

ENVIRONMENT

Wilson Bowden Developments Ltd &
Rochdale Borough Council
Plot R2, Atom Valley Innovation Centre
(Plot R2 AVIC)
Rochdale
Phase 2 Geo-Environmental Assessment

ENVIRONMENT

Wilson Bowden Developments Ltd & Rochdale Borough Council
Plot R2, Atom Valley Innovation Centre (Plot R2 AVIC)
Rochdale
Phase 2 Geo-Environmental Assessment

Birmingham
Livery Place, 35 Livery Street, Colmore Business District, Birmingham, B3 2PB
T: 0121 233 3322

Leeds
Whitehall Waterfront, 2 Riverside Way, Leeds
LS1 4EH
T: 0113 233 8000

London
11 Borough High Street
London, SE1 9SE
T: 0207 407 3879

Manchester
11, Portland Street, Manchester M1 3HU
T: 0161 233 4260

Market Harborough
Harborough Innovation Centre, Wellington Way, Airfield Business Park,
Leicester Road, Market Harborough, Leicestershire, LE16 7WB
T: 01858 455020

Nottingham
Waterfront House, Station Street, Nottingham NG2 3DQ
T: 0115 924 1100

May 2024

DOCUMENT ISSUE RECORD

Document Number:	KYR-BWB-ZZ-XX-RP-YE-0002_Ph2		
BWB Reference:	232081		
Author:	Paolo Moniz BSc (Hons)	Graduate Consultant	
Reviewer:	Alex Booer BSc (Hons) MSc CGeol FGS	Principal Geotechnical Engineer	
	Mike Harper BSc (Hons) MSc CEnv	Principal Consultant	
Approver:	Ralph Sibley BSc PhD CGeol FGS RoGEP Advisor	Technical Director	

REVISION CONTROL

Revision	Date of Issue	Status	Update Notes:	Updated:	Approved:
P02	September 2023	S2	Update with additional hand pitting data and remaining monitoring data.	Paolo Moniz BSc (Hons)	Mike Harper BSc (Hons) MSc CEnv
P03	September 2023	S2	Updated with minor wording clarifications.	Alex Booer BSc (Hons) MSc CGeol FGS	Mike Harper BSc (Hons) MSc CEnv
P04	September 2023	S2	Updated with minor wording clarifications.	Alex Booer BSc (Hons) MSc CGeol FGS	Mike Harper BSc (Hons) MSc CEnv
P05	April 2024	S2	Updated with new scheme name, development description, and masterplan.	Alex Booer BSc (Hons) MSc MA CGeol FGS	Richard Robinson BSc (Hons) MCIWEM
P06	May 2024	S2	Updated with v. P02 of the new masterplan.	Alex Booer BSc (Hons) MSc MA CGeol FGS	Richard Robinson BSc (Hons) MCIWEM

Notice

This document has been prepared for the sole use of the Client in accordance with the terms of the appointment under which it was produced. BWB Consulting Limited accepts no responsibility for any use of or reliance on the contents of this document by any third party. No part of this document shall be copied or reproduced in any form without the prior written permission of BWB.

