Ravenhead Quarry Landfill

Environmental Permit Application – Non-Technical Summary (NTS)

Booth Ventures Waste (North West) Limited

Report No. K0158-BLP-R-ENV-01-02
March 2023
Revision 02

BOOTH VENTURES

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Document Control

Document:	Environmental Permit Application – Non-Technical Summary (NTS)
Project:	Ravenhead Quarry Landfill
Client:	Booth Ventures Waste (North West) Limited
Report Number:	K0158-BLP-R-ENV-01-02

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Disclaimer: Please note that this report is based on specific information, instructions and information from our Client and should not be relied upon by third parties.					

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1 Introduction

1.1 Non-Technical Summary

Booth Ventures Waste (North West) Limited (company number 12508201, the proposed Site Operator) intend to infill the quarry void at Ravenhead Quarry (the Site). The Site is referenced within this application as Ravenhead Quarry Landfill. Booth Ventures Waste (North West) Limited will operate the site under a lease agreement with the landowner Ibstock Brick Ltd (company number 00063230).

This site is currently an active quarry, however upon completion of quarrying activities, the operator proposes restoration of the void by landfilling with non-hazardous wastes.

Applications for Planning Permission and Environmental Permits (the latter being the subject of this application) detail the proposal to utilise excavation waste materials (of a low pollution potential) associated with excavation and construction works to restore the quarry.

It is proposed to infill the existing quarry void as a restoration activity (by landfilling). The infill material will comprise only of wastes which are considered suitable, and which are specified by His Majesty's Revenue and Customs (HMRC) in The Landfill Tax (Qualifying Material) Order 2011 (as amended) (i.e. Qualifying Materials (QMs).

The design of the infilling scheme and restoration profile will be completed to a level coincident with surrounding perimeter ground levels. The exception are areas of the southeast and southern boundaries where exposure of the Site of Special Scientific Interest (SSSI) will be retained. The SSSI management scheme ("approval of the approach" by Natural England in October 2022) has been considered accordingly in the design of the infilling and restoration. Further details are provided in the Environmental Setting and Site Design (ESID) report K0158-BLP-R-ENV-03-02.

The restoration accounts for long term surface water management through ponds and soakaways that will (through a twin tracked planning application and information detailed therein) provide some enhancement to the local ecology. The surface water will be conveyed to a soakaway location on the western boundary which will drain to the underlying groundwater system, in addition surface water will drain to sewer following agreement with United Utilities. Further details are provided in report K0158-BLP-R-ENV-03-02.

The infilling proposals have been risk assessed accordingly. These assessments demonstrate that the scheme does not pose a risk to the primary groundwater water receptor (the Pennine Coal Measures Strata). Groundwater levels are currently lowered through pumping to allow for the final extraction of the winnable mineral reserves. There are no local water courses (within 1km of the Site), as such there are no surface water receptors. The nearest watercourse is the Dean Brook located approximately 1.25km east northeast.

The infill material comprising only of wastes which are considered suitable, and which are specified by His Majesty's Revenue and Customs (HMRC) in The Landfill Tax (Qualifying Material) Order 2011 (as amended) (i.e. Qualifying Materials (QMs)).

In support of the restoration operations and to support sustainability imported wastes with a recoverable composition will be processed to recover aggregates in accordance with the quality

protocol approved by the Environment Agency[1]. It is anticipated that approximately 5% of the wastes imported will be suitable for processing (crushing and/or screening).

Suitable wastes will be stockpiled on hardstanding pad (aggregate over lower permeability soil) located on the southwestern site boundary prior to treatment. When sufficient recoverable wastes have been stockpiled treatment will be undertaken periodically for short periods utilising mobile plant. Recovered aggregate will either be used on site (e.g. for creation of roads and hardstanding areas) or exported and used in accordance with quality protocol (e.g. pipe bedding and highway sub base). The recovery of aggregates from imported wastes will cease when the final restoration of the quarry void is [redacted]

Consideration of local amenity has also been addressed through an Environmental Risk Assessment (H1) which includes a comprehensive dust and noise management plan.

1.2 Structure of Application and Accompanying Documents

Byrnelooby have been instructed to prepare a permit application for the development and infilling of the Ravenhead Quarry, a twin-tracked planning application submission will be issued to the Local Planning Authority (LPA) addressing the requirement for alternative site restoration. The current approved restoration scheme is not considered desirable (further details are provided in report K0158-BLP-R-ENV-03-02).

This document and associated technical assessments support the application for an Environmental Permit. This report, K0158-BLP-R-ENV-01-02 has been compiled to provide details and documentation to address the questions raised in the Environmental Permit application forms and provide details of operator competence (K0158-BLP-R-ENV-02-02).

Section 1.1 of this report forms the 'Non-Technical Summary' of the proposal.

The completed application forms part A, B2, B3 and F1 are included in Appendix A, a summary set of responses to questions contained within the application forms are provided in Section 3 below. A number of drawings illustrate relevant aspects of the application, the Environmental Setting and Installation Design (ESID) information requirements accord with Environment Agency Guidance[2], these drawings are numbered as:

- ESID1 Site Location
- ESID2 Environmental Site Setting
- ESID3 Cultural and Natural Heritage
- ESID4 Existing Site Layout (Permit Boundary)
- ESID5A Installation Phasing Plan – Final Extraction
- ESID5B Installation Phasing – Infill Phasing Plan
- ESID6 Proposed Restoration & Cross Sections (including extent of landfill area)
- ESID7A Leachate Management (location of spine drains)
- ESID7B Installation Engineering Details (leachate monitoring chamber / target pad design)

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/296499/LIT_8709_c60600.pdf
[2] https://www.gov.uk/government/publications/esid-report-template

- ESID8A Section line locations B-B', C-C' & D-D'
- ESID8B Section lines B-B', C-C' & D-D' (for Stability assessment)
- ESID8C Schematic Engineering Details (stone finger drain, groundwater chamber and sidewall liner) including section line location A-A'
- ESID8D Schematic Engineering Details (groundwater dewatering chamber).
- ESID9 Regional Geology
- ESID10 Regional Hydrogeology
- ESI[redacted]logical / Hydrogeological Cross Sections
- ESID12 Monitoring Plan
- ESID13 Surface Water Management

The drawings will be cross-referenced throughout the application where relevant. Risk assessments are also provided accordingly, the following report references support the proposed scheme:

- K0158-BLP-R-ENV-02-02 Operator Competence
- K0158-BLP-R-ENV-03-02 Environmental Setting & Installation Design (ESID)
- K0158-BLP-R-ENV-04-02 Environmental Risk Assessment (H1)
- K0158-BLP-R-ENV-05-02 Waste Acceptance Criteria (WAC)
- K0158-BLP-R-ENV-06-02 Hydrogeological Risk Assessment (HRA)
- K0158-BLP-R-ENV-07-02 Gas Risk Assessment (GRA)
- K0158-BLP-R-ENV-08-02 Stability Assessment (SRA)
- K0158-BLP-R-ENV-09-02 Emissions Monitoring and Financial Provision Report

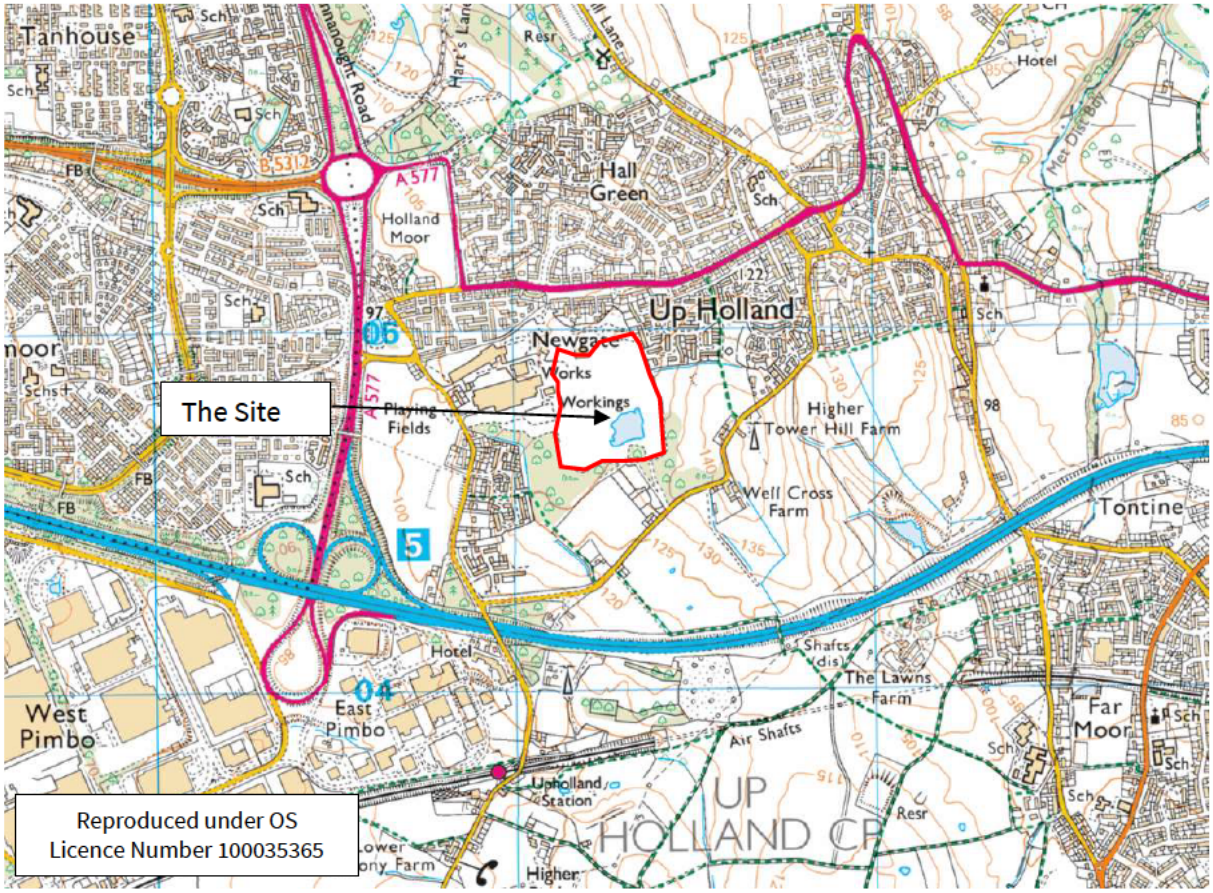
2 Site Location and Description

Ravenhead Quarry is located approximately 500m to the north of the M58 motorway, on the southwest boundary of Upholland, and is approximately 2.5 kilometres to the east of Skelmersdale at National Grid Reference (NGR) SD 5126 0479 (Figure 1, see also Drawing K0158/4/001, ESID 1).

The site is currently an active quarry, the quarrying operations currently occupy the south-eastern area of the quarry, and the mineral processing operations occupy the northern end of the quarry. The whole site is part of the larger Ibstock Brick Works site, which is owned by Ibstock Brick Ltd.

The perimeter of the site is at ~130mAOD in the east and southeast, 120mAOD on the south and northwest boundaries falling to a low point of ~107mAOD near the northwest corner. Current excavation depths within the quarry are estimated to be at ~91mAOD (January 2023), in the southeast area of the current void. Quarry operations may still be undertaken during the initial landfilling phase. Locally, the highest ground is at ~145mAOD at 180m to the east at Tower Hill (Higher Tower Hill farm, Figure 1), with the topography sloping gently to the west-northwest, and at a larger scale to the southwest.

Figure 1 Site Location



2.1 Proposed Development

The site is located entirely within the Carboniferous Pennine Lower Coal Measures strata which is comprised predominantly of low permeability mudstones, with intervening sandstones, seat earths and coal seams. The excavation of the winnable reserves will continue down to a terminal depth of 85mAOD, the base level of the infill scheme (Figure 2, drawing K0158/4/004, ESID 4).

The restoration surface will fall from ~134mAOD to 110mAOD (Figure 2, drawing K0158/4/006, ESID 6), the scheme provides consideration of surface water control accordingly.

It is proposed to complete the infilling of the void with non-hazardous wastes which are listed as qualifying materials[3].

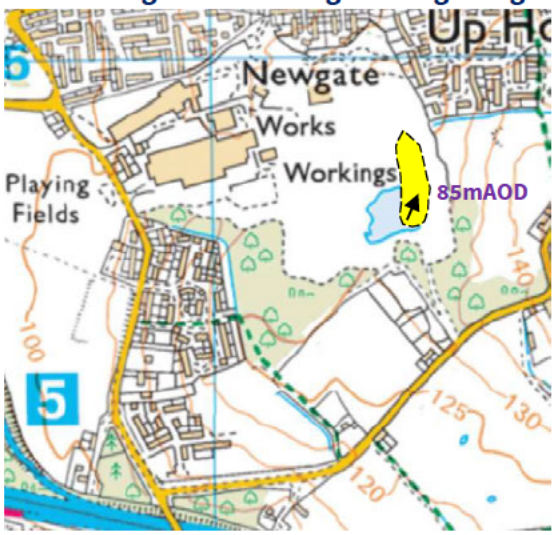
The infill volume is calculated at 1.06Mm³ (equivalent to approximately 2.1M tonnes).

The infilling of the void will provide final restoration contours for the site that are commensurate with the surrounding land surface (as far as is reasonably practical). The proposed wastes will consist of excavation, construction/demolition wastes and similar industrial wastes that have a low-level pollution potential. Therefore, it is not expected that the waste will generate landfill gas or that active management of landfill gas will be required.

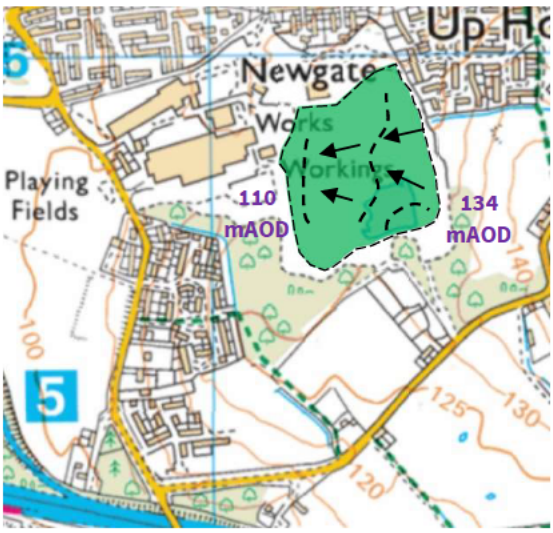
[3]The Landfill Tax (Qualifying Material) Order 2011 (as amended) – https://www.legislation.gov.uk/uksi/2011/1017/contents/made

Such a restriction will also prevent the generation of the primary soluble landfill leachate pollutant (i.e. ammonium) as well as the organic degradation by-products, namely hydrolysis products such as the phenols and hazardous substances such as BTEX compounds.

Figure 2 Engineering Design Schematics



Base (mAOD) & direction of fall



Restoration Surface (mAOD) & direction of fall

As such, the proposed wastes will have a negligible pollution potential (compared to municipal waste sites), thus the void is highly likely to rapidly stabilise to a state where the permitted area could be surrendered upon or shortly after cessation of disposal activities.

Notwithstanding the negligible pollution potential of the wastes proposed for the void, an appropriately "risk based" network of perimeter boreholes will be installed (where additional infrastructure is required to augment existing monitoring locations). The installations will be monitored routinely around the perimeter of the infill area and will be used throughout the site's operational and post-closure phases to assess whether the void is operating as intended.

Figure 3 Location of Aggregate Recovery Activity

The aggregate recovery operation will be undertaken on a hardcore pad as illustrated on Figure 3 below. The pad will be placed on lower permeability soils which will direct surface water run-off into the quarry void, where the water will either be directed into the current dewatering discharge to foul sewer or to the engineered containment of the new landfill.

2.2 Engineering Overview

The site is located entirely within the Pennine Lower Coal Measures Strata. The Hydrogeological Risk Assessment (K0158-BLP-R-ENV-06-02) has indicated there is no requirement for leachate collection, hence there is no requirement for the inclusion of an Artificial Sealing Liner (ASL)[4] in addition to th[redacted]arrier.

Information relating to the engineering properties of the engineered liner (reworked site-won materials or imported Clay to the specification of 500 mm to a maximum permeability of 1 x 10^{-8} m/s), engineering design and groundwater control are provided further in the Environmental Setting & Installation Design / Technical Standards Report (K0158-BLP-R-ENV-03-02).

The stability of the final quarry extraction design is not part of the application, information relating to stability of the waste mass, side slope liner and basal heave considerations are provided in report K0158-BLP-R-ENV-08-02 (Plough Geotechnical Ltd). Liner interface with the waste mass is designed at at 1:3 installed as a "Christmas tree" system.

2.3 Waste Types and Quantities

The void has a calculated capacity of ~1.06Mm³ (~2.1M tonnes) and comprises an area of approximately 6,000m², 0.6ha (base), 47,000m², 4.7ha (cap above the engineered site) and 86,300m², 8.63ha for the area of restoration.

The proposed design is to restore the void using QMs.

QMs are a list of waste types in which Her Majesty's Revenue and Customs (HMRC) has made specific allowance for quarry restoration identifying a very limited list of suitable wastes in accordance with The Landfill Tax (Qualifying Material) Order 2011 (as amended). The QM Order lists a series of wastes with limited to negligible pollution potential with respect to the production of landfill gas or leachates. The qualifying materials include wastes in the following groups:

- Group 1 Rocks and soils
- Group 2 Ceramics or concrete materials
- Group 3 Minerals, processed or prepared
- Group 4 Furnace slags
- Group 5 Ash

Of these the majority of the materials to be landfilled are expected to be:

- Soil (including mixed clays, silts and sands);
- Stones; and

[4] Landfill Directive (99/31/EC) - Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste

- Concrete based construction materials from development schemes

The infilling is anticipated to have a duration of 7 years although material availability may alter the initial assumptions. Input rates averaged over the expected infilling period would equate to 152,000t/y, however, to account for any surplus or additional waste infill availability and only 260 working days in a calendar year, a permitted maximum of 300,000t/y is proposed within the application.

Restoration will meet the objectives of the planning application (twin tracked submission), selected materials will be utilised to assist in surface water control. A typical thickness of 1m of restoration soils is proposed over the cap for achieving the desired restoration profile. ~86,300m^3 is required for a final 1m surface layer over the site, which equates to ~172,600t.

The infilling proposals have been risk assessed accordingly (associated application documents). On issue of the Environmental Permit for the infilling, a detailed CQA design, construction and method statement will be submitted to the Environment Agency for approval.

Only selected waste types will be suitable for the recovery of aggregates. These wastes are specified in Appendix C of the quality protocol and can be summarised as:

- Waste gravel and crushed rocks other than those mentioned in 01 04 07 (EWC 01 04 08)
- Waste sand and clays (EWC 01 04 09)
- Glass packaging (EWC 15 01 07) / Glass (EWC 19 12 05 / 20 01 02)
- Concrete (EWC 17 01 01)
- Bricks (EWC 17 01 02)
- Tiles and ceramics (EWC 17 01 03)
- Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06 (EWC 17 01 07)
- Glass (EWC 17 02 02)
- Bituminous mixtures other than those mentioned in 17 03 01 (EWC 17 03 02)
- Soils and stones other than those mentioned in 17 05 03 (17 05 04)
- Dredging spoil other than those mentioned in 17 05 05 (17 05 06)
- Track ballast other than those mentioned in 17 09 01, 17 09 02 and 17 09 03 (17 09 04)
- Mineral (for example sand and stones) 19 12 09
- Garden and park waste (including cemetery waste) – soil and stones (20 02 02)

Assuming 5% of annual inputs to the site area is suitable for recovery approximately 15,000 tonnes of waste will be treated per year. All recovered aggregate will meet the end of waste criteria detailed in

the quality protocol. The recovered aggregate may be utilised on site or exported for use in off-site construction projects.

3 Application Form A Questions

3.1 Question 5c – Please give details of the Directors

Matthew Spencer Booth
Date of Birth: [redacted]

Harwood Quarry
Brookfold Lane
Harwood
Bolton
BL2 4LT

4 Application Form B2 Questions

4.1 Question 1 – About the Permit

A Conservation and Heritage Screen has been undertaken and received as part of this application process (ref: EPR/LB3107GH/A001) and is contained as Appendix C with report K0158-BLP-R-ENV-04-02.

4.2 Question 3a – Relevant Offences

The Operator Competence Report (K0158-BLP-R-ENV-02-02) submitted as part of this permit application contains details of relevant offences, technical ability and management systems. There are no relevant offenses.

4.3 Question 3b – Technical Ability

The Operator Competence Report (K0158-BLP-R-ENV-02-02) submitted as part of this permit application contains details of technical ability and management systems.

4.4 Question 3c - Finances

No relevant person, or company in which a relevant person was part of, have any current or past bankruptcy or insolvency proceedings against them. Financial Provision calculations are provided in report K0158-BLP-R-ENV-09-02.

4.5 Question 3d – Management System

The Operator Competence Report (K0158-BLP-R-ENV-02-02) submitted as part of this permit application contains details of the management systems.

4.6 Question 5a – Provide a plan for the site

A location plan for the site is provided in drawing ESID 1 (K0158/4/001), the proposed permit boundary is depicted on ESID 4 (K0158/4/004).

4.7 Question 5b – Provide the relevant sections of a site condition/baseline report

Baseline is considered in report K0158-BLP-R-ENV-03-02, Environmental Setting and Installation Design, this is also referred to as the Technical Standards Report.

4.8 Question 6 – Environmental Risk Assessment

The Environmental Risk Assessment (H1) Report (K0158-BLP-R-ENV-04-02) submitted as part of this permit application contains a full assessment of the environmental risks (amenity) posed by the proposed application. A comprehensive Noise Management Plan is included as Appendix A, and a Dust Management Plan is included as Appendix B.

5 Application Form B3 Questions

5.1 Question 1 – What Activities are you applying for?

Landfilling, designated D5 code in the Landfill Directive, of only Qualifying Materials as defined by The Landfill Tax (Qualifying Materials) Order 2011. Restoration, designated R5 and R10 code of only Qualifying Materials.

A total storage capacity of 1.06Mm^3, with an annual throughput of 300,000 tonnes is proposed. A restoration annual throughput of 30,000 tonnes is proposed.

5.2 Question 1b – Types of Waste Accepted and Restriction

The proposed waste types and acceptance procedures are contained in the Waste Acceptance Procedures report (K0158-BLP-R-ENV-05-02) which is included with this application. The wastes proposed are non-hazardous (as defined by WM3)[5].

5.3 Question 2 – Emissions to Air, Water or Land

Emissions to air, water and land are discussed in detail within risk-based reports.

These include the Hydrogeological Risk Assessment (ref: K0158-BLP-R-ENV-06-02, HRA) with assessment of groundwater and surface waters, the Landfill Gas Risk Assessment (ref: K0158-BLP-R-ENV-07-02) which demonstrates there are no significant emissions to air.

There are no point source emissions to sewer or effluent treatment plants from the application site, there are no point source emissions to air.

5.4 Question 3a – Technical Standards

The technical standards of the proposed development at Ravenhead Quarry are contained in the ESID / Technical Standards Report (ref: K0158-BLP-R-ENV-03-02). A Stability Risk assessment is

[5]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1021051/Waste_classification_technical_guidance_WM3.pdf

provided which assesses the stability of the proposed development which is included in report (ref: K0158-BLP-R-ENV-08-02, Plough Geotechnical Ltd).

5.5 Question 3b – General Requirements

The potential impact due to fugitive emissions, odour or noise is assessed in the accompanying Environmental Risk Assessment (ref: K0158-BLP-R-ENV-04-02), attached part of this application.

5.6 Question 4 – Monitoring

Environmental monitoring proposed for the installation is contained in the Environmental Emissions and Monitoring Plan (ref: K0158-BLP-R-ENV-09-02).

Appendix A – Application Forms

[redacted]

Application for an environmental permit Part A – About you

You will need to fill in this part A if you are applying for a new permit, applying to change an existing permit or surrender your permit, or want to transfer an existing permit to yourself. Please check that this is the latest version of the form available from our website.

You can apply online for Waste standard rules environmental permits, bespoke waste permits and bespoke Medium combustion plant permits

Apply online for an environmental permit.

Please read through this form and the guidance notes that came with it.

The form can be:

1) **saved onto a computer and then filled in. Please note that the form follows a logic that means questions will open or stay closed depending on a previous answer. So you may not be able to enter text in some boxes.**
2) **printed off and filled in by hand. Please write clearly in the answer spaces.**

Note: if you believe including information on a public register would not be in the interests of national security you must enclose a letter telling us that you have told the Secretary of State. We will not include the information in the public register unless directed otherwise.

It will take less than one hour to fill in this part of the application form.

Where you see the term 'document reference' on the form, give the document references and send the documents with the application form when you've completed it.

Contents

1 About you

Are you applying as an individual, an organisation of individuals (for example, a partnership), a company (this includes Limited Liability Partnerships) or a public body?

An individual	☐ Now go to section 2 and if you are applying for a new permit or transferring a permit for an installation or waste activity please also fill in Appendix 1
An organisation of individuals (for example, a partnership)	☐ Now go to section 3 and if you are applying for a new permit or transferring a permit for an installation or waste activity please also fill in Appendix 1
A public body	☐ Now go to section 4
A registered company or other corporate body	☑ Now go to section 5 and if you are applying for a new permit or transferring a permit for an installation or waste activity please also fill in Appendix 1

2 Applications from an individual

2a Please give us the following details

Name

Title (Mr, Mrs, Miss and so on) _____

First name _____

Last name _____

Now go to section 6

3 Applications from an organisation of individuals or charity

3a Type of organisation

For example, a charity, a partnership, a group of individuals or a club

3b Details of the organisation or charity

If you are an organisation of individuals, please give the details of the main representative below. If relevant, provide details of other members (please include their title Mr, Mrs and so on) on a separate sheet and tell us the document reference you have given this sheet

Contact name

Title (Mr, Mrs, Miss and so on)

First name

Last name

Now go to question 3c or section 6

3c Details of charity

Full name of charity

This should be the full name of the legal entity not any trading name.

3d Company registration number

If you are registered with Companies House please tell us your registration number

3e Charity Commission number

If you are registered with the Charity Commission please tell us your registration number

Now go to section 6

4 Applications from public bodies

4a Type of public body

For example, NHS trust, local authority, English county council

4b Name of the public body

4c Please give us the following details of the executive

An officer of the public body authorised to sign on your behalf

Name

Title (Mr, Mrs, Miss and so on)

First name

Last name

Position

Now go to section 6

5 Applications from companies or corporate bodies

5a Name of the company

Booth Ventures Waste (North West) Limited

5b Company registration number

12508201

Date of registration (DD/MM/YYYY)

10/03/2020

If you are applying as a corporate organisation that is not a limited company, please provide evidence of your status and tell us below the reference you have given the document containing this evidence.

Document reference

5 Applications from companies or corporate bodies, continued

5c Please give details of the directors

If relevant, provide details of other directors and company secretary, if there is one, on a separate sheet and tell us the reference you have given this sheet.

Document reference: K0158-BLP-R-ENV-01-02

Details of company secretary (if relevant) and director/s

Title (Mr, Mrs, Miss and so on)

First name

Last name

Title (Mr, Mrs, Miss and so on)

First name

Last name

Now go to section 6

6 Your address

6a Your main (registered office) address

For companies this is the address on record at Companies House.

Contact name

Title (Mr, Mrs, Miss and so on): Mr

First name: Matthew

Last name: Booth

Address: Link 665 Business Centre
Todd Hall Road
Haslingden
Rossendale

Postcode: BB4 5HU

Contact numbers, including the area code

Phone: 01204 597788

Fax

Mobile: 07970969968

Email: matthew@boothventures.co.uk

For an organisation of individuals every partner needs to give us their details, including their title Mr, Mrs and so on. So, if necessary, continue on a separate sheet and tell us below the reference you have given the sheet.

Document reference

6b Main UK business address (if different from above)

Contact name

Title (Mr, Mrs, Miss and so on)

First name

Last name

Address

Postcode

6 Your address, continued

Contact numbers, including the area code

Phone

Fax

Mobile

Email

Now go to section 7

7 Contact details

7a Who can we contact about your application?

It will help us if there is someone we can contact if we have any questions about your application. The person you name should have the authority to act on your behalf.

Please add a second contact on a separate sheet if this person is not always available.

Document reference of this separate sheet

This can be someone acting as a consultant or an 'agent' for you.

Contact name

Title (Mr, Mrs, Miss and so on): Dr

First name: Phil

Last name: Scotney

Address: ByrneLooby Ltd
Dunston Innovation Centre
Dunston Road
Chesterfield

Postcode: S41 8NG

Contact numbers, including the area code

Phone

Fax

Mobile

Email: PhilScotney@ByrneLooby.com

7b Who can we contact about your operation (if different from question 7a)?

Contact name

Title (Mr, Mrs, Miss and so on): Mr

First name: Richard

Last name: Lord

Address: Suite 15
Link 665 Business Centre
Todd Hall Road
Haslingden

Postcode: BB4 5HU

Contact numbers, including the area code

Phone: 01204 597788

Fax

Mobile: 07718492960

Email: Richard@boothventures.co.uk

7 Contact details, continued

7c Who can we contact about your billing or invoice?

Note: Please provide the name and address that all invoices should be sent to for your subsistence fees.

As in question 7a ☐

As in question 7b ☐

Please give details below if different from question 7a or 7b.

Contact name

Title (Mr, Mrs, Miss and so on): Mrs

First name: Vanessa

Last name: Worsley

Address: Suite 15, Link 665 Business Centre
Todd Hall Road
Haslingdon
Lancashire

Postcode: BB4 5HU

Contact numbers, including the area code

Phone: 01204 597788

Fax:

Mobile: 07702534811

Email: vanessa@theboothgroup.co.uk

8 How to contact us

If you need help filling in this form, please contact the person who sent it to you or contact us as shown below.

General enquiries: 03708 506 506 (Monday to Friday, 8am to 6pm)

Textphone: 03702 422 549 (Monday to Friday, 8am to 6pm)

Email: enquiries@environment-agency.gov.uk

Website: www.gov.uk/government/organisations/environment-agency

If you are happy with our service, please tell us. It helps us to identify good practice and encourages our staff. If you're not happy with our service, please tell us how we can improve it. More information on how to do this is available at: www.gov.uk/government/organisations/environment-agency/about/complaints-procedure.

Please tell us if you need information in a different language or format (for example, in large print) so we can keep in touch with you more easily.

9 Where to send your application

For how many copies to send see the guidance note on part A.

For water discharges by email to PSC-WaterQuality@environment-agency.gov.uk

For waste and installations by email to PSC@environment-agency.gov.uk

For flood risk activity permits send 1 copy only to enquiries@environment-agency.gov.uk or to the local Environment Agency office for where the work is proposed to be carried out.

Or

Permitting Support, NPS Sheffield
Quadrant 2
99 Parkway Avenue
Parkway Business Park
Sheffield
S9 4WF

Feedback

(You don't have to answer this part of the form, but it will help us improve our forms if you do.)

We want to make our forms easy to fill in and our guidance notes easy to understand. Please use the space below to give us any comments you may have about this form or the guidance notes that came with it.

How long did it take you to fill in this form?

We will use your feedback to improve our forms and guidance notes, and to tell the Government how regulations could be made simpler.

Would you like a reply to your feedback?

Yes please ☐

No thank you ☐

Crystal Mark 19101
Clarity approved by Plain English Campaign

For Environment Agency use only

Date received (DD/MM/YYYY)

Our reference number

Payment received?

No ☐

Yes ☐ Amount received

£

Appendix 1 – Date of birth information for installation and waste activities (applications for a new permit or transferring a permit) only

Date of birth information in this appendix will not be put onto our Public Register

Are you applying as an individual, an organisation of individuals (for example, a partnership) or a company (this includes Limited Liability Partnerships)?

An individual	☐ Now go to 2
An organisation of individuals (for example, a partnership)	☐ Now go to 3
A registered company or other corporate body	☑ Now go to 4

2 Applications from an individual

Please give us the following details

Name

Date of birth (DD/MM/YY)

3 Applications from an organisation of individuals or charity

Details of the organisation or charity

If you are an organisation of individuals, please give the date of birth details of the main representative below. If relevant, provide details of other members on a separate sheet and tell us the document reference you have given this sheet.

Name

Date of birth (DD/MM/YY)

Document reference

4 Applications from companies or corporate bodies

Name of the company: Booth Ventures Waste (North West) Limited

Please give the date of birth details for all directors and company secretary if there is one. If relevant, provide those details of other directors on a separate sheet and tell us the document reference you have given this sheet.

Details of company secretary (if relevant) and director/s

Name

Date of birth (DD/MM/YY)

Name

Date of birth (DD/MM/YY)

Name

Date of birth (DD/MM/YY)

Document reference: K0158-BLP-R-ENV-01-02

Application for an environmental permit
Part B2 – General – new bespoke permit

Environment Agency

Fill in this part of the form together with parts A and F1 if you are applying for a new bespoke permit. You also need to fill in part B3, B4, B5, B6, or B7 (this depends on what activities you are applying for).

Please check that this is the latest version of the form available from our website.

You can apply online for: waste operations; medium combustion plant; and specified generator bespoke environmental permits at **https://apply-for-environmental-permit.service.gov.uk/start/start-or-open-saved**

Please read through this form and the guidance notes that came with it.

The form can be:

1) saved onto a computer and then filled in.

2) printed off and filled in by hand. Please write clearly in the answer spaces

It will take less than two hours to fill in this part of the application form.

Contents

1 About the permit

1a Discussions before your application

If you have had discussions with us before your application, give us the permit reference or details on a separate sheet. Tell us below the reference you have given this extra sheet.

Permit or document reference

K0158 - BLP - R - ENV - 01 - 02

1 About the permit, continued

1b Is the permit for a site or for mobile plant?

	Mobile plant	Now go to **question 1c**
✔	Site	Now go to **section 2**

Note: The term 'mobile plant' does not include mobile sheep dipping units.

Mobile plant only

1c Have we told you during pre-application discussions that we believe that a mobile permit is suitable for your activity?

☐ No

☐ Yes

1d Have there been any changes to your proposal since this discussion?

☐ No Now go to **section 3**

☐ Yes You should send us a description of the activity you want to carry out, highlighting the changes you have made since our pre-application discussions

Document reference

Now go to **section 3**

2 About the site (excludes mobile plant)

2a What is the site name, address, postcode and national grid reference?

Site name

Ravenhead Quarry

Address

Chequer Lane
Up Holland
Lancashire

Postcode

WN8 0DE

National grid reference for the site (for example, ST 12345 67890)

SD 51260 04790

2 About the site (excludes mobile plant), continued

2b What type of regulated facility are you applying for?

Note: if you are applying for more than one regulated facility then go to 2c.

✔ Installation

Waste operation

Mining waste operation

Water discharge activity

Groundwater activity (point source)

Groundwater activity (discharge onto land)

What is the national grid reference for the regulated facility (if only one)?
(See the guidance notes on part B2.)

✔ As in 2a above

Different from that in 2a Please fill in the national grid reference below

National grid reference for the regulated facility

Now go to **question 2d**

2c If you are applying for more than one regulated facility on your site, what are their types and their grid references?

See the guidance notes on part B2.

Regulated facility 1

National grid reference

SD 51169 04663

What is the regulated facility type?

Installation

✔ Waste operation

Mining waste operation

Water discharge activity

Groundwater activity (point source)

Groundwater activity (discharge onto land)

2 About the site (excludes mobile plant), continued

Regulated facility 2

National grid reference

What is the regulated facility type?

- ☐ Installation
- ☐ Waste operation
- ☐ Mining waste operation
- ☐ Water discharge activity
- ☐ Groundwater activity (point source)
- ☐ Groundwater activity (discharge onto land)

Use several copies of this page or separate sheets if you have a long list of regulated facilities. Send them to us with your application form. Tell us below the reference you have given these extra sheets.

Document reference

Now go to **question 2d**

2d Low impact installations (installations only)

Are any of the regulated facilities low impact installations?

- ✔ No
- Yes If yes, tell us how you meet the conditions for a low impact installation (see the guidance notes on part B2 – Appendix 1).

Document reference

☐ Tick the box to confirm you have filled in the low impact installation checklist in **appendix 1** for each regulated facility

2e Treating batteries

Are you planning to treat batteries? (See the guidance notes on part B2.)

- ✔ No
- Yes Tell us how you will do this, send us a copy of your explanation and tell us below the reference you have given this explanation

Document reference for the explanation

2 About the site (excludes mobile plant), continued

2f Ship recycling

Is your activity covered by the Ship Recycling Regulations 2015? (See the guidance notes on part B2.)

✔ No

Yes Tell us how you will do this. Please send us a copy of your explanation and your facility recycling plan, and tell us below the reference numbers you have given these documents

Document reference for the explanation

Document reference for the facility recycling plan

2g Multi-operator installation

If the site is a multi-operator site (that is there is more than one operator of the installation) then fill in the table below the application reference for each of the other permits.

Table 1 – Other permit application references

3 Your ability as an operator

If you are only applying for a standalone water discharge or for a groundwater activity, you only have to fill in **question 3d**.

3a Relevant offences

Applies to all except standalone surface water discharges and groundwater discharges (see the guidance notes on part B2).

3a1 Have you, or any other relevant person, been convicted of any relevant offence?

✔ No Now go to **question 3b**

Yes Please give details below

3 Your ability as an operator, continued

Name of the relevant person

Title (Mr, Mrs, Miss and so on)

First name

Last name

Position held at the time of the offence

Name of the court where the case was dealt with

Date of the conviction (DD/MM/YYYY)

Offence and penalty set

Date any appeal against the conviction will be heard (DD/MM/YYYY)

If necessary, use a separate sheet to give us details of other relevant offences and tell us below the reference number you have given the extra sheet.

Now go to **question 3b**

Please also complete the details in **Appendix 2**.

3b Technical ability

Relevant waste operations only (see the guidance notes on part B2).

Please indicate which of the two schemes you are using to demonstrate you are technically competent to operate your facility and the evidence you have enclosed to demonstrate this.

ESA/EU skills

Please select one of the following:

I have enclosed a copy of the current Competence Management System certificate

or

We will have a certified Competence Management System within 12 months and have enclosed evidence of the contract with an accredited certification body

3 Your ability as an operator, continued

CIWM/WAMITAB scheme

Your answers below must relate to the person(s) providing technically competent management when the permitted activities start.

Please select **one** of the following:

- I have enclosed a copy of:

  ✔ the relevant qualification certificate/s

  or

  evidence of deemed competence

  or

  Environment Agency assessment

  or

  evidence of nominated manager status under the transitional provisions for previously exempt activities

  and, if deemed competent or Agency-assessed, or nominated manager, or if the original qualification is over two years old:

  ✔ I have enclosed a copy of the relevant current continuing competence certificate/s

- ☐ The technically competent manager will complete their qualification within four weeks of starting the permitted activities and I have enclosed evidence of their registration with WAMITAB or their EPOC booking as appropriate

- **For medium- and high-risk tier activities other than landfill**

  The technically competent manager will complete the qualification within 12 months and I have enclosed evidence of their registration with WAMITAB and, where relevant, EPOC booking.

  ☐ I understand they must complete either four specified units of the relevant qualification or an EPOC within four weeks of the permitted activities commencing

For each technically competent manager please give the following information. If necessary, use a separate sheet to give us these details and tell us below the document reference you have given the extra sheet.

Title (Mr, Mrs, Miss and so on)

Mr

First name

Paul

Last name

Anderson

Phone

01204 597788

Mobile

07789363939

Email

paul@theboothgroup.co.uk

3 Your ability as an operator, continued

Please provide the environmental permit number/s and site address for all other waste activities that the proposed technically competent manager provides technical competence for, including permits held by other operators. Continue on a separate sheet as required.

Permit number	Site address	Postcode
LP3133LK	Brittania Quarry, Morley, Leeds	LS27 0JA
BV8741iI	Harwood Quarry, Bolton	BL2 4LT
JB3307AA	Horwich Moor Farm, Bolton	BL6 6PR
JB3100CN	Campions Wood Quarry, Wolverhampton	WV10 7LY

Document reference

K0158 - BLP - R - ENV - 01 - 02

Now go to **question 3c**

Please also complete the details in **Appendix 2**.

3c Finances

Installations, waste operations and mining waste operations only.

Please note that if you knowingly or carelessly make a statement that is false or misleading to help you get an environmental permit (for yourself or anyone else), you may be committing an offence under the Environmental Permitting (England and Wales) Regulations 2016.

Do you, or any relevant person, or a company in which you (or they) (or any relevant person) were a relevant person, have current or past bankruptcy or insolvency proceedings against you?

✔ No

Yes Please give details below, including the required set-up costs (including infrastructure), maintenance and clean up costs for the proposed facility against which a credit check may be assessed

We may want to contact a credit reference agency for a report about your business's finances.

3 Your ability as an operator, continued

Landfill, Category A mining waste facilities and mining waste facilities for hazardous waste only

How do you plan to make financial provision (to operate a landfill or a mining waste facility you need to show us that you are financially capable of meeting the obligations of closure and aftercare)?

- ✔ Renewable bonds
- Cash deposits with the Environment Agency
- Other – provide comprehensive details

Document reference

K0158 - BLP - R - ENV - 09 - 02

Provide a cost profile and expenditure plan of your estimated costs throughout the aftercare period of your site.

Document plan reference

K0158 - BLP - R - ENV - 09 - 02

Now go to **question 3d**

3d Management systems (all)

You must have an effective, written management system in place that identifies and reduces the risk of pollution. You may show this by using a certified scheme or your own system.

Your permit requires you (as the operator) to ensure that you manage and operate your activities in accordance with a written management system.

You need to be able to explain what happens at each site and which parts of the overall management system apply. For example at some sites you may need to show you are carrying out additional measures to prevent pollution because they are nearer to sensitive locations than others.

For waste and installation permits only: your management system must also explain your resilience to climate change.

You can find guidance on management systems on our website at **https://www.gov.uk/guidance/develop-a-management-system-environmental-permits**

- ✔ **Tick this box to confirm that you have read the guidance and that your management system will meet our requirements**

What management system will you provide for your regulated facility?

- ISO 14001
- BS 8555 (Phases 1–5)
- Green dragon
- ✔ Own management system
- EMAS Global
- Other

Please make sure you send us a summary of your management system with your application.

Document reference/s

K0158 - BLP - R - ENV - 01 - 02

4 Consultation

Fill in 4a to 4c for installations and waste operations and 4d for installations only.

Could the waste operation or installation involve releasing any substance into any of the following?

4a A sewer managed by a sewerage undertaker?

✔ No

Yes Please name the sewerage undertaker

4b A harbour managed by a harbour authority?

✔ No

Yes Please name the harbour authority

4c Directly into relevant territorial waters or coastal waters within the sea fisheries district of a local fisheries committee?

✔ No

Yes Please name the fisheries committee

4d Is the installation on a site for which:

4d1 a nuclear site licence is needed under section 1 of the Nuclear Installations Act 1965?

✔ No

Yes

4d2 a policy document for preventing major accidents is needed under regulation 5 of the Control of Major Accident Hazards Regulations 2015, or a safety report is needed under regulation 7 of those Regulations?

☐ No

☐ Yes

5 Supporting information

5a Provide a plan or plans for the site

But not any mobile plant

Clearly mark the site boundary or discharge point, or both. Also include site drainage plans, site layout plans, and plant design drawings/process flow diagrams (as required).
(See the guidance notes on part B2.)

Document reference/s of the plans

K0158 - BLP - R - ENV - 01 - 02

5 Supporting information, continued

5b Provide the relevant sections of a site condition/baseline report if this applies

See the guidance notes on part B2 for what needs to be marked on the plan.

Document reference of the report

K0158 - BLP - R - ENV - 01 - 02

✔ If you are applying for an installation, tick the box to confirm that you have sent in a baseline report

5c Provide a non-technical summary of your application

See the guidance notes on part B2.

Document reference of the summary

K0158 - BLP - R - ENV - 01 - 02

5d Are you applying for an activity that includes the storage of combustible wastes?

This applies to all activities excluding standalone water and groundwater discharges.

✔ No

Yes Provide a fire prevention plan (see the guidance notes on part B2). You need to highlight any changes you have made since your pre-application discussions.

Document reference of the plan

6 Environmental risk assessment

Provide an assessment of the risks each of your proposed regulated facilities poses to the environment. The risk assessment must follow the methodology set out in 'Risk assessments for your environmental permit' at **https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit** or an equivalent method.

Document reference for the assessments

K0158 - BLP - R - ENV - 04 - 02

7 How to contact us

If you have difficulty using this form, please contact the person who sent it to you or contact us as shown below.

General enquiries: 03708 506 506 (Monday to Friday, 8am to 6pm)

Textphone: 03702 422 549 (Monday to Friday, 8am to 6pm)

Email: **enquiries@environment-agency.gov.uk**

Website: **www.gov.uk/government/organisations/environment-agency**

If you are happy with our service, please tell us. It helps us to identify good practice and encourages our staff. If you're not happy with our service, please tell us how we can improve it.

