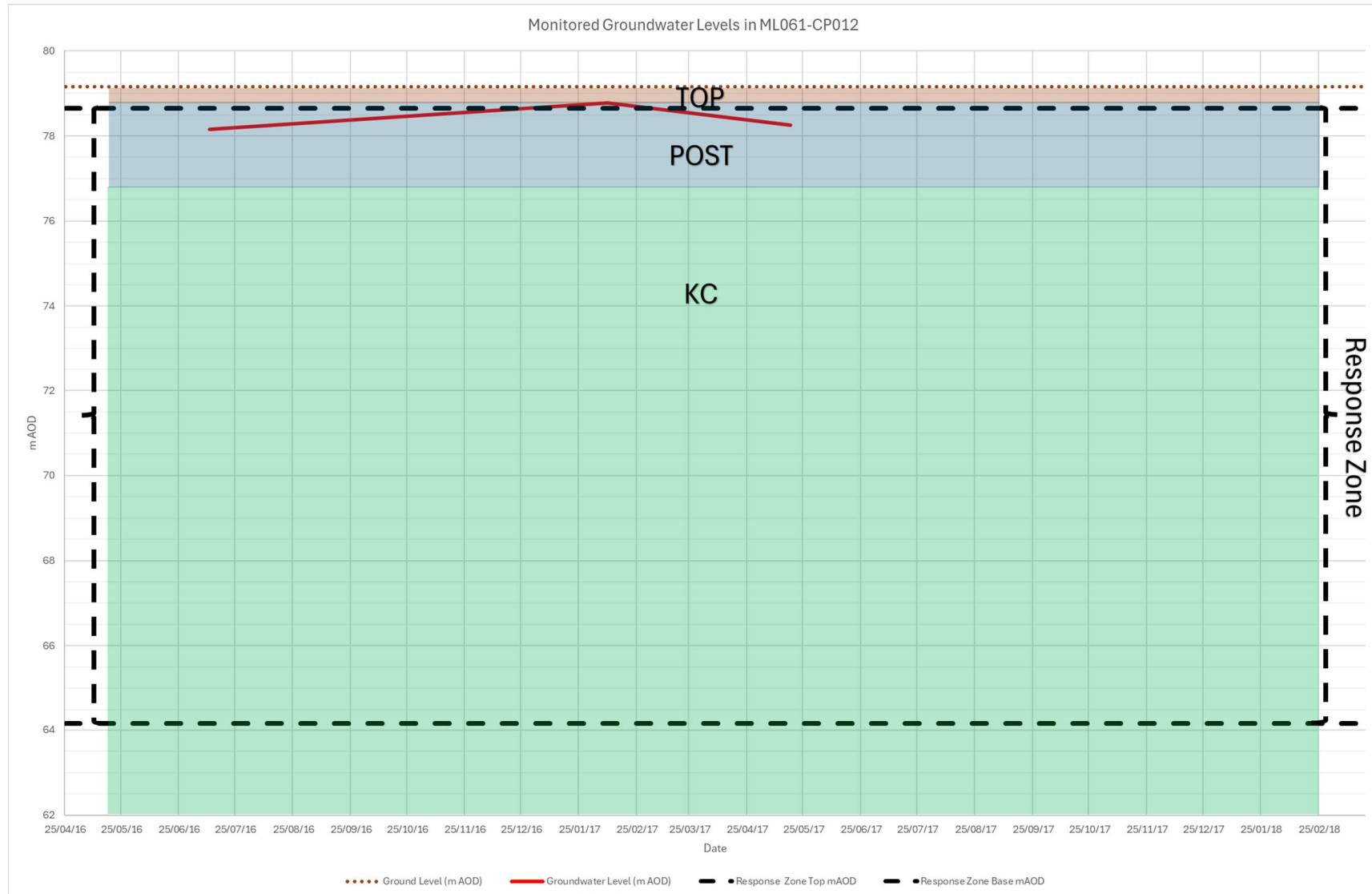


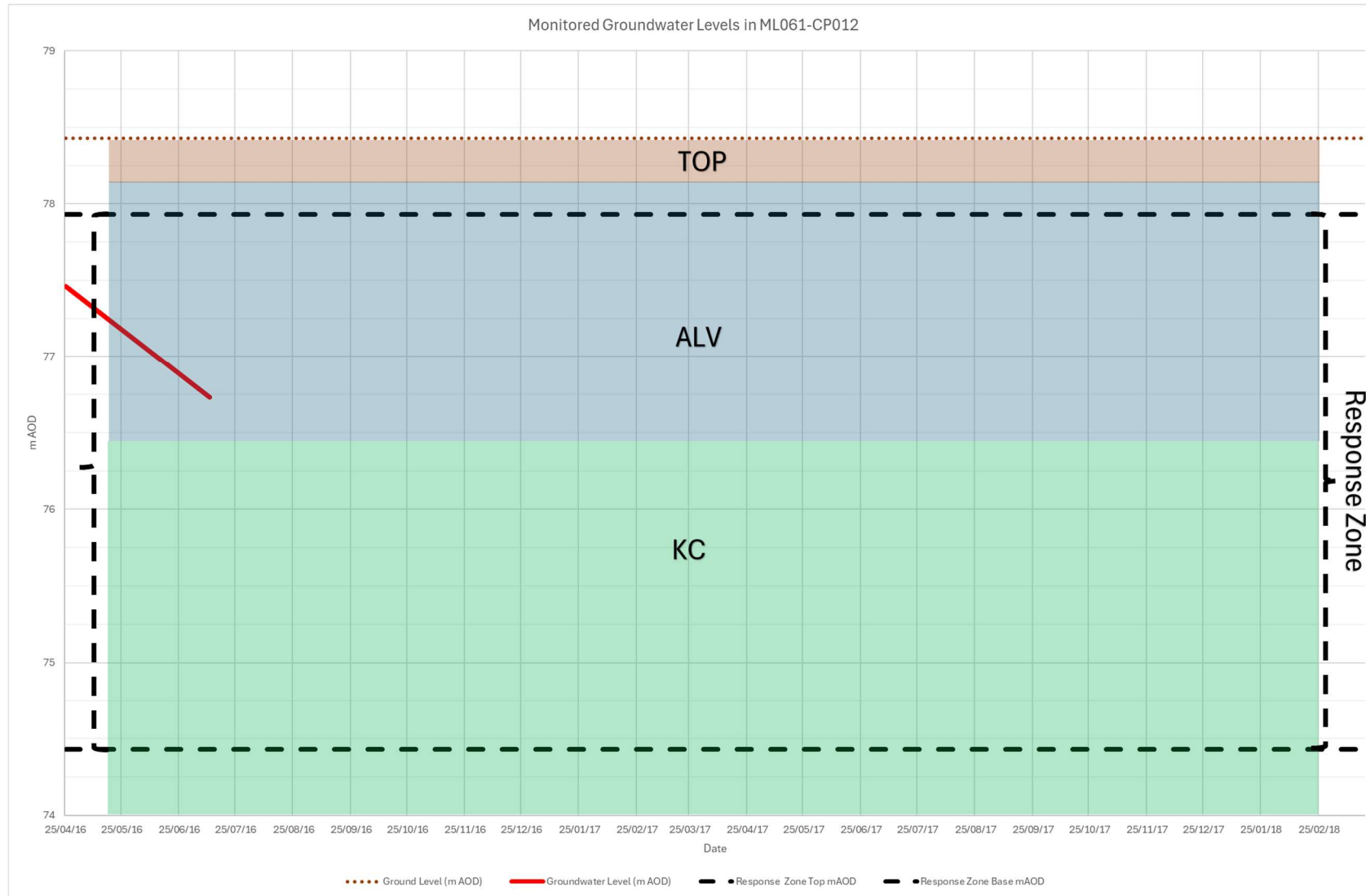
Appendix II-3

Annotated Groundwater Elevation Graphs

03 pages









A High-Speed Design Partnership



High Speed 2 - 1MC06 - Stage One C2 - MWCC –
North Portal of Chiltern Tunnels to Brackley