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY	
Site Address	The site is located on a collection of fields immediately south of Kingsway Business Park Tram Stop in Rochdale, postcode OL16 4JN.
Site Setting	The proposed development is indicated to comprise erection of a research & development building (Use Class E) including office, laboratory & production space, function space & café, new access, car parking, servicing, boundary treatments, hard and soft landscaping and other associated works..
Published Ground Conditions	Information published by the BGS indicates that the site is directly underlain by Hummocky Glacial Deposits (Sand and Gravel) with a small zone of Glacial Till in the very eastern section. These Superficial deposits are underlain by Pennine Lower Coal Measures bedrock. The bedrock is inferred as faulted to the southwest and northeast of the site at distances of 50m and 130m respectively (NW-SE trending).
Site Investigation	Previous ground investigation within the Plot R2 AVIC site boundary included six trial pits and two cable percussive boreholes undertaken as part of the adjacent Plot P investigation (1st to 5th August 2022). The associated data has been incorporated into this report. Further intrusive ground investigation works were undertaken between 3rd and 5th July 2023 and comprised the advancement of two cable percussive boreholes (BH01 and BH02) to a maximum depth of 10.45m bgl with completion of SPTs and installations of gas and groundwater monitoring wells; and four machine excavated trial pits (TP01 to TP04 inclusive) to a maximum depth of 3.90m bgl. To delineate the extent of asbestos fibres recorded within the 2023 investigation, another sampling visit was undertaken on 30/08/23. Ten shallow Made Ground samples were recovered from the Made Ground across the site and in the vicinity of both positive identifications.
Ground Conditions Encountered	The ground conditions encountered during the 2022 and 2023 ground investigations generally confirmed the published geology discussed in the Phase 1 Desk Study report. Ground conditions comprised Topsoil and Made Ground (from 0.2m to 2.3m thickness) directly underlain by Hummocky Glacial Deposits. A layer of relict topsoil between 2.3m and 2.5m was encountered below Made Ground in BH02 (2023). Hummocky Glacial Deposits typically comprised a layer of soft to firm clay (base depths of 0.8m to 3.0m) over medium dense to dense sands and sandy clays to a maximum proven depth of 15.45m. Bedrock was not encountered during either investigation.
Geotechnical Appraisal	Given the variable thickness of Made Ground and underlying soft clays up to 3.0m below ground level, ground improvement will be required for the support of shallow foundations and the floor slab of the proposed building. Ground improvement utilising vibro-stone columns (VSC) is considered feasible. Alternatively, ground improvement comprising rigid inclusions (RIs), with a load transfer platform is likewise considered feasible. Excavation and re-compaction of the upper 2m of soils is also a potential option, although feasibility is strongly weather-dependent and limited by spatial constraints. Significant thicknesses of organic soils or peat were not encountered during the investigation, save for the relict topsoil in BH02 (2023). If any organic soils/Peat are found the building footprint will need to be delineated, chased out, removed and replaced with suitable engineered fill. Excavated organic soils/Peat, if present, could potentially be reused within non-structural areas of the development.

	Compaction testing indicates soils are generally wet of optimum at natural moisture contents and would require dewatering (via chemical modification) for adequate compaction as engineered fill. The design sulphate and ACEC class for below ground concrete at the site is DS-1 and AC-1. For new pavement at the site, modification of the formation soils (e.g. by lime or cement) will be required to achieve the required design CBR value. Based on the ground conditions encountered, together with the variable and shallow groundwater issues in the area, soakaway drainage is not likely to be viable and is not recommended. Groundwater is likely to vary seasonally at the site. The ground investigation will have likely captured the low range of groundwater conditions, with some areas of the site displaying evidence of historical waterlogging at the surface (reeds, organic topsoil build up). If groundwater levels rise following extended periods of wet weather, groundwater control may be required during construction ground works.
Environmental Appraisal	Moderate total Organic Carbon (TOC) content in the Made Ground was recorded was recorded within the 2022 investigation. Characteristic Gas Situation 2 (CS2) prevails on site within monitored boreholes. No soil samples tested during 2023 had contaminant concentrations that exceeded the screening criteria for risks to human health for a commercial end-use. Asbestos fibres were recorded in two locations (TP01 and TP03 during the 2023 investigation – see Waste Assessment section below). Ten samples further shallow Made Ground samples were recovered from across the site and in the area of both positive identifications. No further positive asbestos identifications were recorded. Asbestos fibres recorded in the Made Ground of TP01 and TP03 are considered isolated areas of contamination. No groundwater samples were taken during the 2023 investigation as the groundwater levels were too low to achieve sufficient volume for sampling at the time. Minor exceedances for leachable copper, lead, nickel and zinc were recorded in the 2022 investigation. BWB consider these exceedances to not be significant given the distance to sensitive surface water receptors. Minor exceedances for cadmium, copper, nickel, zinc, and ammonium were recorded in groundwater samples within the 2022 investigation. Due to the proposed development on the site comprising large areas with hardstanding and buildings which will limit further infiltration and leaching, BWB does not consider that controlled waters will be exposed to an unacceptable risk as a result of the proposed development.
Waste Assessment	Soil samples from both investigations have been characterised against hazardous waste criteria using Hazwasteonline. The results of the waste classification indicates that most of the soil samples analysed are likely to be classified as non-hazardous. Asbestos was recorded in two locations (TP01 and TP03). Quantification results recorded <0.001% and 0.359% respectively. Concentrations of asbestos within the soils in TP03 would be classified as hazardous.
Recommendations	A Remediation Strategy should be completed for the site prior to development to provide remediation and mitigation requirements and provide verification requirements of any gas protection measures required. Any earthworks will need to be undertaken in accordance with a suitable specification document, which will need to be prepared to describe the materials and their requirements including placement and acceptability limits.