Please tell us if you need information in a different language or format (for example, in large print) so we can keep in touch with you more easily.

7 How to contact us, continued

Feedback

(You don't have to answer this part of the form, but it will help us improve our forms if you do.)

We want to make our forms easy to fill in and our guidance notes easy to understand. Please use the space below to give us any comments you may have about this form or the guidance notes that came with it.

How long did it take you to fill in this form?

We will use your feedback to improve our forms and guidance notes, and to tell the Government how regulations could be made simpler.

Would you like a reply to your feedback?

- ☐ Yes please
- ☐ No thank you

For Environment Agency use only

Date received (DD/MM/YYYY)

Our reference number

Payment received?

- ☐ No
- ☐ Yes

Amount received (£)

Plain English Campaign's Crystal Mark does not apply to Appendix 1.

Appendix 1 – Low impact installation checklist

See the guidance notes on part B2.

Installation reference			
Condition	**Response**		**Do you meet this?**
A – Management techniques	Provide references to show how your application meets A References		☐ Yes ☐ No
B – Aqueous waste	Effluent created m³/day		☐ Yes ☐ No
C – Abatement systems	Provide references to show how your application meets C References		☐ Yes ☐ No
D – Groundwater	Do you plan to release any hazardous substances or non-hazardous pollutants into the ground? ☐ Yes ☐ No		☐ Yes ☐ No
E – Producing waste	Hazardous waste Tonnes per year Non-hazardous waste Tonnes per year		☐ Yes ☐ No
F – Using energy	Peak energy consumption MW		☐ Yes ☐ No
G – Preventing accidents	Do you have appropriate measures to prevent spills and major releases of liquids? ☐ Yes ☐ No Provide references to show how your application meets G References		☐ Yes ☐ No
H – Noise	Provide references to show how your application meets H References		☐ Yes ☐ No
I – Emissions of polluting substances	Provide references to show how your application meets I References		☐ Yes ☐ No
J – Odours	Provide references to show how your application meets J References		☐ Yes ☐ No
K – History of keeping to the regulations	Say here whether you have been involved in any enforcement action (as described in 'Appendix 1 – Compliance history' section of part B2 guidance notes)	☐ Yes ☐ No	

Appendix 2 – Date of birth information for Relevant offences and/or Technical ability questions only

Date of birth information in this appendix will not be put onto our Public Register.

Have you filled in the Relevant Offences question?

- ✔ Yes
- No

Have you filled in the Technical ability question?

- ✔ Yes
- No

Relevant Offences – date of birth information

Please give us the following details

Name

K0158 - BLP - R - ENV - 01 - 02

Date of birth (DD/MM/YYYY)

Technical ability – date of birth information

Name

K0158 - BLP - R - ENV - 01 - 02

Date of birth (DD/MM/YYYY)

Application for an environmental permit
Part B3 – New bespoke installation permit

If you are applying for a new bespoke permit for an installation, fill in this part of the form, together with parts A, B2 and F1.

Please check that this is the latest version of the form available from our website.

Please read through this form and the guidance notes that go with it.

If you are applying for a permit for an intensive farm do not use this form, but complete application form part B3.5 instead.

The form can be:

1) saved onto a computer and then filled in. Please note that the form follows a logic that means questions will open or stay closed depending on a previous answer. So you may not be able to enter text in some boxes.
2) printed off and filled in by hand. Please write clearly in the answer spaces.

It will take less than three hours to fill in this part of the application form.

Contents

1 What activities are you applying for?

Fill in Table 1a below with details of all the activities listed in schedule 1 or other references (see note 1) of the Environmental Permitting Regulations (EPR) and all directly associated activities (DAAs) (in separate rows), that you propose to carry out at the installation.

Fill in a separate table for each installation you are applying for. Use a separate sheet if you have a long list and send it to us with your application form. Tell us below the reference you have given the document.

Document reference: K0158-BLP-R-ENV-01-02 - Non-Technical Summary

1 What activities are you applying for?, continued

Table 1a – Types of activities

Schedule 1 listed activities						
Installation name	Schedule 1 or other references (See note 1)	Description of the activity (See note 2)	Activity capacity (See note 3)	Annex I (D codes) and Annex II (R codes) and descriptions	Hazardous waste treatment capacity (if this applies) (See note 3)	Non-hazardous waste treatment capacity (if this applies) (See note 3)
If there are not enough rows, send a separate document and give the document reference number here	Put your main activity first			For installations that take waste only	For installations that take waste only	For installations that take waste only
Ravenhead Quarry Landfill	Section 5.2 - landfill	Landfilling of void space		D5, R5, R10		
		Physical treatment of		D15, R13, D14, D9,		

Directly associated activities (See note 4) Also note: if the DAA is a Medium Combustion Plant or Specified Generator (MCP/SG) please also fill in part B2.5, (see https://www.gov.uk/government/publications/application-for-an-environmental-permit-part-b25-new-bespoke-medium-combustion-plant-and-specified-generator-permit)		
Name of DAA If there are not enough rows, send a separate document and give the document reference number here	Description of the DAA (please identify the schedule 1 activity it serves)	
For installations that take waste (See note 5 below)	Total storage capacity	
	Annual throughput (tonnes each year)	

1 What activities are you applying for?, continued

Notes

1. Quote the section number, part A1 or A2 or B, then paragraph and sub-paragraph number as shown in EPR part 2 of schedule 1, schedule 13 and 14 for Local Authority regulated activities, or schedule 25/25B for Medium Combustion Plant or Specified Generators.
2. Use the description from the relevant schedule of the regulations. Include any extra detail that you think would help to accurately describe what you want to do.
3. By 'capacity', we mean:

- the total incineration capacity (tonnes every hour) for waste incinerators
- the total landfill capacity (cubic metres) for landfills
- the total capacity (cubic metres) for the recovery of hazardous waste on land
- the total treatment capacity (tonnes each day) for waste treatment operations
- the total storage capacity (tonnes) for waste storage operations
- the processing and production capacity for manufacturing operations, or
- the thermal input capacity for combustion activities

Fill each listed activity as a separate line and give an accurate description of any other activities associated with your schedule 1 activities. You cannot have Directly Associated Activities (DAAs) as part of a mobile plant application. If the DAA is a Medium Combustion Plant or Specified Generator (MCP/SG) please fill in the table in appendix 1 question 13.

By 'total storage capacity', we mean the maximum amount of waste, in tonnes, you store on the site at any one time.

Types of waste accepted

For those installations that take waste, for each line in Table 1a (including DAAs), fill in a separate document to list those wastes you will accept on to the site for that activity. Give the List of Wastes catalogue code and description (see https://www.gov.uk/government/publications/waste-classification-technical-guidance).

If you need to exclude waste from your activity or facility by restricting the description, quantity, physical nature, hazardous properties, composition or characteristic of the waste, include these in the document. Send it to us with your application form.

Please provide the reference for each document.

You can use Table 1b as a template.

If you want to accept any waste with a code ending in 99, you must provide more information and a full description of the waste in the document, (for example, detailing the source, nature and composition of the waste). Where you only want to receive specific wastes within a waste code you can provide further details of the waste you want to receive. Where a waste is dual coded you should use both codes for the waste.

Document reference of this extra information K0158-BLP-R-ENV-05-02

1 What activities are you applying for?, continued

Table 1b – Template example – types of waste accepted and restrictions

Waste code	Description of the waste
Example	Example
02 01 08*	Agrochemical waste containing hazardous substances
18 01 03*	Infectious clinical waste, not contaminated with chemicals or medicines – human healthcare (may contain sharps) for alternative treatment
17 05 03*/17 06 05*	Non-hazardous soil from construction or demolition contaminated with fragments of asbestos cement sheet

1c Recovery of hazardous waste on land

Are you applying for a waste recovery activity involving the permanent deposit of inorganic hazardous waste on land for construction or land reclamation?

No ☑ Now go to question 2

Yes ☐

Have you written a waste recovery plan (WRP) that shows that you will use waste to perform the same function as non waste materials you would have used?

No You must write a WRP to support your application.

Yes

Have we advised you during pre-application discussions that we believe the activity is waste recovery?

No

Yes

Have there been any changes to your proposal since the discussions?

No

Yes

Please send us a copy of your current waste recovery plan that complies with our guidance at https://www.gov.uk/government/publications/deposit-for-recovery-operators-environmental-permits/waste-recovery-plans-and-deposit-for-recovery-permits. You need to highlight any changes you may have made since your pre-application discussions.

Document reference

Please note that there is an additional charge for the assessment or re assessment of a waste recovery plan that must be submitted as part of this application. For the charge see https://www.gov.uk/government/publications/environmental-permitting-charges-guidance/environmental-permitting-charges-guidance

2 Point source emissions to air, water and land

Fill in Table 2 below with details of the point source emissions that result from the operating techniques at each of your installations.

Fill in one table for each installation, continuing on a separate sheet if necessary.

Table 2 – Emissions (releases)

Installation name	Ravenhead Quarry			
Point source emissions to air				
Emission point reference and location	Source	Parameter	Quantity	Unit
N/A				
Point source emissions to water (other than sewers)				
Emission point reference and location	Source	Parameter	Quantity	Unit
N/A				
Point source emissions to sewers, effluent treatment plants or other transfers off site				
Emission point reference and location	Source	Parameter	Quantity	Unit
N/A				
Point source emissions to land				
Emission point reference and location	Source	Parameter	Quantity	Unit
N/A				

You will also need to complete application form part B6 if your installation includes a point source emission(s) to:

- water
- groundwater or
- sewer

Supporting information

3 Operating techniques

3a Technical standards

Fill in Table 3a for each activity at the installation you refer to in Table 1a above and list the 'Best Available Techniques' you are planning to use. If you use the standards set out in the relevant BAT conclusion(s), BAT reference document(s) (BREF) and/or technical guidance(s) (TGN) there is no need to justify using them within your documents in Table 3a.

For Part A(2) activities refer to https://www.gov.uk/government/collections/integrated-pollution-prevention-and-control-sector-guidance-notes and for Part B and Schedule 14 activities see https://www.gov.uk/government/collections/local-air-pollution-prevention-and-control-lappc-process-guidance-notes

You must justify your decisions in a separate document if:

- there is no technical standard
- the technical guidance provides a choice of standards, or
- you plan to use another standard

This justification could include a reference to the Environmental Risk Assessment provided in part B2 (General bespoke permit) of the application form.

For each of the activities listed in Table 1a, the documents in Table 3a should summarise:

- the operations undertaken
- the measures you will use to control the emissions from your process, as identified in your risk assessment or the relevant BAT conclusions, BREF or technical guidance
- how you will meet other standards set out in the relevant BAT conclusions document, BREF or technical guidance

Table 3 – Technical standards

Fill in a separate table for each activity at the installation.

Installation name	Ravenhead Quarry	
Description of the schedule 1 activity or directly associated activity	Best available technique (BATC, BREF or TGN reference) (see footnote below)	Document reference (if appropriate)
Landfill		
Soil Treatment		

* Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

In all cases, describe the type of facility or operation you are applying for and provide site infrastructure plans, location plans and process flow diagrams or block diagrams to help describe the operations and processes undertaken. Give the document references you use for each plan, diagram and description.

Document reference K0158-BLP-R-ENV-03-02

3b General requirements

Fill in a separate Table 4 for each installation.

Table 4 – General requirements

Name of the installation	Ravenhead Quarry
If the technical guidance or your risk assessment shows that emissions of substances not controlled by emission limits are an important issue, send us your plan for managing them	Document reference or references K0158-BLP-R-ENV-04-02
Where the technical guidance or your risk assessment shows that odours are an important issue, send us your odour management plan	Document reference or references N/A
If the technical guidance or your risk assessment shows that noise or vibration are important issues, send us your noise or vibration management plan (or both)	Document reference or references K0158-BLP-R-ENV-04-02

For guidance on risk assessments for your environmental permit see https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit

3c Types and amounts of raw materials

Fill in Table 5 for all schedule 1 activities. Fill in a separate table for each installation.

Table 5 – Types and amounts of raw materials

Name of the installation		Ravenhead Quarry		
Capacity (See note 1 below)				
Schedule 1 activity	Description of raw material and composition	Maximum amount (tonnes) (See note 2 below)	Annual throughput (tonnes each year)	Description of the use of the raw material including any main hazards (include safety data sheets)

Notes

1 By 'capacity', we mean the total storage capacity (tonnes) or total treatment capacity (tonnes each day).

2 By 'maximum amount', we mean the maximum amount of raw materials on the site at any one time.

Use a separate sheet if you have a long list of raw materials, and send it to us with your application form. Please also provide the reference of this extra sheet.

Document reference: K0158-BLP-R-ENV-01-02 - Non-Technical Summary

3d Information for specific sectors

For some of the sectors, we need more information to be able to set appropriate conditions in the permit. This is as well as the information you may provide in sections 5, 6 and 7. For those activities listed below, you must answer the questions in the related document.

Table 6 – Questions for specific sectors

Sector	Appendix
Combustion	See the questions in appendix 1
Chemicals	See the questions in appendix 2
Incinerating waste	See the questions in appendix 3
Landfill and recovery of hazardous waste on land	See the questions in appendix 4

General information

4 Monitoring

4a Describe the measures you use for monitoring emissions by referring to each emission point in Table 2 above

You should also describe any environmental monitoring. Tell us:

- how often you use these measures
- the methods you use
- the procedures you follow to assess the measures

Document reference K0158-BLP-R-ENV-09-02 - Emissions & FP

4b Point source emissions to air only

4b1 Has the sampling location been designed to meet BS EN 15259 clause 6.2 and 6.3?

No ☐

Yes ☐

4b2 Are the sample ports large enough for monitoring equipment and positioned in accordance with section 6 and appendix A of BS EN 15259?

No ☐

Yes ☐

4b3 Is access adjacent to the ports large enough to provide sufficient working area, support and clearance for a sample team to work safely with their equipment throughout the duration of the test?

No ☐

Yes ☐

4b4 Are the sample location(s) at least 5 HD from the stack exit

No ☐

Yes ☐

4b5 Are the sample location(s) at least 2 HD upstream from any bend or obstruction?

No ☐

Yes ☐

4b6 Are the sample location(s) at least 5 HD downstream from any bend or obstruction?

No ☐

Yes ☐

4b7 Does the sample plane have a constant cross sectional area?

No ☐

Yes ☐

4b8 If horizontal, is the duct square or rectangular (unless it is less than or equal to 0.35 m in diameter)

No ☐

Yes ☐

4b9 If you have answered 'No' to any of the questions 4b1 to 4b8 above, provide an assessment to how the standards in BS EN 15259 will be met.

Document reference of the assessment

5 Environmental impact assessment

5a Have your proposals been the subject of an environmental impact assessment under Council Directive 85/337/EEC of 27 June 1985 [Environmental Impact Assessment] (EIA)?

No ☑ Now go to question 6

Yes ☐ Please provide a copy of the environmental statement and, if the procedure has been completed:

- a copy of the planning permission
- the committee report and decision on the EIA

Document reference of the copy

6 Resource efficiency and climate change

If the site is a landfill or a recovery of hazardous waste on land activity, you only need to fill in this section if the application includes gas engines.

6a Describe the basic measures for improving how energy efficient your activities are

Document reference of the description N/A

6b Provide a breakdown of any changes to the energy your activities use up and create

Document reference of the description N/A

6c Have you entered into, or will you enter into, a climate change levy agreement?

No ☐ Describe the specific measures you use for improving your energy efficiency

Document reference of the description

Yes ☐ Please give the date you entered (or the date you expect to enter) into the agreement (DD/MM/YYYY)

Please also provide documents that prove you are taking part in the agreement.

Document reference of the proof N/A

6d Explain and justify the raw and other materials, other substances and water that you will use

Document reference of the justification N/A

6e Describe how you avoid producing waste in line with Council Directive 2008/98/EC on waste

If you produce waste, describe how you recover it. If it is technically and financially impossible to recover the waste, describe how you dispose of it while avoiding or reducing any effect it has on the environment.

Document reference of the description N/A

7 Installations that include a combustion plant (excluding waste incinerators)

7a List all your combustion plant at the site and provide thermal input and operating hours for each

Document reference N/A

7b Do any of your combustion plants have a net rated thermal input of 1 or more MW and is not an excluded MCP?

No ☐ Go to 7c

Yes ☐ Please fill in the table in appendix 1 question 13

7c Is the aggregated net thermal input of your combustion plant more than 20 MW?

No ☐

Yes ☐ Please go to appendix 1 question 11

8 How to contact us

If you need help filling in this form, please contact the person who sent it to you or contact us as shown below.

General enquiries: 03708 506 506 (Monday to Friday, 8am to 6pm)

Textphone: 03702 422 549 (Monday to Friday, 8am to 6pm)

Email: enquiries@environment-agency.gov.uk

Website: https://www.gov.uk/government/organisations/environment-agency

If you are happy with our service, please tell us. It helps us to identify good practice and encourages our staff. If you're not happy with our service, please tell us how we can improve it.

Please tell us if you need information in a different language or format (for example, in large print) so we can keep in touch with you more easily.

Feedback

(You don't have to answer this part of the form, but it will help us improve our forms if you do.)

We want to make our forms easy to fill in and our guidance notes easy to understand. Please use the space below to give us any comments you may have about this form or the guidance notes that came with it.

How long did it take you to fill in this form?

We will use your feedback to improve our forms and guidance notes, and to tell the Government how regulations could be made simpler.

Would you like a reply to your feedback?

Yes please ☐

No thank you ☐

Crystal Mark 19107
Clarity approved by Plain English Campaign

For Environment Agency use only

Date received (DD/MM/YYYY)

Payment received?

No ☐

Our reference number

Yes ☐ Amount received

£

Plain English Campaign's Crystal Mark does not apply to appendices 1 to 4.

Appendix 1 – Specific questions for the combustion sector

1 Identify the type of fuel burned in your combustion units (including when your units are started up, shut down and run as normal). If your units are dual fuelled (that is, use two types of fuel), list both the fuels you use

Fill in a separate table for each installation.

Installation reference			
Type of fuel	When run as normal	When started up	When shut down
Coal	☐	☐	☐
Gas oil	☐	☐	☐
Heavy fuel oil	☐	☐	☐
Natural gas	☐	☐	☐
WID waste	☐	☐	☐
Biomass (see notes 1 and 2 below)	☐	☐	☐
Biomass (see notes 1 and 2 below)	☐	☐	☐
Biomass (see notes 1 and 2 below)	☐	☐	☐
Biomass (see notes 1 and 2 below)	☐	☐	☐
Biomass (see notes 1 and 2 below)	☐	☐	☐
Landfill gas	☐	☐	☐
Other	☐	☐	☐

Notes

1. Not covered by Industrial Emissions Directive 2010/75/EU.
2. 'Biomass' is referred to The Renewables Obligation Order 2002 (https://www.legislation.gov.uk/uksi/2002/914/contents/made)

Give extra information if it helps to explain the fuel you use.

Document reference

Appendix 1 – Specific questions for the combustion sector, continued

2 Give the composition range of any fuels you are currently allowed to burn in your combustion plant

Fill in a separate table for each installation, continuing on a separate sheet if necessary

Fuel use and analysis					
Installation reference					
Parameter	Unit	Fuel 1	Fuel 2	Fuel 3	Fuel 4
Maximum percentage of gross thermal input	%				
Moisture	%				
Ash	% wt/wt dry				
Sulphur	% wt/wt dry				
Chlorine	% wt/wt dry				
Arsenic	% wt/wt dry				
Cadmium	% wt/wt dry				
Carbon	% wt/wt dry				
Chromium	% wt/wt dry				
Copper	% wt/wt dry				
Hydrogen	% wt/wt dry				
Lead	% wt/wt dry				
Mercury	% wt/wt dry				
Nickel	% wt/wt dry				
Nitrogen	% wt/wt dry				
Oxygen	% wt/wt dry				
Vanadium	mg/kg dry				
Zinc	mg/kg dry				
Net calorific value	MJ/kg				

Appendix 1 – Specific questions for the combustion sector, continued

3 If NOx factors are necessary for reporting purposes (that is, if you do not need to monitor emissions), please provide the factors associated with burning the relevant fuels

Fill in a separate table for each installation.

Installation reference	
Fuel	NOx factor (kgt^{-1})
Fuel 1	
Fuel 2	
Fuel 3	
Fuel 4	

Note: kgt^{-1} means kilograms of nitrogen oxides released for each tonne of fuel burned.

4 Will your combustion plant be subject to Chapter III of the Industrial Emissions Directive 2010/75/EU?

No ☐ Now fill in application form part F

Yes ☐

5 What is your plant?

an existing one ☐ A plant licensed before 1 July 1987

a new one ☐ A plant licensed on or after 1 July 1987 but before 27 November 2002, or a plant for which an application was made before 27 November 2002 and which was put into operation before 27 November 2003

a new-new one ☐ A plant for which an application was made on or after 27 November 2002

6 If you run more than one type of plant or a number of the same type of plant on your installation, please list them in the table below

Fill in a separate table for each installation.

Installation reference	
Type of plant	Number within installation
Existing	
New	
New-new	
Gas turbine (group A)	
Gas turbine (group B)	

Appendix 1 – Specific questions for the combustion sector, continued

7 If you run an existing plant, have you submitted a declaration for the 'limited life derogation' set out in Article 33 of Chapter III of the Industrial Emissions Directive?

No ☐ Now go to question 9

Yes ☐

8 Have you subsequently withdrawn your declaration?

No ☐

Yes ☐

9 List the existing large combustion plants (LCPs) which have annual mass allowances under the National Emission Reduction Plan (NERP), and those with emission limit values (ELVs) under the LCPD

Installation reference	
LCPs under NERP	LCPs with ELVs

10 Do you meet the monitoring requirements of Chapter III of the Industrial Emissions Directive?

No ☐

Yes ☐ Document reference

11 Have you carried out a cost–benefit assessment (CBA) of opportunities for cogeneration (combined heat and power) or district heating under Article 14 of the Energy Efficiency Directive?

No ☐ Please provide supporting evidence of why a CBA is not required (for example, an agreement from us)

Document reference of this evidence

Yes ☐ Please submit a copy of your CBA

Document reference of the CBA

Appendix 1 – Specific questions for the combustion sector, continued

12 Does your installation need to be combined heat and power-ready (CHP-ready)?

No ☐ Please provide supporting evidence of why a CHP-ready assessment is not required (for example, an agreement from us)

Document reference of this evidence

Yes ☐ Please provide a copy of your CHP-ready assessment

Document reference of the CHP-ready assessment

13 Information to be provided by the operator to the competent authority for each Medium Combustion Plant as identified in Annex I of Medium Combustion Plant Directive (EU/2015/2193)

MCP specific identifier*	
12-digit grid reference or latitude/longitude	
Rated thermal input (MW) of the MCP	
Type of MCP (diesel engine, gas turbine, other engine or other MCP)	
Type of fuels used: gas oil (diesel), natural gas, gaseous fuels other than natural gas, landfill gas	
Date when the new MCP was first put into operation	
Sector of activity of the MCP or the facility in which it is applied (NACE code)	
Expected number of annual operating hours of the MCP and average load in use	

Where the option of exemption under Article 6(8) is used the operator (as identified on Form A) should sign a declaration here that the MCP will not be operated more than the number of hours referred to in this paragraph	

* identifier – the MCP must be traceable via a serial number or other unique identifier, name plate, manufacturer and or model

NACE code means Nomenclature of Economic Activities and is the European statistical classification of economic activities (http://www.export.gov.il/files/EEN/ListNACEcodes.pdf).

To find out the 12-digit grid reference you can search on the UK Grid Reference Finder website at https://gridreferencefinder.com/

Appendix 2 – Specific questions for the chemical sector

1 Please provide a technical description of your activities

- The description should be enough to allow us to understand:
- the process
- the main plant and equipment used for each process
- all reactions, including significant side reactions (that is, the chemistry of the process)
- the material mass flows (including by products and side streams) and the temperatures and pressures in major vessels
- the all emission control systems (both hardware and management systems), for situations which could involve releasing a significant amount of emissions – particularly the main reactions and how they are controlled
- a comparison of the indicative BATs and benchmark emission levels standards: technical guidance notes (TGNs) (see https://www.gov.uk/government/collections/technical-guidance-for-regulated-industry-sectors-environmental-permitting); additional guidance 'The production of large volume organic chemicals' (EPR 4.01); 'Speciality organic chemicals sector' (EPR 4.02); 'Inorganic chemicals sector' (EPR 4.03); and best available techniques reference documents (BREFs) for the chemical sector

Document reference

2 If you are applying for a multi-purpose plant, do you have a multi-product protocol in place to control the changes?

No ☐

Yes ☐ Provide a copy of your protocol to accompany this application

Document reference

3 Does Chapter V of the Industrial Emissions Directive (IED) apply to your activities?

No ☐

Yes ☐ Fill in the following

3a List the activities which are controlled under the IED

Installation reference	
Activities	

3b Describe how the list of activities in question 3a above meets the requirements of the IED

Document reference

Appendix 3 – Specific questions for the waste incineration sector

If you are proposing to accept clinical waste, please complete your answer to question 3a 'Technical standards' with reference to relevant parts of our healthcare waste appropriate measures guidance (see https://www.gov.uk/guidance/healthcare-waste-appropriate-measures-for-permitted-facilities)

1a Do you run incineration plants as defined by Chapter IV of the Industrial Emissions Directive (IED)?

No ☐ You do not need to answer any other questions in this appendix

Yes ☐ IED applies

1b Are you subject to IED as

An incinerator? ☐

A co-incinerator? ☐

2 Do any of the installations contain more than one incineration line?

No ☐ Now go to question 4

Yes ☐

3 How many incineration lines are there within each installation?

Fill in a separate table for each installation.

Installation reference		
Number of incineration lines within the installation		
Reference identifiers for each line		

You must provide the information we ask for in questions 4, 5 and 6 below in separate documents. The information must at least include all the details set out in section 2 ('Key Issues') of S5.01 'Incineration of waste: additional guidance' (under the sub heading 'European legislation and your application for an EP Permit'). See https://www.gov.uk/government/collections/technical-guidance-for-regulated-industry-sectors-environmental-permitting.

You must answer questions 7 to 13 on the form below.

4 Describe how the plant is designed, equipped and will be run to make sure it meets the requirements of IED, taking into account the categories of waste which will be incinerated

Document reference

5 Describe how the heat created during the incineration and co-incineration process is recovered as far as possible (for example, through combined heat and power, creating process steam or district heating)

Document reference

Appendix 3 – Specific questions for the waste incineration sector, continued

6 Describe how you will limit the amount and harmful effects of residues and describe how they will be recycled where this is appropriate

Document reference

For each line identified in question 3, answer questions 7 to 13 below

Question 3 identifier, if necessary

7 Do you want to take advantage of the Article 45 (1)(f) allowance (see below) if the particulates, CO or TOC continuous emission monitors (CEM) fail?

No ☐

Yes ☐ This allows 'abnormal operation' of the incineration plant under certain circumstances when the CEM for releases to air have failed. Annex VI, Part 3(2) sets maximum half hourly average release levels for particulates (150 mg/m3), CO (normal ELV) and TOC (normal ELV) during abnormal operation.

Describe the other system you use to show you keep to the requirements of Article 13(4) (for example, using another CEM, providing a portable CEM to insert if the main CEM fails, and so on).

8 Do you want to replace continuous HF emission monitoring with periodic hydrogen fluoride (HF) emission monitoring by relying on continuous hydrogen chloride (HCl) monitoring as allowed by IED Annex VI, Part 6 (2.3)?

Under this you do not have to continuously monitor emissions for hydrogen fluoride if you control hydrogen chloride and keep it to a level below the HCl ELVs.

No ☐

Yes ☐ Please give your reasons for doing this

Appendix 3 – Specific questions for the waste incineration sector, continued

9 Do you want to replace continuous water vapour monitoring with pre-analysis drying of exhaust gas samples, as allowed by IED Annex VI, Part 6 (2.4)?

Under this you do not have to continuously monitor the amount of water vapour in the air released if the sampled exhaust gas is dried before the emissions are analysed.

No ☐

Yes ☐ Please give your reasons for doing this

10 Do you want to replace continuous hydrogen chloride (HCl) emission monitoring with periodic HCl emission monitoring, as allowed by IED Annex VI, Part 6 (2.5), first paragraph?

Under this you do not have to continuously monitor emissions for hydrogen chloride if you can prove that the emissions from this pollutant will never be higher than the ELVs allowed.

No ☐

Yes ☐ Please give your reasons for doing this

Appendix 3 – Specific questions for the waste incineration sector, continued

11 Do you want to replace continuous HF emission monitoring with periodic HF emission monitoring, as allowed by IED Annex VI, Part 6 (2.5), first paragraph?

Under this you do not have to continuously monitor emissions for hydrogen fluoride if you can prove that the emissions from this pollutant will never be higher than the ELVs allowed.

No ☐

Yes ☐ Please give your reasons for doing this

12 Do you want to replace continuous SO2 emission monitoring with periodic sulphur dioxide (SO2) emission monitoring, as allowed by IED Annex VI, Part 6 (2.5), first paragraph?

Under this you do not have to continuously monitor emissions for sulphur dioxide if you can prove that the emissions from this pollutant will never be higher than the ELVs allowed.

No ☐

Yes ☐ Please give your reasons for doing this

Appendix 3 – Specific questions for the waste incineration sector, continued

13 If your plant uses fluidised bed technology, do you want to apply for a derogation of the CO WID ELV to a maximum of 100 mg/m³ as an hourly average, as allowed by IED Annex VI, Part 3?

No ☐

Does not apply ☐

Yes ☐ Please give your reasons for doing this

14 Have you carried out a cost–benefit assessment (CBA) of opportunities for cogeneration (combined heat and power) or district heating under Article 14 of the Energy Efficiency Directive?

No ☐ Please provide supporting evidence of why a CBA is not required (for example, an agreement from us)

Document reference of this evidence

Yes ☐ Please submit a copy of your CBA

Document reference of the CBA

15 Does your installation need to be combined heat and power-ready (CHP-ready)?

No ☐ Please provide supporting evidence of why a CHP-ready assessment is not required (for example, an agreement from us)

Document reference of this evidence

Yes ☐ Please provide a copy of your CHP-ready assessment

Document reference of the CHP-ready assessment

Appendix 4 – Specific questions for the landfill sector and recovery of hazardous waste on land activities

1. For the landfill sector, provide your Environmental Setting and Installation Design (ESID) report and any other risk assessments to control emissions.

For recovery of hazardous waste on land activities, provide your Environmental Setting and Site Design (ESSD) report and any other risk assessments to control emissions

Document reference: K0158-BLP-R-ENV-03-02 - ESID

2. For recovery of hazardous waste on land activities, provide your Waste Acceptance Procedures (including Waste Acceptance Criteria)

Document reference:

Refer to our guidance at

https://www.gov.uk/government/publications/deposit-for-recovery-operators-environmental-permits/waste-acceptance-procedures-for-deposit-for-recovery

3. Provide your hydrogeological risk assessment (HRA) for the site

Document reference: K0158-BLP-R-ENV-06-02 - HRA

4. Provide your outline engineering plan for the site

Document reference: K0158-BLP-R-ENV-03-02 - ESID

5. Provide your stability risk assessment (SRA) for the site

Document reference: K0158-BLP-R-ENV-08-02 - SRA

6. Provide your landfill gas risk assessment (LFGRA) for the site

Document reference: K0158-BLP-R-ENV-07-02 - LFGRA

We have developed guidance on these assessments and their reports which can be found at https://www.gov.uk/government/collections/environmental-permitting-landfill-sector-technical-guidance

7. For recovery of hazardous waste on land activities, have you completed a monitoring plan for the site?

No ☐ Please refer to the section of your ESSD that explains why this is unnecessary for your site

Document reference of this evidence:

Yes ☐ Document reference:

Appendix 4 – Specific questions for the landfill sector and recovery of hazardous waste on land activities, continued

8. Have you completed a proposed plan for closing the site and your procedures for looking after the site once it has closed?

No ☐ If you have answered 'no' for recovery of hazardous waste on land activities, refer to the section of your ESSD that explains why this is unnecessary for your site

Document reference of this evidence

Yes ☑ For landfill you must provide a closure and aftercare plan

Document reference K0158-BLP-R-ENV-03-02 - ESID

Application for an environmental permit
Part F1 – Charges and declarations

Fill in this part for all applications for installations, waste operations, mining waste operations, water discharges, point source groundwater discharges and groundwater discharges onto land. Please check that this is the latest version of the form available from our website.

Please read through this form and the guidance notes that came with it.

The form can be:

1) **saved onto a computer and then filled in. Please note that the form follows a logic that means questions will open or stay closed depending on a previous answer. So you may not be able to enter text in some boxes.**
2) **printed off and filled in by hand. Please write clearly in the answer spaces.**

It will take less than two hours to fill in this part of the application form.

Contents

Each individual who is applying for their name to appear on the permit must complete the declaration in section 5. You will have to print a separate copy of the declaration page for each additional individual to complete.

1 Working out charges

You must fill in this section.

You have to submit an application fee with your application. You can find out the charge by searching for 'Environment Agency charging scheme and guidance: environmental permits' at www.gov.uk/government/organisations/environment-agency.

Please remember that the charges are revised on 1 April each year and that there is an annual subsistence charge to cover the costs we incur in the ongoing regulation of the permit.

Table 1 – Type of application (fill number of activity being applied for in each column)

Installation	Waste	Mining waste	Medium Combustion Plant (MCP)/Specified Generator (SG)	Water discharge/point source discharge to groundwater	Groundwater spreading onto land
Permit Application					

Table 2 – Charge type (A)

Charge activity reference	Charge activity description	What are you applying to do? E.g. new, minor variation, normal variation, substantial variation, surrender, low risk surrender, transfer	Amount
e.g. 1.17.3	e.g. Sect 5.2 landfill for hazardous waste	e.g. transfer	e.g. £5,561
1.17.2	Section 5.2 landfill for non-hazardous waste	New	£ 22,775.00
1.16.12	Physical treatment of non - hazardous waste	New	£ 3,965.00
Total A			£ 26,740.00

1 Working out charges (you must fill in this section), continued

Table 3 – Additional assessment charges (B)

Part 1.19 Charges for plans and assessments			Tick appropriate
Reference	Plan or assessment	Charge	
1.19.1	Waste recovery plan	£1,231	☐
1.19.2	Habitats assessment (except where the application activity is a flood risk activity)	£779	☐
1.19.3	Fire prevention plan (except where the application activity is a farming installation)	£1,241	☐
1.19.4	Pests management plan (except where the application activity is a farming installation)	£1,241	☐
1.19.5	Emissions management plan (except where the application activity is a farming installation)	£1,241	☑
1.19.6	Odour management plan (except where the application activity is a farming installation)	£1,246	☐
1.19.7	Noise and vibration management plan (except where the application activity is a farming installation)	£1,246	☑
1.19.8	Ammonia emissions risk assessment (intensive farming applications only)	£620	☐
1.19.9	Dust and bio-aerosol management plan (intensive farming applications only)	£620	☐
	Advertising	£500	☐
Total B			£ 2,487.00

Total charges

Total A plus total B £ 29,227.00

2 Payment

Tick below to show how you have paid.

Cheque ☐

Postal order ☐

Cash ☐ Tick below to confirm you are enclosing cash with the application

Credit or debit card ☐

Electronic transfer (for example, BACS) ☑

Remittance number

Date paid (DD/MM/YYYY)

How to pay

Paying by cheque, postal order or cash

Cheque details

Cheque made payable to

Cheque number

Amount £

You should make cheques or postal orders payable to 'Environment Agency' and make sure they have 'A/c Payee' written across them if it is not already printed on.

Please write the name of your company and application reference number on the back of your cheque or postal order. **We will not** accept cheques with a future date on them.

We do not recommend sending cash through the post. If you cannot avoid this, please use a recorded delivery postal service and enclose your application reference details. Please tick the box below to confirm you are enclosing cash.

I have enclosed cash with my application ☐

2 Payment, continued

Paying by credit or debit card

If you are paying by credit or debit card we can call you. We will destroy your card details once we have processed your payment. We can accept payments by Visa, MasterCard or Maestro card only.

Please call me to arrange payment by debit or debit card ☐

Paying by electronic transfer BACS reference

If you choose to pay by electronic transfer you will need to use the following information to make your payment.

Company name	Environment Agency
Company address	SSCL (Environment Agency), PO Box 797, Newport Gwent, NP10 8FZ
Bank	RBS/NatWest
Address	London Corporate Service Centre, CPB Services, 2nd Floor, 280 Bishopsgate, London EC2M 4RB
Sort code	60-70-80
Account number	10014411
Account name	EA RECEIPTS
Payment reference number	PSCAPPXXXXXYYY

You need to create your own reference number. It should begin with PSCAPP (to reflect that the application is for a permitted activity) and it should include the first five letters of the company name (replacing the X's in the above reference number) and a unique numerical identifier (replacing the Y's in the above reference number). The reference number that you supply will appear on our bank statements.

If you are making your payment from outside the United Kingdom, it must be in sterling. Our IBAN number is GB23NWK60708010014411 and our SWIFTBIC number is NWBKGB2L.

If you do not quote your reference number, there may be a delay in processing your payment and application.

Provide a unique reference number for the application, i.e. do not only use the company name only: PSCAPPBOOTH158

State who is paying (full name and whether this is the agent/ applicant/other): Booth Ventures Waste (North West) Limited

Fee paid: £ 29,227.00

Date payment sent (DD/MM/YYYY): 15/02/2023

Now read section 3 below

You should also email your payment details and reference number to ea_fsc_ar@gov.sscl.com.

3 Privacy notice

The Environment Agency runs the environmental permit application service.

We are the data controller for this service. A data controller determines how and why personal information is processed.

Our personal information charter explains:

- your rights
- what we do with your personal information

We're allowed to process your personal information because we have official authority as the environmental regulator. We need this information to carry out a task in the public interest that is set out in law. As the data controller, when you apply for an environmental permit, we have a legal obligation to process your personal data under the Environmental Permitting Regulations. The second lawful basis for processing your personal data is to comply with this legal obligation.

We need your personal information to process your environmental permit application. If you do not give us this information we cannot issue a permit to you. After we've issued a permit to you, we use your personal information:

- to check that you're complying with your permit
- during any potential enforcement action

What personal information we collect

If you're the individual applicant, director or company secretary of a company applying or a technically competent manager we need your:

- name
- date of birth

3 Privacy notice, continued

- address
- email address

If you're the agent, consultant, employee responsible for the activity or the employee responsible for billing and invoicing we need your:

- name
- address
- email address

If you're the applicant we need details of any:

- convictions
- bankruptcy

We also collect any questions or feedback you leave, including your email address if you contact us.

Your responsibility with other people's personal information

If you've included personal information about other people on your application, you must tell them. You must provide them with a copy of this privacy notice so that they know how their personal information will be used.

What we do with your personal information

We use your personal information to help us decide whether to issue you with a permit.

The information (except dates of birth) is available online on our consultation website during the consultation period. This website is available to everyone so your information may be seen outside the European Economic Area.

After consultation we put all the information (except dates of birth) you give us in your application on our public register.

If you can demonstrate that any information you send us is commercially or industrially confidential, we'll consider withholding that information from our public register.

If you think that the information you'll send us may be a threat to national security you must contact the Secretary Of State before you apply. You must still send us that information with your application. We will not include this information on our public register unless the Secretary of State decides it can be included.

See the environmental permitting guidance for guidance on national security.

We may use your email address to contact you for user research to improve our service. You don't have to take part in the research.

Where your personal information is processed and stored

We store and process your personal information on servers in the UK. We will not host your personal information outside the European Economic Area.

We do not use your personal information to make an automated decision or for automated profiling.

How long we keep your personal information

We keep your personal information while your permit is in use and for 7 years after you surrender your permit. If the permit is for a landfill site, we keep the data for 10 years after surrender.

Removing personal information from the public register

We will remove your personal information from the public register if:

- you withdraw your application
- we refuse your application and the time limit for appealing the decision has expired or an appeal is dismissed
- the information is no longer relevant for public participation purposes under the Environmental Permitting Regulations

Contact

Our Data Protection Team gives independent advice. They monitor how the Environment Agency uses your personal information.

If you have questions or concerns about how we process personal information, or to make a complaint or request relating to data protection, please contact:

Address: Data Protection Team
Environment Agency
Horizon House
Deanery Road
Bristol
BS1 5AH

3 Privacy notice, continued

Email: dataprotection@environment-agency.gov.uk

You can also make a complaint to the Information Commissioner's Office (ICO).

The ICO is the supervisory authority for data protection legislation. The ICO website has a full list of your rights under data protection legislation.

Now read section 4 below

4 Confidentiality and national security

Confidentiality

We will normally put all the information in your application on a public register of environmental information. However, we may not include certain information in the public register if this is in the interests of national security, or because the information is confidential.

You can ask for information to be made confidential by enclosing a letter with your application giving your reasons. If we agree with your request, we will tell you and not include the information in the public register. If we do not agree with your request, we will let you know how to appeal against our decision, or you can withdraw your application. You can find guidance on confidentiality in 'Environmental permitting guidance: core guidance', published by Defra and available via our website at www.gov.uk/government/organisations/environment-agency.

Only tick the box below if you wish to claim confidentiality for your application

Please treat the information in my application as confidential ☐

National security

You can tell the Secretary of State that you believe including information on a public register would not be in the interests of national security. You must enclose a letter with your application telling us that you have told the Secretary of State and you must still include the information in your application. We will not include the information in the public register unless the Secretary of State decides that it should be included.

You can find guidance on national security in 'Environmental permitting guidance: core guidance', published by Defra and available via our website at www.gov.uk/government/organisations/environment-agency.

You cannot apply for national security via this application.

Now fill in section 5

5 Declaration

If you knowingly or carelessly make a statement that is false or misleading to help you get an environmental permit (for yourself or anyone else), you may be committing an offence under the Environmental Permitting (England and Wales) Regulations 2016.

A relevant person should make the declaration (see the guidance notes on part F1). An agent acting on behalf of an applicant is NOT a relevant person.

Each individual (or individual trustee) who is applying for their name to appear on the permit must complete this declaration. You will have to print a separate copy of this page for each additional individual to complete.

If you are transferring all or part of your permit, both you and the person receiving the permit must make the declaration. You must fill in the declaration directly below; the person receiving the permit must fill in the declaration under the heading 'For transfers only'.

Note: we will issue a letter to both current and new holders to confirm the transfer. If you are changing address we will need to send this letter to your new address; therefore please tell us your new address in a separate letter.

If you are unable to trace one or more of the current permit holders please see below under the transfers declaration.

I declare that the information in this application is true to the best of my knowledge and belief. I understand that this application may be refused or approval withdrawn if I give false or incomplete information.

If you deliberately make a statement that is false or misleading in order to get approval you may be prosecuted.

I confirm that my standard facility will fully meet the rules that I have applied for (this only applies if the application includes standard facilities) ☐

Tick this box to confirm that you understand and agree with the declaration above, then fill in the details below (you do not have to provide a signature as well) ☑

Tick this box if you do not want us to use information from any ecological survey that you have supplied with your application (for further information please see the guidance notes on part F1) ☐

5 Declaration, continued

Name

Title (Mr, Mrs, Miss and so on)	Mr
First name	Matthew
Last name	Booth
on behalf of (if relevant; for example, a company or organisation and so on)	Booth Ventures Waste (North West) Limited
Position (if relevant; for example, in a company or organisation and so on)	Director
Today's date (DD/MM/YYYY)	01/03/2023

For transfers only – declaration for person receiving the permit

A relevant person should make the declaration (see the guidance notes on part F1). An agent acting on behalf of an applicant is NOT a relevant person.

I declare that the information in this application to transfer an environmental permit to me is true to the best of my knowledge and belief. I understand that this application may be refused or approval withdrawn if I give false or incomplete information.

Note: If you cannot trace a person or persons holding the permit you may be able to transfer the permit without their declaration as above. Please contact us to discuss this and supply evidence in your application to confirm you are unable to trace one or all of the permit holders.

If you deliberately make a statement that is false or misleading in order to get approval you may be prosecuted.

Tick this box to confirm that you understand and agree with the declaration above, then fill in the details below (you do not have to provide a signature as well)	☐

Name

Title (Mr, Mrs, Miss and so on)	
First name	
Last name	
on behalf of (if relevant; for example, a company or organisation and so on)	
Position (if relevant; for example, in a company or organisation and so on)	
Today's date (DD/MM/YYYY)	

Now go to section 6

6 Application checklist

You must fill in this section.

If your application is not complete we will return it to you. If you aren't sure about what you need to send, speak to us before you submit your application.