Aylesbury Embankment Landscape Earthworks Conceptual Site Model
1MC06-CEK-EV-NOT-CS04_CL18-000009
Rev. C01

APPENDIX III

III Pre-Remediation Landfill Waste Screened Chemical Data

Number of Pages: 01

[illegible]

Harwell Landfill (LQ 11-03) Pre Remediation Chemical Testing Summary

		London Deep (M01-M02)		M03-M04		M05-M06		M07-M08		M09-M10		M11-M12		M13-M14		M15-M16		M17-M18		M19-M20		M21-M22		M23-M24		M25-M26		M27-M28		M29-M30		M31-M32		M33-M34		M35-M36		M37-M38		M39-M40		M41-M42		M43-M44		M45-M46		M47-M48		M49-M50		M51-M52		M53-M54		M55-M56		M57-M58		M59-M60		M61-M62		M63-M64		M65-M66		M67-M68		M69-M70		M71-M72		M73-M74		M75-M76		M77-M78		M79-M80		M81-M82		M83-M84		M85-M86		M87-M88		M89-M90		M91-M92		M93-M94		M95-M96		M97-M98		M99-M100		M101-M102		M103-M104		M105-M106		M107-M108		M109-M110		M111-M112		M113-M114		M115-M116		M117-M118		M119-M120		M121-M122		M123-M124		M125-M126		M127-M128		M129-M130		M131-M132		M133-M134		M135-M136		M137-M138		M139-M140		M141-M142		M143-M144		M145-M146		M147-M148		M149-M150		M151-M152		M153-M154		M155-M156		M157-M158		M159-M160		M161-M162		M163-M164		M165-M166		M167-M168		M169-M170		M171-M172		M173-M174		M175-M176		M177-M178		M179-M180		M181-M182		M183-M184		M185-M186		M187-M188		M189-M190		M191-M192		M193-M194		M195-M196		M197-M198		M199-M200		M201-M202		M203-M204		M205-M206		M207-M208		M209-M210		M211-M212		M213-M214		M215-M216		M217-M218		M219-M220		M221-M222		M223-M224		M225-M226		M227-M228		M229-M230		M231-M232		M233-M234		M235-M236		M237-M238		M239-M240		M241-M242		M243-M244		M245-M246		M247-M248		M249-M250		M251-M252		M253-M254		M255-M256		M257-M258		M259-M260		M261-M262		M263-M264		M265-M266		M267-M268		M269-M270		M271-M272		M273-M274		M275-M276		M277-M278		M279-M280		M281-M282		M283-M284		M285-M286		M287-M288		M289-M290		M291-M292		M293-M294		M295-M296		M297-M298		M299-M300		M301-M302		M303-M304		M305-M306		M307-M308		M309-M310		M311-M312		M313-M314		M315-M316		M317-M318		M319-M320		M321-M322		M323-M324		M325-M326		M327-M328		M329-M330		M331-M332		M333-M334		M335-M336		M337-M338		M339-M340		M341-M342		M343-M344		M345-M346		M347-M348		M349-M350		M351-M352		M353-M354		M355-M356		M357-M358		M359-M360		M361-M362		M363-M364		M365-M366		M367-M368		M369-M370		M371-M372		M373-M374		M375-M376		M377-M378		M379-M380		M381-M382		M383-M384		M385-M386		