	Ground improvement will likewise need to be undertaken in accordance with a suitable specification. Allowance should be made for temporary shoring of excavations due to likely stability issues associated with running sands. Contingency for groundwater control should be considered especially if development is undertaken during winter months.
This summary should be read in conjunction with BWB's full report (ref. KYP-BWB-ZZ-XX-RP-YE-0002_Ph2-P02 and reflects an assessment of the Site based on information received by BWB at the time of production.	

CONTENTS

EXECUTIVE SUMMARY	iv
1. INTRODUCTION.....	1
Instruction	1
Proposed Development	1
Previous Reports	1
Objectives	1
Scope of Works	2
2. THE SITE	3
Site Location.....	3
Site Description	3
3. PUBLISHED GROUND CONDITIONS.....	4
Published Geology	4
Hydrogeology	4
Hydrology	4
4. PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT	5
Introduction	5
5. PHASE II GEO-ENVIRONMENTAL AND GEOTECHNICAL GROUND INVESTIGATION	9
Chemical Sampling Strategy	9
Chemical Analytical Strategy	10
Soil Strategy	10
Groundwater Strategy	11
Geotechnical Strategy	11
6. GROUND CONDITIONS ENCOUNTERED.....	13
Geological Summary	13
Geological Descriptions	13
Hydrogeology	16
Hydrology	16
7. GEOTECHNICAL ASSESSMENT	17
Introduction	17
Ground Model	17
Foundation Solutions	17
Ground Improvement Techniques	18
Ground Floor Slabs	19
Piled Foundations	19
Roads and Pavements.....	19

Drainage.....	19
Ease of Excavation	20
Stability of Excavation.....	20
Legislation on Personnel Entry to Excavations	20
Groundwater.....	20
Chemical Attack on Buried Concrete	20
Earthworks.....	21
8. GROUND GAS ASSESSMENT	22
Introduction	22
Methodology	22
Results.....	22
Risk Assessment	23
Recommendations.....	24
9. CONTAMINANT DISTRIBUTION	25
Soils	25
Surface Water	25
10. HUMAN HEALTH RISK ASSESSMENT.....	26
Pathways	26
Sources.....	27
11. CONTROLLED WATERS RISK ASSESSMENT.....	28
Pathways	28
Soil Leachability	28
Groundwater Assessment.....	29
12. ENVIRONMENTAL RISK ASSESSMENT	30
Introduction	30
Sources.....	30
Pathways	30
Receptors	30
13. ENVIRONMENT LIABILITY ASSESSMENT AND DEVELOPMENT IMPLICATIONS	33
Statutory Liability	33
Third Party Liability.....	33
Public Relations	33
Development Implications	33
14. WASTE MANAGEMENT.....	34
Waste Classification	34
Waste Acceptance Criteria.....	34
15. CONCLUSIONS AND RECOMMENDATIONS	35

Conclusions	35
Environmental	35
Geotechnical.....	35
Recommendations.....	36
16. REFERENCES	38

FIGURES

Figure 2.1: Site Location Plan

Figure 6.1: SPT 'N₆₀' Values vs. Depth.

Figure 6.2: Hand Shear Vane (HSV) vs. Depth (m bgl).

TABLES

Table 4-1: Potential Sources of Contamination

Table 4-2: Relevant Potential Pathways and Receptors

Table 4-3: Preliminary Conceptual Site Model

Table 5-1: Response Zones

Table 6-1 : Summary of Ground Conditions

Table 6-2 : PSD Results Summary (Hummocky Glacial Deposits).

Table 8-1 : Summary of Recorded Ground Gas Results

Table 8-2: Gas Protection Matrix

Table 9-1 : Summary of Soil Chemical Testing Results

Table 10-1 : Commercial Exposure Pathways

Table 11-1 : Controlled Water Exposure Pathways

Table 11-2: Summary of Leachate Exceedances – EQS

Table 11-3: Summary of Water Sample Exceedances - EQS

Table 11-4: Summary of Water Sample Exceedances - DWS

Table 12-1 : Preliminary Conceptual Site Model

APPENDICES

Appendix 1: Masterplan

Appendix 2: Exploratory Hole Logs

Appendix 3: SPT Calibration Certificate

Appendix 4: Gas and Groundwater Monitoring Data

Appendix 5: Soil Chemical Analysis Results

Appendix 6: Groundwater Analysis Results

Appendix 7 : Geotechnical Analysis Results

Appendix 8: CLEA Assessment Worksheets

Appendix 9: Leachate Screening Worksheets

Appendix 10: Groundwater Screening Worksheets

Appendix 11 : Waste Classification

1. INTRODUCTION

Instruction

- 1.1 This Phase 2 Geo-Environmental Assessment has been undertaken on behalf of Wilson Bowden Developments Ltd for the Plot R2 AVIC site, Kingsway Business Park, Rochdale. Details of the project brief are included in BWB proposal reference 230505/P02/0001/210939 dated May 2023.