You must do the following:

Complete legibly all parts of this form that are relevant to you and your activities	☑
Identify relevant supporting information in the form and send it with the application	☑
List all the documents you are sending in the table below. If necessary, continue on a separate sheet. This separate sheet also needs to have a reference number and you should include it in the table below	☑
For new permits or any changes to the site plan, provide a plan that meets the standards given in the guidance note on part F1	☑
Provide a supporting letter for any claim that information is confidential	☐
Get the declaration completed by a relevant person (not an agent)	☑
Send the correct fee	☑

6 Application checklist, continued

Question reference	Document title	Document reference
A, B2, B3 & F1	Non Technical Summary	K0158-BLP-R-ENV-01-02
B2	Operator Competence	K0158-BLP-R-ENV-02-02
B2 & B3	ESID (Tecnical Standards)	K0158-BLP-R-ENV-03-02
B2	Environmental Risk Assessment (H1)	K0158-BLP-R-ENV-04-02
B3	Waste Acceptance Criteria (WAC)	K0158-BLP-R-ENV-05-02
B3	Hydrogeological Risk Assessment (HRA)	K0158-BLP-R-ENV-06-02
B3	Gas Risk Assessment (GRA)	K0158-BLP-R-ENV-07-02
B3	Stability Risk Assessment (SRA)	K0158-BLP-R-ENV-08-02
B2 & B3	Emmisions Monitoring and Financial Provision	K0158-BLP-R-ENV-09-02
	ESID Drawings 1 - 13	

7 How to contact us

If you need help filling in this form, please contact the person who sent it to you or contact us as shown below.

General enquiries: 03708 506 506 (Monday to Friday, 8am to 6pm)

Textphone: 03702 422549 (Monday to Friday, 8am to 6pm)

Email: enquiries@environment-agency.gov.uk

Website: www.gov.uk/government/organisations/environment-agency

If you are happy with our service, please tell us. It helps us to identify good practice and encourages our staff. If you're not happy with our service, or you would like us to review a decision we have made, please let us know. More information on how to do this is available at: https://www.gov.uk/government/organisations/environment-agency/about/complaints-procedure.

Please tell us if you need information in a different language or format (for example, in large print) so we can keep in touch with you more easily.

8 Where to send your application

For how many copies to send see the guidance note on part F1.

Please send your filled in application form to:

For water discharges by email to PSC-WaterQuality@environment-agency.gov.uk

For waste and installations by email to PSC@environment-agency.gov.uk

Or

Permitting Support, NPS Sheffield
Quadrant 2
99 Parkway Avenue
Parkway Business Park
Sheffield
S9 4WF

Do you want all information to be sent to you by email?

Please tick this box if you wish to have all communication about this application sent via email (we will use the details provided in part A) ☐

Feedback

(You don't have to answer this part of the form, but it will help us improve our forms if you do.)

We want to make our forms easy to fill in and our guidance notes easy to understand. Please use the space below to give us any comments you may have about this form or the guidance notes that came with it.

How long did it take you to fill in this form?

We will use your feedback to improve our forms and guidance notes, and to tell the Government how regulations could be made simpler.

Would you like a reply to your feedback?

Yes please ☐

No thank you ☐

For Environment Agency use only

Date received (DD/MM/YYYY)

Our reference number

Payment received?

No ☐

Yes ☐ Amount received

£

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www.byrnelooby.com

Email: info@byrnelooby.com

Ravenhead Quarry Landfill

Environmental Permit Application – Operator Competence Report

Booth Ventures Waste (North West) Limited

Report No. K0158-BLP-R-ENV-02-02
March 2023
Revision 02

BOOTH VENTURES

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Document Control

Document:	Environmental Permit Application – Operator Competence Report
Project:	Ravenhead Quarry Landfill
Client:	Booth Ventures Waste (North West) Limited
Report Number:	K0158-BLP-R-ENV-02-02

Document Checking:

Revision	Revision/ Review Date	Details of Issue	Authorised		
			Prepared By	Checked By	Approved By
00	January 2023	Draft	Dan King	Phil Scotney	John Baxter
01	February 2023	Final	Dan King	Phil Scotney	John Baxter
02	March 2023	Final	Dan King	Phil Scotney	John Baxter
Disclaimer: Please note that this report is based on specific information, instructions and information from our Client and should not be relied upon by third parties.					

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1 Operator Competence

1.1 Introduction

Booth Ventures Waste (North West) Limited are the proposed site operator and permit holder. Booth Ventures Waste (North West) Limited will be referred to as the Operator throughout this application and associated documents.

This Operator Competence Report has been prepared in support of the permit application and responds to Question 3d of the application form B2, which asks for a demonstration of operator competency. In order to demonstrate operator ability, information is requested on:

- Relevant offences;
- Technical ability;
- Finances; and
- Environmental management systems.

All relevant information has been supplied by Booth Ventures Waste (North West) Limited and has not been independently verified.

1.2 Relevant Offences

There are no current relevant offences.

1.3 Technical Ability

Paul Anderson has a Competence Management Certificate (CMS) and Continuing Competence certificate issued by CIWM (landfill, inert and on-hazardous waste in addition to non-hazardous treatment). The Certification is contained in Appendix A of this report. Paul Anderson also provides COTC cover for the following sites:

- Britannia Quarry (Ref: LP3133LK)
- Harwood Quarry (Ref: BV8741IL)
- Horwich Moor Farm (Ref: JB3307AA)
- Campions Wood Quarry (Ref: JB3100CN)

It is expected that Richard Lord will additionally be qualified by the time that an Environmental Permit is issued for the site. All relevant Certification is contained in Appendix A of this report.

1.4 Finance

The relevant persons put forward as part of this application (detailed in report K0158-BLP-R-ENV-01-02, Section 3.1) have not been subject to any insolvency or bankruptcy proceedings.

Financial Provision cost assessments are provided in report K0158-BLP-R-ENV-09-02 (Emissions Monitoring and Financial Provision), the calculation covers the requirement for ongoing environmental monitoring, labour, sample analysis, capping costs, maintenance and repair of infrastructure and associated reporting obligations through the aftercare period (post closure).

1.5 Management System

Booth Ventures Waste (North West) Limited operate their own Environmental Management System (EMS). The system has attained 14001 accreditation at Harwood and Campions Wood Quarries, in addition to Head Office and is intended to be rolled out to all Booth Ventures Ltd facilities / sites in the future. This will include Ravenhead Quarry Landfill.

A copy of the current 14001 certificate is provided at Appendix A, the outline of the sites EMS is provided at Appendix B.

Appendix A – Competence Management System Certificate

WAMITAB

Waste Management Industry
Training and Advisory Board

The Chartered Institution
of Wastes Management

Certificate No. OCC2255

Operator Competence Certificate

Qualification Title:

Managing Landfill - Non Hazardous Waste - 4MLNH

This Certificate is awarded to

Paul Anderson

Awarded: 03/08/2011

Authorised

WAMITAB Director General

CIWM Chief Executive Officer

This certificate is jointly awarded by WAMITAB and the Chartered Institution of Wastes Management (CIWM) and provides evidence to meet the Operator Competence requirements of the Environmental Permitting (EP) Regulations, which came into force on 6 April 2008.

WAMITAB. Waste Management Industry Training and Advisory Board. Peterbridge House, 3 The Lakes, Northampton, NN4 7HE
Telephone: 01604 231950 Fax: 01604 232457 Email: info.admin@wamitab.org.uk Website: www.wamitab.org.uk

CIWM

Continuing Competence Certificate

This certificate confirms that

Paul Anderson

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current for two years from 04/02/2022

LNH	Landfill - Non Hazardous Waste
TSNH	Transfer - Non Hazardous Waste
TMNH	Treatment - Non Hazardous Waste

Expiry Date: 04/02/2024

Verification date: 25/01/2022

Authorised:

Professional Services Director

Learner ID: 21149

Certificate No.: 5192265

Date of Issue: 04/02/2022

CIWM Chief Executive Officer

The Chartered Institution of Wastes Management

Scan code on reverse to authenticate that this is a genuine paper

Appendix B – EMS Outline

Certificate Annex

Booth Ventures Limited

Annex 1 of 1 to Certificate number 15365-EMS-001
Containing 3 locations including Head Office

12/03/2021

ISO 14001: 2015

Scope of Registration:

The provision of quarrying and landfill services.

HEAD OFFICE

001 Link 665 Business Centre, Todd Hall Road, Haslingden, Lancashire, BB4 5HU

OTHER LOCATIONS

002 Wolverhampton Road, Hollybush, Wolverhampton, WV10 7LY

Scope of Registration:

The provision of quarrying services.

OTHER LOCATIONS

003 Harwood Quarry, Brookfold Lane, Bolton, BL2 4LT

Signed:
Steve Stubley, Technical Director
(on behalf of Alcumus ISOQAR)

This certificate will remain current subject to the company maintaining its system to the required standard. This will be monitored regularly by Alcumus ISOQAR. Further clarification regarding the scope of this certificate and the applicability of the relevant standards' requirement may be obtained by consulting Alcumus ISOQAR

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Ravenhead Quarry Landfill

Waste Acceptance (Waste Types and Leachate Source Term)

Booth Ventures Waste (North West) Limited

Report No. K0158-BLP-R-ENV-05-02
March 2023
Revision 02

BOOTH VENTURES

BYRNELOOBY

IRELAND | UK | UAE | BAHRAIN | KSA

Document Control

Document: Waste Acceptance (Waste Types and Leachate Source Term)

Project: Ravenhead Quarry Landfill

Client: Booth Ventures Waste (North West) Limited

Report Number: K0158-BLP-R-ENV-05-02

Document Checking:

Revision	Revision/ Review Date	Details of Issue	Authorised		
			Prepared By	Checked By	Approved By
00	February 2023	Draft	Dan King	P Scotney	J Baxter
01	February 2023	Final	Dan King	P Scotney	J Baxter
02	March 2023	Final	Dan King	P Scotney	J Baxter
Disclaimer: Please note that this report is based on specific information, instructions and information from our Client and should not be relied upon by third parties.					

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TABLES

1 Introduction

1.1 Background

This document supports the permit application for Ravenhead Quarry Landfill Site and details the wastes to be deposited. This document also provides information on the leachate quality associated with the proposed wastes. To facilitate the landfilling of the site, a permit application is being applied for to allow for the import of wastes suitable for quarry restoration fill. HM Revenue and Customs (HMRC) made specific allowance for quarry restoration identifying a very limited list of suitable wastes in accordance with The Landfill Tax (Qualifying Material) Order 2011 (as amended). In accordance with HMRC's LFT1 guidance[1], condition 8.4.1 states:

"Lower rate material which is used for the purpose of filling existing or former quarries may qualify for exemption. The following table provides a summary of the conditions that must be met to qualify for exemption. If the material disposed of consists only of materials listed in the Landfill Tax (Qualifying Material) Order 2011, a summary of which is set out of paragraph 4.2, or the material disposed of consists mainly of materials listed in the Landfill Tax (Qualifying Material) Order 2011 save for incidental amount of standard rate material as described in paragraph 7.3 and:

- *the disposal takes place in a quarry;*
- *there is planning consent in place to fill (or partly fill) the quarry; and*
- *the permit only authorises the disposal of qualifying material.*

Then the disposal of material is exempt."

In support of the restoration operations and to support sustainability imported wastes with a recoverable composition will be processed to recover aggregates in accordance with the quality protocol approved by the Environment Agency[2]. Only the wastes specified in Appendix C of the quality protocol.

This report describes the wastes to be accepted with reference to the requirements of the Qualifying Material Order and quality protocol. The wastes acceptance procedures will be detailed in the site's Environmental Management System (EMS) and are summarised in Section 2 below.

1.2 Structure of Application and Accompanying Details

Section 2 of this report details the waste acceptance protocol for the site (structured characterisation, compliance testing and verification) and includes a list (including associated European Waste Catalogue (EWC) codes) for both disposal, restoration and treatment activities. Section 3 of this report introduces the rationale behind the derivation of an appropriate source term, the review forms part of a substantial dataset held by ByrneLooby (formerly TerraConsult) on similar infilling schemes throughout the UK. This section of the report explains how a leachate source term has been calculated for the proposed wastes taking account of actual leachate composition collected from similar and identical schemes.

[1] Excise Notice LFT1: a general guide to Landfill Tax - GOV.UK (www.gov.uk)
[2] Quality protocol: aggregates from inert waste - GOV.UK (www.gov.uk)

2 Waste Acceptance

2.1 Background and Restoration Overview

There are three aspects to consider for the infilling at Ravenhead Quarry Landfill:

1. Infilling 1.06 Mm^3 (non-hazardous wastes), the permit boundary depicted on drawing ESID 4.
2. Restoration cover (non-hazardous wastes), selected materials will be utilised to assist in surface water control. A typical thickness of 1m of restoration soils is proposed over the cap for achieving the desired restoration profile hence ~86,300 m^3 is required for a final 1m surface layer over the site (area of 8.63 ha).
3. Processing waste with a recoverable composite to recover aggregates. It is anticipated that approximately 5% of the wastes imported will be suitable for processing (crushing and/or screening), equating to approximately 15,000 tonnes of waste being treated per year.

The waste types proposed for infilling, restoration and treatment (aspects 1, 2 and 3above) are presented in Table 1, Table 2 and Table 3 respectively.

2.2 Restoration Contours

The consented scheme (subject to planning approval) will allow for the restoration of the site in accordance with the pre-settlement contours depicted on drawing ESID 6. The contours allow for full site completion and long-term surface water management control.

2.3 Landscaping

The consented landscaping scheme will be in accordance with details approved via the twin tracked planning application, subject to approval by the Local Planning Authority (LPA).

2.4 Waste Types

2.4.1 Waste Types for Disposal

Proposed waste types for disposal (integral for restoring the quarry void) are presented in Table 1.

2.4.2 Waste Types for Restoration

The proposed waste types for restoration (integral for assisting in surface water control and to provide a growing medium for the final land surface) are presented in Table 2.

The Site's restoration, reclamation and improvement of land (if required) will be achieved using appropriate waste materials under activities R5 (recycling or reclamation of other inorganic materials). Where enhancement is required, this will be conducted under R10 activities.

At the time of understanding the specific requirements for enhancement, i.e. in 7 years' time and post infilling (and delineated on an area basis and appropriate end-use), relevant approval will be obtained from the Environment Agency (Agency) in regard to application rates and suitable waste types.

This cannot be elaborated upon further at this point as the imported soils have not been accepted at Site, hence enhancement cannot be specified for the restoration surface.

Site restoration is not anticipated for ~7 years based on the assumed infilling rates, details are provided in the ESID (K0158-BLP-R-003-02).

2.4.3 Waste Types for Treating

The proposed waste types for processing (crushing and/or screening) are presented in Table 2. These wastes are specified in Appendix C of the quality protocol.

The aggregate recovery operation will be undertaken on a hardcore pad located on the southwestern site boundary. Suitable wastes will be stockpiled. prior to treatment. When sufficient recoverable wastes have been stockpiled treatment will be undertaken periodically for short periods utilising by mobile plant. Recovered aggregate will either be used on site (e.g. for creation of roads and hardstanding areas) or exported and used in accordance with quality protocol (e.g. pipe bedding and highway sub base). The recovery of aggregates from imported wastes will cease when the final restoration of the quarry void is completed.

Table 1 Wastes to be Accepted for Disposal

EWC code	Description	Qualifying Material Order 2011 (as amended) Group and most likely suitable descriptions
01 01	**waste from mineral excavation**	
01 01 02	wastes from mineral non-metalliferous excavation	**Group 1 – Rocks and soils** naturally occurring: rock, clay, sand, gravel, sandstone, limestone, crushed stone, stone from demolition of buildings or structures, slate, sub-soil, silt.
01 04 10	dusty and powdery wastes other than those mentioned in 01 04 07	**Group 1 – Rocks and soils** naturally occurring: rock, clay, sand, gravel, sandstone, limestone, crushed stone, stone from demolition of buildings or structures, slate, sub-soil, silt. Or **Group 3 – Minerals processed or prepared** Moulding sands, including used foundry sand; clays, including moulding clay (including Fuller's earth and bentonite); excluding moulding sands containing organic binders, man-made mineral fibres made from glass–reinforced plastic and asbestos
01 04 12	tailings and other wastes from washing and cleaning of minerals other than those mentioned in 01 04 07 and 01 04 11	
01 04 13	wastes from stone cutting and sawing other than those mentioned in 01 04 07	
01 04	**waste from physical and chemical processing of non-metalliferous mineral**	
01 04 08	waste gravel and crushed rocks other than those mentioned in 01 04 07	**Group 1 – Rocks and soils** naturally occurring: rock, sand, gravel, sandstone, limestone, crushed stone.
01 04 09	waste sand and clays	**Group 1 – Rocks and soils** naturally occurring: clay, & sand.
10 01	**wastes from power stations and other combustion plants (except 19**	
10 01 01	bottom ash, slag and boiler dust (excluding boiler dust mentioned in 10 01 04)	**Group 5 – Ash** bottom ash and fly ash produced only from the combustion of wood, of waste or of both; bottom ash and fly ash from the combustion of coal, petroleum coke or of both, deposited in a cell containing the product of that combustion alone; and bottom ash and fly ash from the combustion of coal, of petroleum coke or of both, burnt together with biomass and deposited in a cell containing the product of that combustion and burning alone. Excluding fly ash from sewage sludge, municipal, clinical and hazardous waste incinerators.
10 03	**wastes from aluminium thermal metallurgy**	
10 03 16	skimmings other than those mentioned in 10 03 15	**Group 6 Low activity inorganic compounds** calcium based reaction wastes from titanium dioxide production, calcium carbonate, magnesium carbonate, magnesium oxide, magnesium hydroxide, iron

EWC code	Description	Qualifying Material Order 2011 (as amended) Group and most likely suitable descriptions
		oxide, ferric hydroxide, aluminium oxide, aluminium hydroxide, zirconium dioxide
10 08	**wastes from other non-ferrous thermal metallurgy**	
10 08 09	Other slags	**Group 4 - Furnace slags** Vitrified wastes and residues from thermal processing of minerals where, in either case, the residue is both fused and insoluble and slag from waste incineration.
10 08 11	dross and skimmings other than those mentioned in 10 08 10	**Group 6 Low activity inorganic compounds** calcium based reaction wastes from titanium dioxide production, calcium carbonate, magnesium carbonate, magnesium oxide, magnesium hydroxide, iron oxide, ferric hydroxide, aluminium oxide, aluminium hydroxide, zirconium dioxide
10 09	**wastes from casting of ferrous pieces**	
10 09 03	Furnace slag	**Group 4 - Furnace slags** Vitrified wastes and residues from thermal processing of minerals where, in either case, the residue is both fused and insoluble and slag from waste incineration.
10 09 06	casting cores and moulds which have not undergone pouring other than those mentioned in 10 09 05	**Group 3 – Minerals processed or prepared** Moulding sands, including used foundry sand; clays, including moulding clay (including Fuller's earth and bentonite); excluding moulding sands containing organic binders, man-made mineral fibres made from glass–reinforced plastic and asbestos.
10 09 08	casting cores and moulds which have undergone pouring other than those mentioned in 10 09 07	
10 10	**wastes from casting of non-ferrous pieces**	
10 10 06	casting cores and moulds which have not undergone pouring, other than those mentioned in 10 10 05	**Group 3 – Minerals processed or prepared** Moulding sands, including used foundry sand; clays, including moulding clay (including Fuller's earth and bentonite); excluding moulding sands containing organic binders, man-made mineral fibres made from glass–reinforced plastic and asbestos.
10 10 08	casting cores and moulds which have undergone pouring, other than those mentioned in 10 10 07	
10 11	**Waste from the manufacture of glass and glass products**	
10 11 03	waste glass-based fibrous materials	**Group 3 – Minerals processed or prepared** Moulding sands, including used foundry sand; clays, including moulding clay (including Fuller's earth and bentonite); excluding moulding sands containing organic binders, man-made mineral fibres made from glass–reinforced plastic and asbestos.
10 11 12	Waste glass other than those mentioned in 10 11 11	**Group 2 – Ceramics or concrete materials.** Glass, including fritted enamel; Excluding glass fibre and glass-reinforced plastic and concrete plant washings.
10 12	**Waste from manufacture of ceramic goods, bricks, tiles and construction products**	
10 12 06	Discarded moulds	**Group 3 – Minerals processed or prepared** Moulding sands, including used foundry sand; clays, including moulding clay (including Fuller's earth and bentonite); excluding moulding sands containing organic binders, man-made mineral fibres made from glass–reinforced plastic and asbestos.
10 12 08	waste ceramics, bricks, tiles and construction products (after thermal processing)	**Group 2 – Ceramics or concrete materials.** Ceramics, tiles, clay ware, pottery, china and refractories. Excluding glass fibre and glass-reinforced plastic and concrete plant washings.
10 13	**wastes from manufacture of cement, lime and plaster and articles and products made from them**	
10 13 14	waste concrete and concrete sludge	**Group 2 – Ceramics or concrete materials.** Concrete, including reinforced concrete, concrete block, breeze blocks and aircrete blocks. Excluding glass fibre and glass-reinforced plastic and concrete plant washings.

EWC code	Description	Qualifying Material Order 2011 (as amended) Group and most likely suitable descriptions
16 01	**end-of-life vehicles from different means of transport (including off-road machinery) and wastes from dismantling of end-of-life vehicles and vehicle maintenance (except 13, 14, 16 06 and 16 08)**	
16 01 20	glass	**Group 2 – Ceramics or concrete materials.** Glass, including fritted enamel; Excluding glass fibre and glass-reinforced plastic and concrete plant washings.
15 01	**Packaging**	
15 01 07	Glass packaging	**Group 2 – Ceramics or concrete materials.** Glass, including fritted enamel; Excluding glass fibre and glass-reinforced plastic and concrete plant washings.
16 01	**End-of-life vehicles from different means of transport (including off-road machinery) and wastes from dismantling of end-of-life vehicles and vehicle maintenance**	
16 01 20	Glass	**Group 2 – Ceramics or concrete materials.** Glass, including fritted enamel; Excluding glass fibre and glass-reinforced plastic and concrete plant washings.
17 01	**Concrete, bricks, tiles and ceramics and gypsum based materials**	
17 01 01	Concrete	**Group 2 – Ceramics or concrete materials.** Concrete, including reinforced concrete, concrete blocks, breeze blocks and aircrete blocks. Excluding glass fibre and glass-reinforced plastic and concrete plant washings.
17 01 02	Bricks	**Group 2 – Ceramics or concrete materials.** Ceramics, including bricks, bricks and mortar. Excluding glass fibre and glass-reinforced plastic and concrete plant washings.
17 01 03	Tiles and ceramics	**Group 2 – Ceramics or concrete materials.** Ceramics, tiles, clay ware, pottery, china and refractories. Excluding glass fibre and glass-reinforced plastic and concrete plant washings.
17 01 07	mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	**Group 2 – Ceramics or concrete materials.** Glass, including fritted enamel; Ceramics, including bricks, bricks and mortar, tiles, clay ware, pottery, china and refractories. Excluding glass fibre and glass-reinforced plastic and concrete plant washings.
17 02	**Wood, Glass and Plastic**	
17 02 02	Glass	**Group 2 – Ceramics or concrete materials.** Glass, including fritted enamel; Excluding glass fibre and glass-reinforced plastic and concrete plant washings.
17 05	**Soil (including excavated soil from contaminated sites) stones and dredging spoil**	
17 05 04	soil and stones other than those mentioned in 17 05 03	**Group 1 – Rocks and soils** naturally occurring: rock, clay, sand, gravel, sandstone, limestone, crushed stone, stone from demolition of buildings or structures, slate, sub-soil, silt. ***Including components of the following groups*** **Group 2 – Ceramics or concrete materials.** Glass, including fritted enamel; Ceramics, including bricks, bricks and mortar, tiles, clay ware, pottery, china and refractories; Concrete, including reinforced concrete, concrete blocks, breeze blocks and aircrete blocks. Excluding glass fibre and glass-reinforced plastic and concrete plant washings.

EWC code	Description	Qualifying Material Order 2011 (as amended) Group and most likely suitable descriptions
		Group 3 Minerals, processed or prepared: Moulding sands, including used foundry sand; Clays, including moulding clay absorbents (including Fuller's earth and bentonite); Mineral absorbents; Man-made mineral fibres, including glass fibres; Silica; Mica; Mineral abrasives Excluding moulding sands containing organic binders; man-made mineral fibres made from glass-reinforced plastic and asbestos. **Group 4 - Furnace slags** Vitrified wastes and residues from thermal processing of minerals where, in either case, the residue is both fused and insoluble **Group 5 – Ash** bottom ash and fly ash produced only from the combustion of wood, of waste or of both; bottom ash and fly ash from the combustion of coal, petroleum coke or of both, deposited in a cell containing the product of that combustion alone; and bottom ash and fly ash from the combustion of coal, of petroleum coke or of both, burnt together with biomass and deposited in a cell containing the product of that combustion and burning alone. Excluding fly ash from sewage sludge, municipal, clinical and hazardous waste incinerators.
17 05 06	dredging spoil other than those mentioned in 17 05 05	**Group 1 – Rocks and soils** naturally occurring: rock, clay, sand, gravel, sandstone, limestone, slate, sub-soil, silt.
17 05 08	track ballast, soil and stones other than those containing dangerous substances	
17 09	**Other construction and demolition wastes**	
17 09 04	Mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	**Group 1 – Rocks and soils** naturally occurring: rock, clay, sand, gravel, sandstone, limestone, crushed stone, stone from demolition of buildings or structures, slate, sub-soil, silt. ***including components of the following groups*** **Group 2 – Ceramics or concrete materials.** Glass, including fritted enamel; Ceramics, including bricks, bricks and mortar, tiles, clay ware, pottery, china and refractories; Concrete, including reinforced concrete, concrete blocks, breeze blocks and aircrete blocks. Excluding glass fibre and glass-reinforced plastic and concrete plant washings. **Group 3 Minerals,** processed or prepared: Moulding sands, including used foundry sand; Clays, including moulding clay absorbents (including Fuller's earth and bentonite); Mineral absorbents; Man-made mineral fibres, including glass fibres; Silica; Mica; Mineral abrasives. Excluding moulding sands containing organic binders; man-made mineral fibres made from glass-reinforced plastic and asbestos. **Group 4 Furnace slags**

EWC code	Description	Qualifying Material Order 2011 (as amended) Group and most likely suitable descriptions
		Vitrified wastes and residues from thermal processing of minerals where, in either case, the residue is both fused and insoluble. **Group 5 – Ash** bottom ash and fly ash produced only from the combustion of wood, of waste or of both; bottom ash and fly ash from the combustion of coal, petroleum coke or of both, deposited in a cell containing the product of that combustion alone; and bottom ash and fly ash from the combustion of coal, of petroleum coke or of both, burnt together with biomass and deposited in a cell containing the product of that combustion and burning alone. Excluding fly ash from sewage sludge, municipal, clinical and hazardous waste incinerators.
19 01	**wastes from incineration or pyrolysis of waste**	
19 01 12	bottom ash and slag other than those mentioned in 19 01 11	**Group 5 – Ash** bottom ash and fly ash produced only from the combustion of wood, of waste or of both; bottom ash and fly ash from the combustion of coal, petroleum coke or of both, deposited in a cell containing the product of that combustion alone; and bottom ash and fly ash from the combustion of coal, of petroleum coke or of both, burnt together with biomass and deposited in a cell containing the product of that combustion and burning alone. Excluding fly ash from sewage sludge, municipal, clinical and hazardous waste incinerators.
19 02	**wastes from physico/chemical treatments of waste (including dechromatation, decyanidation, neutralisation)**	
19 02 06	sludges from physico/chemical treatment other than those mentioned in 19 02 05	**Group 1 – Rocks and soils** naturally occurring: rock, clay, sand, gravel, sandstone, limestone, crushed stone, stone from demolition of buildings or structures, slate, sub-soil, silt.
19 03	**stabilised/solidified wastes**	
19 03 05	stabilised wastes other than those mentioned in 19 03 04	**Group 1 – Rocks and soils** **Group 2 – Ceramics or concrete materials** **Group 4 Furnace slags** **Group 5 – Ash**
19 03 07	solidified wastes other than those mentioned in 19 03 06	
19 04	**vitrified waste and wastes from vitrification**	
19 04 01	vitrified waste	**Group 1 – Rocks and soils** **Group 2 – Ceramics or concrete materials** **Group 4 Furnace slags** **Group 5 – Ash**
19 12	**Waste from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified.**	
19 12 05	Glass	**Group 2 – Ceramics or concrete materials, g**lass, including fritted enamel.
19 12 09	Mineral (for example sand, stones)	**Group 1 – Rocks and soils** naturally occurring: rock, clay, sand, gravel, sandstone, limestone, crushed stone, stone from demolition of buildings or structures, slate, sub-soil, silt. **Group 3 Minerals,** processed or prepared:

EWC code	Description	Qualifying Material Order 2011 (as amended) Group and most likely suitable descriptions
		Moulding sands, including used foundry sand; clays, including moulding clay (including Fuller's earth and bentonite); mineral absorbents; Man-made mineral fibres, including glass fibres; Silica; Mica; Mineral abrasives. Excluding moulding sands containing organic binders; man-made mineral fibres made from glass-reinforced plastic and asbestos.
19 12 12	Treated bottom ash including IBA and slag other than that containing dangerous substances	**Group 4 Furnace slags** Vitrified wastes and residues from thermal processing of minerals where, in either case, the residue is both fused and insoluble. **Group 5 – Ash** bottom ash and fly ash produced only from the combustion of wood, of waste or of both; bottom ash and fly ash from the combustion of coal, petroleum coke or of both, deposited in a cell containing the product of that combustion alone; and bottom ash and fly ash from the combustion of coal, of petroleum coke or of both, burnt together with biomass and deposited in a cell containing the product of that combustion and burning alone. Excluding fly ash from sewage sludge, municipal, clinical and hazardous waste incinerators.
19 12 12	Residue from waste processing	**Group 1 – Rocks and soils** naturally occurring: rock, clay, sand, gravel, sandstone, limestone, crushed stone, stone from demolition of buildings or structures, slate, sub-soil, silt. ***including components of the following groups*** **Group 2 – Ceramics or concrete materials.** Glass, including fritted enamel; Ceramics, including bricks, bricks and mortar, tiles, clay ware, pottery, china and refractories; Concrete, including reinforced concrete, concrete blocks, breeze blocks and aircrete blocks. Excluding glass fibre and glass-reinforced plastic and concrete plant washings. **Group 3 Minerals,** processed or prepared: Moulding sands, including used foundry sand; Clays, including moulding clay (including Fuller's earth and bentonite); Mineral absorbents; Man-made mineral fibres, including glass fibres; Silica; Mica; Mineral abrasives. Excluding moulding sands containing organic binders; man-made mineral fibres made from glass-reinforced plastic and asbestos. **Group 4 Furnace slags** Vitrified wastes and residues from thermal processing of minerals where, in either case, the residue is both fused and insoluble. **Group 5 – Ash** bottom ash and fly ash produced only from the combustion of wood, of waste or of both; bottom ash and fly ash from the combustion of coal, petroleum coke or of both, deposited in a cell containing the product of that combustion alone; and bottom ash and fly ash from the combustion of coal, of petroleum coke or of both, burnt together with biomass and deposited in a cell containing the product of that

EWC code	Description	Qualifying Material Order 2011 (as amended) Group and most likely suitable descriptions
		combustion and burning alone. Excluding fly ash from sewage sludge, municipal, clinical and hazardous waste incinerators.
19 13	**Waste from soil and groundwater remediation**	
19 13 02	Solid waste from soil remediation other than those containing dangerous substances	**Group 1 – Rocks and soils** naturally occurring: rock, clay, sand, gravel, sandstone, limestone, crushed stone, stone from demolition of buildings or structures, slate, sub-soil, silt. including components of the following groups **Group 2 – Ceramics or concrete materials.** Glass, including fritted enamel; Ceramics, including bricks, bricks and mortar, tiles, clay ware, pottery, china and refractories; Concrete, including reinforced concrete, concrete blocks, breeze blocks and aircrete blocks. Excluding glass fibre and glass-reinforced plastic and concrete plant washings. **Group 3 Minerals,** processed or prepared: Moulding sands, including used foundry sand; Clays, including moulding clay (including Fuller's earth and bentonite); Mineral absorbents; Man-made mineral fibres, including glass fibres; Silica; Mica; Mineral abrasives; Excluding moulding sands containing organic binders; man-made mineral fibres made from glass-reinforced plastic and asbestos. **Group 4 Furnace slags** Vitrified wastes and residues from thermal processing of minerals where, in either case, the residue is both fused and insoluble.
20 01	**20 01 separately collected fraction (except 15 01)**	
20 01 02	Glass	**Group 2 – Ceramics or concrete materials.** Glass, including fritted enamel; Excluding glass fibre and glass-reinforced plastic and concrete plant washings.
20 02	**Garden and park wastes (including cemetery waste)**	
20 02 02	soil and stones, excluding top soil and peat	**Group 1 – Rocks and soils** naturally occurring: rock, clay, sand, gravel, sandstone, limestone, crushed stone, stone from demolition of buildings or structures, slate, sub-soil, silt.

Table 2 Wastes to be Accepted for Restoration

EWC Code	Description
01	**WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS**
01 04	**Wastes from physical and chemical processing of non-metalliferous minerals.**
01 04 08	Waste gravel and crushed rocks other than those mentioned in 01 04 07
01 04 09	Waste sand and clays
17	**CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)**
17 05	**Soils (excluding soils from excavated sites), stones and dredgings**
17 05 04	Soils and stones including chalk other than those mentioned in 17 05 03
17 05 06	Dredging spoil other than those mentioned in 17 05 05

EWC Code	Description
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF SITE WASTE WATER TREATMENT PLANTS AND PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION / INDUSTRIAL WASTE**
19 12	**Wastes from mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified**
19 12 09	Minerals (for example sand, stones)
19 13	**Wastes from soil and groundwater remediation**
19 13 02	Solid wastes from soil remediation other than those mentioned in 19 13 01
20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATLEY COLLECTED FRACTIONS**
20 02	**Garden and park wastes (including cemetery waste)**
20 02 02	Soil and stones

Table 3 Wastes to be Accepted for Treatment

EWC Code	Description
01	**WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS**
01 04	**Wastes from physical and chemical processing of non-metalliferous minerals.**
01 04 08	Waste gravel and crushed rocks other than those mentioned in 01 04 07
01 04 09	Waste sand and clays
15	**WASTE PACKAGING, ABSORBENTS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED**
15 01	**packaging (including separately collected municipal packaging waste)**
15 01 07	Glass Packaging
17	**CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)**
17 01	**concrete, bricks, tiles and ceramics**
17 01 01	Concrete
17 01 02	Bricks
17 01 03	Tiles and ceramics
17 01 07	Mixtures of concrete, brick, tiles and ceramics other than those mentions in 17 01 06
17 02	**wood, glass and plastic**
17 02 02	Glass
17 03	**bituminous mixtures, coal tar and tarred products**
17 03 02	bituminous mixtures other than those mentioned in 17 03 01
17 05	**soil (including excavated soil from contaminated sites), stones and dredging spoil**
17 05 04	soil and stones other than those mentioned in 17 05 03
17 05 06	dredging spoil other than those mentioned in 17 05 05
17 09	**other construction and demolition wastes**
17 09 04	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE**
19 12	**wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified**
19 12 05	Glass
19 12 09	Minerals (for example sand, stones)
20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS**
20 01	**separately collected fractions (except 15 01)**
20 01 02	Glass
20 02	**garden and park wastes (including cemetery waste)**

EWC Code	Description
20 02 02	Garden and park waste (including cemetery waste) – soil and stones

2.5 Waste Acceptance Procedures

Waste acceptance will be a structured hierarchy with appropriate points of control for the identification and validation of suitable wastes for use in the disposal, restoration and treatment activities at the site. This can be summarised as follows:

- Level 1. Basic characterisation through pre-submission of an appropriate waste classification (EWC codes, site investigations etc);
- Level 2. Compliance testing; and
- Level 3. On-site verification.

Each stage in the proposed waste acceptance scheme is detailed further below.

2.5.1 Level 1: Waste Characterisation

Table 1, Table 2 and Table 3 details the list of wastes to be accepted at the Site for infilling, restoration and treatment in the restoration scheme respectively.

The EWC code of wastes will be checked against any relevant available data provided (e.g. waste description, waste source or chemical testing) to confirm that the waste coding is correct, it can be accepted under the permit and it is suitable for the proposed activities. The waste enquiry procedure requires the following information, where available and applicable, to be gathered from any potential waste load prior to acceptance:

- Details of the waste producer including their organisation name, address and contact details;
- Source and origin of the waste (including full site address);
- Volume of the material to be deposited;
- Information on the process producing the waste (description and characteristics of raw materials and products);
- If the waste has gone through some treatment, then a full description of the waste treatment applied;
- A description of the waste;
- Code according to the EWC;
- Appearance of the waste (smell, colour, physical form); and
- Data on the composition and chemical properties of the waste. This is provided by customers as a site investigation report including full laboratory chemical analysis. The Operator will ensure the analysis provided for any material is sufficient for a hazardous

waste assessment, which will be undertaken in accordance with the Waste Framework Directive and relevant Agency guidance[3].

This data will be reviewed by a suitably qualified person to ensure that all sampling is representative of the source of the waste and an appraisal of the composition, including the likelihood of hazardous properties, will be undertaken.

Certain types of waste can be classified and accepted as inert without requiring testing if it meets the description in the Annex to the Landfill Directive and the following is confirmed:

- It comes from a single source;
- It is well characterised and described; and
- It carries no risk of contamination, for example from a site that has not previously been developed.

In the case of suspicion of contamination (either from visual inspection or from the knowledge of the origin of the waste) the waste will be tested (or refused acceptance on site). If waste acceptance testing is required, the appropriate data will be requested and will be reviewed by a suitably qualified person.

Only waste that is shown to be compliant with the sites Permit, following the basic waste characterisation, will be accepted for use at the site. If deemed acceptable a quote will be issued to the customer, including the correct EWC for inclusion on their waste transfer note. Sometimes the EWC is supplied by the customer, but the Operator will always undertake the Basic Waste Characterisation anyway to ensure the EWC is correct.

If the composition of a waste stream subsequently changes, the Operator will stop the importation of the material and request additional / new information to enable them to carry out basic waste characterisation again.

Where the results of basic waste characterisation show a waste stream is not acceptable for use at the site, the customer is informed, and the waste is not accepted.

A copy of the site investigation report, analytical test data and any other relevant documentation relating to a waste stream that has been accepted at the Site, is kept on file and can be made available for inspection by the Agency if requested.

2.5.2 Level 2: Compliance Testing

If the Operator has a regularly arising waste stream from the same source, checks are carried out to ensure that the properties determined by the basic waste characterisation have not changed.

The Operator always ensure that the site investigation information, provided as part of the basic waste characterisation, is fully representative of all material proposed for import at the site.

A volume / tonnage of material, to be imported and recovered, will be agreed at the time of basic waste characterisation and the provision of a quotation. Once records obtained at the site 'booking

[3] Waste classification technical guidance - GOV.UK (www.gov.uk)

in' cabin show the imports are close to the agreed volumes / tonnages the 'booking in operative' (BIO) will notify the administration department, who will then contact the customer to discuss additional imports. If additional material from the same source is still proposed for import, additional information, listed in Section 2.5.1 of this document, will be requested to demonstrate continued compliance with the Permit. Records of the additional information requested is kept on file and can be made available for inspection by the Agency if requested.

Sampling of material from random loads arriving at the site is carried out on a monthly basis. The Operator undertake sampling on a different date each month. On the designated day, the site operative will select and stop a vehicle at random, at any point during that day, to allow the collection of a sample from the vehicle. The samples are sent to their laboratory for chemical analysis to ensure the material meets the conditions of the sites permit.

A schedule of proposed sampling dates, a random waste sampling record and the laboratory chemical analysis scheduled for each sample, are included in the EMS. This schedule is kept by the admin team and can also be found on the wall on the site 'booking in' cabin. Records containing actual sampling dates and the corresponding laboratory chemical testing results are kept on record and can be made available for inspection by the Agency if requested.

2.5.3 Level 3: On-Site Verification

The BIO carries out visual checks on each load arriving on site. This verifies that the waste arriving at the site is the expected waste and that there are no visual signs of contamination. Visual inspections are also carried out on every load to ensure that there are no non-permitted waste types within the load.

All incoming vehicles will enter via the site entrance and check in at the 'booking in' cabin. The documentation accompanying the load shall be checked by the BIO and shall include, but not be limited to, the Carriers Certificate of Registration and Duty of Care Waste Transfer Note. If the BIO is satisfied that the waste conforms to the documentation and conditions of the Permit, the waste is accepted, and the suitable amendments are made to waste transfer note. Where it cannot be demonstrated that a waste conforms to the documentation and conditions in the Permit it is rejected from Site and the Agency are notified immediately.

The information to be recorded in respect of each load will be where appropriate:

- Pre-treatment details;
- Waste type;
- Date;
- Time;
- Customer name;
- Vehicle registration number and type;
- Ticket number; and
- Carriers registration number.

2.5.4 Rejection Procedures

Discrepancies found as a result of the above procedures will result in the load being rejected from the site. The driver will be asked to leave the site and the customer will be notified.

If a load / vehicle has been rejected, details of the carrier, vehicle registration, waste source, description, date, time etc. are recorded and kept on file. These records can be made available if the Agency requests.

If any discrepancies cannot be found during visual inspection at the site 'booking in' cabin, but then are found once the load has been tipped, the waste is immediately reloaded onto the vehicle and the driver will be asked to leave the site. The Technically Competent Manager (TCM) and the BIO will be notified, who in turn, will notify the customer.

The Site's EMS includes details of the rejection procedures.

2.5.5 Site Records

Copies of all records required in accordance with the Permit are maintained and kept on file and can be made available for inspection by the Agency if required.

All waste transfer notes will be kept on file for a minimum of two years. Waste transfer notes can be made available during this period for inspection by the Agency if required.

2.6 Operational Practice

2.6.1 Personnel

The operation will be staffed as a minimum by the following personnel:

- Site Business Manager/Contract Manager;
- Closed Site Operations Supervisor;
- Weighbridge Operator;
- Machine Operator; and
- Construction Quality Assurance (CQA) supervision in accordance with the approved CQA plan.

Should additional personnel be required by site operations, this resource will be brought in on a reasonably practicable timescale.

2.6.2 Resources

The operation shall require the following resources, in addition to the staffing and material resource as listed above:

- Plant, this typically will be a bulldozer equal to a Caterpillar D6 in size;
- Tractor and Water Bowser for dust suppression activities;

- Wheel wash facilities; and
- Crusher and screener for treatment activities.

2.6.3 Delivery

Prior to arrival at the site all waste material will be assessed and approved to ensure it is suitable for receipt, is a listed waste type and meets the relevant (if applicable) engineering requirements at Site. Once approved, and issued with a unique approval number, the waste must be booked into the site, giving at least 24 hrs notice.

Importation of recovery, disposal or restoration wastes to Ravenhead Quarry Landfill will only be carried out by a registered waste carrier, under relevant Duty of Care. On arrival at the weighbridge, the load will be checked and visually inspected for conformance. All incoming loads must be sheeted.

Waste materials will either be directly placed or stored in temporary stockpiles. The stockpiles will either be placed at a later date or directed for processing (crushing and/or screening) to produce an aggregate as required.

2.6.4 Storage

The designated phased infilling area will be divided into suitable working phases and the creation of any temporary stockpiles will, where practicable, be adjacent to the phase for which the soils are to be used for restoration. This will only become relevant in the final stages of infilling the void.

The restoration materials will be tipped in appropriate designated stockpiles. Soil stockpiles will be placed at appropriate locations preferably near to the area being restored.

Soils for processing will be stockpiled on the hardstanding pad (aggregate over lower permeability soil) located on the southwestern site boundary prior to treatment.

2.6.5 Quarantine

The site manager will designate a quarantine area for each phase of the infilling / restoration work to temporarily isolate any restoration materials deemed unsuitable for use prior to removal off site.

2.6.6 Application

Imported recovery, disposal and restoration materials will be placed in accordance with the design and restoration contours as approved by the permit, and materials will be treating in accordance with the quality protocol and permit. All waste will be accepted in accordance with the legal obligations imposed by the issued permit and the Duty of Care and the Operators Integrated Management System.

3 Leachate Source Term

3.1 Overview

The application is to restore the quarry void with Qualifying Materials as defined in the supporting application documents.

Any leachate generated from the non-hazardous Qualifying Materials will differ significantly from a typical Municipal Solid Waste (MSW) leachate as there is not a putrescible component to the waste stream. Consequently, the significant ammoniacal-N and dissolved organic matter (as represented by the COD) as well as other soluble salts will not be present as readily degradable organic matter and soluble salts are specifically excluded from the list of wastes described as Qualifying Materials. Given that the proposed waste types are unlikely to contain a degradable organic content, elevated ammoniacal-N and BOD is not expected to be associated with site. Similarly, solvents, refined petroleum fuels or other chemical sources will be excluded. In simple terms, source characterisation will preclude any significantly contaminated soils.