M387-M388		M389-M390		M391-M392		M393-M394		M395-M396		M397-M398		M399-M400		M401-M402		M403-M404		M405-M406		M407-M408		M409-M410		M411-M412		M413-M414		M415-M416		M417-M418		M419-M420		M421-M422		M423-M424		M425-M426		M427-M428		M429-M430		M431-M432		M433-M434		M435-M436		M437-M438		M439-M440		M441-M442		M443-M444		M445-M446		M447-M448		M449-M450		M451-M452		M453-M454		M455-M456		M457-M458		M459-M460		M461-M462		M463-M464		M465-M466		M467-M468		M469-M470		M471-M472		M473-M474		M475-M476		M477-M478		M479-M480		M481-M482		M483-M484		M485-M486		M487-M488		M489-M490		M491-M492		M493-M494		M495-M496		M497-M498		M499-M500		M501-M502		M503-M504		M505-M506		M507-M508		M509-M510		M511-M512		M513-M514		M515-M516		M517-M518		M519-M520		M521-M522		M523-M524		M525-M526		M527-M528		M529-M530		M531-M532		M533-M534		M535-M536		M537-M538		M539-M540		M541-M542		M543-M544		M545-M546		M547-M548		M549-M550		M551-M552		M553-M554		M555-M556		M557-M558		M559-M560		M561-M562		M563-M564		M565-M566		M567-M568		M569-M570		M571-M572		M573-M574		M575-M576		M577-M578		M579-M580		M581-M582		M583-M584		M585-M586		M587-M588		M589-M590		M591-M592		M593-M594		M595-M596		M597-M598		M599-M600		M601-M602		M603-M604		M605-M606		M607-M608		M609-M610		M611-M612		M613-M614		M615-M616		M617-M618		M619-M620		M621-M622		M623-M624		M625-M626		M627-M628		M629-M630		M631-M632		M633-M634		M635-M636		M637-M638		M639-M640		M641-M642		M643-M644		M645-M646		M647-M648		M649-M650		M651-M652		M653-M654		M655-M656		M657-M658		M659-M660		M661-M662		M663-M664		M665-M666		M667-M668		M669-M670		M671-M672		M673-M674		M675-M676		M677-M678		M679-M680		M681-M682		M683-M684		M685-M686		M687-M688		M689-M690		M691-M692		M693-M694		M695-M696		M697-M698		M699-M700		M701-M702		M703-M704		M705-M706		M707-M708		M709-M710		M711-M712		M713-M714		M715-M716		M717-M718		M719-M720		M721-M722		M723-M724		M725-M726		M727-M728		M729-M730		M731-M732		M733-M734		M735-M736		M737-M738		M739-M740		M741-M742		M743-M744		M745-M746		M747-M748		M749-M750		M751-M752		M753-M754		M755-M756		M757-M758		M759-M760		M761-M762		M763-M764		M765-M766		M767-M768		M769-M770		M771-M772		M773-M774		M775-M776		M777-M778		M779-M780		M781-M782		M783-M784		M785-M786		M787-M788		M789-M790	
Chem Group	Chem Name	Report Unit	Vol																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				