Proposed Development

- 1.2 The proposed development is shown on the architect's masterplan in **Appendix 1**. The proposed development is indicated to comprise erection of research & development building (Use Class E) including office, laboratory & production space, function space & café, new access, car parking, servicing, boundary treatments, hard and soft landscaping and other associated works.

Previous Reports

- 1.3 The following geo-environmental reports have previously been completed for the site, or part of the site:
- 'Phase 1 Geo-Environmental Assessment' by BWB Consulting Ltd for Wilson Bowden Developments Ltd, reference KYP-BWB-ZZ-XX-RP-YE-0001_Ph1, dated July 2022.
 - 'Phase 2 Geo-Environmental Assessment' by BWB Consulting Ltd for Wilson Bowden Developments Ltd, reference KYP-BWB-ZZ-XX-RP-YE-0001_Ph1, dated October 2022.
- 1.4 The Phase 1 report listed above refers to Plot P, but covers the area now known as Plot R2 AVIC as well as the adjacent Plot P. The Plot P ground investigation covered part of the area of the current Plot R2 AVIC site, and information from that investigation has been incorporated into this Phase 2 Report for Plot R2 AVIC. Details are discussed further in **Section 2** below.

Objectives

- 1.5 The objectives of this assessment and report are to assess:
- The prevailing ground and groundwater conditions across the site;
 - The potential presence and extent of contamination in shallow soil and groundwater beneath the site;
 - The significance and magnitude of the observed contamination through comparison of analytical data with appropriate published environmental screening criteria;
 - The strength properties of the soil beneath the site to enable foundation design;
 - The ability to rework the soils for earthworks required to achieve the development platform;
 - Any precautions required with respect to attack on buried concrete;

- The drainage properties of the underlying strata; and
 - The ground gas regime beneath the site.
- 1.6 The above objectives will allow the preliminary Conceptual Site Model presented in the Phase 1 report to be verified and updated. The report has been completed in accordance with BS10175:2011(+A2:2017) 'Investigation of Potentially Contaminated Sites, Code of Practice' and EA Guidance on Risk Management of Land Contamination <https://www.gov.uk/government/publications/land-contamination-risk-management-lcm>.
- 1.7 This report presents the information obtained from a desk study and two ground investigations, one undertaken in 2023 specifically for the current development, and one undertaken for the adjacent Plot P site which at the time overlapped with the Plot R2 AVIC boundary. Relevant factual information from the Plot P investigation has been included in this report. The report, together with the associated Figures and Appendices, provides a Ground Investigation Report (GIR), as defined in BS EN 1997-1:2004 and BS EN 1997-2:2007

Scope of Works

- 1.8 The recent ground investigation scope of works for Plot R2 AVIC was completed on 05/07/2023 and comprised the following:
- Non-intrusive survey of exploratory hole locations for underground utilities;
 - 4 no. machine excavated trial pits;
 - 2 no. cable percussive boreholes;
 - 10 no. hand dug pits (undertaken 31st August 2023);
 - 4 no. gas and groundwater monitoring visits;
 - Chemical analysis of soil samples; and
 - Geotechnical testing of recovered soil samples.
- 1.9 The aspects of the Plot P ground investigation relevant to the current Plot R2 AVIC site included:
- 6 no. machine excavated trial pits;
 - 2 no. cable percussive boreholes;
 - 4 no. gas and groundwater monitoring visits;
 - Chemical analysis of soil samples; and
 - Geotechnical testing of recovered soil samples.

2. THE SITE

Site Location

- 2.1 The site is located at Plot R2, Atom Valley Innovation Centre (Plot R2 AVIC), in Rochdale, centred at National Grid Reference 391907 412651, nearest postcode OL16 4JN. The approximate location of the site is shown below in **Figure 2.1**.