For the purposes of assessment, a source term has been derived for initial screening based on the leaching data that ByrneLooby have compiled from 7 sites (including a hazardous soil landfill) over a 7–10 year period, as well as Qualifying Materials data from identically proposed infill schemes (Table 3). These concentrations are applicable to the infilling / disposal aspect of the sites restoration and have been quantitively assessed in the supporting Hydrogeological Risk Assessment.

Table 4 Source Term Waste Leaching Data compared to Drinking Water Standards

Determinand	Soil Infill Site data			No. of Samples	% of samples < LOD	DWS	Comment
	25%ile	Median	95%ile				
	mg/l					mg/l	
Hazardous Metals							
Cadmium	0.00003	0.00010	0.00060	593	66	0.005	Below DWS at source
Mercury	0.00003	0.00010	0.00025	331	87	0.001	Below DWS at source
Non-hazardous Metals							
Lead	0.001	0.001	0.300	580	89	0.01	Above DWS at source
Nickel	0.007	0.011	0.052	579	3	0.02	
Chromium	0.001	0.002	0.015	586	60	0.05	Below DWS at Source
Copper	0.002	0.007	0.039	566	31	2	Below DWS at source
Zinc	0.003	0.006	0.128	383	19	5	
Non-Hazardous Metalloid							
Arsenic	0.003	0.005	0.021	593	4	0.01	Above DWS at source
Matrix and Minor ions							
Chloride	69	133	637	768	0	250	Above DWS at source
Sulphate	607	912	1731	600	1	250	
Ammoniacal-N	0.2	1.1	15.6	757	11	0.39*	Above DWS at source
Herbicide and Hydrocarbons - µg/l							
Mecoprop	5.8	12.5	33.7	61	77	0.0004 (MRV)	Above DWS at source
Benzene	1.3	1.5	2.0	50	96	0.001 (MRV)	Above DWS at source
Toluene	1.1	1.2	3.7	68	96	0.004 (MRV)	Above DWS at source

Drinking Water Standards (DWS) from 2016 No. 614WATER, ENGLAND AND WALES, The Water Supply (Water Quality) Regulations 2016 The Water Supply (Water Quality) Regulations 2016 (legislation.gov.uk), Minimum Reporting Values, MRV concentrations (Hazardous substances to groundwater: minimum reporting values - GOV.UK (www.gov.uk))

*Ammonium (as NH4) DWS 0.5mg/l

All naphthalene data < LOD (number of samples = 55)

This leachate source term is derived from non-inert soil-forming wastes and similar materials, and is also valid for a Landfill Tax Complaint LOI test waste source containing either Transfer / Recovery Site Trommel Fines as well as asbestos wastes co-disposed with the soils.

As it can be seen, by virtue of the collated source term summary presented above in Table 3 that these sites have a separate geochemistry to biochemically derived solutions (i.e. typical landfill leachates with significant concentrations of ammoniacal-N) as the bulk organic content is excluded prior to disposal.

The majority of the selected substances (most pertinent to environmental risk to groundwaters and surface waters) are below DWS concentrations at source based on the reviewed data.

As a geochemically derived liquor, calcium and sulphate are limited by the solubility of gypsum (which equates to approximately 1,500mg/l sulphate and 700mg/l calcium under oxidising to anoxic conditions) and ammoniacal-N is consistently low (95th%ile concentration of 15.6mg/l, median concentration of 1.1mg/l).

Chloride is typically <500mg/l in these sites, with median and average concentrations of 133mg/l and 214mg/l respectively however in localised areas of some sites there may be very short-term increases, or localised anomalous data of greater concentrations, as such the overall dataset 95th %ile concentration of 637mg/l is reported. It is recognised that infrequent or short term "outliers" can skew statistical appraisals but are not reflective of the overall bulk infill chemistry. This can occur for all substances analysed.

Another significant factor for low organic and soil-based wastes is that the primary vector which mobilises heavy metals, i.e. as colloidal organo-metallic complexes which additionally are not present. Consequently, metals such as nickel and chromium which are also uniquely present within methanogenic and acetogenic leachates (as compared to other metals which can be present in UK groundwaters and geological strata) are in the case of nickel low within soil disposal sites whilst chromium is invariably absent (60% of all data reported at < LOD).

Copper and zinc data report occasional outliers are reported, these concentrations are insignificant compared to the 2mg/l and 5mg/l DWS. Arsenic is also environmentally low, with concentrations reducing to less than the 10µg/l DWS after a short initial stabilisation period.

In regard to hazardous metals, both cadmium and mercury are below DWS concentrations (95%ile) however it is also apparent that the majority of the dataset (593 samples and 331 samples respectively) are reported at <LOD for 66% and 87% of all samples analysed. Lead is reported above DWS at the 95%ile concentration however it is noted that ~90% of the entire dataset (580 samples) is reported at <LOD (Table 3).

Specific organic substances are rarely reported in soil cells, i.e. the majority of substances are reported as "below detection level" or <LOD. Small quantities of mecoprop can be reported, with almost all data reported as less than the 18µg/l EQS. However, it is not reported above 1µg/l for some of the sites evaluated and <LOD for almost 80% of the dataset (61 samples). All other organic substances reported are single occurrences, which are not repeated on consecutive hazardous substance screens.

4 Summary

The application proposes to utilise non-hazardous soils for the infilling and restoration of the current void, waste acceptance criteria will accord with WM3 guidance in regard to the definition of non-hazardous. A significant dataset has been reviewed in deriving a source term from similar infilling schemes. Hence the source term is considered statistically robust.

Waste Acceptance Procedures outlined herein, in addition to Booth Ventures Waste (North West) Limited EMS will ensure that wastes that do not confirm with the Qualifying Materials Order, including those that contain putrescible / biodegradable wastes are excluded from disposal. Ongoing monitoring of the source term will validate the Conceptual site Model. And source term outlined herein.

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Ravenhead Quarry

Environmental Permit Application – Hydrogeological Risk Assessment

Booth Ventures Waste (North West) Limited

Report No. K0158-BLP-R-ENV-06-01
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1 Introduction

1.1 Background and Risk Assessment Objectives

ByrneLooby (BL) has prepared this Hydrogeological Risk Assessment (HRA) for the Ravenhead Quarry Landfill site to support the application for an Environmental Permit.

This assessment utilises the conceptualisation of the site (provided in report 5430-BLP-R-003-01) and includes discussion on the source-pathway-receptor relationship and a qualitative assessment for completeness. This approach accords with the low sensitivity setting of the site and source – pathway – receptor relationships.

The infilling will comprise of non-hazardous wastes, those considered suitable are specified by Her Majesty's Revenue and Customs (HMRC) in The Landfill Tax (Qualifying Material) Order 2011 (as amended) (i.e. Qualifying Materials (QMs).

2 Application of Aquifer Designation and Chemical Status at Ravenhead Quarry

2.1 Aquifer Classification and Regulatory Background

The ESID report (5430-BLP-R-003-01) that underpins the application has detailed the environmental setting of the site. The site is contained within a geological barrier (lower sidewalls and base, with a significant low permeability, i.e. evidenced by no groundwater inflow to the site) and with no associated connectivity to a receptor.

The upper sections of the sidewall (with associated significant lateral widths to the site boundary) are comprised of interburden / overburden materials surplus the brick manufacturing process. This material is not a receptor.

Notwithstanding the above, the following pertinent points are detailed for clarity:

- The site proposal is for engineered containment where required (i.e. on lower sidewall faces where bedrock is exposed to mitigate against seepages to any sandstone or espleys) which is contained overall within a geological barrier.
- There is no confirmed or documented pathway for the identified sandstone layers / horizons at site;
- No justifiable receptor has been identified (that is linked by a pathway);

As part of this review, the role of a credible receptor has been undertaken. A fundamental point is the applicability of the geological / hydrogeological system and its potential, and or fulfilment in the role as an "aquifer".

Clay pits (in this case for brickmaking) are seldom located in areas defined as "aquifers". Typically, they are defined as non-productive strata as little (if any) water can be drawn from the formation even if pore-waters are recorded within environmental monitoring installations. As such, this review starts by introducing key parameterisation that underpins the regulatory framework regarding this matter.

Previous quantitative modelling undertaken at nearby sites has been on a "theoretical basis" to a hypothetical underlying target (in this case at Vigo Utopia Landfill a water bearing sandstone "Espley" that was sufficiently continuous to act as a Water Body under the Water Framework Directive classifications) or judged against an adjacent piezometric water level under the principal of hydraulic containment (Highfields South Landfill). It is noted however at these local sites includes "putrescible wastes" which is not proposed at Ravenhead.

As such, theoretical assessment is not required at Ravenhead Quarry Landfill (as defined by the conceptualisation outlined herein).

2.2 Classification of Water Resources

The classification of water resources is determined by the terminology and objectives of the Water Framework Directive. This directive was adopted with the specific purpose of establishing a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater bodies.

With regards to groundwater, Article 7 (of 2000/60/EC) states that for *"Waters used for the abstraction of drinking water"*

1. Member States shall identify, within each river basin district:

- all bodies of water used for the abstraction of water intended for human consumption providing more than $10m^3$ a day as an average or serving more than 50 persons, and
- those bodies of water intended for such future use.

Member states shall monitor, in accordance with Annex V, those bodies of water which according to Annex V, provide more than $100m^3$ a day as an average.

Annex III (assessment of groundwater chemical status) of the Groundwater Daughter Directive (Directive 2006/118/EC) also states in Paragraph 4

4. For the purposes of investigating whether the conditions for good groundwater chemical status referred to in Article 4 (2)(c)(ii) and (iii) are met, Member States will, where relevant and necessary, and on the basis of relevant monitoring results and **of a suitable conceptual model of the body of groundwater, assess**:

   (a) the impact of the pollutants in the body of groundwater;

   (b) **the amounts and the concentrations of the pollutants being, or likely to be, transferred from the body of groundwater to the associated surface waters or directly dependent terrestrial ecosystems;**

   (c) **the likely impact of the amounts and concentrations of the pollutants transferred to the associated surface waters and directly dependent terrestrial ecosystems;**

   (d) the extent of any saline or other intrusions into the body of groundwater; and

   (e) **the risk from pollutants in the body of groundwater to the quality of water abstracted, or intended to be abstracted, from the body of groundwater for human consumption.**

2.3 Chemical Status

Groundwater is considered to have a good chemical status when:

- measured or predicted nitrate levels do not exceed 50mg/l, while those of active pesticide ingredients, their metabolites and reaction products do not exceed 0.1µg/l (a total of 0.5µg/l for all pesticides measured);
- the levels of certain high-risk substances are below the threshold values set by Member States; at the very least, this must include ammonium, arsenic, cadmium, chloride, lead, mercury, sulphate, trichloroethylene and tetrachloroethylene;
- the concentration of any other pollutants conforms to the definition of good chemical status as set out in Annex V to the Water Framework Directive;
- if a value set as a quality standard or a threshold value is exceeded, **an investigation confirms, among other things, that this does not pose a significant environmental risk.**

2.4 Aquifer Classification

The Water Framework Directive (WFD) also defines an "aquifer" as

> "*a subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater".*

and defines a "Body of groundwater" as

> "*a distinct volume of groundwater within an aquifer"*

The directive therefore quantifies an aquifer as a rock bearing a sustainable useable quantity of water in excess of $10m^3/d$ on average. The Environment Agency has further classified the status of an aquifer into Principal and Secondary Aquifers defined as:

Principal Aquifers: These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Secondary Aquifers include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into two types:

- **Secondary A** - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;
- **Secondary B -** predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. **These are generally the water-bearing parts of the former non-aquifers.**

There is a third type of rock classification "Unproductive Strata". These are rock layers or drift deposits with low permeability that have negligible significance for water supply or for river base flow.

In regard to Ravenhead Quarry, a Secondary A designation does not fit the site description of "a clay pit" that is primarily operated (and continues to be operated) "dry". Collected water in the base of the void is periodically pumped to the on-site settlement pond prior to discharge in accordance with the sites discharge consent.

BGS available borehole logs at site and surrounding environs support the lack of water within the geological barrier (marl), consistent with BGS / Environment Agency descriptions within the "Physical Properties of Minor Aquifer in England and Wales (2000)" R&D publication 68.

The classification exercise undertaken for the purposes of the WFD was based on a simple assumption presented by the Environment Agency to the British Geological Survey (BGS) that rocks characterised as mudstones are unproductive strata and that all other strata (including potentially permeable bands and lenses) are classified as an aquifer, and hence considered as a high priority receptor within risk assessment irrespective of whether there is a viable sustainable recharge or not.

As a first stage high level screening exercise this is a useful starting point to focus on the key water resource strata and ensuring that important baseflow contributors to the surface water ecosystems are identified.

With regards to the aquifer status, the WFD defines two criteria, namely a requirement to monitor those bodies which provide more than $100m^3$/day as well as bodies of water used for the sustained abstraction of more than $10m^3$/day as an average. These abstraction figures therefore provide a benchmark or threshold for assessing and classifying aquifers as either Principal or Secondary Aquifers.

Where there is the requirement for site specific clarification is associated with how a water body is assessed when sustainable recharge rates approach or are below $10m^3$/day, but do not have a geological description as a mudstone. Under this condition, the groundwater resource value cannot be associated with abstraction, as there is clearly too little recharge to sustain abstraction. However, this does not prevent a need to assess such a geological strata as a pathway towards either a more permeable strata or its net base-flow contribution to surface water. With regards to the site there is no connectivity between the Etruria Formation and baseflow fed surface water.

3 Conceptual Site Model

3.1 Source

Any leachate generated from the non-hazardous QM's will differ significantly from a typical Municipal Solid Waste (MSW) leachate as there is not a putrescible component to the waste stream. Consequently, the significant ammoniacal-N and dissolved organic matter (as represented by the COD) as well as other soluble salts will not be present as readily degradable organic matter and soluble salts are specifically excluded from the list of wastes described as QMs. Given that the proposed waste types are unlikely to contain a degradable organic content, elevated ammoniacal-N and BOD is not expected to be associated with site. Similarly, solvents, refined petroleum fuels or other chemical sources will be excluded. In simple terms, source characterisation will preclude any significantly contaminated soils.

For the purposes of this assessment, a source term has been derived for initial screening based on the leaching data that ByrneLooby (formerly TerraConsult) have compiled from 7 sites (including a

hazardous soil landfill) over a 7-10year period, as well as QMs data from identically proposed infill schemes (Table 1).

Table 1 Source Term Waste Leaching Data compared to Drinking Water Standards

Determinand	Soil Infill Site data			No. of Samples	% of samples < LOD	DWS	Comment
	25%ile	Median	95%ile				
	mg/l					mg/l	
Hazardous Metals							
Cadmium	0.00003	0.00010	0.00060	593	66	0.005	Below DWS at source
Mercury	0.00003	0.00010	0.00025	331	87	0.001	Below DWS at source
Non-hazardous Metals							
Lead	0.001	0.001	0.300	580	89	0.01	Above DWS at source
Nickel	0.007	0.011	0.052	579	3	0.02	
Chromium	0.001	0.002	0.015	586	60	0.05	Below DWS at Source
Copper	0.002	0.007	0.039	566	31	2	Below DWS at source
Zinc	0.003	0.006	0.128	383	19	5	
Non-Hazardous Metalloid							
Arsenic	0.003	0.005	0.021	593	4	0.01	Above DWS at source
Matrix and Minor ions							
Chloride	69	133	637	768	0	250	Above DWS at source
Sulphate	607	912	1731	600	1	250	
Ammoniacal-N	0.2	1.1	15.6	757	11	0.39*	Above DWS at source
Herbicide and Hydrocarbons - µg/l							
Mecoprop	5.8	12.5	33.7	61	77	0.0004 (MRV)	Above DWS at source
Benzene	1.3	1.5	2.0	50	96	0.001 (MRV)	Above DWS at source
Toluene	1.1	1.2	3.7	68	96	0.004 (MRV)	Above DWS at source

DWS from 2016 No. 614WATER, ENGLAND AND WALES, The Water Supply (Water Quality) Regulations 2016 https://www.legislation.gov.uk/uksi/2016/614/pdfs/uksi_20160614_en.pdf, Minimum Reporting Values, MRV concentrations (https://www.gov.uk/government/publications/values-for-groundwater-risk-assessments/hazardous-substances-to-groundwater-minimum-reporting-values#:~:text=o%2Dxylene%20and%20m%2Fp,to%203%20micrograms%20per%20litre)

*Ammonium (as NH_4) DWS 0.5mg/l

All naphthalene data < LOD (number of samples = 55)

This leachate source term is derived from non-inert soil-forming wastes and similar materials, and is also valid for a Landfill Tax Complaint LOI test waste source containing either Transfer / Recovery Site Trommel Fines as well as asbestos wastes co-disposed with the soils.

As it can be seen, by virtue of the collated source term summary presented above in Table 1 that these sites have a separate geochemistry to biochemically derived solutions (i.e. typical landfill leachates with significant concentrations of ammoniacal-N) as the bulk organic content is excluded prior to disposal.

As a geochemically derived liquor, calcium and sulphate are limited by the solubility of gypsum (which equates to approximately 1,500mg/l sulphate and 700mg/l calcium under oxidising to anoxic conditions) and ammoniacal-N is consistently low (95th%ile concentration of 15.6mg/l, median concentration of 1.1mg/l).

Chloride is typically <500mg/l in these sites, with median and average concentrations of 133mg/l and 214mg/l respectively however in localised areas of some sites there may be very short-term increases, or localised anomalous data of greater concentrations, as such the overall dataset 95th %ile concentration of 637mg/l is reported. It is recognised that infrequent or short term “outliers” can skew statistical appraisals but are not reflective of the overall bulk infill chemistry. This can occur for all substances analysed.

Another significant factor for low organic and soil-based wastes is that the primary vector which mobilises heavy metals, *i.e.* as colloidal organo-metallic complexes which additionally are not present. Consequently, metals such as nickel and chromium which are also uniquely present within methanogenic and acetogenic leachates (as compared to other metals which can be present in UK groundwaters and geological strata) are in the case of nickel low within soil disposal sites whilst chromium is invariably absent (60% of all data reported at < LOD).

Copper and zinc data report occasional outliers are reported, these concentrations are insignificant compared to the 2mg/l and 5mg/l DWS. Arsenic is also environmentally low, with concentrations reducing to less than the 10µg/l DWS after a short initial stabilisation period.

In regard to hazardous metals, both cadmium and mercury are below DWS concentrations (95%ile) however it is also apparent that the majority of the dataset (593 samples and 331 samples respectively) are reported at <LOD for 66% and 87% of all samples analysed. Lead is reported above DWS at the 95%ile concentration however it is noted that ~90% of the entire dataset (580 samples) is reported at <LOD (Table 1).

Specific organic substances are rarely reported in soil cells, *i.e.* the majority of substances are reported as "below detection level" or <LOD. Small quantities of mecoprop can be reported, with almost all data reported as less than the 18µg/l EQS. However, it is not reported above 1µg/l for some of the sites evaluated and <LOD for almost 80% of the dataset (61 samples). All other organic substances reported are single occurrences, which are not repeated on consecutive hazardous substance screens.

The proposed source term is considered to be of a "low-pollution" potential compared to putrescible landfill leachates and those already consented, including historic sites located nearby.

3.2 Pathway

The site is fully contained within a natural geological barrier (lower sidewall and basal succession). Sandstone layers where reported are typically less than 1m in thickness and based on visual observation are cemented, with minor, near vertical joints and discontinuities.

These observations are consistent with the Etruria Marl being described effectively a dual property unit, a distinction that is not readily apparent from bulk permeability testing of the unit which returns an *in-situ* permeability of the formation to between $1.5x10^{-11}$m/s and $2x10^{-5}$m/s[1]. However, this upper range is considered to be due to the more permeable intermittent sandstone espleys where hydraulic conductivity ranges from $1.6x10^{-8}$m/s to $1.7x10^{-5}$m/s. with an average hydraulic conductivity of $4x10^{-6}$m/s, with the mudstone units at the lower (10^{-11}m/s) end of the range).

Around the site periphery, interburden / overburden material is present at variable depths / thicknesses. This material provides a significant lateral thickness to the *in-situ* strata at the site boundary.

To the east (borehole log reference BH22-01), 24m of interburden / overburden is recorded, to the north 15m (borehole log reference BH22-02D), to the south / southwest 25.5m (borehole log reference BH22-04D) with 10.6m on the west perimeter location (geotechnical test position, borehole log reference BH22-03). 6.9m was recorded in the base of pit (borehole log reference BH22-

[1] SLR Consulting (2002) Vigo Hydrogeological Risk Assessment

05). Additionally, the lateral thickness of this material is significant with even greater distances from the infill scheme to the associated monitoring points at the edge of the site. Based on the site investigation it is apparent that lateral thickness (as a minimum to the monitoring locations) is between 15m and 135m at BH01, 12m and 55m at BH2S / 2D and 20m and 110m at BH4S / 4D.

3.3 Receptor

Geology

It is the dominance of the mudstone/marl units that led to the BGS describing the Etruria Marl in The Physical Properties of Minor Aquifers in England and Wales[2] as being "poorly productive".

This BGS review, described the Etruria Marl as being composed predominantly of impermeable argillaceous rocks and yields little or no water. Fractures in the 'espley' rocks, however, can yield moderate quantities of water suitable for small-scale agricultural or industrial requirements (Downing et al., 1970; Barrow et al., 1919). Although the 'espley' rocks are generally well cemented, in south Staffordshire they often have a more sandy and porous matrix and may yield a good supply.

The BGS report goes on to state *"Many sandstones and some limestones, particularly those of Westphalian age, are local developments and not laterally persistent. In some cases, thick localised sandstones have an extensive outcrop area through which recharge can occur but thin rapidly down dip and yield little or no groundwater at depth. Where the aquifer horizon has an outcrop area of limited extent, recharge may be insufficient to sustain initially high yields, which decline with time as storage is depleted".*

At Ravenhead, (like at the nearby Vigo Utopia Landfill), the sandstone units do not outcrop at the surface, and therefore falls under the characterisation of *insufficient to sustain initially high yields.*

There are no confirmed lateral relationships or down dip linkages between the sandstone sequences identified during the site investigations. Encapsulated water bearing horizons are not receptors as they are contained within a geological barrier. As such, water contained within this material is not a receptor. However, based on good environmental practice, the water quality will be monitored (if present) albeit there are no requirements for compliance points to be assigned or limits set.

There are no superficial deposits reported at site, as such these deposits (although reported locally) are not a receptor. As such, there is no monitoring of superficial strata.

Interburden / overburden material is present around the site perimeter. This material is not a receptor and hence does not require protective enhancement through the placement of an artificial geological barrier.

[2] Jones, H K, Morris, B L, Cheney, C S, Brewerton, L J, Merrin, P D, Lewis, M A, MacDonald, A M, Coleby, L M, Talbot, J C, McKenzie, A A, Bird, M J, Cunningham, J, and Robinson, V K. 2000. The physical properties of minor aquifers in England and Wales. British Geological Survey Technical Report, WD/00/4. 234pp. Environment Agency R&D Publication 68.

Hydrology

There are no surface water receptors on the site, the adjacent Swan Pool is topographically equivalent to the current surface water settlement pond. As such, this pond is above the infill and hence is not at risk from the scheme. As the site surface water (water collected during operations, and conversely post restoration) is to be collected, managed, and diverted to the enlarged "on site" pond (or secondary pond during infilling) there can be no influence on the adjacent Swan Pool. Off-site flows when discharged, bypass Swan Pool in accordance with the current discharge consent.

The adjacent Daw End Canal is topographically above the site, hence there are no risks from the proposed infill on this potential receptor, the upper profile of the site dips towards the east / northeast as such all potential flows are away from the canal.

4 Requirement for Risk Assessment

4.1 CSM Overview

A simple conceptual site model (CSM) can be constructed for the site, based on the relationship:

Source → Pathway → Receptor

This relationship at Ravenhead Quarry is:

- The Source is leachate within the landfill;
- The Pathway is groundwater within sandstone horizons of the Etruria Formation; and
- The Receptor is the groundwater within sandstone horizons of the Etruria Formation.

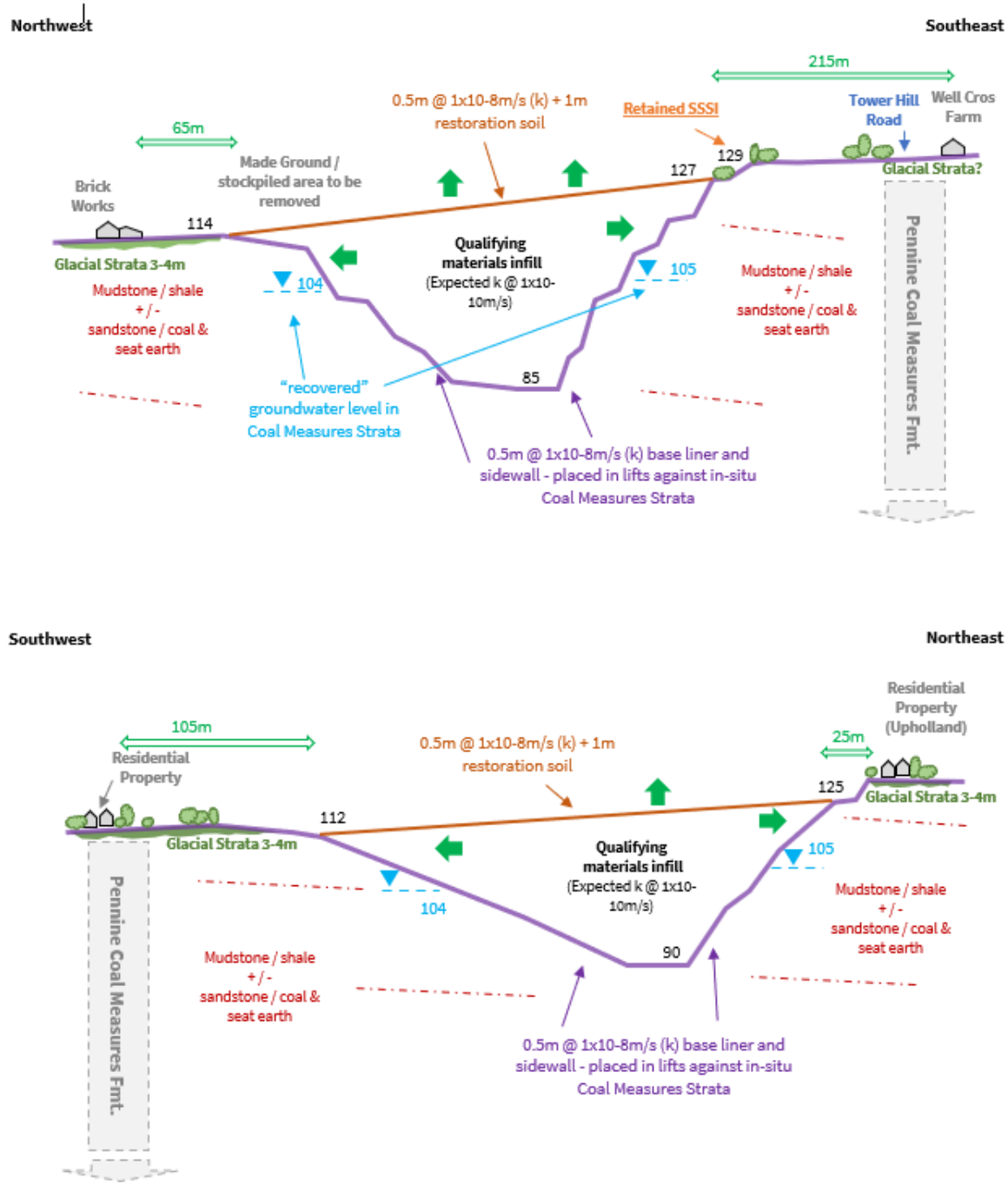
Pathway linkages are purely theoretical – there is no established lateral connectivity between sandstone layers within reviewed borehole logs.

In a downgradient direction, no linkages have been established with any receptors.

- The Pathway is the geological pathway towards a water resource; and
- The Receptor is **a useable water resource** or **baseflow contribution** to a surface water feature.

Site observations have not established any credible linkage to a useable water resource or baseflow to a water receptor. The geological strata dips to the north. northeast hence any "water bearing" or permeable formations (if present) become progressively deeper with distance from the site.

Figure 1 Hydrogeology CSM



4.2 Environmental Data

When reviewing site specific water quality data collected during the baselining activities, it has been established that the water locally has been significantly impacted via off-site sources (ESID, report 5430/BLP/R/006/01, Section 3.8.6). Cross referencing the proposed source term with local groundwater / porewater data is provided in Table 2.

It is apparent that the anticipated source term is not capable of deteriorating local water quality within the interburden / overburden.

Table 2 Source Term Waste Leaching Data (substances above DWS) compared to Local Water Quality (mg/l)

	Soil Infill Site data			Site Groundwater / Porewater Maximum (Interburden / overburden)	Site Groundwater / Porewater Maximum (Etruria Fmt)	Local Site Groundwater / Porewater Maximum	DWS	Comment
	25th %ile	Median	85th %ile					
	mg/l						mg/l	
Non-hazardous Metals								
Nickel	0.007	0.011	0.030	0.199		0.31	0.02	Adjacent to Highfield South (North)
Non-Hazardous Metalloid								
Arsenic	0.003	0.005	0.013	0.103		0.07	0.01	Adjacent to Highfield South (North)
Matrix and Minor ions								
Chloride	69	133	370	11,100		1,400	250	Adjacent to Highfield South (North)
Sulphate	607	912	1,410	1,030		1,100	250	Adjacent to Vigo (Northeast)
Ammonia cal-N	0.2	1.1	5.9	131		100	0.39*	Adjacent to Highfield South (North)
Herbicide - µg/l								
Mecoprop	5.8	12.5	30.8	23.4		100	0.0004 (MRV)	Adjacent to Vigo (Northeast)

Local data obtained from Freedom of Information request; shaded cells denote water quality exceedance of regulatory standards. Site data includes data available from all site monitoring locations.

4.3 The Nature of the Hydrogeological Risk Assessment

In regard to available Environment Agency technical guidance, it is apparent that Ravenhead Landfill (although close to surface water bodies) falls within a category of simple risk assessment:

"It is clear from the conceptual model and the risk screening that the hazards are relatively low and the environmental setting is sufficiently insensitive to negate the possibility of significant impacts (e.g. sites on low permeability strata remote from abstractions and surface waters"

Although there are two modelling approaches that could be taken for the Ravenhead site in regard to the adjacent water bearing systems, modelling is not required for the following reasons.

Etruria Formation

- The first approach would be to consider the site as a hydraulically contained landfill, in which the water levels (pore-water) within the site / infill are below the external groundwater level of the Etruria Formation. It has been established through

environmental baselining that water levels within the Etruria Formation are individual *"to each specific monitoring location*" with no overall lateral connectivity. If there was a coherent and linked water system (with permeability and thickness) to allow the fulfilment of a "water body" classification under the requirements of the Water Framework Directive, then the site would be full of water or conversely would requirement management accordingly.

This is not the case.

- Secondly, if pore-water within the site was to exceed the external groundwater level in the Etruria Formation, then basal seepages could be considered to an underlying receptor or established pathway to a receptor.

  This has not been established or verified at site, with at least 5.5m of *in-situ* clay / marl beneath the base of the site.

Interburden / overburden

There is water present within this material which locally is significantly impacted, water levels are reported at almost ground level, hence the infill could be considered as being "fully hydraulically contained" in this regard. Currently there is a local hydraulic gradient towards the site.

Permeability expectations are $1x10^{-8}$m/s (cross check with pumping trials) and hence meet the minimum directive requirements for a geological barrier between the infill and the natural strata (Etruria Formation) at the site boundary. Lateral thicknesses are in the range between 15m and 135m to the monitoring locations, hence distances to the natural strata are greater.

This material is not considered a receptor, as such there is no requirement for modelling or lining with an AGB for the benefit of environmental protection.

Modelling

As there are no pathways established within the Etruria Formation (Section 4.1) that link to a down gradient receptor, abstraction point or surface water body there is no requirement for quantitative hydrogeological modelling. The interburden / overburden is not a receptor.

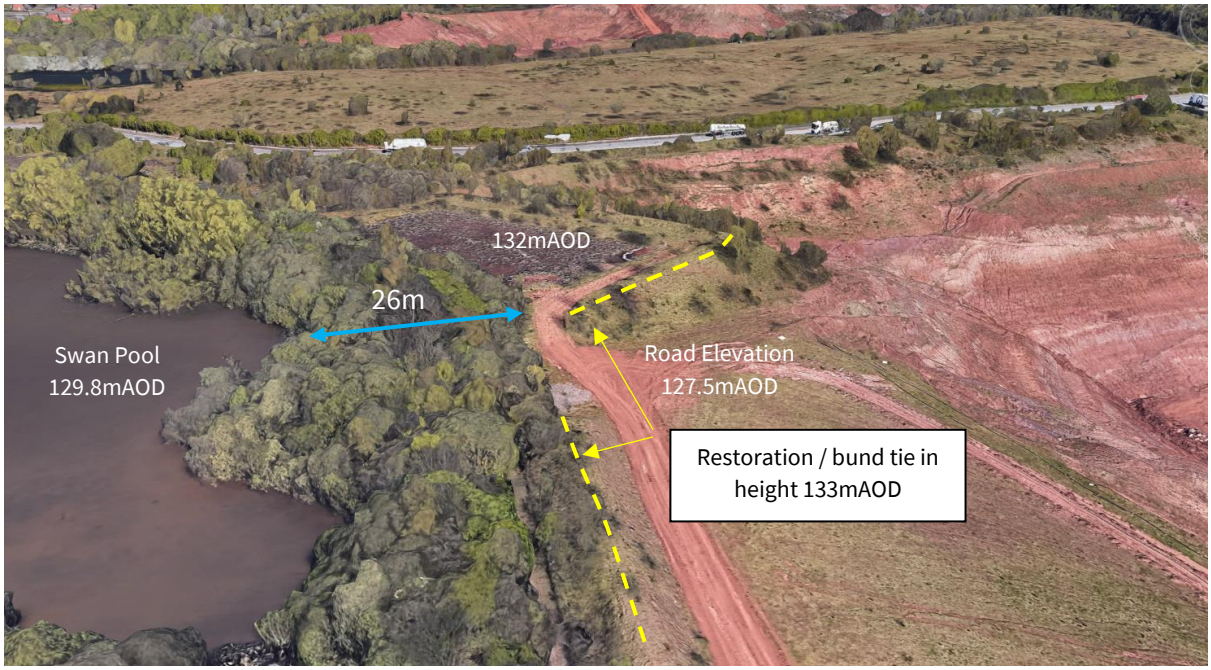
It has been established that the source term is incapable of deterioration of any water bearing system at site, or locally, and as such there is no requirement for leachate collection or management. It has been established within the associated ESID that it is not possible to dewater or control a porewater levels within a soil infill (via underdrainage).

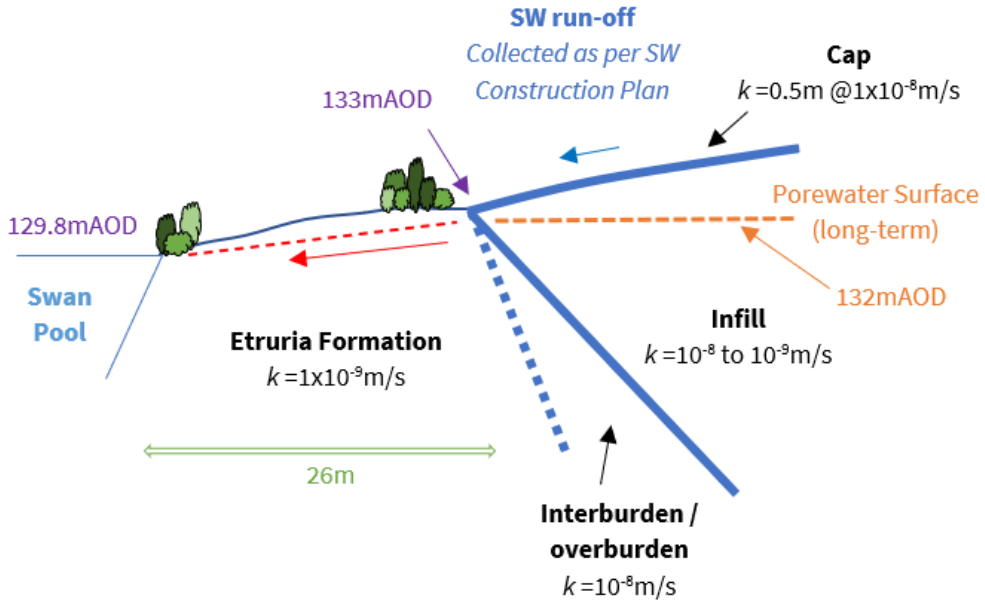
4.4 Lateral Migration to Surface Waters

Leachate / Porewater Seepages

On the eastern boundary of the site, the elevation of the Daw End Canal is above the restoration / infill and hence there are no potential linkages from the site. On the western boundary there is a significant lateral width of land (with extensive tree / shrub cover) between the infill scheme / restoration toe slope and site perimeter. A measured distance of 26m separates the infill from the adjacent Swan Pool. A visual and schematic representation is provided on Figure 2.

Figure 2 Overtopping Surface Water Impact Overview and Schematic Representation





Any potential seepages from the soil / infill are expected to be of a "low volume" (expected waste mass permeability of 10^{-8} to 10^{-9}m/s) and with a restoration surface low point at 133mAOD porewater will be contained by the 0.5m engineered cap/interburden tie-in ($1x10^{-8}$m/s) prior to any transit through the adjacent geological strata towards the receptor.

A direct linkage to Swan Pool is considered to be contained by a lateral pathway of *in-situ* geological barrier with a lateral width of ~26m. The surface level of Swan Pool is 129.8 mAOD.

Irrespective of the sidewall liner and capping surface interface (0.5m @$1x10^{-8}$m/s in addition to restoration soils) un-retarded travel time for porewater seepage from the soil infill at 132mAOD (a maximum possible level, equivalent to containment overtopping) migrating laterally through the

in-situ geological barrier towards Swan Pool (head differential of 2.2m, porosity of 17%, Etruria Formation conservative hydraulic conductivity *k* of $1x10^{-9}$m/s) is ~1,656 years. The scenario described above is represented schematically below in Figure 2 for completeness. This calculation is also conservative, excluding effective porosity of the clay / marl would increase travel times to the receptor to 9,744 years.

Such extended travel times through a significant attenuation barrier (i.e. Etruria Formation Clay / marl) would prevent the potential for pollution to occur, hence there is not considered a risk to the environment from lateral leachate porewater migration through the sides of the site and *in-situ* geological barrier.

Notwithstanding the above, the surface area of Swan Pool is 0.92hectares (9,200 m^2). With a conservative depth estimate of 5m, the volume of water in the pond would equate to 46,000m3 hence there would be considerable dilution potential in the event of direct seepage transport.

If in the event that cap / leachate seepages remain of environmental concern, and if, through the collection of the pore-water / leachate source term data there is any significant deviation from the assumed source term is noted then a collection drain could be considered. The drain would be installed progressively as restoration phasing is completed and would drain to a temporary sump and ultimately a permanent chamber all of which can be dewatered using a suitable pump. The drain would collect porewater from the highest level of waste fill during the operational period allowing collected water to be tested prior to pumping (if pumping proves necessary) to ascertain the most appropriate disposal/re-use route in accordance with the surface water management scheme. The drain would continue to function following the installation of the engineered cap, however there is no expectation that any pumping will be required at this point.

Seepage flux, assessment of environmental risk, application of any associated compliance limits could all be included within an appropriately worded improvement condition based on the collection of site data during the operational period. This would feed into the production of a CQA plan for the design of the sub-cap drain.

Cap Run-off

The site surface water run-off once restored (15.3 Ha) will runoff in a westerly and north-westerly direction towards the enlarged surface water pond (Surface Water Management Plan (07200/SWMP/R00 – 7 Engineering Consultancy, Appendix D of report 5430BLP-003-01).

5 Review of Technical Precautions

The primary technical precaution implemented for the void restoration scheme is through restricting the restoration materials to the QMs. These materials have negligible organic content and a resulting negligible leachate generating potential. This qualitative hydrogeological risk assessment has demonstrated that technical precautions are not required for the restoration of Ravenhead Quarry Landfill using QMs.

Protection is provided for by the properties of a significant thickness of *in-situ* Etruria Formation strata, which acts as a natural geological barrier beneath and to the side of the landfill, albeit off-site contaminant effects on water contained in the interburden / overburden material are recognised locally (primarily to the north).

The report has demonstrated (in conjunction with the ESID) that leachate level (pore-water) control is not necessary and that any substances exiting the site either under a concentration gradient (*i.e.* chemical diffusion) or a mass flux under a hydraulic gradient would not lead to a change in groundwater quality.

It is however, considered possible that a proportion of the incidental rainfall will not infiltrate into the deposited materials and will run-off as surface water. Therefore, some surface water management will be required during the first phase of operations when the quarry floor has been partially infilled / restored.

6 Requisite Surveillance

A monitoring schedule is based on the risk assessment which has demonstrated that provided that the robust waste acceptance control procedures are implemented, monitoring of the leachate and groundwater is unlikely to be necessary.

However, as per previously determined permit applications for equivalent schemes, a monitoring network for off-waste and in-waste monitoring will be proposed (monitoring schedule are proposed in report 5430-BLP-009-01). Spine drains beneath the infill will convey some porewater collection to the monitoring chamber. Monitoring the quality will allow cross-referencing with the assumed source term contained herein.

7 Conclusions

The site is located within a low-risk area, namely a clay / marl pit within Etruria Formation.

It is considered that given the current groundwater quality and the attenuation capacity of the geological barrier that it is highly unlikely that the proposed restoration scheme could discernibly impact on groundwater quality. Consequently, the requirements of the Groundwater Directive (1998) have been met. The nature of the proposed materials and the associated hydrogeological risk is consistent with that for an inert site.

Such sites do not require active management controls and there is not a sensitive underlying water resource. There is not a risk-based justification for implementing active management controls for leachate within the site. However, a monitoring schedule has been proposed in the permit application which will enable the design assumptions to be validated. This monitoring schedule will however include infrastructure capable of being utilised for leachate abstraction should a condition arise where active leachate management is required.

It is considered that the espley / sandstone layers form a transitory position between formally classified unproductive strata (*i.e.* mudstones) and secondary aquifers. It is considered appropriate that given the permeable layers do contain a pore-water, under this scenario they will not fulfil a role as a useable water resource or water body as defined by the Water Framework Directive.

With limited lateral extent and variable thicknesses of these sandstone espley units (many <1m in thickness) which are separated by marls and mudstone; offsets through minor faulting; juxtaposition against lower bulk permeability sequences then water framework directive yield

targets cannot be met as the sandstone layers are not linked to the surface to allow any recharge, conversely they do not link with any receptors (in any direction). Disconnected layers (irrespective of hydraulic properties) only have a "limited" exploitable storage.

The local porewater within the interburden / overburden (particularly to the north), whereby long-term infilling will promote overall flow direction to the north / northwest i.e. consistent with topography indicates that the source term is not capable of worsening the downgradient water quality.

Therefore, the primary potential risk to the environment from leachate is in the event that leachate overtops the sides of the site; hence the future leachate management strategy should be based on this risk pathway. This can be mitigated by the incorporation of a sub cap collection ditch and monitoring sump.

7.1 Compliance with Schedule 10 (Landfill) of the Environmental Permitting Regulations 2010 (update 2016)

The Landfill Regulations have been superseded by the Environmental Permitting Regulations 2010. Both these regulations implement the same underlying Landfill Directive, therefore the justifications for compliance remain the same for both sets of regulations.

The conclusions of this review are that:

The development does not pose a hazard to groundwater and surface water quality, subject to the technical precautions identified with regards to passive controls (*i.e.* engineered containment on the lower exposed sidewall of natural strata) and longer term collection of leachate / porewater at the cap interface is monitored and manged (if required).

The site therefore complies with the necessary Environmental Permitting Regulations.

7.2 Compliance with Schedule 22 (Groundwater Activities) of the Environmental Permitting Regulations 2010 (update 2016)

Protection of groundwater was regulated by the Groundwater Regulations 1998, this regulation implements the Water Framework Directive, which requires that hazardous (formerly List I) substances are prevented from entering groundwater and that List II substances are controlled so as to prevent pollution.

The risk assessment has qualitatively demonstrated that the technical precautions identified and implemented at the site are sufficient to:

- prevent a direct discharge of hazardous substances
- prevent hazardous substances entering groundwater at discernible concentrations; and
- prevent pollution by List II substances.

The risk assessments in association with the monitoring data demonstrate that the site is highly unlikely to have a discernible impact on groundwater quality given the background trends that have already been observed.