A High-Speed Design Partnership



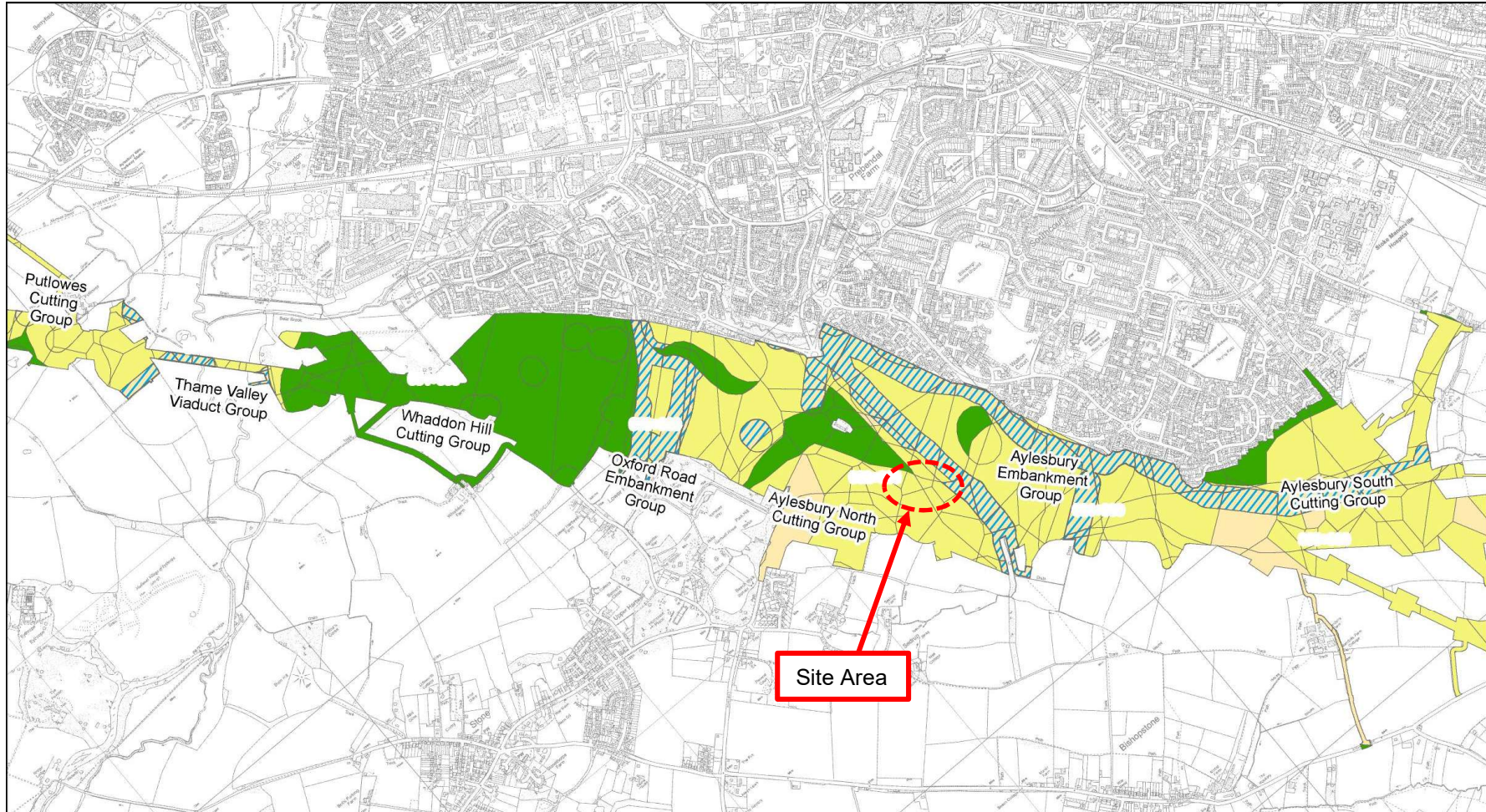
High Speed 2 - 1MC06 - Stage One C2 - MWCC –
North Portal of Chiltern Tunnels to Brackley

Aylesbury Embankment Landscape Earthworks Conceptual Site Model
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APPENDIX IV

Made Ground Re-Use Zoning Plan

Number of Pages: 01





A High-Speed Design Partnership



High Speed 2 - 1MC06 - Stage One C2 - MWCC –
North Portal of Chiltern Tunnels to Brackley