The site therefore complies with the relevant requirements of the Groundwater Regulations and the Water Framework Directive.

Appendix A – LandSim

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Ravenhead Quarry Landfill

Environmental Permit Application – Emissions Monitoring & Financial Provision

Booth Ventures Waste (North West) Limited

Report No. K0158-BLP-R-ENV-09-02
March 2023
Revision 02

BOOTH VENTURES

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Document Control

Document:	Environmental Permit Application – Emissions Monitoring & Financial Provision
Project:	Ravenhead Quarry Landfill
Client:	Booth Ventures Waste (North West) Limited
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Disclaimer: Please note that this report is based on specific information, instructions and information from our Client and should not be relied upon by third parties.					

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1 Introduction

1.1 Report Context

This document supports the permit application for the Ravenhead Quarry Landfill Site and summarises environmental monitoring proposed at the Site. Ravenhead Quarry is currently an active quarry, operated by Booth Ventures Waste (North West) Limited, excavating aggregate for the construction industry. This permit application proposes to infill the existing quarry void as a restoration activity. In support of the restoration operation imported wastes with a recoverable composition will be processed to recover aggregates in accordance with the quality protocol approved by the Environment Agency.

The report provides a summary of the potential emissions identified in other parts of the application and details the monitoring regime for the installation taking into consideration the waste types to be accepted at the site. Each type of emission is considered in a separate section of this report.

All monitoring locations described in this report are shown on the accompanying Environmental Monitoring Plan (ESID 12, K0158/4/012). Indicative locations of the proposed monitoring points are provided in Figure 1, with the exception of the in-waste gas monitoring probes which will be designated and installed upon completion of the landfilling.

Figure 1 Indicative locations of proposed monitoring points

In waste gas probes as described will be provided on an updated Environmental Monitoring Plan post installation; GW (Groundwater) blue; Groundwater / Gas (combined) BH04/23 also depicted as blue, in waste sampling from the leachate monitoring wells (LMP1). Gas monitoring installations targeted for monitoring adjacent to residential receptors (yellow).

At the time of writing, the combined groundwater / gas installation (BH04/23) and gas monitoring locations LFG01/23 and LFG02/23 are proposed. These wells require the agreement of Natural England as they fall within the current geological SSSI area. Baseline data has been collected from BH02A/19, BH03/19 and BH01/19 in advance of application submission, further details are provided in report K0158-BLP-R-ENV-03-02 (ESID).

2 Landfill Gas

2.1 Monitoring Point Locations

The risks posed by landfill gas emissions are assessed in detail in the LFGRA (report reference K0158-BLP-R-ENV-07-02) which forms part of this permit application. A programme of landfill gas monitoring will be undertaken as follows:

- In-waste landfill gas monitoring
- Perimeter landfill gas monitoring.

In-waste gas monitoring points will be installed through the waste following the completion of the restoration, with a minimum of two points per hectare. The cap area is approximately 4.7ha hence 10 probes are proposed. Due to number of gas monitoring points / probes they are not shown on the accompanying drawing ESID 12. They will be installed post completion of infilling & restoration.

The accompanying Environmental Risk Assessment (report reference K0158-BLP-R-ENV-04-02) and LFGRA (report reference K0158-BLP-R-ENV-07-02) have outlined the considerable pathway lengths to the nearby residential properties (to the west and southeast) which are at a considerable distance from the infill scheme (~120m and ~200m respectively). The closest properties to the northeast are located ~25m from the infill scheme, these are part of the Up Holland residential area of Highmeadow Road, along with Broadacre, Vale Croft and Fieldview (Figure 1).

The Site is contained within the Pennine Lower Coal Measures strata thus there is a potential for alternative sources of gas locally (mine gas).

Lateral migration of any ground gas produced from the Qualifying Material waste through the *in-situ* strata will encounter a relatively high rebounded water table (post infilling) and predominance of mudstone geology. Notwithstanding the above, gas production is considered negligible if the infilled wastes are only those outlined within the application (with no putrescible content), additionally the available geological records have indicated the presence of low-permeability clay (at surface) in the residential areas to the northeast, southwest and in the area of the brickworks.

As such, the proposed landfill gas monitoring regime for the site are detailed in Table 1 and Table 2 below.

Table 1 In-waste Gas Monitoring Schedule

Monitoring Point	Monitoring Frequency		
	Operational	Post-Operational	Parameter
In-waste gas monitoring boreholes / probes RQL-GP01 to RQL-GP10	N/A	Monthly	Methane, Carbon Dioxide, Oxygen and Gas Balance (% v/v), Gas Flow (l/hr), Relative pressure (mBar), Atmospheric Pressure (mBar) Water level and base level

The surface area for the site is 4.7 Ha, hence 10 probes are proposed.

Table 2 Perimeter Gas Monitoring Schedule

Monitoring Point	Monitoring Frequency		
	Operational	Post-Operational	Parameter
At landfill gas monitoring boreholes shown on drawing number ESID 12 (K0158/4/012) *Existing* BH01/19, BH02A/19, BH03/19 *Proposed* BH04/23, LFG01/23, LFG02/23	Monthly	Monthly	Methane, Carbon Dioxide, Oxygen and Gas Balance (% v/v), Gas Flow (l/hr), Relative pressure (mBar), Atmospheric Pressure (mBar)
	Quarterly	Quarterly	Water level and base level

The proposed monitoring location LFG01/23 will monitor at the closest location to the nearby residential properties from the infilling scheme.

2.2 Action Plan

An action plan has been developed to respond to any significant changes or trends in the monitoring data. The action plan is to be implemented by the Site Manager, or an appropriate nominee, in the event of the following:

- Methane concentrations in the perimeter boreholes breaching the permit limit (to be set based on background data obtained during the determination period);
- Abnormal, adverse trends in monitoring data;
- Reported events (e.g. odour complaints);
- Confirmed migration events; and
- Confirmed adverse impacts on local air quality.

Further details (including maintenance of infrastructure) are provided in report K0158-BLP-R-ENV-07-02.

Operator Response

If any of the events identified above occur, the following course of action will be implemented iteratively until the cause of the issue has been identified and any adverse effects have ceased or been remediated (times are cumulative from date of detection / non-compliant gas concentration).

- Report to the Environment Agency in accordance with the permit if the compliance level is exceeded and on progress with any resulting actions detailed below.
- Review the monitoring data to identify any other associated rising trends in perimeter methane / carbon dioxide concentrations in the context of known background processes and seasonal / cyclic trends (week 1). Repeat the gas monitoring as soon as possible but no later than 7 days to confirm the reproducibility of data. If the repeat reading is below the compliance / action level then no further investigations are required (week 1).

- Review the in-waste monitoring data to identify if gas production has increased in conjunction with reviewing the historical data set for trends which may indicate an increase in gas production (week 2).
- If in-waste gas production is within its normal range then a review of alternative sources / causes of ground gas production will be instigated. This will include changes to site engineering e.g. capping or lining, agricultural practices outside the site boundary such as manure spreading or drainage works (week 3).
- If migration is persistently observed in a specific borehole the monitoring data will be reviewed along with the in–waste gas monitoring data and changes implemented as required (weeks 4-6).
- The surrounding area will be checked for signs vegetation die back (week 7).
- If elevated levels continue, the area of the migration will be audited to establish potential remediation works to be carried out if required (week 8 - 10).

In the unlikely event that remedial action is required, a proposal will be provided to the Environment Agency for approval (week 12).

3 Groundwater

3.1 Monitoring Point Locations

The applicability and extent of the groundwater monitoring is discussed in the Hydrological Risk Assessment (report reference K0158-BLP-R-ENV-06-02.) that accompanies this application. Assessment has been made that takes into consideration the proposed waste types to be accepted at the site and the reduced risk of environmental impact.

The site is located within a geological setting of Coal Measures strata, a system comprising of interbedded sandstones, mudstones and coal seams.

Although the groundwater levels are currently suppressed and are lowered (to allow for the final excavation of winnable reserves), they will be allowed to recover in accordance with the information provided in the stability review (report K0158-BLP-R-ENV-08-02).

The expectation is that post dewatering, groundwater direction will be to the west / northwest consistent with topography. The inclusion of the additional monitoring locations outlined on Figure 1 will ensure the site accords with the requirement of LFTGN02 irrespective of groundwater flow direction).

3.2 Groundwater Monitoring

The groundwater within the Coal Measure strata will be monitored for levels and for quality from the existing and proposed groundwater monitoring points. Groundwater level monitoring will be conducted monthly whilst the site is operational, and quarterly after closure of the site.

A monitoring regime has been proposed as identified in Table 3 below.

It is proposed that the site should continue to be monitored for a period of 10 years after completion of the restoration programme (consistent with similar schemes that have received Environment

Agency approval). This aftercare period is based on a conservative increase to the general aftercare duration requirements for an inert landfill site, the closest analogue to the proposed scheme.

The post-closure monitoring regime will be presented in the site Closure Plan to be submitted to the Environment Agency once disposal activities have ceased.

Table 3 Groundwater Monitoring Schedule (Coal Measures Formation)

Location	Parameter	Units	Limits	Frequency
Downgradient BH01/19 BH04/23 Upgradient BH02A/19 BH/03/19	Water Level	mAOD	none	Quarterly
	Dip to base	mAOD	none	Annually
	NH_4-N, TOC, pH, EC, Cl, SO_4, Cd Pb	mg/l	none	Quarterly
	Ca, Mg, Na, K Alkalinity, Cd, As, Pb Cr, Cu, Ni, Zn Fe, Mn	mg/l	none	Annually
	Hazardous substances detected in leachate	n/a	none	Annually

Proposed compliance limits are detailed in report K0158-BLP-R-ENV-06-02. Monitoring should be augmented at the gas installations (if water is present) on an annual basis for completeness (LFG01/23 and LFG02/23).

3.3 Groundwater Compliance Limits

The Hydrogeological Risk Assessment (HRA, K0158-BLP-R-ENV-06-02) indicates that there will be no discernible discharge of Hazardous and Non-Hazardous substances to groundwater from the proposed infilling scheme. Despite the low risk posed by the proposed landfill to groundwater it is intended to monitor groundwater quality to ensure that during the operational and post closure phases of the landfill, no actual detrimental effects to the environment occur.

Any groundwater quality data should always be viewed in the context of the available background quality data obtained prior to infilling. Environmental Assessment Limits (EAL's) have been proposed in the HRA accordingly based on baseline monitoring data.

3.4 Groundwater Action Plan

Should the compliance limits be exceeded, actions will be taken in accordance with the site EMS procedures. The action plan is summarised below, and actions should be selected as appropriate:

- The result will be confirmed by the laboratory or the sample re-tested if deemed necessary;
- The Environment Agency will be informed under the conditions of the Permit;
- Exceedance confirmation through repeat sampling;
- Review monitoring data to establish significance and apparent trends;
- Review as necessary, management and operations procedures and implement any actions if exceedance is considered significant risk to the environment;

- If exceedances are continued, the conceptual model and ultimately the HRA will be reviewed;
- If the risks are unacceptable, procedures will be establish for implementing permanent corrective measures.

4 Surface Water

4.1 Monitoring Point Locations

As outlined in reports K0158-BLP-R-ENV-01-02 and K0158-BLP-R-ENV-03-02 and K0158-BLP-R-ENV-06-02, the nearest watercourse is the Dean Brook located approximately 1.25km east northeast. As such, there are no surface water receptors and hence surface water is not at risk from the proposed infilling scheme. Incident precipitation and de-watered groundwater will continue to be discharged from the quarry base to foul sewer in accordance with the extant consent.

4.2 Surface Water Quality

There is no surface water quality for review.

4.3 Surface Water Compliance Limits

There are no requirements for surface water compliance limits.

4.4 Surface Water Action Plan

As no compliance limits for the site are proposed, there is no requirement for an action plan.

4.5 Restoration Run-Off and Surface Water Management

During infilling incident precipitation that falls on the waste within the contained area will be retained and within the contained area. If removal of surface water from the contained area is required it will be tested to confirm that it meets the appropriate limits of either the extant foul sewer consent or the surface water sewer consent. If not suitable for either it will be removed by tanker.

Further details on surface water management are included in the twin tracked Planning Application (document reference 07209/SWMP/R00). A surface water flow from restored areas will be diverted to surface water sewer in accordance with a subsequently agreed discharge consent.

5 Leachate

5.1 Monitoring Point Locations

The applicability of landfill leachate monitoring is discussed in the accompanying HRA (K0158-BLP-R-ENV-06-02) to this variation application. The low permeability nature of the waste types intended for deposit should result in minimal leachate generation in the site. The leachate strength is also expected to be weak due to the anticipated low leachability of the waste. The low-risk potential explained in the HRA has informed the monitoring regime proposed for the site.

Leachate level and quality will be monitored from the proposed leachate monitoring point, which will be constructed up from the base of the site. There will be a singular leachate monitoring well at the centre of the landfill cell, a target pad will be installed adjacent to the well so that a replacement can be installed if required in the future (drawing ESID 7A and 7B). A monitoring schedule is proposed in Table 4.

Table 4 Leachate Monitoring Schedule

Location	Parameter	Units	Limits	Frequency
LMP01	Water Level	mAOD	none	Quarterly
	Dip to base	mAOD	none	Monthly during infilling then Annually
	pH, EC Cl, SO_4, NH_4-N	mg/l	none	Quarterly
	TOC Ca, Mg, Na, K Alkalinity, TON Cd, As, Pb Cr, Cu, Ni, Zn Fe, Mn	mg/l	none	6-monthly
	Hazardous substances	n/a	none	Annually

The indicative location of the well is shown on ESID 7A and ESID 12 (K0158/4/012) and indicatively in Figure 1, monitoring will be conducted as per Table 4. No leachate level limits will apply.

5.2 Leachate Quality

Leachate Quality (pore-water) will be analysed to the specification and frequency detailed in Table 4. The frequency of the leachate monitoring will be reviewed as more data is obtained or when leachate composition can be shown to be more consistent.

Following the installation of an engineered cap over the infill (i.e. non-operational), the frequency of the hazardous substance screen will be reduced to once every four years.

6 Amenity Monitoring – Dust

6.1 Monitoring Point Locations

Quantitative dust monitoring will be undertaken from three dust monitoring points quarterly for 12 months, following issue of the permit. These locations are positioned adjacent to the sensitive receptors located at the site boundary.

6.2 Dust Quality

Deposited and directional dust is monitored using 'frisbee' deposition gauges in accordance with the method specified in the Environment Agency guidance document M17. Each gauge is analysed for total dust mass (mg), deposition rate (mg/m^2/day), directional dust (8 compass points), and particulate characterisation (e.g. carbonaceous matter, silicon rich, general dirt, calcium rich etc.).

Table 5 Dust Monitoring Schedule

Location	Parameter	Units	Action Level	Frequency	Method
D1, D2 & D3	Deposited Dust	mg/m^2/day	none	Quarterly	As specified in the Environment Agency Guidance document M17

6.3 Dust Compliance Limits

No compliance limits are proposed for dust. Environment Agency guidance document M17 states monitoring results at mass deposition gauges are usually compared with a 'complaints likely' dust guideline of 200 mg/m^2/day^{-1} the limit being applied to the individual sample and not the annual average value. This has been proposed as the action level for the site. If elevated readings are recorded the below action plan will be implemented.

6.4 Dust Action Plan

In the unlikely event that unacceptable dust emissions arise from the site, as indicated by the quantitative monitoring detailed in Table 5, one or more of the following remedial actions will be undertaken:

- Operations identified as generating unacceptable emissions of dust will be reduced or suspended until effective remedial actions have been taken or weather conditions resulting in the fugitive emissions have moderated;
- Additional dust suppression may be employed by spraying water onto affected areas or stockpiles;
- On site vehicle movement routes may be reconsidered with regard to location (i.e. relocating further from the receptor at risk), speed limits may be reduced, or surfaces and gradients altered;
- Additional inspection of vehicles may be undertaken to ensure adequate covering of loads arriving on site and cleanliness of wheels when leaving site;
- All vehicles will pass through the wheel wash facility and additional wheel cleaning may be employed if required, such as a mobile pressure washer;
- Waste handling procedures may be altered and waste acceptance procedures reviewed, such covering dusty wastes on deposit, or stop accepting problematic wastes; and
- Additional quantitative monitoring may be implemented, if persistent complaints are received and the corrective actions above have not resolved the problem.

A record relating to the management and monitoring of dust will be maintained in the site log. This record will include the following details:

- A record of all dust events including date, time and the cause of the problem;
- A record of all complaints;
- Details on the corrective action taken and any subsequent changes to operational procedures.

7 Financial Provision Expenditure Plan

The financial provision proposed for the site has been calculated in accordance with the Environment Agency document 'Guidance on Financial Provision for Landfill (EPR5.02.2, 2011)'.

The format of this report and associated Financial Provision Calculations (Appendix A) have been utilised in previous permit applications and subsequently approved by the Environment Agency.

The spreadsheet of costs presented in Appendix A sets out the financial provision analysis for the site. Two sets of figures are provided, the:

- annual expenditure in the post operational phase; and
- financial provision needed for each year of the post operational phase of the site to completion.

7.1 Aftercare Period

Section 4.4 of the Environment Agency guidance quoted above contains guidance on the determination of an appropriate aftercare period, which states:

"For landfills for hazardous and non-hazardous waste we consider it appropriate that you estimate detailed costs for an aftercare period of 60 years, with a contingency fund available thereafter. We consider this to be a reasonable period during which you are likely to have to maintain operational controls over the site, in terms of leachate and landfill gas management. It also represents a period over which costs can be determined with a reasonable degree of accuracy and after which detailed estimates become less and less meaningful. ***Shorter periods may be agreed*** *where you can demonstrate an effective mechanism for rapid stabilisation of the landfill mass (e.g. a system for the introduction of leachate back into the waste mass with necessary management infrastructure and procedures in place), which we have approved."*

The Landfill Gas Risk Assessment (K0158-BLP-R-ENV-07-02) and Hydrogeological Risk Assessment (K0158-BLP-R-ENV-06-02) submitted as part of this permit application, consider the proposed landform and predicted waste volumes, types and associated emissions.

The waste types proposed to be accepted are restricted to Qualifying Materials, these are wastes with very low / negligible pollution potential. The risk assessments support the conclusion that the risk of landfill gas and leachate generation from the deposition of the proposed waste types can be considered negligible and there are no short- or long-term requirements to collect or manage leachate or landfill gas.

Taking the findings of these risk assessments and as previously agreed with the Environment Agency at similar permitted sites, it is considered that with appropriate environmental controls and monitoring, a 10 year aftercare period is sufficient for stabilisation to be achieved.

7.2 Environmental Monitoring

Environmental monitoring costs have been calculated to include all sub-contracted costs (e.g. chemical testing, labour etc.) and are based on prices obtained in the commercial market place by the operator.

The environmental monitoring costs are based on similar permitted schemes at other Qualifying Material Sites and are summarised in Table 6. In-waste gas monitoring points will be retro installed

following the completion of the capping and restoration. The installation costs for the in-waste gas points are included in the provision. The cap area is approximately 4.7 ha hence 10 probes are proposed.

The post-operational monitoring costs have been calculated for this provision and are outlined in Table 1 below.

Table 6 Monitoring Costs - Annual

Item	Cost	No of points	Total No. per year	Annual Cost
Groundwater Quarterly Suite (4 x per annum)	£10	4	16	£160
Groundwater Annual Suite (additional cost to the quarterly suite) (1 x per annum)	£45	4	4	£180
Groundwater Hazardous Substances (additional cost to the quarterly and annual suite) (1 per annum)	£160	4	4	£640
Leachate Quarterly	£10	1	4	£40
Leachate "6-monthly"	£45	1	2	£90
Leachate Hazardous Substance (annually)	£160	1	1	£160
Sampling Visits	£300	n/a	12	£3,600
Dust monitoring (4x per annum)	£325	3	12	£3,900
Annual Monitoring Report	£950	n/a	1	£950
			Total	**£9,720**

Appendix 1 of the Agency's Financial Provision guidance states that monitoring boreholes have a design life of 50+ years. No provision has been made for borehole replacement however a provision of £200 per year has been provided for borehole maintenance throughout the post-closure period. This includes provision for new caps and valves and de-silting if required.

A sum of £3,000 has been included in the provision for the completion of the final surrender report.

7.3 Capping and Restoration

The phasing of the site consists of one singular cell, which will be constructed, filled, capped and restored. Phasing details and final restoration contours on drawings ESID 5B and ESID 6.

The site will be progressively constructed, filled, capped and restored. As each area / phase is being filled. It is assumed that 20% of the total cap area will require placement in the final year of operation approximately 1 hectare.

Capping costs for the final phase of capping has been calculated at £5 per m^2, e.g. equivalent to 500mm at k=1x10^{-8}m/s (consistent with similar permitted schemes) equating to a provision of £50,000.

Maintenance of capping in post-closure is specific to repairs to engineered capping. Maintenance costs equate to £200 per hectare per year as per Environment Agency guidance. The total capped area will be approximately 5 hectares; therefore the maintenance cost is £1,000 per year. An

allowance of £500 per annum has been made for the maintenance of surface water ditches in the restoration scheme and this is included in the overall cap maintenance provision.

A provision of £500 has also been allocated for each of the 3 in-waste gas monitoring points to be installed following the final capping area of the site. This equates to £1,500.

7.4 Miscellaneous Provision

This section of the provision will provide details on miscellaneous items not covered under the previous section headers.

Maintenance and Security

The potential for unauthorised access minimal. Consequently, a figure of £500 per year is assumed appropriate for general site security and maintenance; this includes provision for the repair of sections of stock proof fencing surrounding the site (50 metres of BS EN 10244 Class A fencing including labour for a day).

Topographical Surveys

A sum £300 per year has been allocated for annual topographical surveys of the site.

7.5 Specific Events

Provision has been made for £3,200 for dealing with any specified event which requires additional expenditure to prevent harm to the environment. Specified events that although very unlikely to occur are detailed in Table 7 below.

Table 7 Possible Specified Events and Solutions

Likelihood	Relevant Event	Remedial Action	Comment /Cost Estimate
Low	Damage to gas monitoring wells on restored areas.	Seal and level or replace if required in accordance with industry guidance.	Replace gas monitoring point estimated cost £500
Low	Perimeter borehole damage	Seal and level or replace if required in accordance with industry guidance.	Replace external monitoring point estimated cost £750
Low	Leachate monitoring point damage	Seal and level or replace if required in accordance with industry guidance.	Re-drill leachate monitoring point estimated cost £1,500.
Very low	Leachate accumulation	Removal of excess leachate from a leachate monitoring point.	Tanker hire to collect leachate and dispose of 30m^3 at £15 per m^3, totalling £450

Financial provision for the site based on the above is calculated at £198,000 for the 10-year aftercare period.

Appendix A – FP Calculation

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NOISE MANAGEMENT AND MONITORING SCHEME

1. Noise Sources

The following sources of noise have been identified that may be transmitted beyond the quarry boundary, and affect the nearest receptor locations:

- mineral extraction and processing activities;
- export of material by HGVs and;
- restoration/soil placement.

2. Noise Reduction Methods

Employment of best practice measures, including the following, will mean noise levels at surrounding receptor locations will be reduced to a minimum:

- all plant and equipment to comply with EU noise emission limits;
- all plant and machinery to be regularly maintained;
- internal haul routes to be well maintained and have as low a gradient as possible;
- use of 'quieter option' vehicle reversing alarms;
- unnecessary revving of engines to be avoided, and plant to be switched off when not in use;
- drop height of materials onto vehicles to be minimised;
- avoiding the quietest times of day (lowest ambient conditions) when carrying out the noisiest activities whenever practical; and
- the start-up plant and vehicles sequentially rather than all together.

3. Response to Complaints

The Company will take all noise complaints seriously and:

- record all complaints received;
- react swiftly to investigate complaints attributed to quarry operations;
- implement remedial measures if noise complaints are validated and monitoring results are measured in excess of planning permission limits.

4. Noise Monitoring Locations

Noise monitoring will be undertaken at the following or equivalent receptor locations on a regular basis of not less than once per year (while the quarry is operational):

- MP1 – In a field adjacent to north-eastern border of Ravenhead Quarry and considered representative of the closest residential properties on Broadacre and Vale Croft;
- MP2 – In a field to the south of Ravenhead Quarry site approximately 20 metres north-west of 234 Tower Hill Lane and considered representative of isolated properties on Tower Hill Road;
- MP3 – In a field adjacent to the south-west of Ravenhead Quarry site approximately 10 metres east of 87 Chequer Lane and considered representative of surrounding residential properties on Chequer Lane; and
- MP4 – In the disused area to the north-west of Ravenhead Quarry and considered representative of the closest residential properties to the north of the site.

The noise monitoring locations are illustrated on **Figure 66721.ES.011**.

5. Noise Monitoring Protocol

Noise monitoring should be undertaken during normal operating conditions. Measurements shall be undertaken during suitable meteorological conditions (i.e. no precipitation, winds below 5 m/s and temperatures above 3 degrees C.

The noise monitoring equipment shall be sited in free-field conditions (i.e. no precipitation, winds below 5 m/s and temperature above 3 degrees C).

Noise monitoring will be undertaken by a suitably qualified person and in accordance with good acoustical practice, care being taken to avoid the effects of local acoustic screening and acoustic reflections.

The sound level meter will be programmed to log noise levels including the L_{Aeq} parameter. Care will be taken to exclude extraneous sources of noise from outside the quarry boundary such as road traffic and domestic noise.

Results will be recorded on a suitable log sheet.

6. Noise Limits

Noise limits will be those conditioned by the relevant planning consent.

7. Reporting

Details of noise monitoring undertaken will be sent to the Mineral Planning Authority at:

Lancashire County Council
PO Box 78
County Hall
Fishergate
Preston
Lancashire
PR1 8XJ

The following information will be included:

- monitoring locations;
- dates and times of measurements;
- equipment type (including serial numbers) used at each location, including details of calibration;
- name and position of person undertaking the measurements;
- details of ongoing site activities throughout the monitoring period;
- details of all discernible noise sources;
- results of all acoustic measurements;
- comparison of measured levels with the noise limits, and resultant conclusion; and
- any other relevant information.

8. Noise Exceedance Procedure

If the results of monitoring indicate that the noise limits are being exceeded at one or more noise sensitive property, the site manager will be notified and advice will be provided to reduce noise levels so far as practicable. The remedial actions taken in these circumstances must be noted and reported to the Mineral Planning Authority.

Nature and Heritage Conservation

Screening Report: Bespoke Waste

Reference	**EPR/LB3107GH/A001**
NGR	**SD 51260 04790**
Buffer (m)	**150**
Date report produced	**11/01/2023**
Number of maps enclosed	**2**

The nature and heritage conservation sites and/or protected species and habitats identified in the table below must be considered in your application.

Nature and heritage conservation sites	Screening distance (m)	Further Information
Sites of Special Scientific Interest (SSSI)	1000	Natural England
Ravenhead Brickworks		
Local Wildlife Sites (LWS)	200	Appropriate Local Record Centre (LRC)
Pimbo Lane Pit		

The relevant Local Records Centre must be contacted for information on the features within local wildlife sites. A small administration charge may also be incurred for this service.

Please note we have screened this application for protected and priority sites, habitats and species for which we have information. It is however your responsibility to comply with all environmental and planning legislation, this information does not imply that no other checks or permissions will be required.

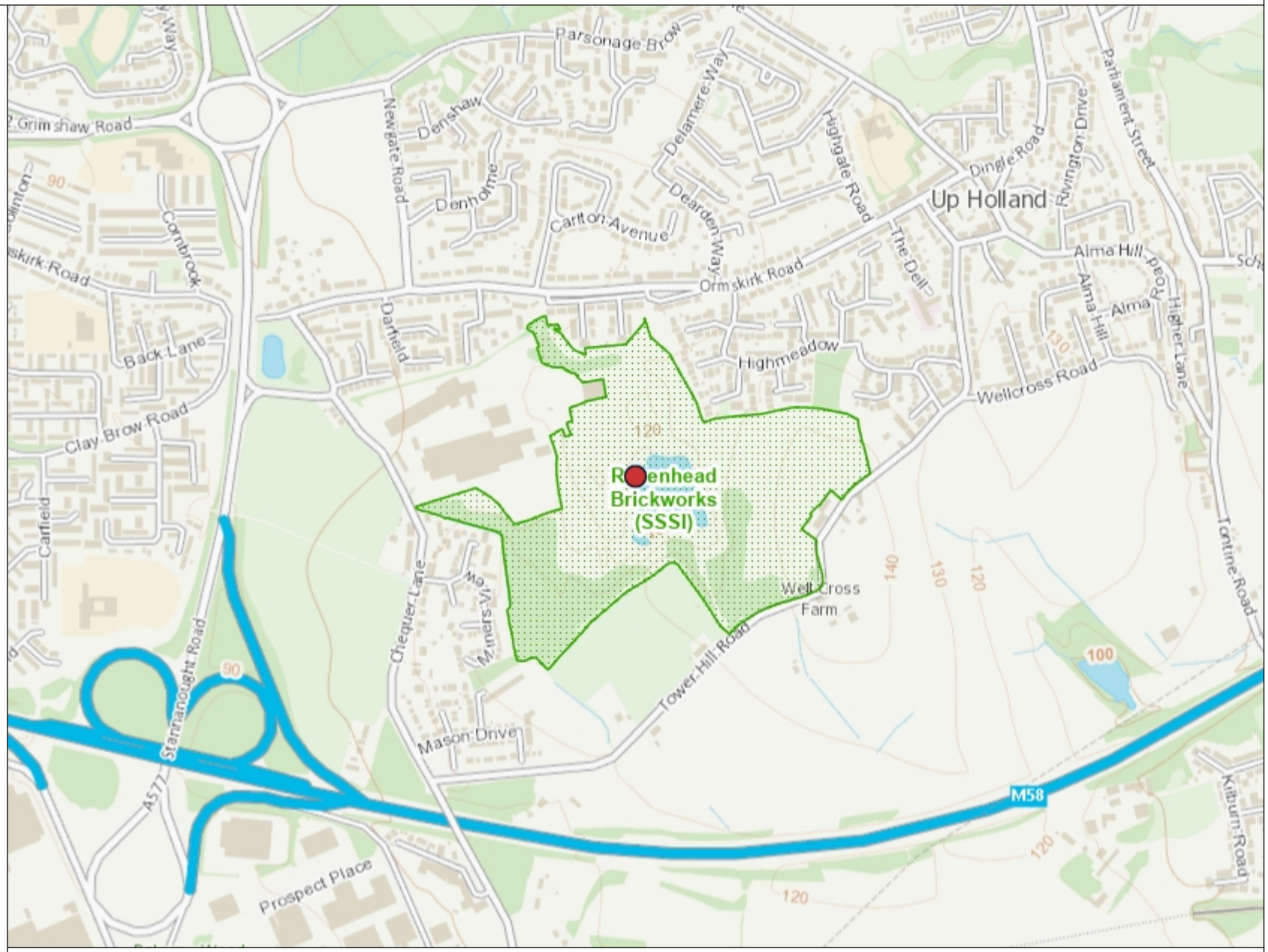
Please note the nature and heritage screening we have conducted as part of this report is subject to change as it is based on data we hold at the time it is generated. We cannot guarantee there will be no changes to our screening data between the date of this report and the submission of the permit application, which could result in the return of an application or requesting further information.

Sites of Special Scientific Interest

Environment Agency

Legend

SSSI (England)



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Metres

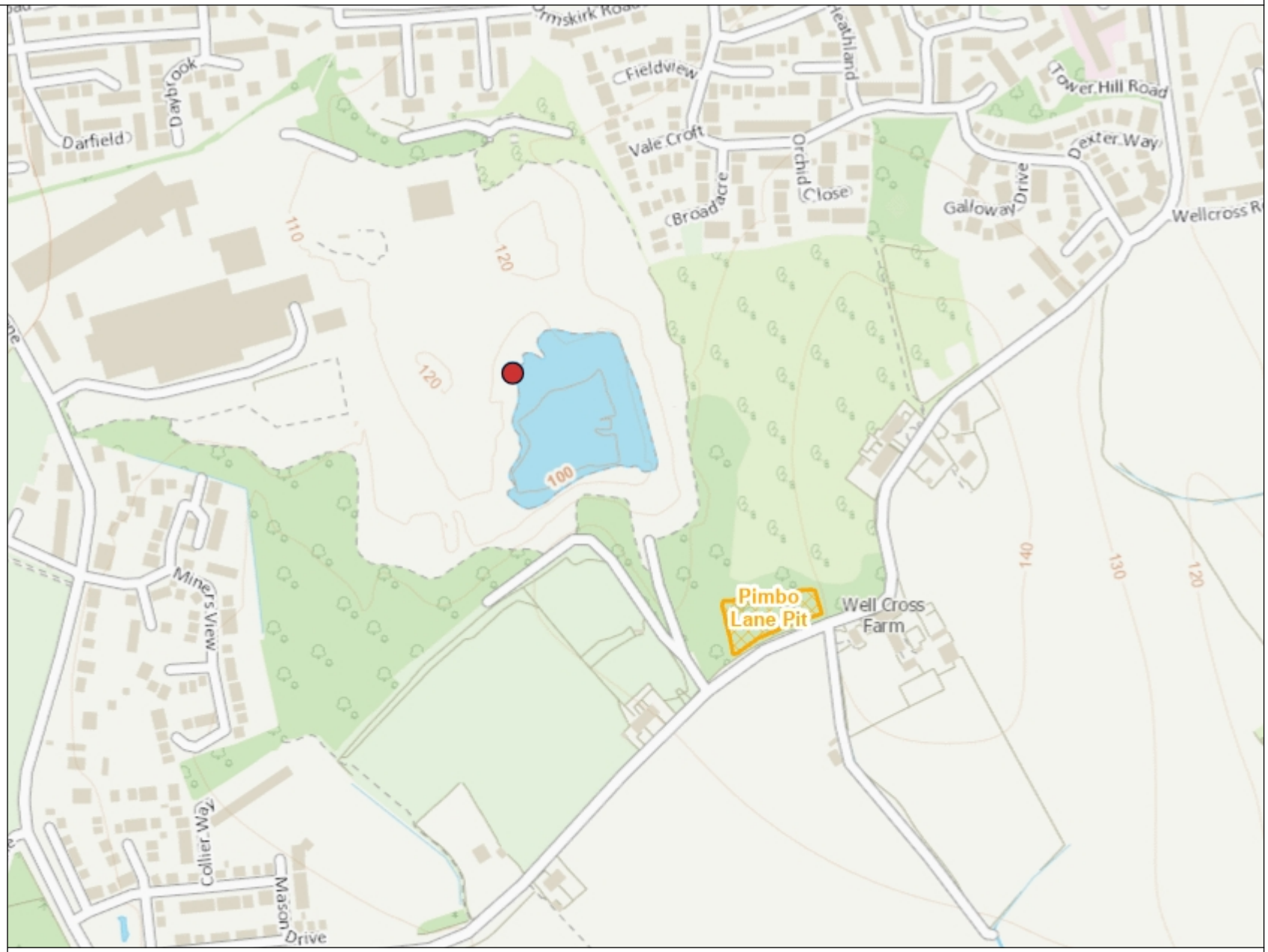
N W E S

Local Wildlife Sites

Environment Agency

Legend

Local Wildlife Sites



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0 125

Metres

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RAVENHEAD QUARRY LANDFILL,
SKELMERSDALE, LANCASHIRE
STABILITY RISK ASSESSMENT

Report No K0158-R-08-02

8th March 2023

Prepared For:	**Prepared By:**
Booth Ventures Limited	***Plough Geotechnical Ltd*** Elysium Chambers 7 Telford Court Chestergates Chester CH1 6LT

DOCUMENT INFORMATION AND CONTROL SHEET

Document Status and Approval Schedule

Report No.	Title
K0158-R-08	Ravenhead Quarry Landfill, Skelmersdale, Lancashire Stability Risk Assessment

Issue History

Version	Status		Signature	Date
01	Not used			
02	draft	**Prepared By** A. Binns BSc CEng FICE		08.03.2023

DISCLAIMER

Plough Geotechnical Limited completed this consultancy contract based on a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill, and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget, the degree of manpower and resources allocated to the project as agreed.

Plough Geotechnical Limited cannot accept responsibility to any parties whatsoever, following the issue of this report, for any matters arising that may be considered outside the agreed scope of works.

This report is issued solely to the client and Plough Geotechnical Limited cannot accept any responsibility to any third parties to whom this report may be circulated, in part or in full, and any such parties rely on the contents at their own risk.

RAVENHEAD QUARRY LANDFILL, SKELMERSDALE, LANCASHIRE STABILITY RISK ASSESSMENT

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TABLES (in text)

Figures (in text)

APPENDICES

RAVENHEAD QUARRY LANDFILL, SKELMERSDALE, LANCASHIRE STABILITY RISK ASSESSMENT

1. INTRODUCTION

1.1. Report Context

1.1.1. Ravenhead quarry (owned Ibstock Bricks Ltd) has been worked for the feedstock for the brick manufacture. Over time the brickworks has moved its source from the quarry to importation and subsequently, Booth Ventures Ltd has taken over excavations within the quarry to supply aggregates for the construction industry. Booth Ventures Limited intend to infill and restore the quarry void and the purpose of this report is to provide an assessment of the stability of the various stages of the operations.

1.1.2. The proposals are as follows:

- Excavation in the base from the current level of about 90 m OD to a potential minimum level of approximately 85 m OD.
- Installation of a suitable engineered barrier (0.5m clay) to the base and sidewalls
- Landfilling using non-hazardous and similar wastes (ie Qualifying Materials Order Wastes).

1.1.3. Plough Geotechnical Ltd (PGL) was commissioned by ByrneLooby (BL - Booth Venture's agent) to carry out a Stability Risk Assessment (SRA) on behalf of Booth Ventures to support the proposals.

1.1.4. This report discusses:

- the slope stability of the proposed excavation down to 85 m OD
- the slope stability of the proposed waste during the works
- the slope stability of the proposed side slope liners during the works
- the slope stability of the proposed restoration
- the stability of the proposed basal liner resisting basal heave during pumping and placement of waste.

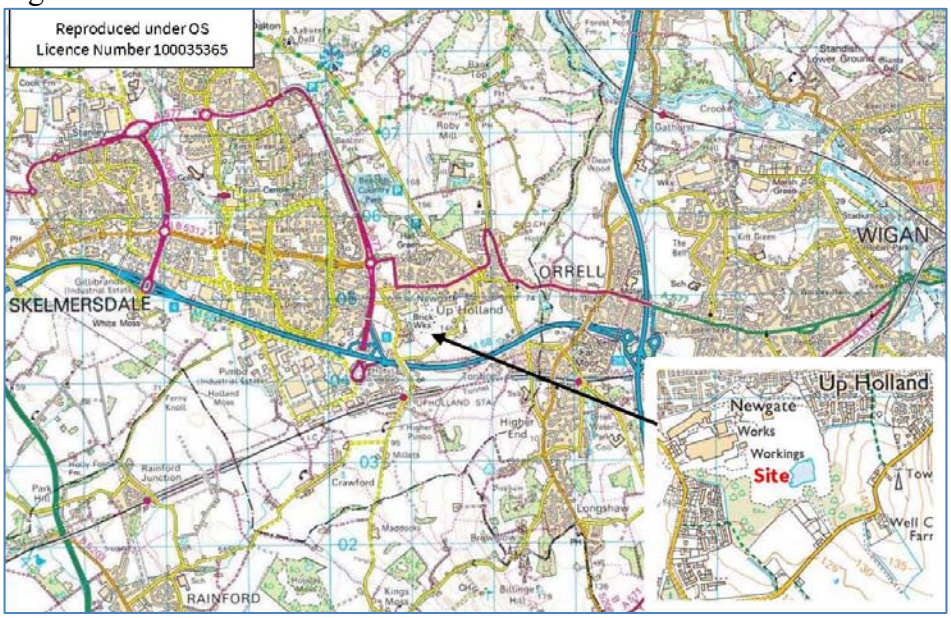
1.1.5. It does not cover any aspects of the extraction on any other cross sections through the quarry and its waste (existing or proposed waste placement) and should in no way be considered part of the design requirements for the management of a stable quarry in accordance with the Quarries Regulations (1999). The report describes the work undertaken and summarises the results of the analysis which has been undertaken in accordance with the appropriate Environment Agency (EA) guidance and British Standards.

1.2. Site Location

1.2.1. Ravenhead Quarry is located on the eastern margin of Skelmersdale (West Lancashire), west of Up Holland and ~7km west of Wigan. The topographic height to the east is ~135mAOD, falling in a south-westerly directing to ~115mAOD in the area south of the brickworks.

1.2.2. A plan showing the location is presented as Figure 1.

Figure 1: Site Location



2 CONCEPTUAL STABILITY SITE MODEL

2.1. Site Geology

2.1.1. Superficial deposits are not present within the site boundary as result of underlying mineral resource extraction. Locally, superficial glacial head, till and glacio-fluvial sheet deposits are recorded.

The bedrock strata are part of the Carboniferous Pennine Lower Coal Measures Formation (Westphalian Stage). At the site the Westphalian A strata dip ~ eastwards between 12 and 20º, with alternating beds of mudstone, siltstone, sandstone with a succession of coals and seat earths (ganister).

2.2 Groundwater

2.2.1. Groundwater level monitoring was carried out by BL and is presented in Table 1 for the three boreholes of interest in this SRA.

Table 1 - Water levels from BL monitoring

Borehole	Date	BH datum (mAOD)	Dip to water (mgbl)	GW level (mAOD)
BH01/19	22/10/2019	114	13.52	100.48
BH01/19	22/04/2022	114	14.86	99.14
BH01/19	24/05/2022	114	15.99	98.01
BH01/19	17/06/2022	114	16.24	97.76
BH01/19	14/07/2022	114	16.53	97.47
BH01/19	11/08/2022	114	16.81	97.19
BH01/19	22/09/2022	114	17.11	96.89
BH01/19	23/11/2022	114	15.99	98.01
BH02A/19	22/10/2019	138.5	32.65	105.85
BH02A/19	22/04/2022	138.5	35.11	103.39
BH02A/19	24/05/2022	138.5	36.39	102.11
BH02A/19	17/06/2022	138.5	36.81	101.69
BH02A/19	14/07/2022	138.5	38.71	99.79
BH02A/19	11/08/2022	138.5	37.92	100.58
BH02A/19	22/09/2022	138.5	38.48	100.02
BH02A/19	23/11/2022	138.5	33.9	104.6
BH03/19	22/10/2019	142	36.36	105.64
BH03/19	22/04/2022	142	38.98	103.02
BH03/19	24/05/2022	142	39.82	102.18
BH03/19	17/06/2022	142	40.31	101.69
BH03/19	14/07/2022	142	40.82	101.18
BH03/19	11/08/2022	142	40.37	101.63
BH03/19	22/09/2022	142	42.01	99.99
BH03/19	23/11/2022	142	39.73	102.27

2.2.2. BL have a predicted groundwater recovery level for the Ravenhead Quarry site of approximately 103-104m OD (email 08.02.2023).

2.3. Geotechnical Parameters

2.3.1. The geotechnical parameters have been based upon the experience of PGL with similar materials, coupled with published values. For further details see the appropriate Section.

2.3.2. The resulting characteristic soil strengths are considered to be conservative.

2.4. Plant Loading on the Slope

2.4.1. Loading from construction plant is based upon a Caterpillar D6 or similar near the crest. For further details see the appropriate Section.

3 ANALYSIS APPROACH AND SOFTWARE

3.1. Analysis Approach for Stability

3.1.1. The stability risk assessment (SRA) of the subgrade and slope has been carried out in general accordance with the principles of Eurocode 7, which uses a partial factor method (on actions and strength), to determine the Over Design Factor (ODF).

3.1.2. Eurocode 7 is based on the principles of limit state design, whereby a design must ensure that no limit state is exceeded. With respect to the analyses presented in this report, the limit state of relevance is limit state GEO defined as "*failure or excessive deformation of the ground, in which the strength of soil or rock is significant in providing resistance*", e.g. stability of a slope, bearing capacity of foundation soils.

3.1.3. Each limit state requires different partial factors to be used in the analysis. These are presented in the National Appendix to EC7. It should be noted that the approach adopted in the UK for limit state GEO (Design Approach 1) requires two combinations of partial factors to be analysed as follows:

Combination 1 A1 + M1 + R1

Combination 2 A2 + M2 + R1

Where

A = Partial factors on actions (applied forces and moments).

M= Partial factors on soil parameters; and

R = Partial factors on resistances.

3.1.4. The values of various sets of partial factors that are applied to characteristic actions (A1 and A2), characteristic material strengths (M1 and M2) and resistances (R1) vary depending upon whether they are favourable or unfavourable to the stability of the structure. Note: Only Combination 2 is considered in this assessment because any imposed loadings are negligible compared to the soil masses.

3.1.5. When considering a limit state of rupture or excessive deformation EuroCode 7 requires that $E_d \leq R_d$ where:

E_d = design value of effect of actions (forces) and

R_d = design value of the resistance to actions

3.1.6. The ratio R_d/ E_d is defined as the Over Design Factor and stability is demonstrated when the ODF ≥ 1.00. Hence, for each limit state considered, ODF's ≥ 1.00 are required for the design to be considered stable (i.e. safe).

3.1.7. Stability analyses were undertaken by considering the worst credible conditions likely to be encountered for each of the sections selected at the site.

3.2. Software

3.2.1. The analysis of slope stability (including the waste and the sidewall liners) was undertaken using the computer programme *FLACSlope* (version 8.1), which utilises the finite difference method of analysis. *FLACSlope* offers many advantages over traditional limit equilibrium based programmes.

3.2.2. Limit equilibrium codes use an approximate scheme (typically based on the method of slices) in which several assumptions are made (eg the location and angle of the interslice forces). Several assumed failure surfaces are tested (often many hundreds), and the one giving the lowest factor of safety is chosen. Equilibrium is only satisfied on an idealised set of surfaces.

3.2.3. In contrast, *FLACSlope* provides a full solution of the coupled stress/displacement, equilibrium, and constitutive equations. Given a set of properties, the system is determined to be stable or unstable. By automatically performing a series of simulations while changing the strength properties (strength reduction technique), the factor of safety (= ODF in these analyses) can be found to correspond to the point of stability and the critical failure (slip) surface can be located. Hence:

- Any failure mode develops naturally; there is no need to specify a range of trial surfaces in advance.
- No artificial parameters (eg functions for interslice force angles) need to be given as input.
- Multiple failure surfaces (or complex internal yielding) evolve naturally if the conditions give rise to them.
- The solution consists of mechanisms that are kinematically feasible whereas the limit equilibrium method considers only forces and not kinematics.

4. STABILITY OF THE FINAL EXTRACTION TO 85 m OD

4.1. Design Approach

4.1.1. The plan of the final extraction that was analysed is shown on Drawing No. K0158-3003 - Infill Phasing Plan and the section A-A' shown in plan and cross section on Drawing No. K0158-4-008 ESID 8C; both drawings being presented in Appendix A.

4.2. Shear strength parameters

4.2.1. The shear strength parameters used in the analysis are those summarised in Table 2.

4.2.2. Very limited geotechnical tests have been conducted and it is emphasised that the shear strength parameters used have been based upon the experience of PGL with similar materials, coupled with published values as follows:

4.2.2.1. The shear strength of the Lower Coal Measures (parent rock) was found using back analysis of the existing slopes of the excavation using the lower section from 96 m OD down to 90 m OD (excavation level existing at present). Guidance on appropriate values to begin the analysis was obtained from (Bell FG – Ref 6 Table 11.3; and the ICE Manual of Geotechnical Engineering – Ref 15 Fig 36.18). Tension of 31 kPa was allowed in the parent rock.

4.2.2.2. Back analysis of the same section was used also to estimate the shear strength on the bedding joints in the Lower Coal Measures - strata dip ~ eastwards between 12 and 20º (Section 2.1). The section A-A' was orientated SW-NE so horizontal bedding has been assumed in the analysis (conservative).

4.2.3. PGL considers the characteristic shear strengths used to be conservative but recommend that care and vigilance is practiced at all times during operations and that any minor slippages that may occur are remediated as a priority before they become worse.

Table 2 - Shear Strength Parameters for Final Extraction

Material	Effective Stress Strength Parameters				Unit weight above GWL kN/m³	Unit weight below GWL kN/m³
	c'_k kPa	ϕ'_k deg	EC7 DC2 c'_{design} kPa	EC7 DC2 ϕ'_{design} deg		
Lower Coal Measures rocks	625	39	500	33	24	24
Lower Coal Measures rocks strength along discontinuities	11.25	22.7	9	18.5	18	18

4.3. Water Levels

4.3.1. The water levels applied in the analysis were based on the levels recorded in the BL monitoring (Table 1- page 3) a value of 105 m OD selected at distance from the excavation with the water level at excavation level (85 m OD) at the base.

4.4. Design Loads

4.4.1. Plant loading has been applied in the analyses (one on the berm and one at the crest) equivalent to a loaded lorry (EC7 DC2 factored pressure of 39 kPa).

4.5. Vegetation on the Slope

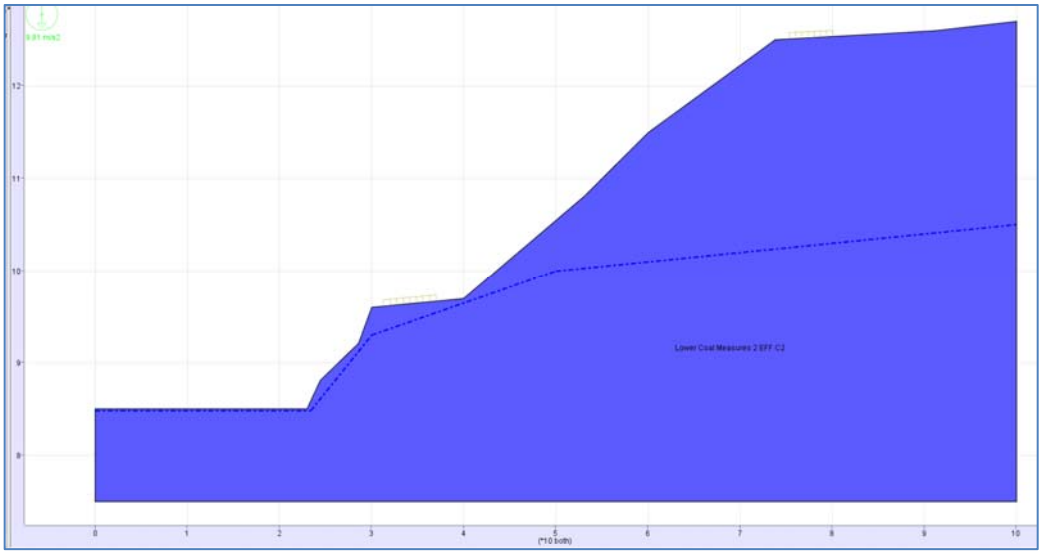
4.5.1. There is no allowance for the reinforcing effect of vegetation growing on the slope.

4.6. Design Cases

4.6.1. The stability of the slope has been considered using only effective stress parameters.

4.6.2. Ten FlacSlope models were used for the back analysis with the final stability obtained from Run 09. The Run 09 model is shown in Figure 2.

Figure 2: General Section FlacSlope Model for Run 09 – Final Excavation



4.7 Stability of the Final Extraction to 85 m OD

4.7.1. The outputs/results of the analyses are presented in Appendix B with the results being summarised in Table 3.

4.7.2. An example of the FlacSlope output is shown in Figure 3.

4.7.3. The bright yellow, green, and blue colours in Figure 3 indicate where the shear strains are highest and hence where the critical slip surface(s) would be.

4.7.4. In this case, the critical slip surface is in the final, steep excavation down to 85 m OD.

Figure 3: Run09-Section A – Strains - Final Extraction

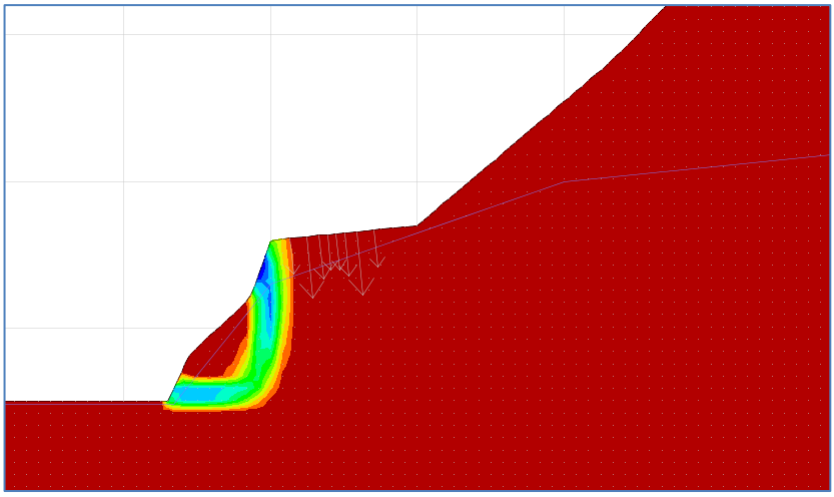


Table 3 - Summary of the Stability Analyses of the Final extraction to 85 m OD

Run	Model	Analysis	ODF	Comment on result
01 to 08 and 10	These runs looked at excavation down to 90 m OD (the current excavation level) in order to estimate shear strength parameters for the intact rock coupled with that along the horizontal (ubiquitous) discontinuities	Effective	Lowest ODF of 1.00 required as the excavation was still stable	**Safe**
09	excavation down to 85 m OD	Effective	1.03	**Safe** Critical surface is from the berm, down the steep excavation to 85 m OD. (see Figure 3)

4.8. Assessment – Stability of the Final extraction to 85 m OD

4.8.1. The analyses have shown that, with ODFs ≥ 1.00, the proposed excavation down to 85 m OD is stable.

4.8.2. As discussed in paragraph 4.2.3, PGL considers the characteristic soil strengths used to be conservative but recommend that care and vigilance is practiced at all times

during operations and that any minor slippages that may occur are remediated as a priority before they become worse.

4.8.3. Once waste filling has started at the base of the excavation then the waste requires to be placed with compaction of the layers using a standard heavy weight waste compactor following recognised industry guidelines.

5. STABILITY OF THE PROPOSED WASTE DURING THE WORKS

5.1 Design Scenarios

5.1.1 The plans of the of the phases of waste filling are shown on Drawing No. K0158-3003 - Infill Phasing Plan presented in Appendix A.

5.1.2 Infill Phase 2 is also shown on Drawing No. K0158-5001 and Section E-E' has the following slopes:

5.1.1.1 Lower slope = 1 in 3.5.

5.1.1.2 Upper slope = 1 in 3.2.

5.1.3 The majority of the materials to be landfilled are expected to be:

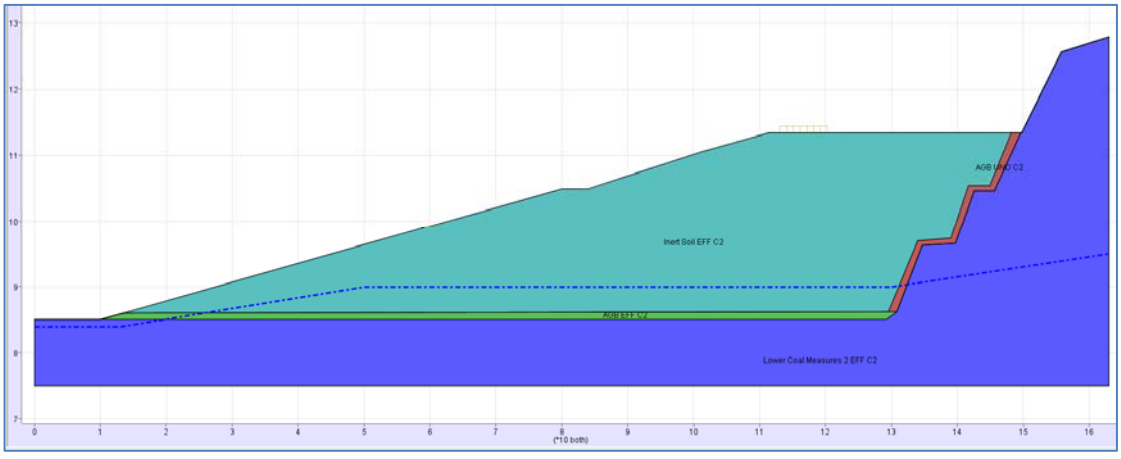
- Soil (including mixed clays, silts and sands);
- Stones; and
- Concrete based construction materials from development schemes
- There is no putrescible element.

5.2 Stability Analysis

5.2.1 The analysis was carried out in accordance with EC7 DC2 as with the slope analysis using the computer programme *FLACSlope* (version 8.1) as before.

5.2.2 The general model analysed is shown in Figure 4.

Figure 4: FlacSlope Model Run 11



5.3 Shear strength parameters

5.3.1 The shear strength parameters used in the analysis are those summarised in Table 4. They are based on PGL's experience with similar materials together with back analysis for the rock properties. The sidewall liner is given a lower strength than the basal liner to allow for the more difficult placement against the steep sidewalls.

Table 4 - Shear Strength Parameters for Waste During the Works

Material	Effective Stress Strength Parameters				Unit weight above GWL kN/m³	Unit weight below GWL kN/m³
	c'_k kPa	ϕ'_k deg	EC7 DC2 c'_{design} kPa	EC7 DC2 ϕ'_{design} deg		
Waste / Inert soil	3.75	24.0	3.0	19.6	17	17
Compacted Clay liner	5.00	28.4	4.0	23.4	18	18
Lower Coal Measures rocks	625	39	500	33	24	24
Lower Coal Measures rocks strength along discontinuities	11.25	22.7	9	18.5	18	18
	Undrained Strength Parameters					
Compacted Clay Basal liner	50	0	35.7	0	18	18
Compacted Clay Sidewall liner	40	0	28.6	0	17	17

5.3.2. The EC7 DC2 design interface shear strength parameters assumed for the materials are those presented in Table 5, using effective stress parameters for the rock and waste materials but undrained parameters for both basal and sidewall clay liners (Run 11) but changing to effective stress parameters for the basal liner in Run 12 to allow for its clay to gain strength with consolidation.

5.4 Water Levels

5.4.1. The water levels applied in the analysis were based on the levels recorded in the BL monitoring (Table 1- page 3) a value of 95 m OD selected at distance from the excavation with the water level at excavation level (85 m OD) at the toe.

5.4.2. Inside the cell being filled, a very conservative water level some 5 m above the liner was assumed.

5.5 Design Loads

5.5.1 Plant loading has been applied in the analyses (one at the crest) equivalent to a loaded lorry (EC7 DC2 factored pressure of 39 kPa).

5.6 Analysis Results - Stability of Waste During the Works

5.6.1 The outputs/results of the analyses are presented in Appendix C and summarised in Table 5.

Table 5 - ODFs for Stability of the Waste During The Works

Section Run	Over Design Factor (ODF)	Comment on analysis result
11	1.01	Both slopes considered Both basal and sideslope liners were undrained Sideslope liner was assumed to be lower strength than the basal liner Plant on crest of slope Water in cell at 5 m above basal liner The critical surface was in the waste from crest to toe of waste (see Figure 5) and sliding on the basal liner **SAFE** ODF >1.00 with conservative parameters used.
12	1.36	Both slopes considered Basal liner given effective parameters and sideslope liners undrained parameters Sideslope liner was assumed to be lower strength than the basal liner Plant on crest of slope Water in cell at 5 m above basal liner The critical surface was in the waste from crest to toe of waste (see Figure 6) and sliding on the basal liner **Very SAFE** ODF >1.00 with conservative parameters used.

Figure 5: FlacSlope Run 11 - strains

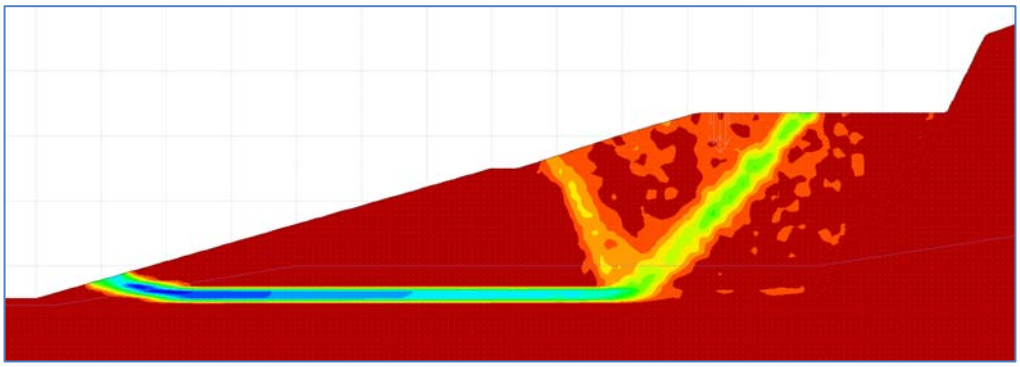
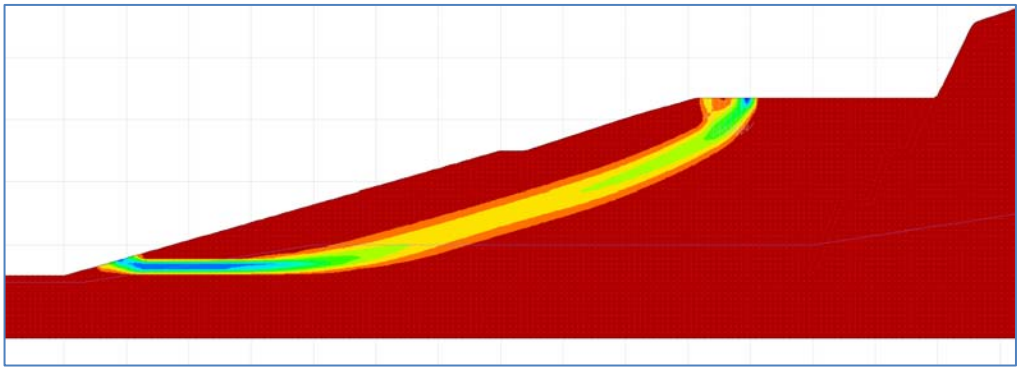


Figure 6: FlacSlope Run 12 – strains



5.7 Assessment – Stability of the Proposed Waste During The Works

5.7.1 The waste slopes proposed are shown to be stable with ODFs > 1.00.

5.7.2 The result obtained from Run 11 (ODF = 1.01) is only marginal. However, as conservative parameters were used it is considered that the undrained parameters used for the basal liner would most probably have converted to effective strengths before the full height of Phase 2 was reached and therefore the ODF would have increased more towards the 1.36 gained in Run 12.

6 STABILITY OF THE SIDEWALL LINER

6.1 Design Scenarios

6.1.1 A re-engineered clay artificial geological barrier (AGB) will be placed across the base and sidewalls.

6.1.2 A 500mm minimum thickness AGB, at a permeability no greater than $1x10^{-8}$m/s is proposed to provide a geological barrier for lateral containment.

6.1.3 The clay will be placed in lifts of 3 m commensurate to the rising waste fill deposits to ensure stability.

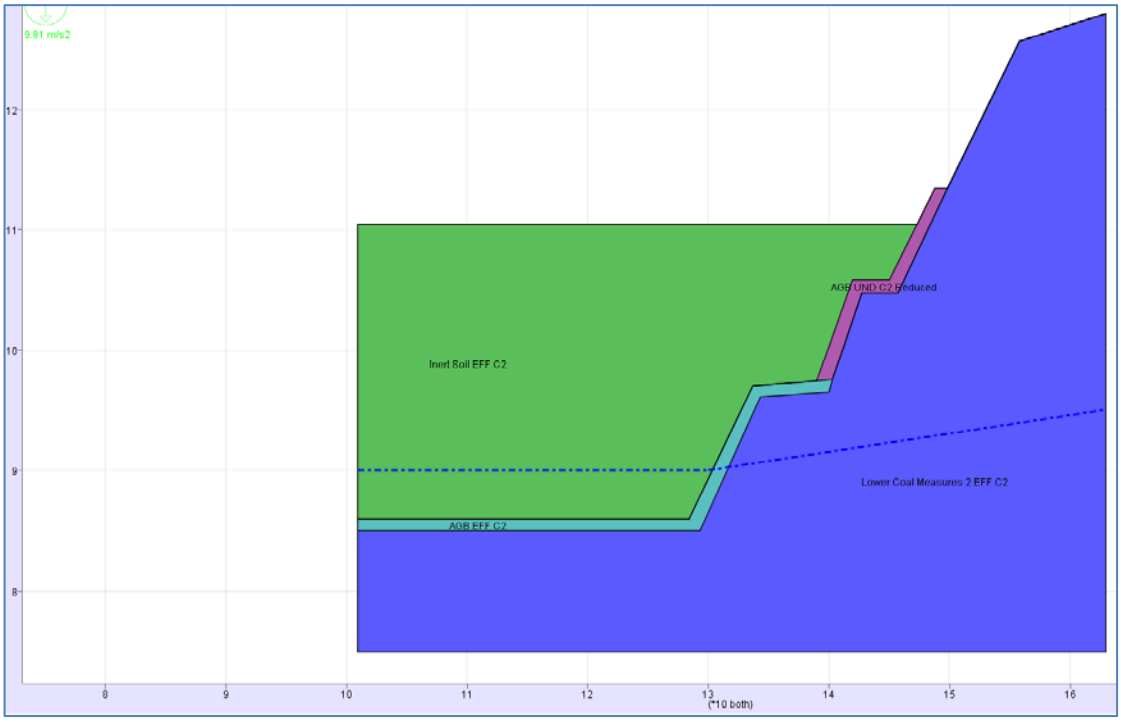
6.2 Veneer Analysis

6.2.1 The analysis was carried out in accordance with EC7 DC2 as with the slope analysis using the computer programme *FLACSlope* (version 8.1). This is because there is only one layer, 0.5 m thick, to the clay liner.

6.2.2 The analysis considers the stability of the liner placed with 3 m unsupported above the level of the rising waste level.

6.2.3 The general model analysed is shown in Figure 7.

Figure 7: FlacSlope Model for Run 13 - Sidewall Liner



6.3 Shear strength parameters

6.3.1 The EC7 DC2 design interface shear strength parameters assumed for the materials are those presented in Table 6, using effective stress parameters for the rock and waste materials.

6.3.2 Effective stress parameters have been assumed for the basal liner and the lower section of the sidewall liner because they will have been in place for some time and will have gained strength. The analysis has assumed total stress parameters for the upper section of the sidewall liner including the protruding section because the clay will have had insufficient time to gain strength.

Table 6 - Shear Strength Parameters for Sidewall Liner

Material	Effective Stress Strength Parameters				Unit weight above GWL kN/m^3	Unit weight below GWL kN/m^3
	c'_k kPa	ϕ'_k deg	EC7 DC2 c'_{design} kPa	EC7 DC2 ϕ'_{design} deg		
Waste / Inert soil	3.75	24.0	3.0	19.6	17	17
Compacted Clay liner	5.00	28.4	4.0	23.4	18	18
Lower Coal Measures rocks	625	39	500	33	24	24
	Undrained Strength Parameters					
Compacted Clay liner	14 to 28	0	10 to 20	0	18	18

6.4 Water Levels

6.4.1. The water levels applied in the analysis were based on the levels recorded in the BL monitoring (Table 1- page 3) a value of 95 m OD selected at distance from the excavation with the water level at excavation level (85 m OD) at the toe.

6.4.2. Inside the cell being filled, a very conservative water level some 5 m above the liner was assumed.

6.5 Design Loads

6.5.1 Plant loading has not been applied to the liner.

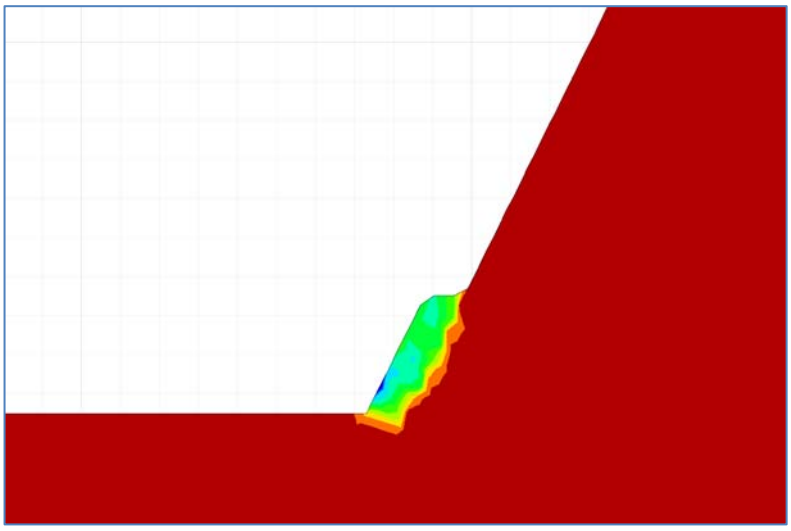
6.6 Analysis Results - Veneer Stability of Sidewall Liners

6.6.1. Several runs were made with the Run 13 model with a different undrained strength each time for the protruding sidewall liner. The outputs/results of the analyses are presented in Appendix D and summarised in Table 7.

Table 7 - ODFs for Stability of the Sidewall Liners

Section Run	Over Design Factor (ODF)	Comment on analysis result
13	1.43 $c_{u;\,design}$ of sidewall liner = 10 kPa	The critical surface was in the sidewall liner (see Figure 8) The Sidewall Liner is **very SAFE**
	2.11 $c_{u;\,design}$ of sidewall liner = 15 kPa	The critical surface was in the sidewall liner (see Figure 8) The Sidewall Liner is **very SAFE**
	3.21 $c_{u;\,design}$ of sidewall liner = 20 kPa	The critical surface was in the sidewall liner (see Figure 8) The Sidewall Liner is **very SAFE**

Figure 8: Run 13 - Sidewall Liner - critical surface



6.7 Assessment – Veneer Stability of Sidewall Liners

6.7.1. The lowest ODF obtained was 1.43 and this was assuming the undrained shear strength of the sidewall liner was 10 kPa. This strength is so low as to be un-compactable and therefore the ODF is expected to be greater than 3.21.

6.7.2. The sidewall liner therefore would have a higher ODF, and a 3m lift is considered to be safe with a protruding height of liner of 3m or less.

6.7.3. It is recommended that the height of 3 m is not exceeded because, although it would be theoretically stable, in practice the longer the sidewall liner remains exposed then the more chance it has of drying out and cracks forming in it. In warm, drying weather it is recommended that smaller heights are used.

6.8 Waste Emplacement Methodology Against the Sidewall liner

6.8.1 The first metre of waste placed against a sidewall liner shall be free from large objects and items that, due to their physical nature, might cause penetrative damage to the geological barrier.

6.8.2 Waste shall be placed and compacted by heavy plant in lifts no greater than 2m in height.

6.8.3 A 10 m wide by 2m deep buttress of waste shall be placed against the sidewall liner as quickly as is practical to provide support to the 2m high exposed clay sidewall liner.

6.8.4 The surface of the waste shall be graded to encourage surface water run-off and no waste slope shall exceed 1:2.5**.**

7 STABILITY OF THE PROPOSED RESTORATION

7.1 Design Scenario

7.1.1 The Section locations are shown on Drawing No K0158-4008 ESID 8A and the sections on Drawing No K0158-4008 ESID 8B.

7.1.2 The sections show various surface profiles as follows:

Section B-B' – between chainage 0 and 11.51 m the gradient is 1 in 3 followed by a gradient of 1 in 7.7.

Section C-C' – between chainage 0 and 13.91 m the gradient is 1 in 3.2 followed by a gradient of 1 in 18.

Section D-D' – has a gradient of 1 in 15.6 throughout.

The analysis will concentrate therefore on Section B-B'.

7.2 Shear Strength Parameters

7.2.1. The majority of the materials to be landfilled are expected to be:

- Soil (including mixed clays, silts and sands);
- Stones; and
- Concrete based construction materials from development schemes
- There is no putrescible element.

7.2.2. The shear strength parameters used in the analysis are those summarised in Table 8.

Table 8 - Shear Strength Parameters for the Proposed Restoration

Material	Effective Stress Strength Parameters				Unit weight above GWL kN/m³	Unit weight below GWL kN/m³
	c'_k kPa	ϕ'_k deg	EC7 DC2 c'_{design} kPa	EC7 DC2 ϕ'_{design} deg		
Waste / Inert soil	3.75	24.0	3.0	19.6	17	17
Compacted Clay liner and Cap	5.00	28.4	4.0	23.4	18	18
Lower Coal Measures rocks	625	39	500	33	24	24
Restoration soil	1.25	33	1	27.45	18	21

7.3. Water Levels

7.3.1. The water levels inside the landfill are assumed to be at 1m above the basal liner.

7.3.2. Outside the liner the predicted rebound level of 104 m OD has been applied in the analysis.

7.4. Design Cases

7.4.1. The stability of the base has been considered using only effective stress parameters throughout as the materials will have had sufficient time to consolidate.

7.4.2. Only EC7 DC2 has been considered because plant loading is variable, transient and negligibly small compared to the soil mass that could slip.

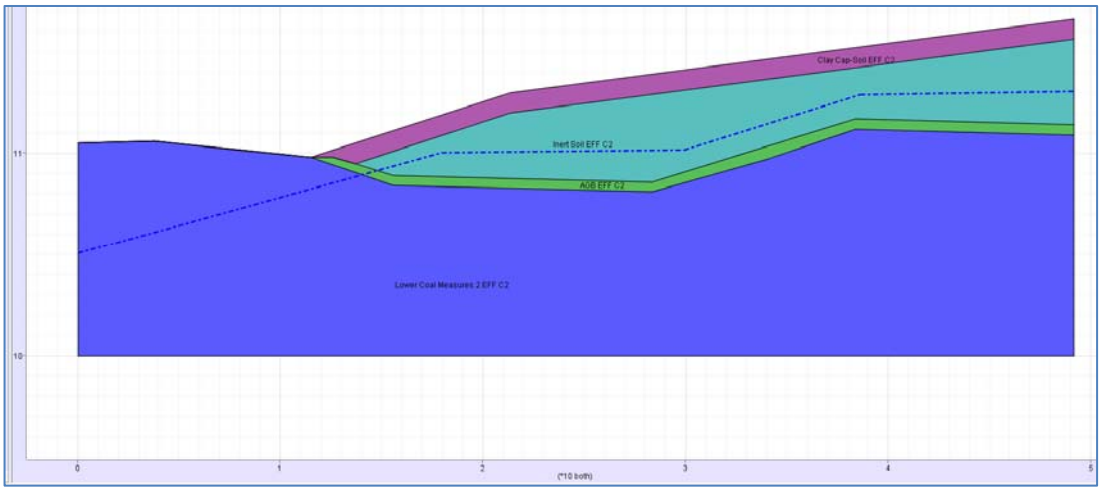
7.5. Design Loads

7.5.1. **P**lant loading has been applied in the analyses (one at the crest) equivalent to a Bulldozer light ground pressure (EC7 DC2 factored pressure of 29 kPa).

7.6. Analysis Results - Stability of Waste During the Works

7.6.1 The analysis was carried out using FlacSlope with the model shown in Figure 9.

Figure 9: FlacSlope Run 14 - strains



7.6.2 The outputs/results of the analyses are presented in Appendix E and summarised in Table 9.

Table 9 - ODFs for Stability of the Proposed Restoration

Run	Over Design Factor (ODF)	Comment on analysis result
14	**1.03**	Water in cell at 1 m above liner Plant loading at crest The critical surface was in the restoration soil under the bulldozer tracks (see Figure 10). ODF >1.00 **SAFE**
15	**1.49**	Water in cell at 1 m above liner. No plant loading. The critical surface was in the restoration soil under the bulldozer tracks (see Figure 11). ODF >1.00 **VerySAFE**

Figure 10: FlacSlope Run 14 - strains

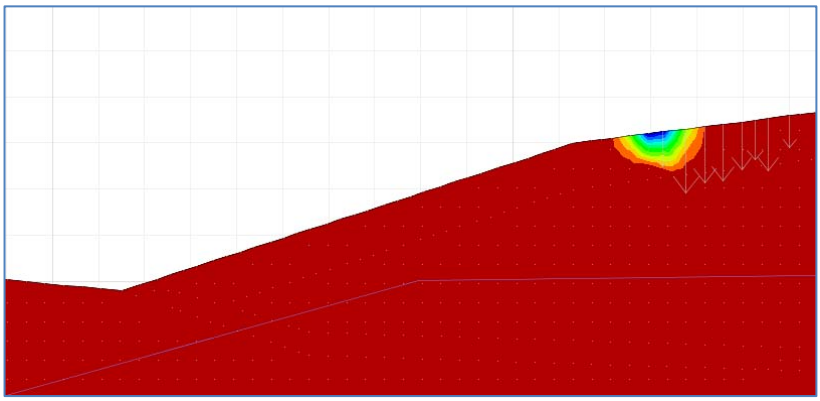
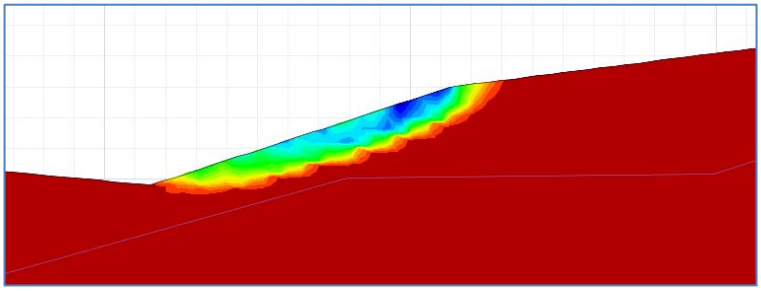


Figure 11: FlacSlope Run 15 – strains



7.7 Assessment – Stability of the Proposed Restoration

7.7.1. The proposed waste slopes proposed are shown to be stable with ODFs > 1.00.

7.7.2. The result obtained from Run 14 (ODF = 1.03), with plant operating at the crest, is marginal. However, the failure is restricted to the restoration soil benearth the plant tracks which highlights the fact that only light track bearing pressure plant should be used to spread the restoration soil.

7.7.3. Without plant operating on the slope as in Run 15 (ODF = 1.49) the restored slope is shown to be very safe with the critical surface involving the whole of the restoration soil slipping on the interface with the clay cap beneath it.

8 STABILITY OF THE BASAL LINER RESISTING HEAVE

8.1 Design Approach

8.1.1 The analysis has assumed that a small area (1 m square in plan) of the basal liner will be forced up by the water pressure in the underlying Lower Coal Measures (LCM).

8.1.2 The base excavation will be taken down to about 85 m OD.

8.2 Shear Strength Parameters

8.2.1. The shear strength parameters used in the analysis are those summarised in Table 4. This is in accordance with EC7 DC2 with the partial factors on soil parameters listed in Table A.16 of the National Annex A1: 2013 – "Partial factors for soil parameters for uplift limit state verifications".

8.2.2. However, as the basal liner and the overlying waste tends to be uplifted, cracking will make any shear resistance indeterminate. Therefore, shear resistance to uplift has been ignored in the analysis with only the weight of the waste being considered to resist the uplift.

8.2.3. The weight of the waste has been taken as 12 kN/m^3 (not as 17 kN/m^3 given in Table 4) to allow for any light compaction of the waste.

8.3 Water Levels

8.3.1. BL have a predicted groundwater recovery level for the Ravenhead Quarry site of approximately 103-104 m OD. The water level on the base of the liner has been taken as 106 m OD to allow for variation.

8.3.2. The analysis has assumed that the LCM have sufficient permeability to maintain the head on the base of the liner to continue any uplift motion.

8.4 Analysis and Assessment

8.4.1 Plant loading was ignored because it is variable.

8.4.2 The partial factor on actions has been obtained from Table A.15 of the National Annex A1: 2013:

9.4.2.1 The upward force exerted by water pressure in the sandstone layer has been factored up by EC7 partial factor $\gamma_{Q;dst}$ =1.5.

9.4.2.2 The downward force exerted by waste has been factored by EC7 partial factor $\gamma_{G;stb}$ = 0.9.

8.4.3. The waste prism tending to being forced upwards is an inverted frustum. The volume of a frustum is calculated using its top area, A_t, base area, A_b and height, h.

8.4.4. A_t is the top area of the frustum which depends on frustum angle the angle of the sides of the frustum with the vertical (f is assumed at 35º = 1 in 1.4 slope). Therefore, $A_t = (B+2h/3*tanf)^2$

If the size of the square block of liner tending to be forced upwards is B, then the volume of the frustrum = $h/3*(A_t + A_b+(A_t*A_b)^{0.5})$. The weight of the waste resisting uplift is then given by the volume of the frustum x the unit weight of the waste.

8.4.5. The EC7 DC2 design upward disturbing force exerted by the water is calculated at 308.7kN. The EC7 DC2 soil design resistance force is calculated at 342.4 kN. This gives an EC7 DC2 Overdesign Factor = 342.4/308.7 = 1.11 > 1.0 ∴ Safe.

8.4.6. The analysis is conservative because:

- it ignores the shear strength of the waste and the basal liner
- it assumes that the LCM have sufficient hydraulic conductivity to maintain an uplift pressure on the base of the basal liner once it starts to move upwards.

9 REFERENCES

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4. EuroCode 7 – NA to BS EN 1997-1: 2004. UK National Annex to Eurocode 7: Geotechnical design – Part 1: General rules.

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13 Sandown Quarry, Coal Mining Report, the Coal Authority, 2022

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15 ICE manual of geotechnical engineering, Volume I, Geotechnical Engineering Principles, Problematic Soils and Site Investigation. London: 2012

Appendix A

Drawings

3003 – Phases of Infilling

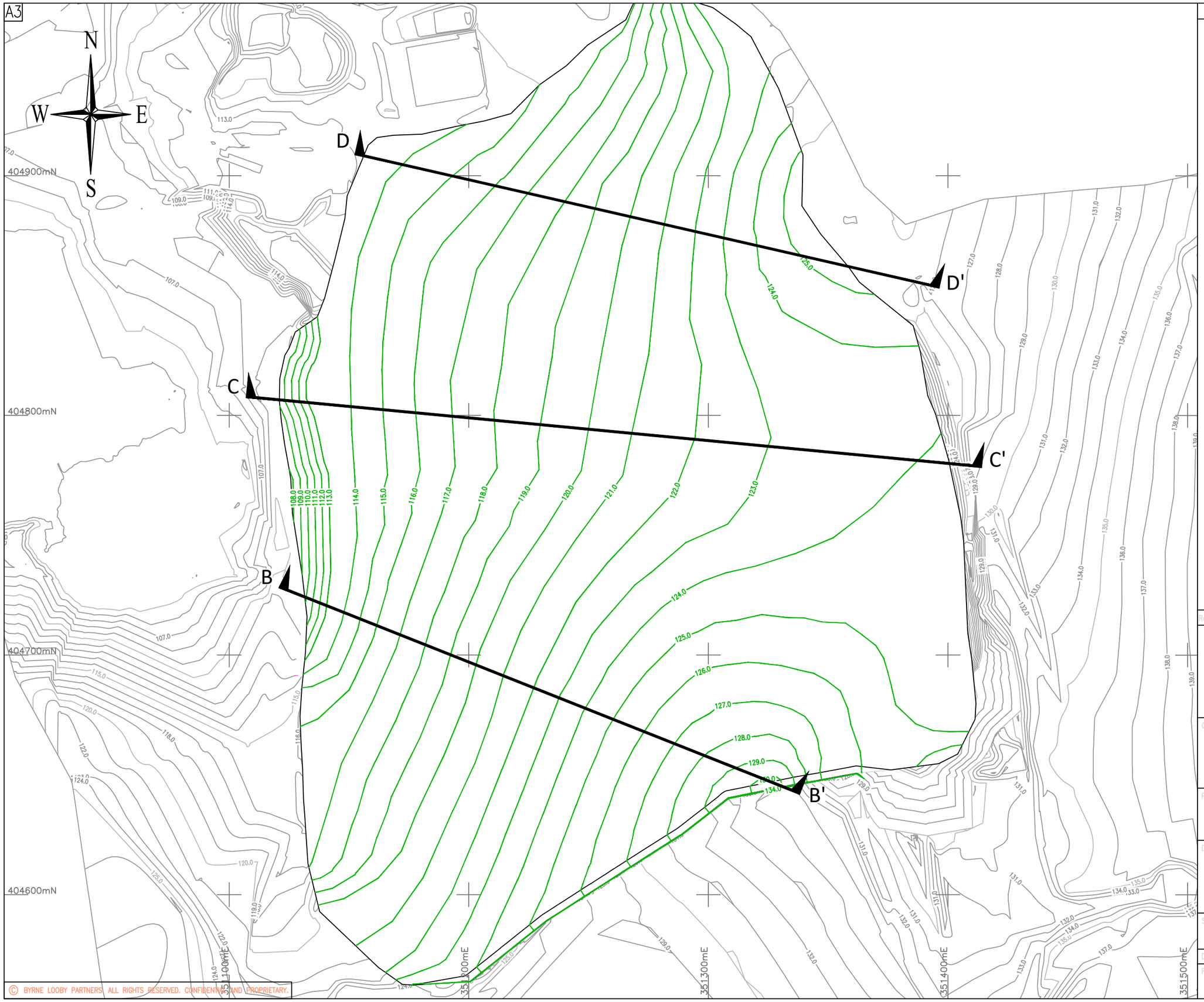
4008 – ESDI8A – Location of Sections

4008 – ESDI8B – Cross Sections

4008 – ESDI8C – Engineering Details

5001 - Stability Section Through Infill Phase 2

A3



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A.07 - CROSS SECTIONS SEE DRAWING K0158-4-008 ESID 8B

KEY

120.0 / 119.0 — EXISTING GROUND CONTOURS

110.0 / 109.0 — PROPOSED RESTORATION CONTOURS

CROSS SECTION LOCATION

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BOOTH VENTURES

PROJECT

RAVENHEAD QUARRY
LANDFILL RESTORATION SCHEME

DRAWING TITLE

PROPOSED RESTORATION
ESID 8

STATUS

Date: 03/2023	Scale: 1:1500	Drawn: PP	Chk: AB	App: PS

Project No:	Org. No:	Rev:
K0158	K0158-4-008 ESID 8A	

A3

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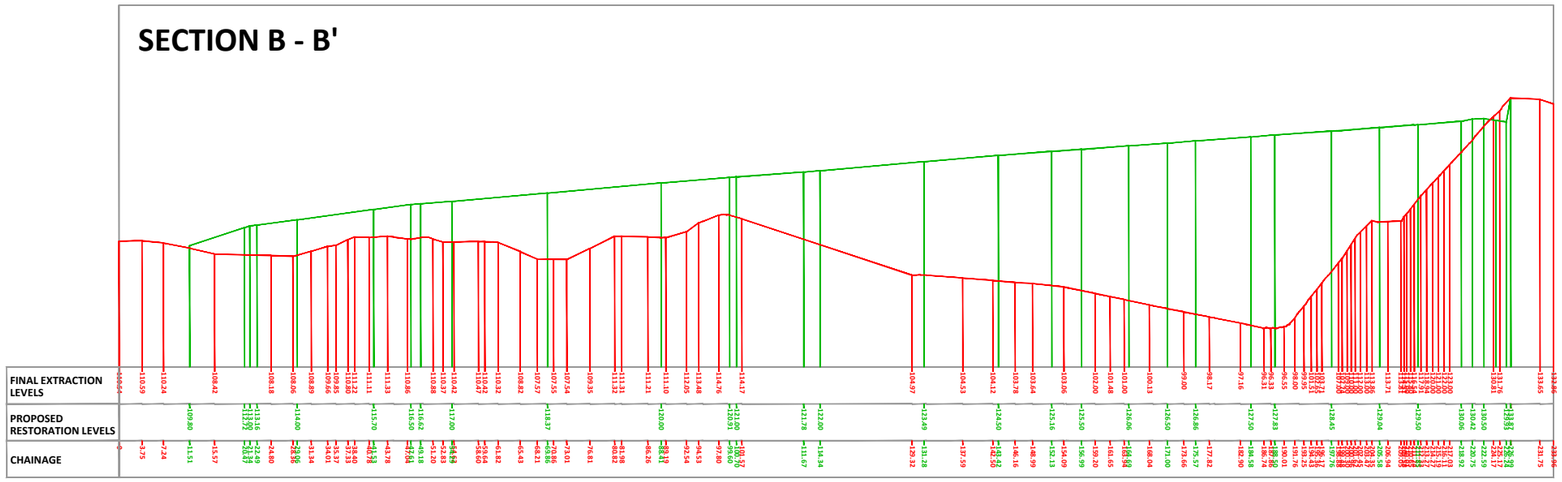