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APPENDIX V

Controlled Water Made Ground Chemical Acceptance Criteria

Number of Pages: 06

Table V-1 Made Ground Acceptance Criteria

Contaminants	Limit of Detection (mg/kg, unless stated)	Controlled Waters SCAC (mg/kg). All values are Consim derived, unless stated otherwise					Human Health Screening Criteria (S4UL) 1% SOM (mg/kg) unless stated otherwise. Zone 3			Comment
		Zone 1a	Zone 1b	Zone 2a	Zone 2b	Zone 2c	>1.2m in parts of the LLAU to be returned to agriculture (Allotment)	≤ 300mm in Ecological Planting Area: Public Open Space (park)	≤ 600mm in the LOD: Commercial/Industrial	
Asbestos		N/A	N/A	N/A	N/A	N/A	No detectable asbestos	<0.001% subject to further assessment ♦		
Metals										
Arsenic	<1	-	-	45.3*	-	45.3*	43	170	640	
Beryllium	<1	-	-	-	-	-	35	63	12	
Boron	<1	-	-	-	-	-	45	46,000	240,000	
Cadmium	<0.2	-	-	2.5	-	2.5	1.9	532	190	
Chromium III	<1	93.9*	93.9*	93.9*	-	93.9*	18,000	33,000	8,600	
Chromium VI	<1	16.7	50	16.7	-	16.7	1.8	220	33	
Copper	<1	-	-	6,667	-	6,667	520	44,000	68,000	
Lead	<2	-	-	-	-	-	80 #	1,300 #	2,300 #	C4SL Value used for Human Health (no S4UL value available)
Mercury	<0.3	-	-	-	-	-	21	30	58	
Nickel	<2	-	-	67	-	67	53	800	980	
Selenium	<1	-	-	-	-	-	88	1,800	12,000	
Vanadium		-	-	-	-	-	91	5,000	9,000	

Contaminants	Limit of Detection (mg/kg, unless stated)	Controlled Waters SCAC (mg/kg). All values are Consim derived, unless stated otherwise					Human Health Screening Criteria (S4UL) 1% SOM (mg/kg) unless stated otherwise. Zone 3			Comment
		Zone 1a	Zone 1b	Zone 2a	Zone 2b	Zone 2c	>1.2m in parts of the LLAU to be returned to agriculture (Allotment)	≤ 300mm in Ecological Planting Area: Public Open Space (park)	≤ 600mm in the LOD: Commercial/Industrial	
Zinc	<2	-	-	35,300	-	35,300	620	170,000	730,000	
Inorganics										
Total Cyanide	<1	-	-	50	-	50	-	-	-	No published human health value
TPH Aliphatics										
C ₅ -C ₆	<0.01	882	5,000† (16,667)	405	469	3	730	5,000† (95,000)	3,200	Screening driven by visual and olfactory observation (see Table V-2) rather than Human Health risk screening values
>C ₆ -C ₈	<0.01	3,750	5,000† (75,000)	1,765	2,500	13	2,300	5,000† (150,000)	5,000† (7,800)	
>C ₈ -C ₁₀	<0.1	333	3,000	231	-	231	320	5,000† (14,000)	2,000	
>C ₁₀ -C ₁₂	<0.1	-	-	-	-	-	2,200	5,000† (21,000)	5,000† (9,700)	
>C ₁₂ -C ₁₆	<0.1	-	-	-	-	-	5,000† (11,000)	5,000† (25,000)	5,000† (59,000)	
>C ₁₆ -C ₃₅	<0.1	-	-	-	-	-	5,000† (260,000)	5,000† (450,000)	5,000† (1,600,000)	Screening driven by visual and olfactory observation (see Table V-2) rather
TPH Aromatics										
>EC ₀₅ -EC ₀₇	<0.01	-	-	-	-	-	13	5,000† (76,000)	5,000† (26,000)	
>EC ₀₇ -EC ₀₈	<0.01	-	-	-	-	-	22	5,000† (87,000)	5,000† (56,000)	
>EC ₈ -EC ₁₀	<0.1	75	5,000† (5,882)	17.6	33	5	8.6	5,000† (7,200)	3,500	