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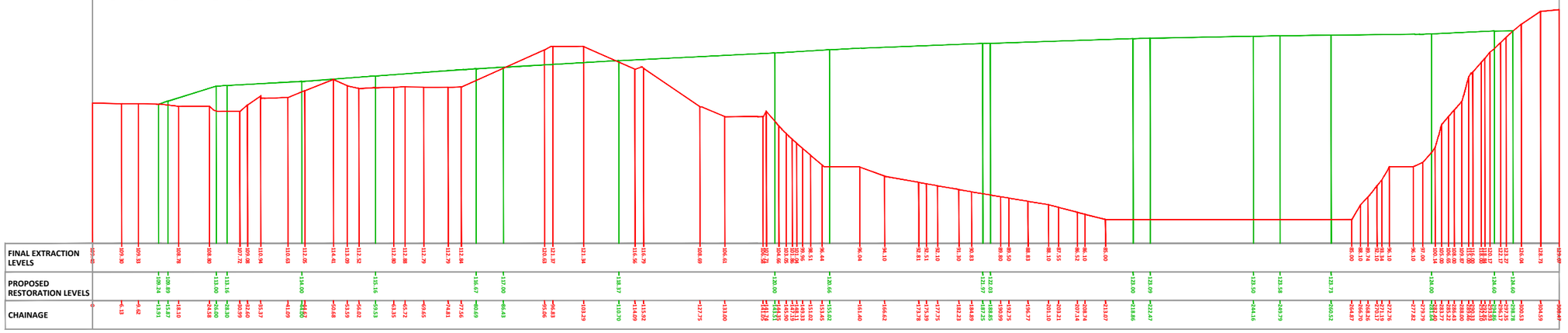
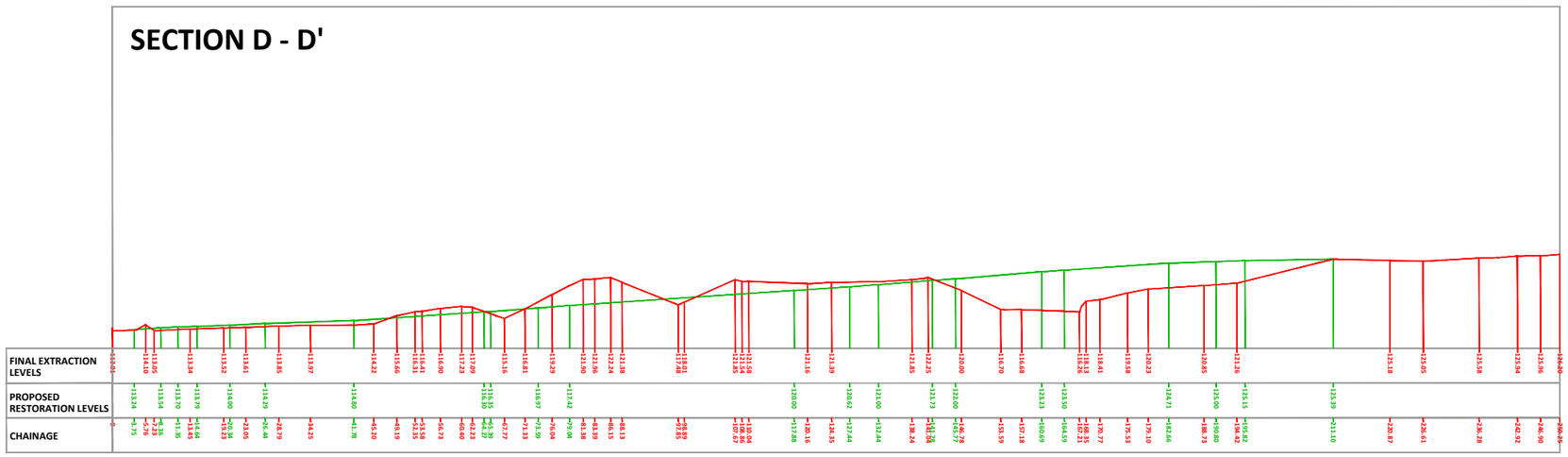


SECTION D - D'



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A.07 - CROSS SECTIONS LOCATIONS SEE DRAWINGS K0158-4-008 ESID 8A

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LANDFILL RESTORATION SCHEME

DRAWING TITLE

CROSS SECTIONS
ESID 8

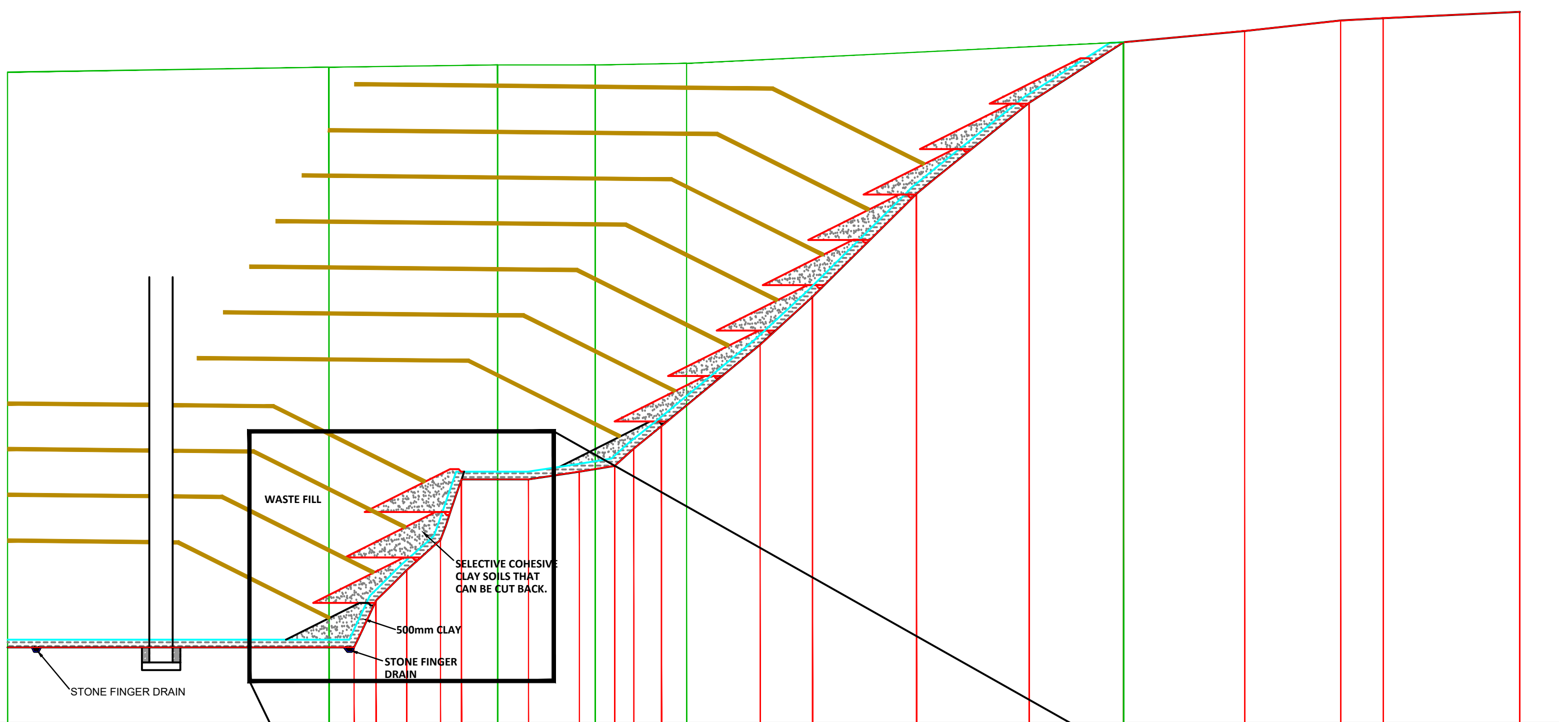
STATUS

Date: 03/2023	Scale: 1:1000	Drawn: PP	Chk: AB	App: PS

Project No:	Drg. No:	Rev:
K0158	K0158-4-008 ESID 8B	

A3

SECTION A - A'



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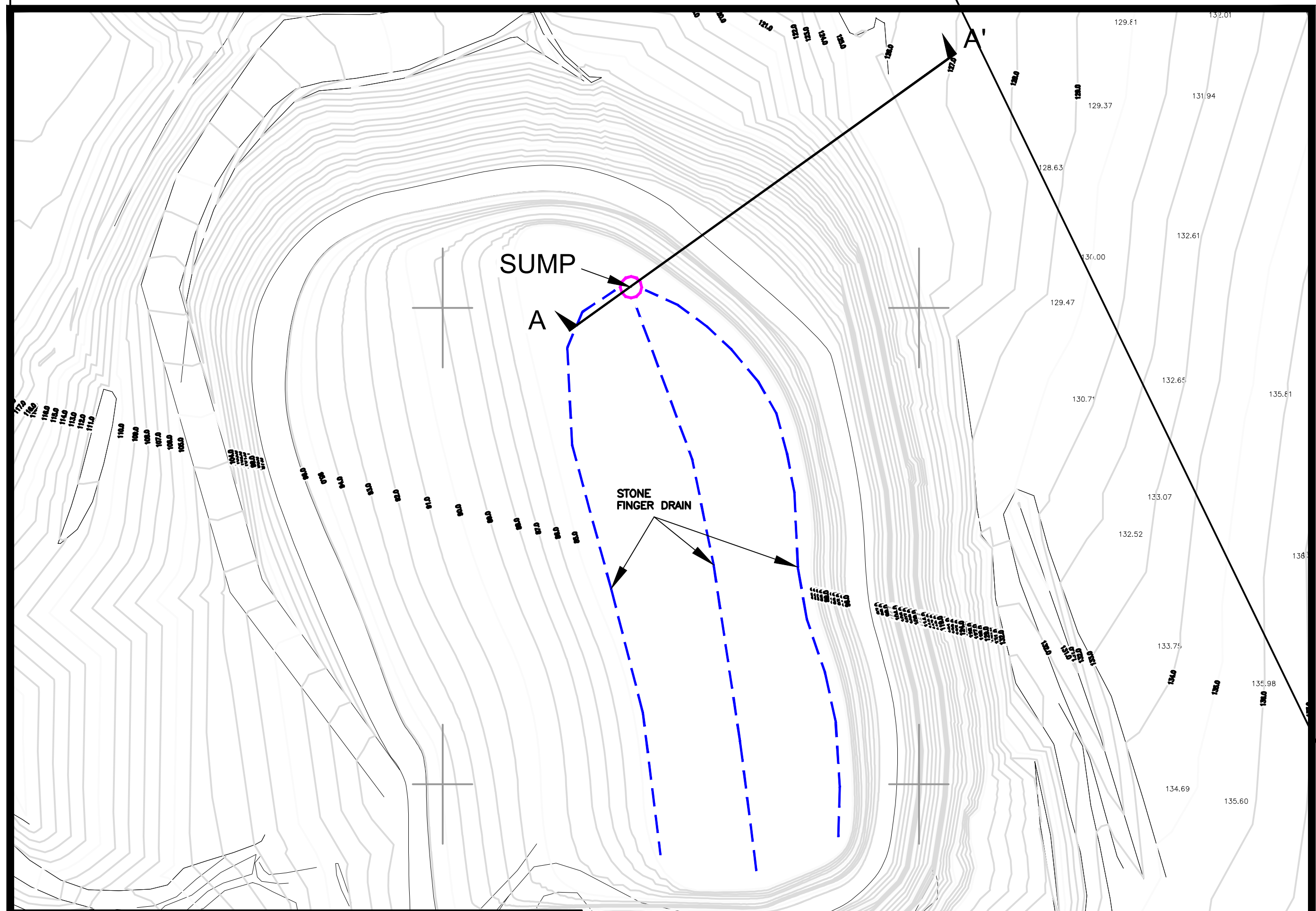
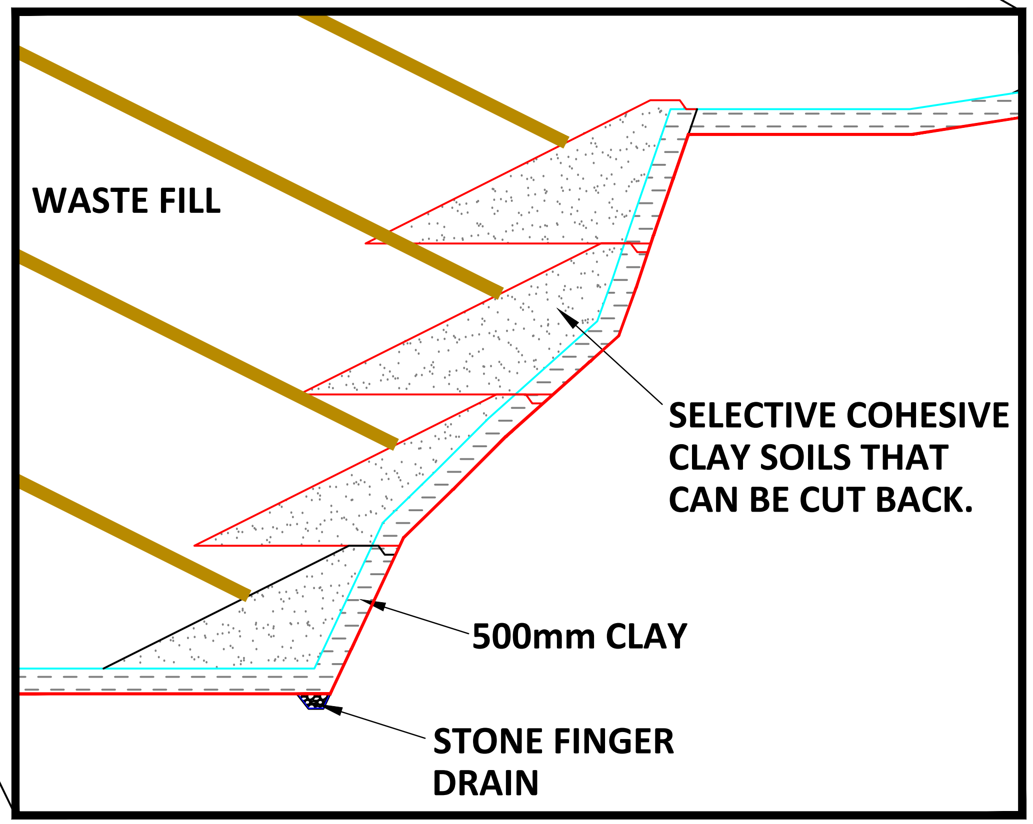
CHAINAGE	0	21.25	22.91	24.37	26.39	28.64	30.02	32.41	34.45	37.82	38.86	40.15	41.41	43.24	44.91	49.77	53.23	60.11	67.56	73.80	81.81	88.16	90.98	100.00





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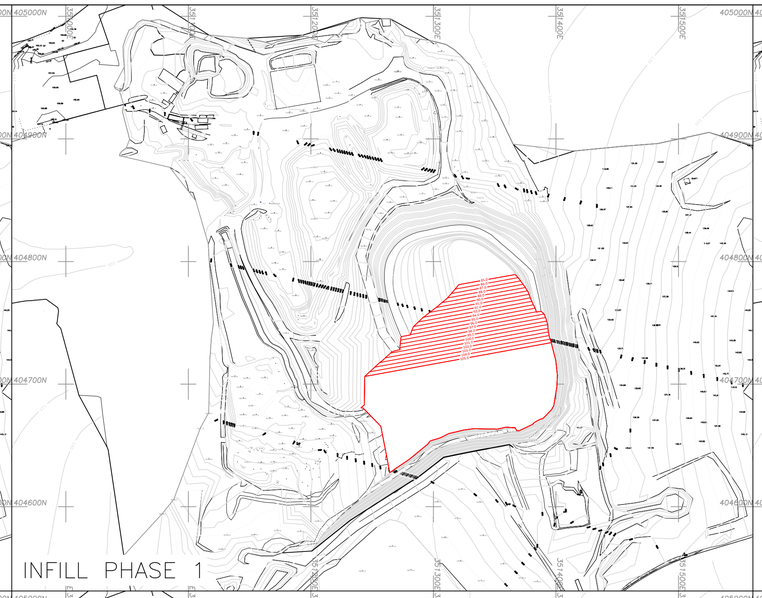
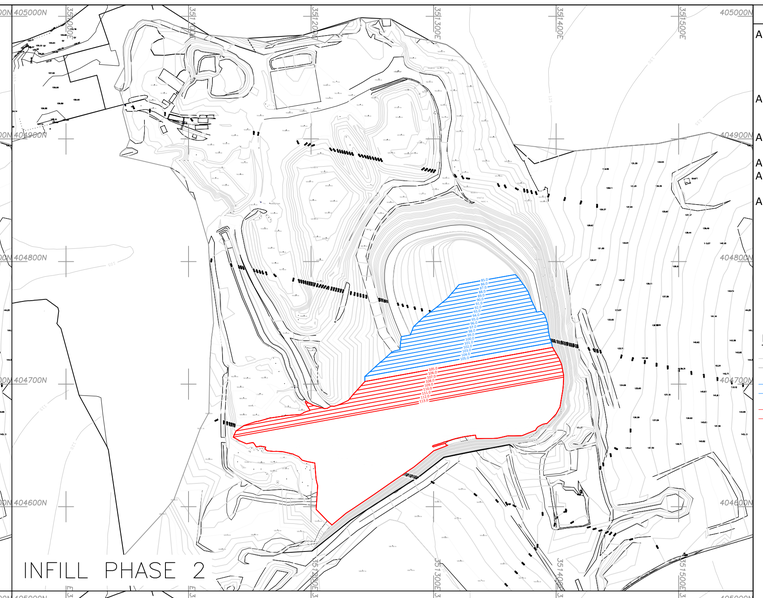
DRAWING TITLE
SCHEMATIC ENGINEERING DETAILS
ESID 8

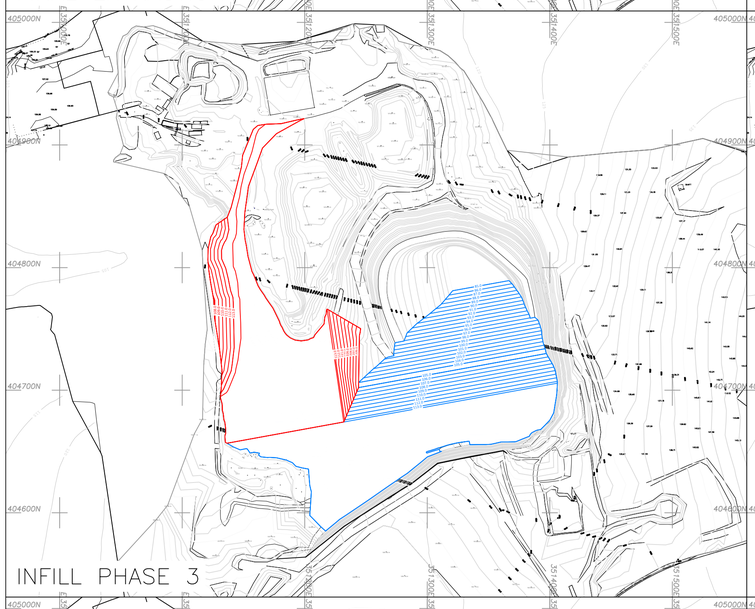
STATUS

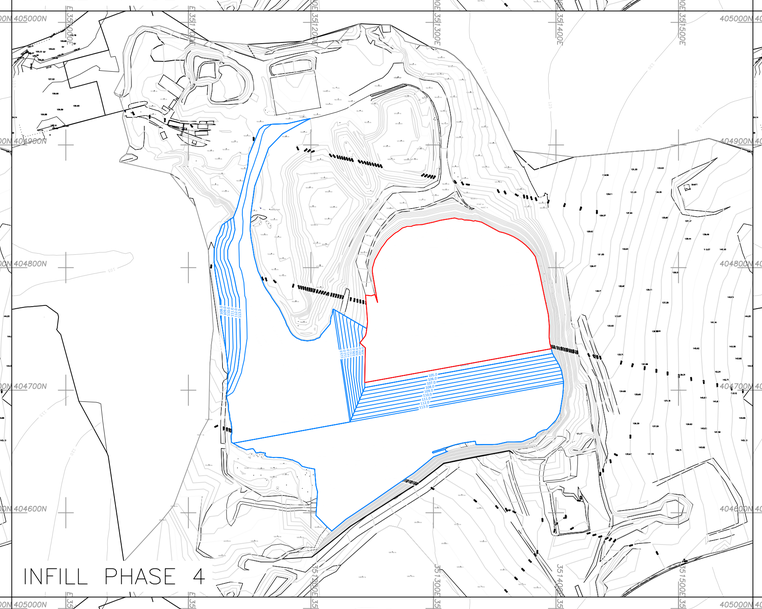
Date: 03/2023	Scale: 1:1000	Drawn: PP	Chk: AB	App: PS
Project No: K0158	Drg. No: K0158-4-008 ESID 8C			Rev:

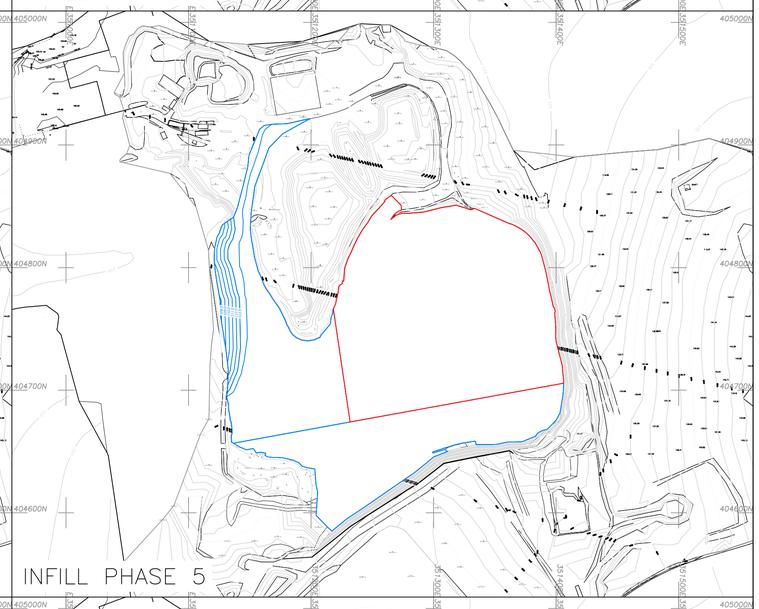
A1

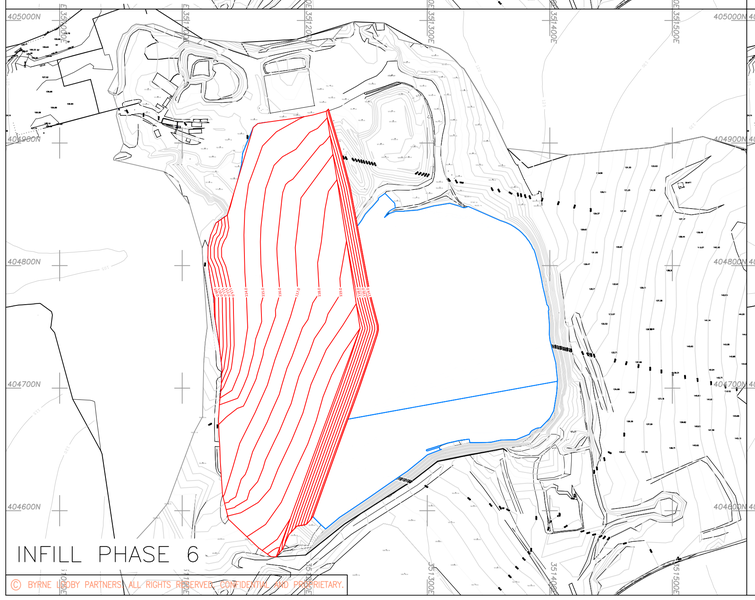


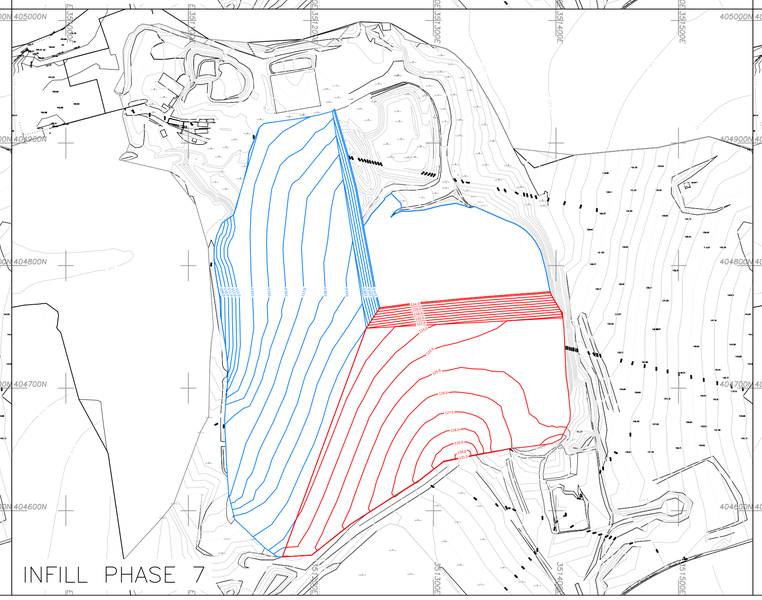


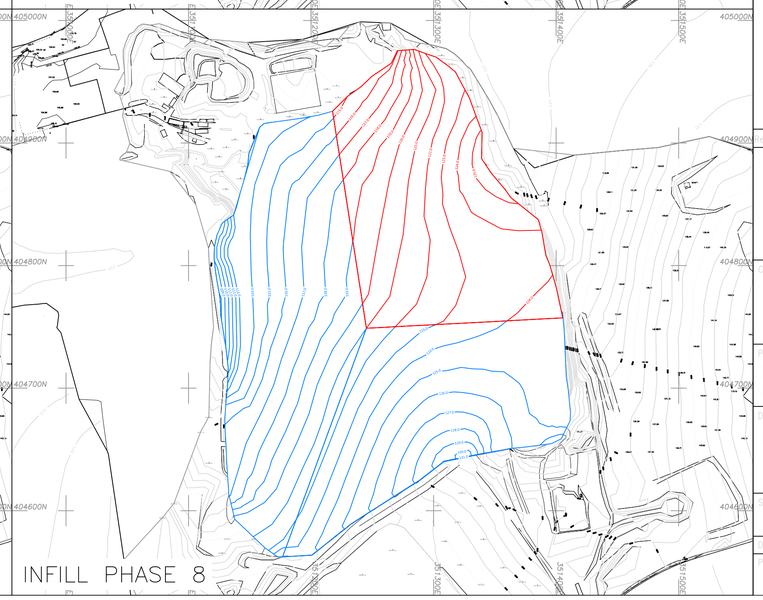












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A.05 - ALL LEVELS AND SETTING OUT TO ARCHITECTS DRAWINGS.

A.06 - ALL DIMENSIONS AND LEVELS ARE TO BE DETERMINED AND/OR CHECKED ON SITE. SHOULD ANY DISCREPANCY BE IDENTIFIED BETWEEN THE DIMENSIONS, AND OR DETAILS DETERMINED ON SITE, AND THOSE SHOWN THOSE SHOWN ON THE RELEVANT DRAWINGS, BYRNE LOOBY SHALL BE NOTIFIED IMMEDIATELY, AND THEIR INSTRUCTIONS OBTAINED PRIOR TO THE COMMENCEMENT OF ANY WORK.

KEY

FINAL EXTRACTION CONTOURS

COMPLETED INFILL PHASE CONTOURS

ACTIVE INFILL PHASE CONTOURS

No.	Date	Description	By	Chk	Apv.

BYRNELOOBY

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CLIENT: BOOTH VENTURES

PROJECT: RAVENHEAD QUARRY
LANDFILL RESTORATION SCHEME

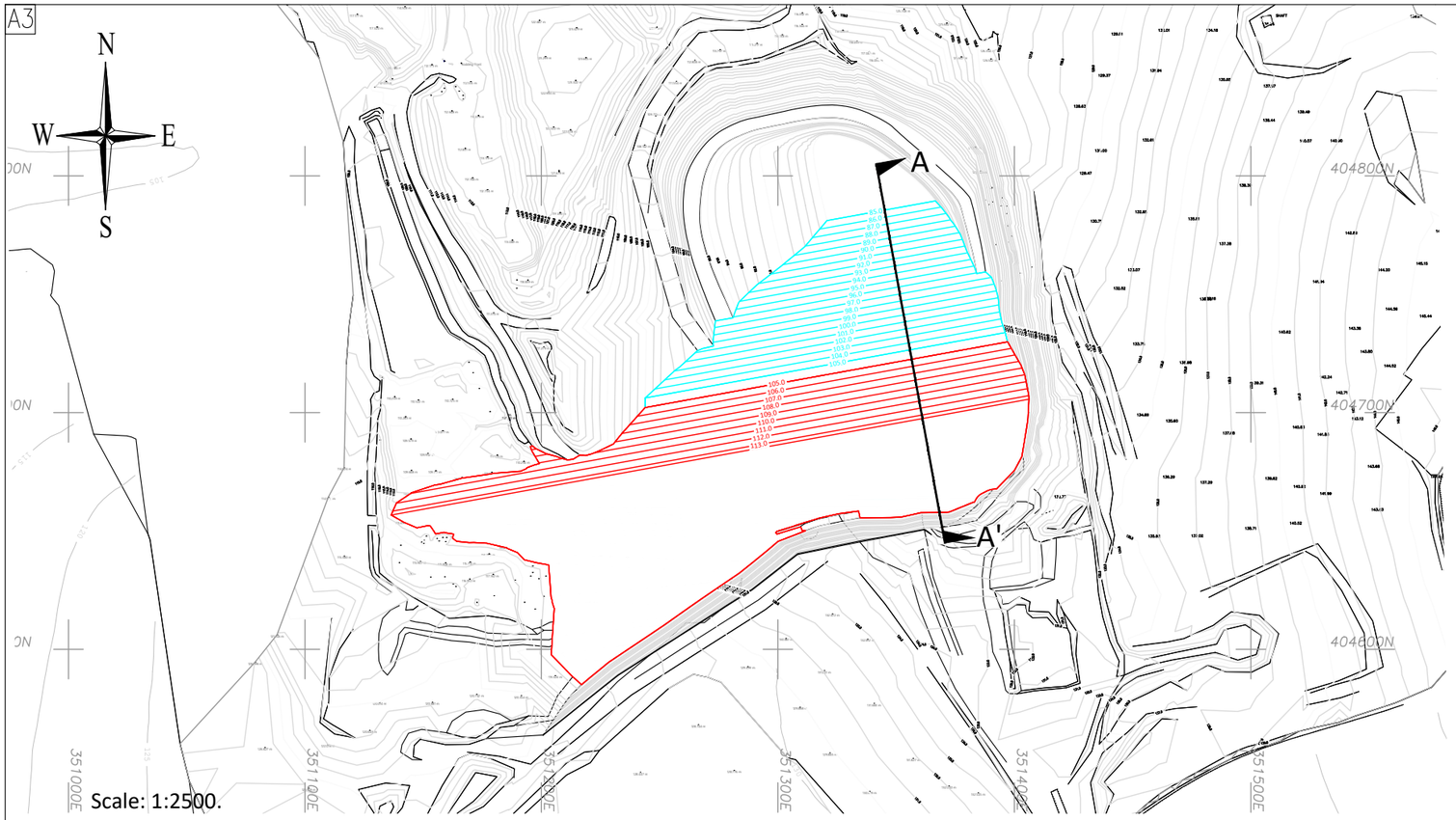
DRAWING TITLE: INFILL PHASING PLAN

STATUS:

Date: 10/09/22	Scale: 1:2,500	Drawn: PP	Chk: PS	Apv: JB

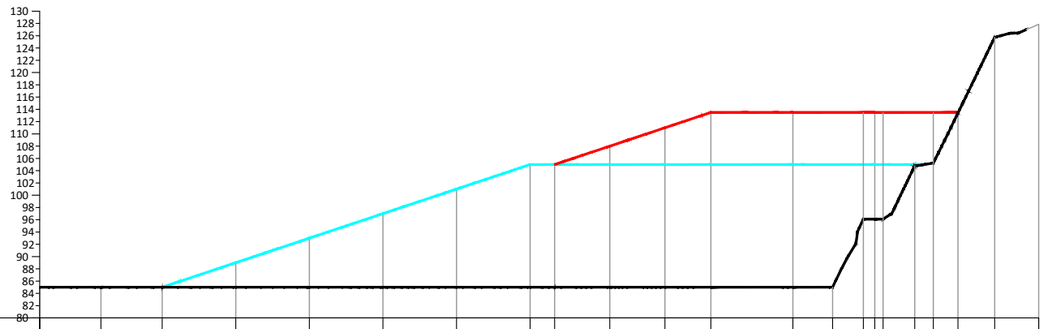
Project No:	Drg. No:	Rev:
K0158	K0158-3003	00

A3



Scale: 1:2500.

SECTION A-A'



Existing Levels	85.000	85.000	85.000	85.000	85.000	85.000	85.000	85.000	85.000	85.000	85.000	85.000	85.000	96.100	96.100	96.100	104.818	105.242	113.384	125.747	127.869
Phase 1 Levels			85.000	89.000	93.000	97.000	101.000	105.000	105.000	105.000	105.000	105.000	105.000	105.000	105.000	105.000	105.000				
Phase 2 Levels								105.000	108.000	111.000	113.500	113.500	113.500	113.500	113.500	113.500	113.500	113.500	113.500		
Chainage	0.000	9.988	19.976	31.976	43.976	55.976	67.976	79.976	83.976	92.976	101.976	109.476	122.839	129.320	134.332	136.202	137.545	142.722	145.743	149.761	155.756	162.929

Scale: H 1:1000,V 1:1000.

GENERAL NOTES

Rev	Date	Description	By	Chk	App
01	06/03	FOR REVIEW	GH	PS	AB

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CLIENT

BOOTH VENTURES LTD

PROJECT

RAVENHEAD QUARRY RESTORATION

DRAWING TITLE

STABILITY SECTION

STATUS

FOR REVIEW

Date: 06/03/23	Scale: AS SHOWN	Drawn: GH	Chk: PS	App: AB

Project No:	Drg. No:	Rev:
K0158	K0158–5001	01

Appendix B

Stability Of The Final Extraction To 85 m OD

Project file: Run09-Final Ecavation-tension.psl
Project title: Ravenhead Run09 Sec A- Surchberm+crest - Final excavation Drg 8C ALL

Material Properties - Ubiquitous-Joint

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ	JAngle θ	JCohesion c_j	JTension σ_j^t	JFriction φ_j	JDilation ψ_j
Units	kg/m^3	Pa	Pa	Deg.	Deg.	Deg.	Pa	Pa	Deg.	Deg.
Rock Lower Coal Measures 2 EFF C2	2400.0	500000.0	31000.0	33.0	0.0	0.0	9000.0	0.0	18.5	0.0

Interface Properties

Class Name	Cohesion Pa	Tensile Str Pa	Friction Deg.	Dilation Deg.
User new 1	0.0	0.0	0.0	0.0

Factor of Safety

Project	Model	Material Type	Shape	Mesh	Switches	FOS
Run09Final	Ecavationtension_Model_1	Ubiquitous-Joint	General slope	Fine	ufucut	1.03

Program: FLAC/Slope v8.1.469 & GIIC/Slope v2.20.527
Created: Thu Mar 02 10:04:36 GMT 2023

JOB TITLE : Ravenhead Run09 Sec A- Surchberm+crest - Final exc to 85mOD ALLSLOPE

FLAC/SLOPE (Version 8.10)

LEGEND

2-Mar-23 9:44

Factor of Safety 1.03

Max. shear strain-rate

2.00E-08
6.00E-08
1.00E-07
1.40E-07
1.80E-07
2.20E-07

Contour interval= 2.0000E-08
Extrap. by averaging
(zero contour omitted)
Boundary plot

0 2E 1

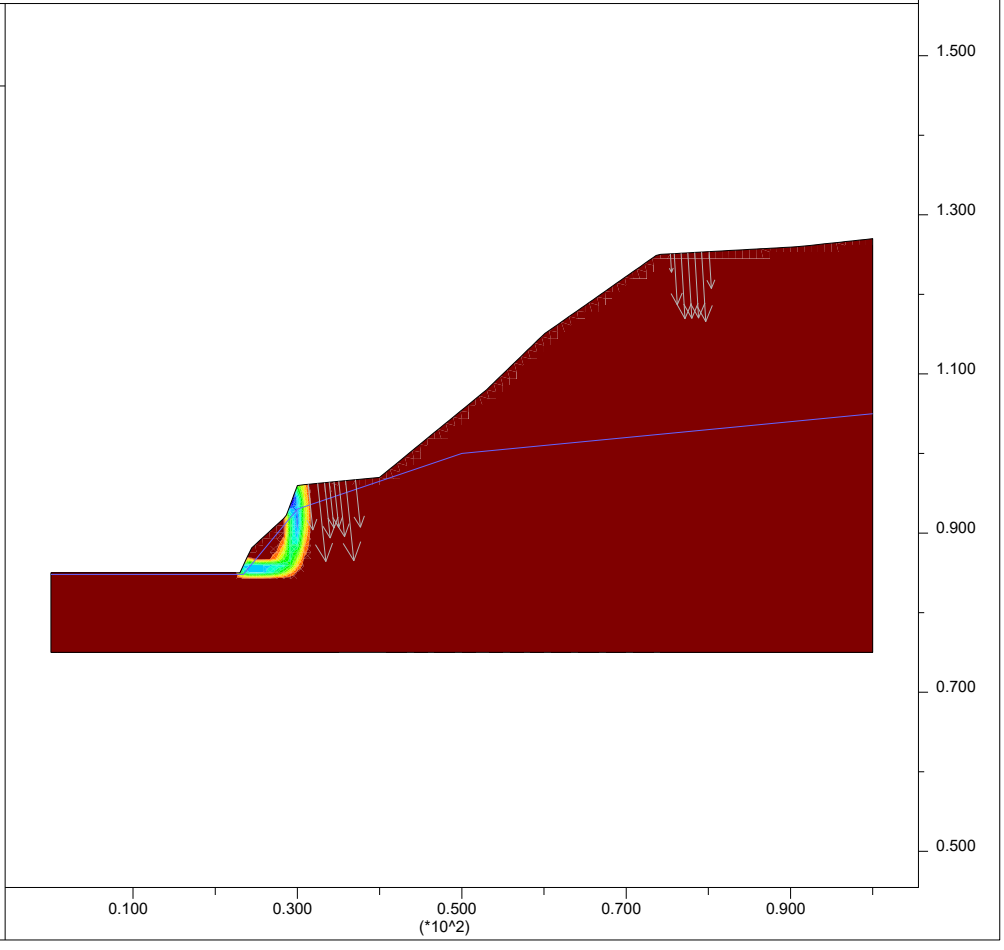
Water Table

Net Applied Forces

max vector = 3.975E+04

0 1E 5

Plough Geotechnical Limited
Strains



Appendix C

Stability Of The Proposed Waste During The Works

JOB TITLE : Ravenhead Run11 Sec E InfillPh2 Surch crest - Drg 5001 - UND EC7 DC2

FLAC/SLOPE (Version 8.10)

LEGEND

7-Mar-23 10:04

Factor of Safety 1.01

User-defined Groups
'Rock:Lower Coal Measures 2
'Clay basal Liner:AGB UND C
'Waste 2:Inert Soil EFF C2'
'Clay sidewalll Liner:AGB U
Boundary plot

0 5E 1

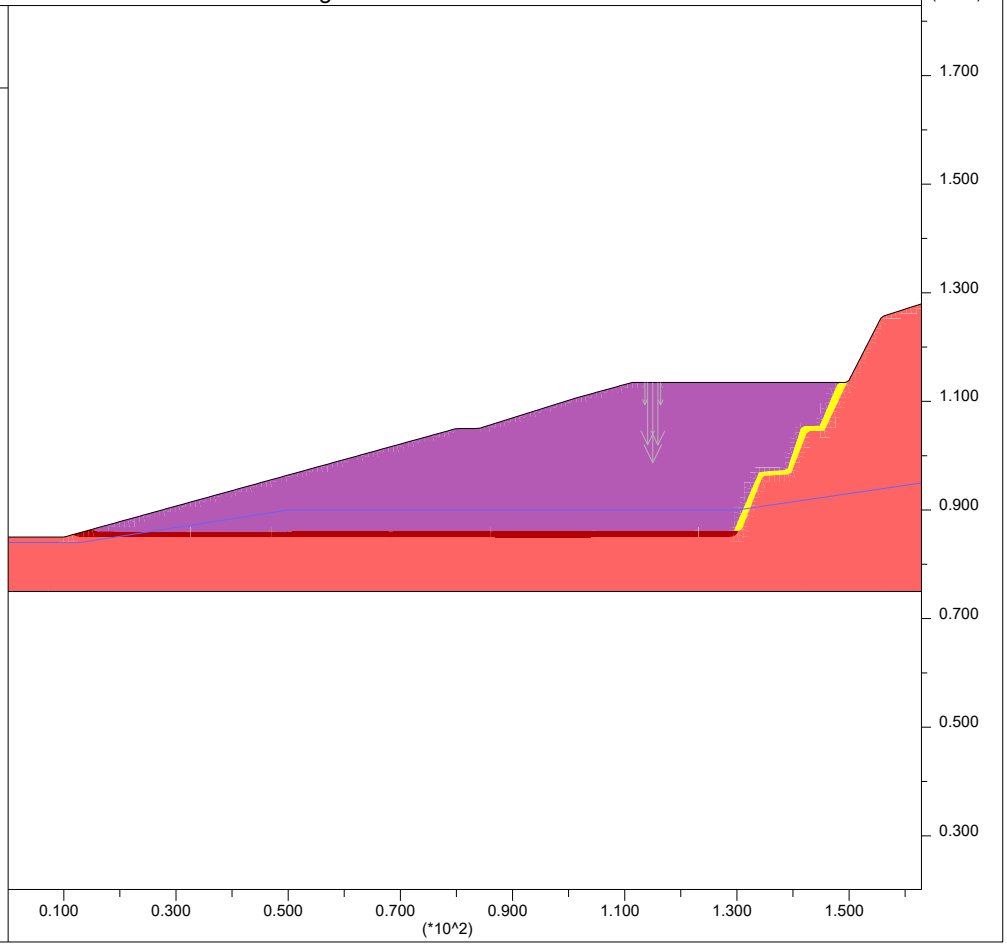
Water Table

Net Applied Forces

max vector = 3.532E+04

0 1E 5

Plough Geotechnical Limited
Materials



Project file: Run11-InfillPhase 2-bothslopes-UND.psl
Project title: Ravenhead Run11 Sec E InfillPh2 Surch crest - Drg 5001 - UND EC7 DC2

Material Properties - Mohr-Coulomb

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ
Units	**kg/m^3**	**Pa**	**Pa**	**Deg.**	**Deg.**
Clay basal Liner AGB UND C2	1800.0	35700.0	0.0	0.0	0.0
Waste 2 Inert Soil EFF C2	1700.0	3000.0	0.0	19.6	0.0
Clay sidewalll Liner AGB UND C2	1800.0	28600.0	0.0	0.0	0.0

Material Properties - Ubiquitous-Joint

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ	JAngle θ	JCohesion c_j	JTension σ_j^t	JFriction φ_j	JDilation ψ_j
Units	**kg/m^3**	**Pa**	**Pa**	**Deg.**	**Deg.**	**Deg.**	**Pa**	**Pa**	**Deg.**	**Deg.**
Rock Lower Coal Measures 2 EFF C2	2400.0	500000.0	31000.0	33.0	0.0	0.0	9000.0	0.0	18.5	0.0

Interface Properties

Class Name	Cohesion Pa	Tensile Str Pa	Friction Deg.	Dilation Deg.
User new 1	0.0	0.0	0.0	0.0

Factor of Safety

Project	Model	Material Type	Shape	Mesh	Switches	FOS
Run11InfillPhase	2bothslopesUND_Model_1_Z180	Mohr & Ubiquitous	General slope	fc	ufuc	1.01

Program: FLAC/Slope v8.1.469 & GIIC/Slope v2.20.527
Created: Tue Mar 07 10:12:14 GMT 2023

JOB TITLE : Ravenhead Run11 Sec E InfillPh2 Surch crest - Drg 5001 - UND EC7 DC2

FLAC/SLOPE (Version 8.10)

LEGEND

7-Mar-23 10:03

Factor of Safety 1.01

Max. shear strain-rate

- 5.00E-08
- 1.50E-07
- 2.50E-07
- 3.50E-07
- 4.50E-07
- 5.50E-07
- 6.50E-07

Contour interval= 5.0000E-08
Extrap. by averaging
(zero contour omitted)
Boundary plot