Contaminants	Limit of Detection (mg/kg, unless stated)	Controlled Waters SCAC (mg/kg). All values are Consim derived, unless stated otherwise					Human Health Screening Criteria (S4UL) 1% SOM (mg/kg) unless stated otherwise. Zone 3			Comment
		Zone 1a	Zone 1b	Zone 2a	Zone 2b	Zone 2c	>1.2m in parts of the LLAU to be returned to agriculture (Allotment)	≤ 300mm in Ecological Planting Area: Public Open Space (park)	≤ 600mm in the LOD: Commercial/Industrial	
>EC ₁₀ -EC ₁₂	<0.1	18	500	6.9	10	4	13	5,000† (9,200)	5,000† (16,000)	than Human Health risk screening values
>EC ₁₂ -EC ₁₆	<0.1	90	5,000	15	45	15	23	5,000† (10,000)	5,000† (36,000)	
>EC ₁₆ -EC ₂₁	<0.1	45	129	30	90	30	46	5,000† (7,600)	5,000† (28,000)	Screening driven by visual and olfactory observation (see Table V-2) rather than Human Health risk screening values
>EC ₂₁ -EC ₃₅	<0.1	1,011	-	1,111	-	1,111	370	5,000† (7,800)	5,000† (28,000)	
<EC ₃₅ -EC ₄₄	<0.1	-	-	-	-	-	370	5,000† (7,800)	5,000† (28,000)	
BTEX										
Benzene	<0.001	0.005	0.1	0.002	0.003	0.002	0.017	90	27	Screening driven by visual and olfactory observation (see Table V-2) rather than Human Health risk screening values
Toluene	<0.01	23.3	1750	5.38	10.8	1.9	22	5,000† (87,000)	5,000† (56,000)	
Ethylbenzene	<0.01	21.4	1500	4.92	9.7	1.1	16	5,000† (17,000)	5,000† (5,700)	
o xylene	<1	-	-	-	-	-	28	5,000† (17,000)	660	
m xylene	<1	-	-	-	-	-	31	5,000† (17,000)	5,000† (6,200)	
p xylene	<1	-	-	-	-	-	29	5,000† (17,000)	5,000† (5,900)	
Total Xylenes		35.7	2500	8.33	16.7	1.7	No published value	-	-	
PAH#										
Naphthalene	<0.01	0.033	0.1	0.028	0.02	0.028	4.1	1,200	190	Screening driven by visual and olfactory observation (see Table V-2) rather
Benzo(k)fluoranthene	<0.1	0.417	-	0.676	-	0.676	37	370	1,200	
Benzo(b)fluoranthene	<0.1	0.125	-	0.167	-	0.167	0.99	13	44	

Contaminants	Limit of Detection (mg/kg, unless stated)	Controlled Waters SCAC (mg/kg). All values are Consim derived, unless stated otherwise					Human Health Screening Criteria (S4UL) 1% SOM (mg/kg) unless stated otherwise. Zone 3			Comment
		Zone 1a	Zone 1b	Zone 2a	Zone 2b	Zone 2c	>1.2m in parts of the LLAU to be returned to agriculture (Allotment)	≤ 300mm in Ecological Planting Area: Public Open Space (park)	≤ 600mm in the LOD: Commercial/Industrial	
Benzo(a)pyrene	<0.1	0.135	-	0.116	-	0.116	0.97	11	35	than Human Health risk screening values
Indeno(123cd)pyrene	<0.1	0.25	-	0.281	-	0.281	9.5	150	500	Screening driven by visual and olfactory observation (see Table V-2) rather than Human Health risk screening values
Benzo(ghi)perylene	<0.1	-	-	-	-	-	290	1,400	3,900	
Acenaphthene	<0.1	-	-	-	-	-	34	29,000	84,000	
Acenaphthylene	<0.1	-	-	-	-	-	28	29,000	83,000	
Anthracene	<0.1	-	-	-	-	-	380	150,000	520,000	
Benzo(a)anthracene	<0.1	-	-	-	-	-	2.9	49	170	
Chrysene	<0.1	-	-	-	-	-	4.1	93	350	
Dibenz(a,h)anthracene	<0.1	-	-	-	-	-	0.14	1.1	3.5	
Fluoranthene	<0.1	-	-	-	-	-	52	6,300	23,000	
Fluorene	<0.1	-	-	-	-	-	27	20,000	63,000	
Phenanthrene	<0.1	-	-	-	-	-	15	6,200	22,000	
Pyrene	<0.1	-	-	-	-	-	110	15,000	54,000	
Phenolics										
Phenol	<0.05	0.59	428	0.05	0.23	0.05	66	760	760	Screening driven by visual and olfactory observation (see

Contaminants	Limit of Detection (mg/kg, unless stated)	Controlled Waters SCAC (mg/kg). All values are Consim derived, unless stated otherwise					Human Health Screening Criteria (S4UL) 1% SOM (mg/kg) unless stated otherwise. Zone 3			Comment
		Zone 1a	Zone 1b	Zone 2a	Zone 2b	Zone 2c	>1.2m in parts of the LLAU to be returned to agriculture (Allotment)	≤ 300mm in Ecological Planting Area: Public Open Space (park)	≤ 600mm in the LOD: Commercial/Industrial	
										Table V-2) rather than Human Health risk screening values

- No Derived Criteria as CoC not predicted to reach base of the unsaturated zone within 1,000 years, hence an appropriate human health risk screening criterion (S4UL or C4SL) based on proposed land use will be adopted.

* Background concentration adopted as discussed in Derivation of Made Ground Assessment Criteria for the Protection of Controlled Waters [7].

≠ Note: The Soil Chemical Acceptance Criteria (SCAC) are not to be applied to tarmac and road surfacing materials. Tarmacadam is to be segregated from Made Ground and stockpiles of Tarmac bound materials (such as existing road surfaces) to be tested for speciated PAH to inform the potential re-use or disposal options.

(C4SL, Allotment, 6 % SOM).

♦ Detectable asbestos <0.001% or low levels of cement bound fibres can be used at depths < 600/300 mm, subject to further assessment which may include Detailed Quantitative Risk Assessment (DQRA).

† Screening for hydrocarbons will be driven by visual/olfactory observations of the materials to be used in accordance with Table V-2 below rather than Human Health risk screening values. Material which appears to be visibly impacted by hydrocarbon contamination (presence of odours or oily sheens), will not be considered suitable for re-use. For TPH fractions a target value of 5,000 mg/kg has been applied for the re-use criteria where the S4UL and derived values are >5000mg/kg. Concentrations in soil above this value will require treatment.

Records of visual/olfactory observations during the watching brief are primarily to support pre-screening and subsequent segregation of Made Ground. These details should be recorded on the EKFB Land Quality Sampling Record for Made Ground Materials during the watching brief for inclusion in the final Verification Report. The criteria are discussed in Table V-2 and V-3.

Table V-2 - Visual / Olfactory Assessment Criteria for Hydrocarbon Impacted Material

Contaminant / Indicator	Criteria for Unacceptable Contamination
Polycyclic Aromatic Hydrocarbons (PAH)	Visual: Black liquid or semi-solid tar in veins or zones. Heavily stained or coated surfaces. Solid tar/bitumen. Headspace ⁽¹⁾ : Over 100 ppm, Olfactory ⁽²⁾
Mineral Oils (Total Petroleum Hydrocarbons – TPH)	Visual: Liquid oil, oil saturated solids in veins or zones. Heavily stained or coated surfaces. Headspace ⁽¹⁾ : Over 100 ppm, Olfactory ⁽²⁾

Notes

1. Headspace analysis to be conducted where required/applicable. Headspace analysis criteria shall be subject to calibration of instruments.

2. Olfactory assessment shall always be confirmed by headspace analysis.

Additionally, the following provides a scale of aesthetic criteria.

Table V-3 - Aesthetic criteria for appropriate stockpile

Category	Visual	Olfactory
1	Occasional-frequent staining	Faint to distinct but no strong odour in soil
2	Heavy staining of soil	Strong odour in soil
3	Visible hydrocarbon product	Strong to overwhelming odour