0 5E 1

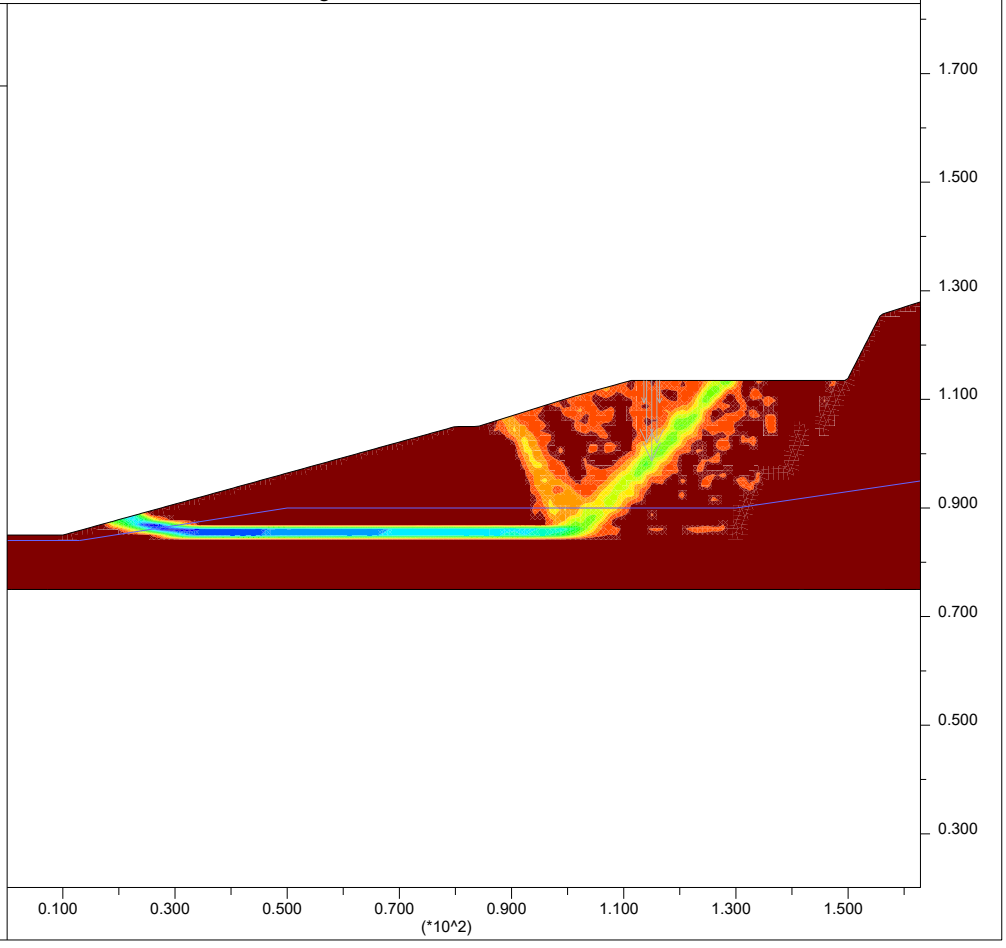
Water Table

Net Applied Forces

max vector = 3.532E+04

0 1E 3

Plough Geotechnical Limited
Strains



JOB TITLE : Ravenhead Run12 Sec E InfillPh2 Surch crest - Drg 5001 - EFF EC7 DC2

FLAC/SLOPE (Version 8.10)

LEGEND

7-Mar-23 9:33

Factor of Safety 1.36

User-defined Groups
'Rock:Lower Coal Measures 2
'Clay basal Liner:AGB EFF C
'Waste 2:Inert Soil EFF C2'
'Clay sidewalll Liner:AGB U
Boundary plot

0 5E 1

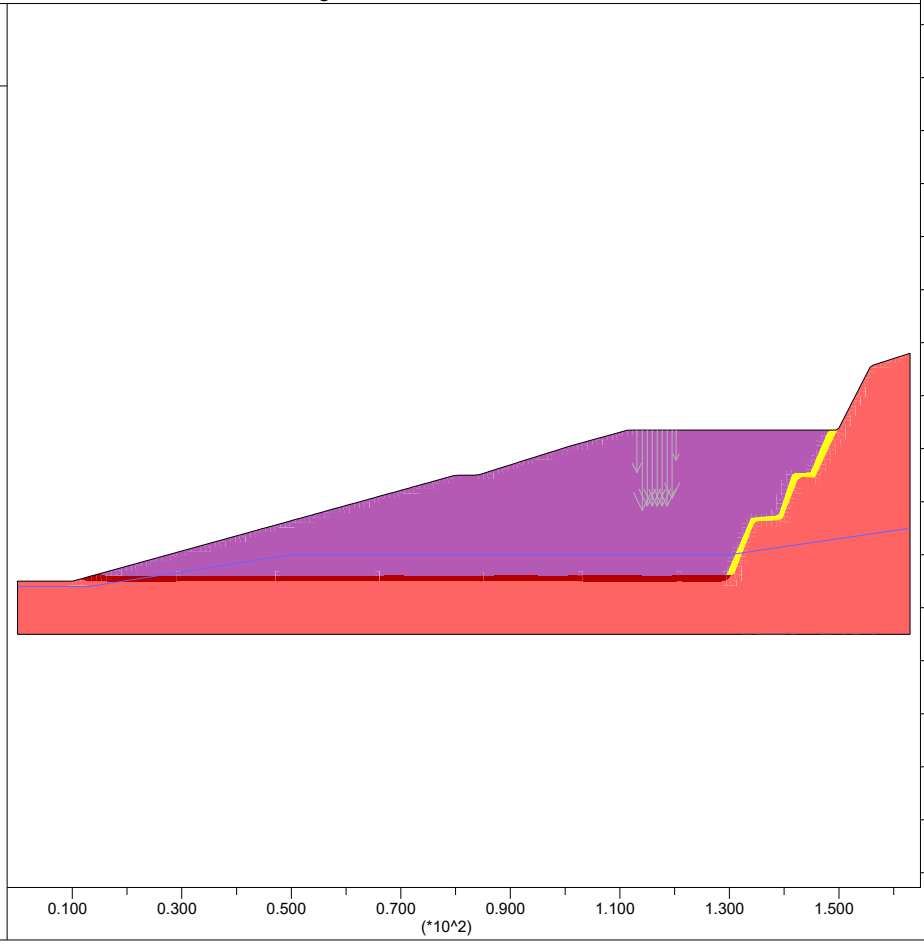
Water Table

Net Applied Forces

max vector = 3.735E+04

0 1E 5

Plough Geotechnical Limited
Materials



Project file: Run12-InfillPhase 2-bothslopes-EFF.psl
Project title: Ravenhead Run12 Sec E InfillPh2 Surch crest - Drg 5001 - EFF EC7 DC2

Material Properties - Mohr-Coulomb

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ
Units	**kg/m^3**	**Pa**	**Pa**	**Deg.**	**Deg.**
Clay basal Liner AGB EFF C2	1800.0	4000.0	0.0	23.4	0.0
Waste 2 Inert Soil EFF C2	1700.0	3000.0	0.0	19.6	0.0
Clay sidewalll Liner AGB UND C2	1800.0	28600.0	0.0	0.0	0.0

Material Properties - Ubiquitous-Joint

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ	JAngle θ	JCohesion c_j	JTension σ_j^t	JFriction φ_j	JDilation ψ_j
Units	**kg/m^3**	**Pa**	**Pa**	**Deg.**	**Deg.**	**Deg.**	**Pa**	**Pa**	**Deg.**	**Deg.**
Rock Lower Coal Measures 2 EFF C2	2400.0	500000.0	31000.0	33.0	0.0	0.0	9000.0	0.0	18.5	0.0

Interface Properties

Class Name	Cohesion Pa	Tensile Str Pa	Friction Deg.	Dilation Deg.
User new 1	0.0	0.0	0.0	0.0

Factor of Safety

Project	Model	Material Type	Shape	Mesh	Switches	FOS
Run12InfillPhase	2bothslopesEFF_Model_1_Z180	Mohr & Ubiquitous	General slope	fc	ufuc	1.36

Program: FLAC/Slope v8.1.469 & GIIC/Slope v2.20.527
Created: Tue Mar 07 09:34:18 GMT 2023

JOB TITLE : Ravenhead Run12 Sec E InfillPh2 Surch crest - Drg 5001 - EFF EC7 DC2

FLAC/SLOPE (Version 8.10)

LEGEND

7-Mar-23 9:31

Factor of Safety 1.36

Max. shear strain-rate

2.00E-05
6.00E-05
1.00E-04
1.40E-04
1.80E-04

Contour interval= 2.0000E-05
Extrap. by averaging
(zero contour omitted)
Boundary plot

0 5E 1

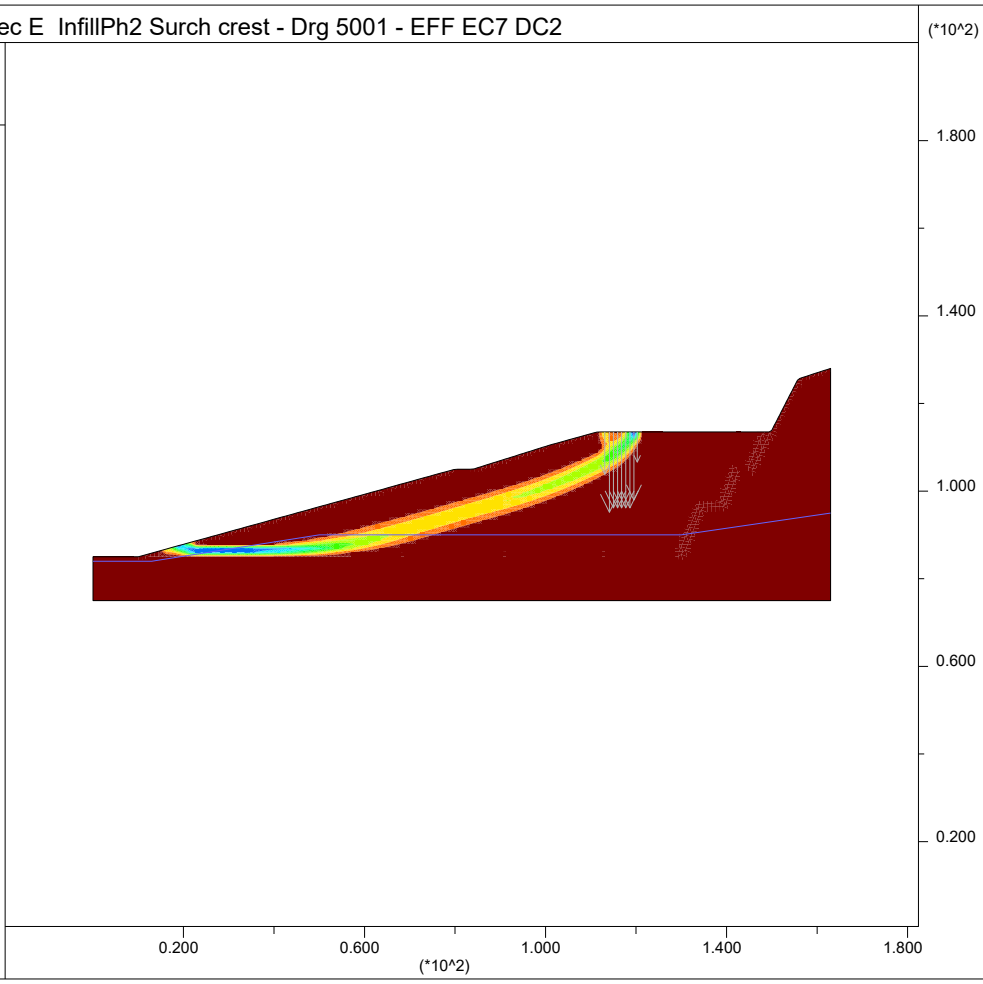
Water Table

Net Applied Forces

max vector = 3.735E+04

0 1E 5

Plough Geotechnical Limited
Strains



Appendix D

Stability Of The Sidewall Liner

JOB TITLE : Ravenhead Run13 Sidewall liner Surch crest - Top liner reduced to 15kPa

FLAC/SLOPE (Version 8.10)

LEGEND

7-Mar-23 14:37

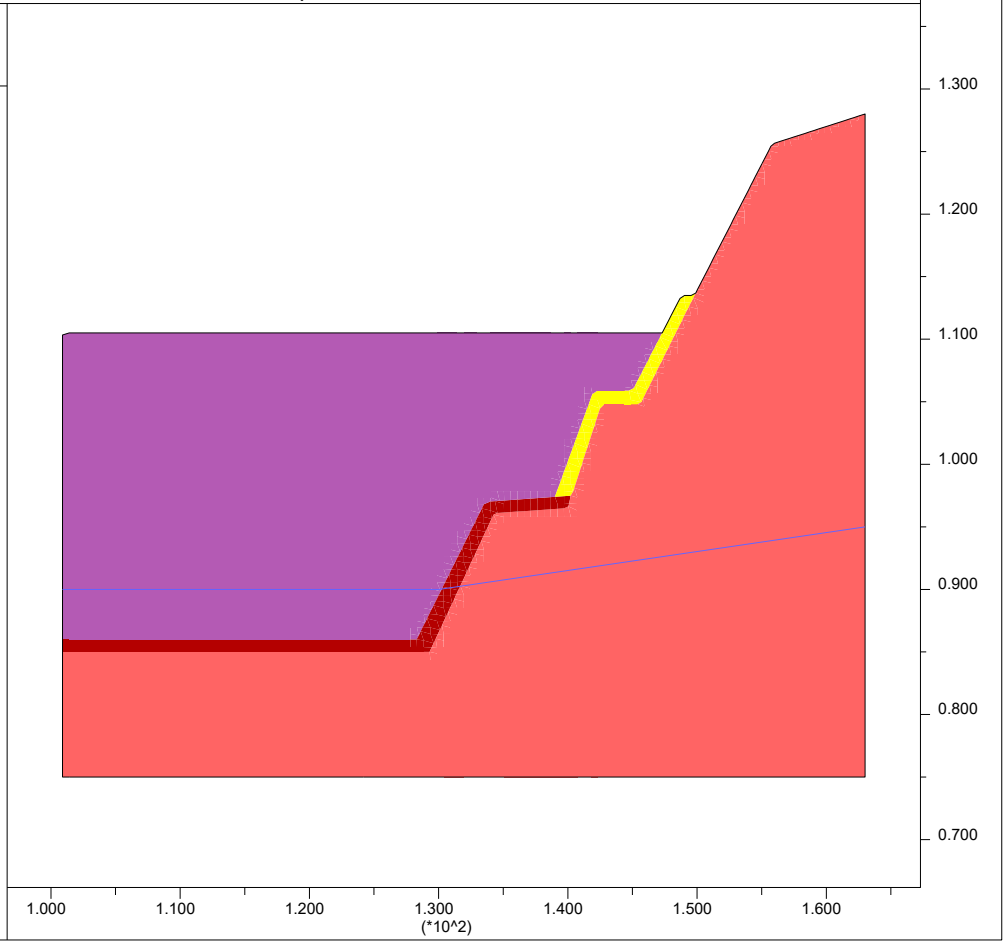
Factor of Safety 2.11

User-defined Groups
'Rock:Lower Coal Measures 2
'Clay basal Liner:AGB EFF C
'Waste 2:Inert Soil EFF C2'
'Clay sidewalll Liner:AGB U
Boundary plot

0 2E 1

Water Table

Plough Geotechnical Limited
Materials



Project file: Run13-Clay liner-3m lift-Reduced-150kPa.psl
Project title: Ravenhead Run13 Sidewall liner Surch crest - Top liner reduced to 15kPa

Material Properties - Mohr-Coulomb

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ
Units	**kg/m^3**	**Pa**	**Pa**	**Deg.**	**Deg.**
Waste 2 Inert Soil EFF C2	1700.0	3000.0	0.0	19.6	0.0
Clay basal Liner AGB EFF C2	1800.0	4000.0	0.0	23.4	0.0
Clay sidewalll Liner AGB UND C2	1800.0	28600.0	0.0	0.0	0.0
Clay sidewalll Liner AGB UND C2 Reduced	1800.0	15000.0	0.0	0.0	0.0

Material Properties - Ubiquitous-Joint

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ	JAngle θ	JCohesion c_j	JTension σ_j^t	JFriction φ_j	JDilation ψ_j
Units	**kg/m^3**	**Pa**	**Pa**	**Deg.**	**Deg.**	**Deg.**	**Pa**	**Pa**	**Deg.**	**Deg.**
Rock Lower Coal Measures 2 EFF C2	2400.0	500000.0	31000.0	33.0	0.0	0.0	9000.0	0.0	18.5	0.0

Interface Properties

Class Name	Cohesion Pa	Tensile Str Pa	Friction Deg.	Dilation Deg.
User new 1	0.0	0.0	0.0	0.0

Factor of Safety

Project	Model	Material Type	Shape	Mesh	Switches	FOS
Run13Clay	liner3m_liftReduced10kPa_Model_1_Z120	Mohr & Ubiquitous	General slope	fc	ufuc	2.11

Program: FLAC/Slope v8.1.469 & GIIC/Slope v2.20.527
Created: Tue Mar 07 14:39:44 GMT 2023

JOB TITLE : Ravenhead Run13 Sidewall liner Surch crest - Top liner reduced to 15kPa

FLAC/SLOPE (Version 8.10)

LEGEND

7-Mar-23 14:36

Factor of Safety 2.11

Max. shear strain-rate

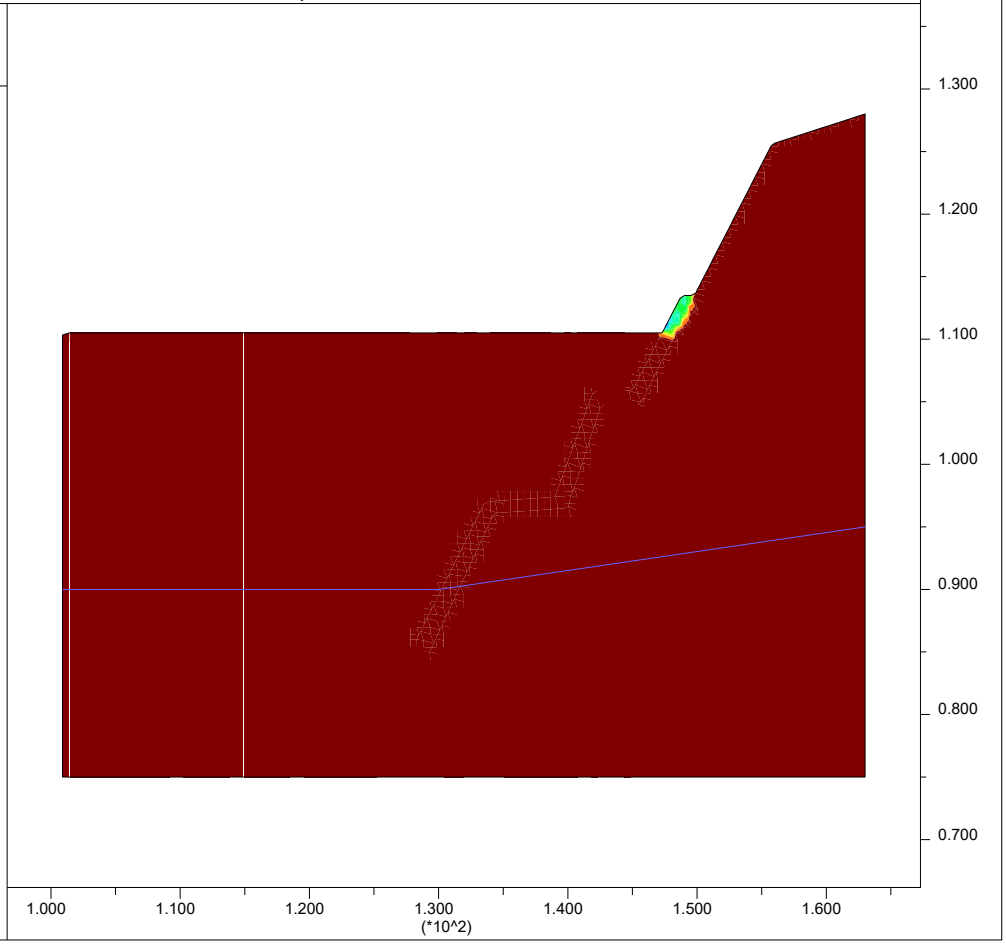
1.00E-06
3.00E-06
5.00E-06
7.00E-06
9.00E-06

Contour interval= 1.0000E-06
Extrap. by averaging
(zero contour omitted)
Boundary plot

0 2E 1

Water Table

Plough Geotechnical Limited
Strains



Project file: Run13-Clay liner-3m lift-Reduced-20kPa.psl
Project title: Ravenhead Run13 Sidewall liner Surch crest - Top liner reduced to 20kPa

Material Properties - Mohr-Coulomb

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ
Units	**kg/m^3**	**Pa**	**Pa**	**Deg.**	**Deg.**
Waste 2 Inert Soil EFF C2	1700.0	3000.0	0.0	19.6	0.0
Clay basal Liner AGB EFF C2	1800.0	4000.0	0.0	23.4	0.0
Clay sidewalll Liner AGB UND C2	1800.0	28600.0	0.0	0.0	0.0
Clay sidewalll Liner AGB UND C2 Reduced	1800.0	20000.0	0.0	0.0	0.0

Material Properties - Ubiquitous-Joint

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ	JAngle θ	JCohesion c_j	JTension σ_j^t	JFriction φ_j	JDilation ψ_j
Units	**kg/m^3**	**Pa**	**Pa**	**Deg.**	**Deg.**	**Deg.**	**Pa**	**Pa**	**Deg.**	**Deg.**
Rock Lower Coal Measures 2 EFF C2	2400.0	500000.0	31000.0	33.0	0.0	0.0	9000.0	0.0	18.5	0.0

Interface Properties

Class Name	Cohesion Pa	Tensile Str Pa	Friction Deg.	Dilation Deg.
User new 1	0.0	0.0	0.0	0.0

Factor of Safety

Project	Model	Material Type	Shape	Mesh	Switches	FOS
Run13Clay	liner3m_liftReduced20kPa_Model_1_Fine	Mohr & Ubiquitous	General slope	fc	ufuc	3.21

Program: FLAC/Slope v8.1.469 & GIIC/Slope v2.20.527
Created: Tue Mar 07 15:11:58 GMT 2023

JOB TITLE : Ravenhead Run13 Sidewall liner Surch crest - Top liner reduced to 20kPa

FLAC/SLOPE (Version 8.10)

LEGEND

7-Mar-23 15:11

Factor of Safety 3.21

Max. shear strain-rate

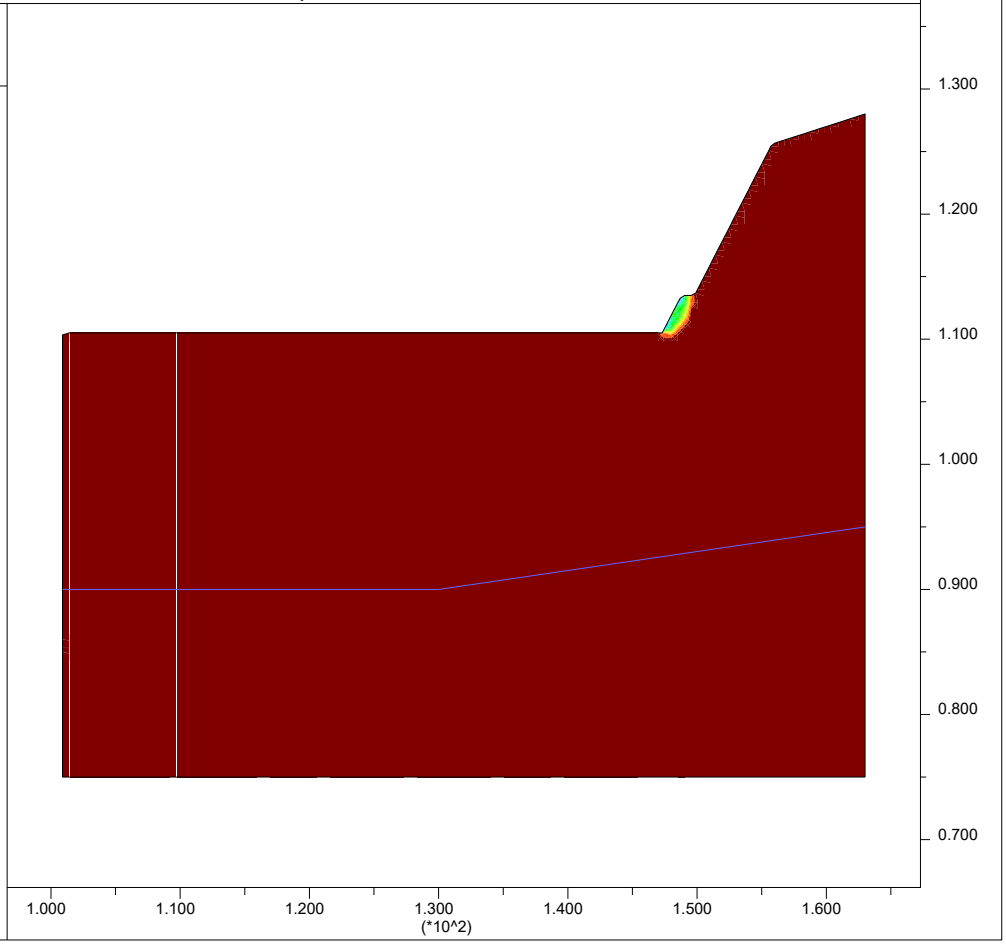
5.00E-07
1.50E-06
2.50E-06
3.50E-06
4.50E-06
5.50E-06
6.50E-06
7.50E-06

Contour interval= 5.0000E-07
Extrap. by averaging
(zero contour omitted)
Boundary plot

0 2E 1

Water Table

Plough Geotechnical Limited
Strains



Appendix E

Stability Of The Proposed Restoration Surfaces

JOB TITLE : Ravenhead Run14 Section B Drg 4008 Restoration Surch crest

FLAC/SLOPE (Version 8.10)

LEGEND

8-Mar-23 11:34

Factor of Safety 1.03

User-defined Groups
'Rock:Lower Coal Measures 2
'Clay Capping:Clay Cap-Soil
'Clay basal Liner:AGB EFF C
'Waste 2:Inert Soil EFF C2'
Boundary plot

0 1E 1

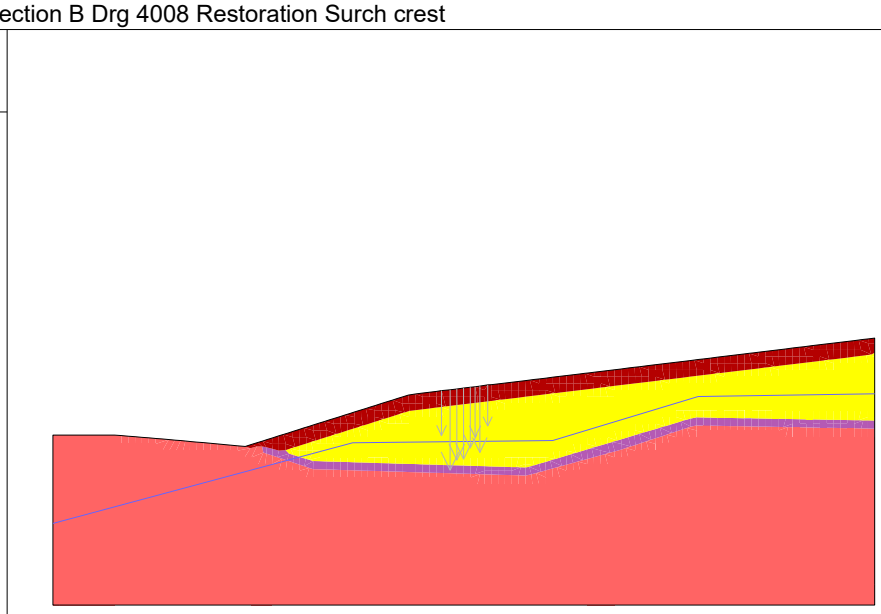
Water Table

Net Applied Forces

max vector = 1.323E+04

0 2E 4

Plough Geotechnical Limited
Materials



(*10^2)
1.250
1.150
1.050
0.950
0.850
0.500
1.500
2.500
3.500
4.500
(*10^1)

Project file: Run14-Restoration-EFF.psl
Project title: Ravenhead Run14 Sec B Restoration Surch crest - Drg 4008 - EFF EC7 DC2

Material Properties - Mohr-Coulomb

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ
Units	**kg/m^3**	**Pa**	**Pa**	**Deg.**	**Deg.**
Clay basal Liner AGB EFF C2	1800.0	4000.0	0.0	23.4	0.0
Waste 2 Inert Soil EFF C2	1700.0	3000.0	0.0	19.6	0.0
Clay sidewalll Liner AGB UND C2	1800.0	28600.0	0.0	0.0	0.0
Clay Capping Clay Cap-Soil EFF C2	1800.0	1000.0	0.0	18.8	0.0

Material Properties - Ubiquitous-Joint

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ	JAngle θ	JCohesion c_j	JTension σ_j^t	JFriction φ_j	JDilation ψ_j
Units	**kg/m^3**	**Pa**	**Pa**	**Deg.**	**Deg.**	**Deg.**	**Pa**	**Pa**	**Deg.**	**Deg.**
Rock Lower Coal Measures 2 EFF C2	2400.0	500000.0	31000.0	33.0	0.0	0.0	9000.0	0.0	18.5	0.0

Interface Properties

Class Name	Cohesion Pa	Tensile Str Pa	Friction Deg.	Dilation Deg.
User new 1	0.0	0.0	0.0	0.0

Factor of Safety

Project	Model	Material Type	Shape	Mesh	Switches	FOS
Run14RestorationEFF	Model_1_Z120	Mohr & Ubiquitous	General slope	fc	ufuc	Unknown

Program: FLAC/Slope v8.1.469 & GIIC/Slope v2.20.527
Created: Wed Mar 08 11:43:27 GMT 2023

JOB TITLE : Ravenhead Run14 Section B Drg 4008 Restoration Surch crest

FLAC/SLOPE (Version 8.10)

LEGEND

8-Mar-23 11:35

Factor of Safety 1.03

Max. shear strain-rate

2.00E-04
6.00E-04
1.00E-03
1.40E-03
1.80E-03
2.20E-03

Contour interval= 2.0000E-04
Extrap. by averaging
(zero contour omitted)
Boundary plot

0 1E 1

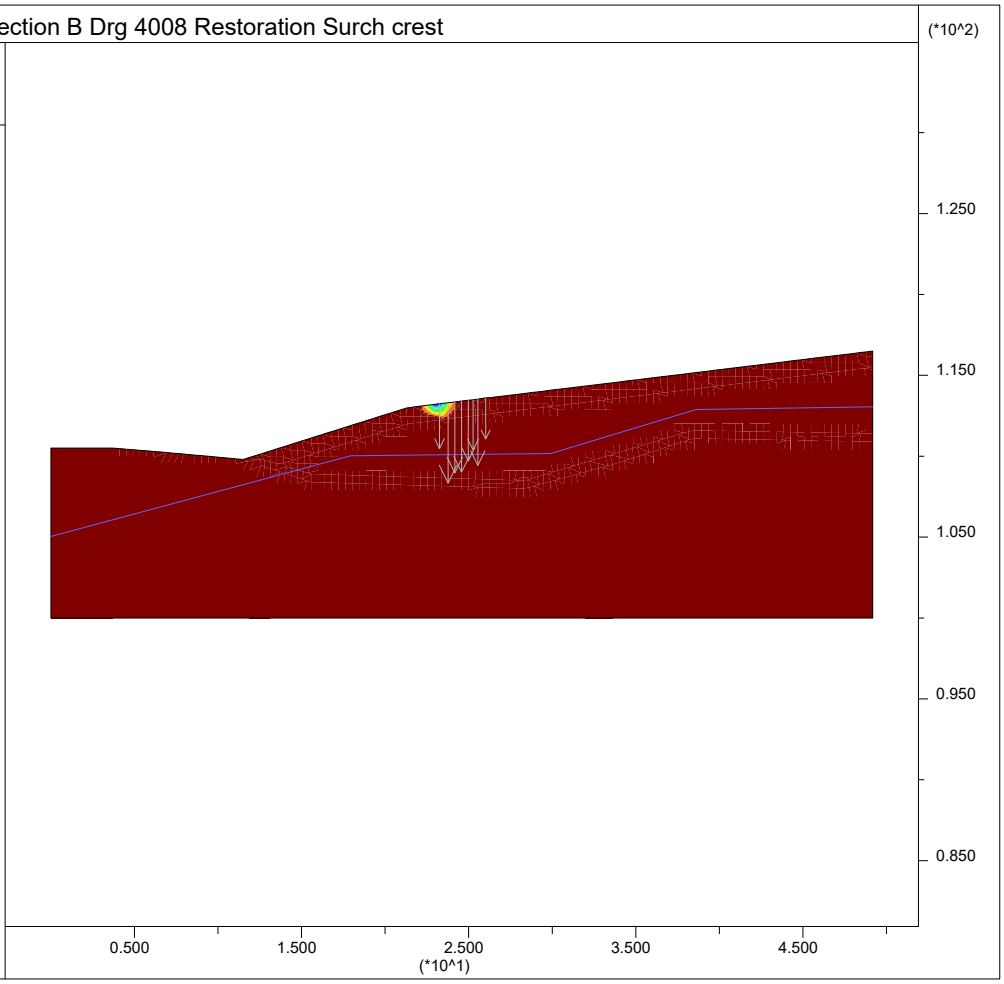
Water Table

Net Applied Forces

max vector = 1.323E+04

0 2E 4

Plough Geotechnical Limited
Strains



JOB TITLE : Ravenhead Run15 Section B Drg 4008 Restoration No Surch

FLAC/SLOPE (Version 8.10)

LEGEND

8-Mar-23 11:40

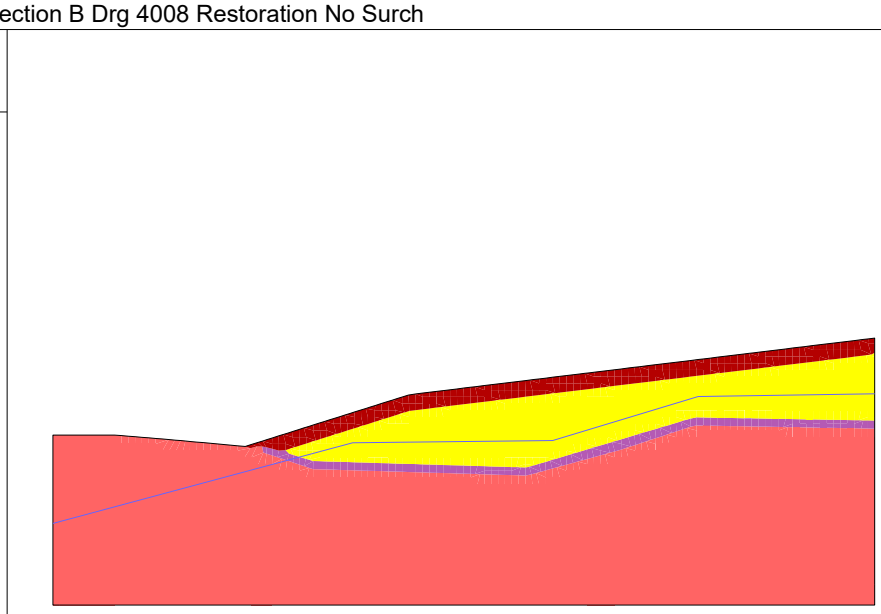
Factor of Safety 1.49

User-defined Groups
'Rock:Lower Coal Measures 2
'Clay Capping:Clay Cap-Soil
'Clay basal Liner:AGB EFF C
'Waste 2:Inert Soil EFF C2'
Boundary plot

0 1E 1

Water Table

Plough Geotechnical Limited
Materials



(*10^2)
1.250
1.150
1.050
0.950
0.850
0.500
1.500
2.500
3.500
4.500
(*10^1)

Project file: Run15-Restoration-EFF.psl
Project title: Ravenhead Run15 Section B Drg 4008 Restoration No Surch

Material Properties - Mohr-Coulomb

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ
Units	**kg/m^3**	**Pa**	**Pa**	**Deg.**	**Deg.**
Clay basal Liner AGB EFF C2	1800.0	4000.0	0.0	23.4	0.0
Waste 2 Inert Soil EFF C2	1700.0	3000.0	0.0	19.6	0.0
Clay sidewalll Liner AGB UND C2	1800.0	28600.0	0.0	0.0	0.0
Clay Capping Clay Cap-Soil EFF C2	1800.0	1000.0	0.0	18.8	0.0

Material Properties - Ubiquitous-Joint

Class Name	Density ρ	Cohesion c	Tension σ^t	Friction φ	Dilation ψ	JAngle θ	JCohesion c_j	JTension σ_j^t	JFriction φ_j	JDilation ψ_j
Units	**kg/m^3**	**Pa**	**Pa**	**Deg.**	**Deg.**	**Deg.**	**Pa**	**Pa**	**Deg.**	**Deg.**
Rock Lower Coal Measures 2 EFF C2	2400.0	500000.0	31000.0	33.0	0.0	0.0	9000.0	0.0	18.5	0.0

Interface Properties

Class Name	Cohesion Pa	Tensile Str Pa	Friction Deg.	Dilation Deg.
User new 1	0.0	0.0	0.0	0.0

Factor of Safety

Project	Model	Material Type	Shape	Mesh	Switches	FOS
Run15RestorationEFF	Model_1_Z120	Mohr & Ubiquitous	General slope	fc	ufuc	1.49

Program: FLAC/Slope v8.1.469 & GIIC/Slope v2.20.527
Created: Wed Mar 08 11:41:15 GMT 2023

JOB TITLE : Ravenhead Run15 Section B Drg 4008 Restoration No Surch

FLAC/SLOPE (Version 8.10)

LEGEND

8-Mar-23 11:40

Factor of Safety 1.49

Max. shear strain-rate

2.50E-07
1.00E-06
1.75E-06
2.50E-06
3.25E-06
4.00E-06
4.75E-06

Contour interval= 2.5000E-07
Extrap. by averaging
(zero contour omitted)
Boundary plot

0 1E 1

Water Table

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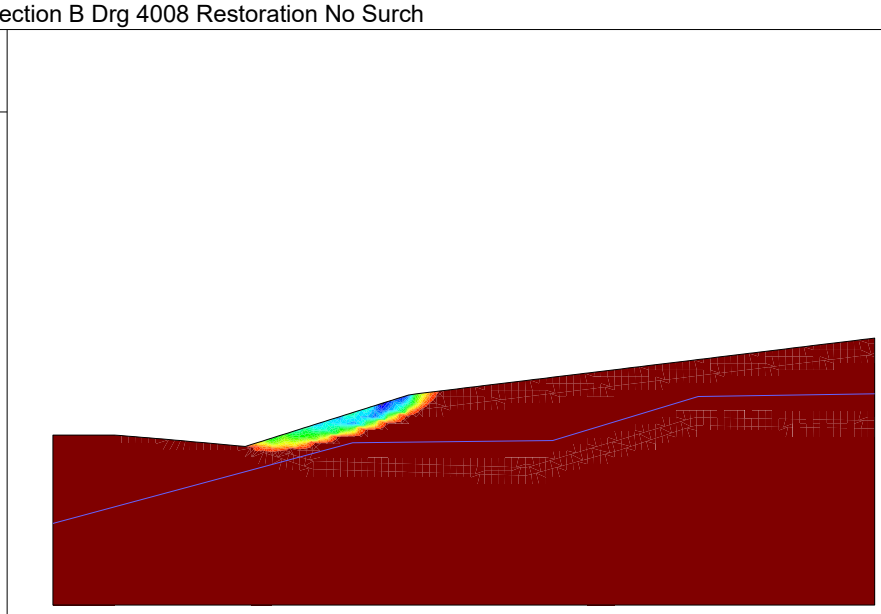
Strains



(*10^2)
1.250
1.150
1.050
0.950
0.850
0.500
1.500
2.500
3.500
4.500
(*10^1)

Appendix F

Stability Of The Basal Liner Resisting Heave

Client: Byrne Looby
Project No: BL13
Project Name: Sandown LFS

Stability of Basal Liner from Uplift
Eurocode 7 Combination 2
Limit State UPL

Calculations By:	Alan Binns BSc CEng FICE				**Checked By:**					
Basal Liner thickness m	0.5								**RL base of liner m OD**	85.0
Clay liner unit weight kN/m^3	18								**Water level at base of liner m OD**	106.0
EC7 DC 2 c'$_{design}$ kPa	4.0								**RL at top of liner m OD**	85.5
EC7 DC 2 ϕ'_{design} degrees	23.4	**Radians**	0.408408						**Water level at top of liner m OD**	85.5

Consider a 1m square block of the liner lifting up with no waste on the top

weight of clay liner block kN	9.00			**Pressure Diagrams for liner**						
Coeff' of lateral pressure K_0	0.603									
Vert total prtessure		**Water pressure**			**Vert eff pressure**				**Vert Horiz pressure**	
0.0		0.0			0.0					
0.5										
	9		1038.8			-1029.80				

The vert water pressure > the vertical downward pressure therfore uplift is probable

Consider a 1m square block of the liner lifting up with waste on the top

When the Liner is on the point of uplift a mass of waste is lifted up with the it.
The shape of the uplifted soil = an inverted FRUSTUM.
The volume of a frustum calculated using its top area, A_t, base area, A_b and height, h.
If the size of the square block = B and the frustum angle (f=35º), then the area of the top = $A_t = (B+2h/3*\tan f)^2$ and
the volume of the frustrum = $h/3*(A_t + A_b+(At*Ab)^{0.5})$

									degrees
Size of square liner lifting up m	1	Angle of the shearing soil plane with the vertical, frustum angle, f							35
height of frustum, h m	5.5							**Radians**	0.6109
Unit weight of waste kN/m^3	12	Reduced value to allow for light compaction of the waste							
Area of base of waste, A_b m^2	1.0								
Area of top of waste frustum, A_t m^2	12.7								
Volume of waste soil frustum, m^3	31.7								
Weight of waste soil frustum, kN	380.5								

As the waste is pushed up then it will have some shear resistance along the ides of the frustum. However, the frustum will tend to pull away from the staionary waste so this shear resistance is indeterminate. I shall ignore any shear resistance as this will be conservative.

Water upthrust on base of liner kN	205.8								
Partial factor on Actions UPL $\gamma_{Q;dst}$ Table A.15 EC7 NA Transient unfavourable	1.5								
Design Water upthrust on base of liner kN	**308.7**								
Downthrust from waste frustum kN	380.5								
Partial factor on Actions UPL $\gamma_{G;stb}$ Table A.15 EC7 NA Transient unfavourable	0.9								
Design Water downthrust on base of liner kN	**342.42**								
Overdesign Factor against uplift	**1.11**								

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DUST MANAGEMENT SCHEME

The National Planning Policy Framework Technical Guidance makes it clear that dust emissions from mineral extraction sites should be controlled, mitigated or removed at source. This Dust Management Scheme sets out the methods the quarry will employ to minimise dust arisings at source and therefore dust nuisance.

1. Dust Sources

The following activities may create dust that could be transmitted beyond the quarry boundary, and so affect nearby sensitive receptors:

- excavation of minerals, soils and overburden;
- stockpiling;
- crushing and screening operations;
- movement of plant and machinery;
- lorry movements.

2. Management Controls

Practical measures shall be taken within the quarry to ensure that the best practicable means are used to control the emissions of dust and to ensure (so far as is reasonably practicable) that operations do not give rise to nuisance or complaint.

The following measures will be adopted.

Observation

The quarry manager and site supervisor will observe weather conditions and forecasts for dry and windy weather which could exacerbate the generation of dust arising from site activities with reference to neighbouring sensitive receptors. Quarry activities and mitigation measures will be reviewed when dust generation occurs. In critical conditions activities will be relocated or suspended until suitable conditions return or alternative/additional mitigation is employed.

Access Road

- the haul route from wheel wash to site access will be metalled, adequately drained and swept regularly;
- speed controls to be implemented on the access road;
- wheel cleaning equipment will be used for all departing HGVs ;

Haul Roads and Vehicles

- use of water bowsers to dampen haul roads when required to supress dust;
- plan and minimise haulage distances during dry and windy weather;
- grade and repair haul roads to maintain drainage and avoid rutting;
- apply speed limits; and
- plant and machinery exhausts not to be directed downwards.

Overburden and Soil Handling

- water sprays to be used as required to dampen dry materials before excavation and placement to minimise dust arisings;
- plan routeing to/from storage locations to minimise distances and double handling;
- soil bunds and mounds consolidated and graded to minimise wind blown dust;
- soil bunds and mounds seeded immediately upon completion of construction;

- stockpile heights restricted to minimise dust emissions;
- drop heights to be minimised at all times;
- stockpiling of materials away from sensitive boundaries where possible; and
- restrict access to restored areas to minimise erosion.

Mineral Extraction and Processing

- working at/from low levels when practical to do so to reduce exposure to wind;
- stockpiling of minerals in excavation areas, or dedicated stockpile zones;
- maintaining crushing and screening plant and machinery to manufacturers specification;
- drop heights to be minimised;
- use of water sprays when processing dry and friable materials;
- operating plant and machinery in accordance with Environmental Permit conditions; and
- optimise separation distances to sensitive receptors during dry and windy conditions.

3. Response to Complaints

The Company will take all dust complaints seriously and:

- report all complaints to the quarry manager;
- record all complaints received is site log and Environmental Management System;
- react swiftly to investigate complaints attributed to quarry operations; and
- implement remedial measures if complaints are validated.