Figure 2.1: Site Location Plan



Site Description

- 2.2 A full site description and site photographs are included within the BWB Phase 1 Geo-Environmental Assessment (Ref: KYP-BWB-ZZ-XX-RP-YE-0001_Ph1) dated July 2022, which included the current footprint of the Plot R2 AVIC site as well as adjacent land.
- 2.3 The current Plot R2 AVIC site comprises of an undeveloped, irregularly shaped parcel of grassed land to the east of Rochdale town centre, covering approximately 2.5 hectares. The site is undulating, with ground levels typically around 149m to 150.5m above Ordnance Datum.
- 2.4 The Oldham to Rochdale tram line is located adjoining the northern boundary of the site, with residential development beyond and to the north. The Kingsway Loop Road (Michael Faraday Avenue) bounds the site to the south. The land to the east and west of the site currently comprises undeveloped grassed fields.
- 2.5 The Stanney Brook watercourse is present around 150m to the south and west of the site boundary. Beyond the Brook is a series of engineered ponds, and immediately adjacent to these ponds the Rochdale Canal is present around 350m to the west of site.

3. PUBLISHED GROUND CONDITIONS

Published Geology

- 3.1 British Geological Survey (BGS) mapping for the site indicates that the site is underlain by Hummocky Glacial Deposits (Sand and Gravel) and/or Glacial Till. These Superficial deposits are underlain by Pennine Lower Coal Measures bedrock (with seams last worked in 1915 at depths of 97m to 107m bgl). The bedrock is inferred as faulted to the southwest and northeast of the site at distances of 52m and 130m respectively (both NW-SE trending faults). The BGS Lexicon database describes the bedrock as interbedded mudstone, siltstone and sandstone containing thicker coal seams towards the upper boundary.
- 3.2 The closest BGS borehole to the site is SD91SW-156, approximately 350 m west. The borehole recorded 1.4m of Made Ground, comprising of 200mm of topsoil over dark brown sandy topsoil with a small amount of gravel content. This is underlain by 4.6m of medium dense, brown silty fine to medium sand becoming loose at 5.2m to the borehole's termination at 6.0m bgl (below ground level). The Glacial Till is not present at this borehole location, but the Hummocky Glacial Deposits and underlying Lower Coal Measures bedrock, which are present on site, are included in this record.

Hydrogeology

- 3.3 The underlying ground conditions have been classified by the Environment Agency (EA) as follows:
- Glacial Till: Secondary Undifferentiated Aquifer;
 - Hummocky Glacial Deposits (Sand and Gravel): Secondary A Aquifer; and
 - Pennine Lower Coal Measures Bedrock: Secondary A Aquifer.

Hydrology

- 3.4 The following bodies of water are present within 400m of the site:
- Stanney Brook is present around 150m to the south of the site boundary;
 - A series of engineered ponds are present around 230m to the west; and
 - Rochdale Canal is present around 350m to the west.
- 3.5 There is a high risk of surface water flooding on site, primarily related to the surface water bodies listed above. There is risk of a maximum flood depth of 0.3m to 1m from surface water flooding on site for a 1 in 30-year event according to Environment Agency mapping.
- 3.6 There is a low to moderate risk of groundwater flooding on site according to Environment Agency mapping.

4. PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT

Introduction

4.1 The risk posed by any contaminants in soil or groundwater will depend on the nature of the hazard, the probability of exposure, the pathway by which exposure occurs, and the likely effects on the receptors. A contaminant is defined as a substance that has the potential to cause harm, while a risk is considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.

4.2 The following sections discuss all the identified potential on and off-site sources, pathways and receptors in the context of the proposed development and plausible pollutant linkages which may represent a risk to identified receptors such as human health and/or controlled waters from the data gained from the desk study. At this stage the assessment is qualitative and aimed to determine all pollutant linkages, irrespective of significance or allowing for uncertainty.

4.3 Three impact potentials exist for any given site; these are:

- The site impacting upon itself;
- The site impacting on its surroundings; and
- The surroundings impacting on the site.

All three impacts need to be considered in a risk assessment.

4.4 A Source, Pathway, Receptor analysis has been undertaken for the site based on the information provided in the preceding sections. This is presented as Table 5 and further information about the risk classification scheme is included within **Appendix 5**.

4.5 Sources (S); These are potential or known sources of contamination that may relate to a former land use or present site feature or process (e.g. fuel storage tanks).

4.6 Pathways (P); A pathway is defined as a mechanism or route by which a contaminant comes into contact with, or otherwise affects a receptor. Pathways by which the identified receptors may be impacted upon in the context of the proposed development.

4.7 Receptors (R); Receptors are defined as people, living organisms, ecological systems, controlled waters, atmosphere, structures and utilities that could be adversely affected by contaminant(s).

4.8 Under the Construction Design Management (CDM) Regulations 2015, construction and maintenance contractors must undertake their own risk assessments and mitigation to protect their staff, other human receptors and the environment from potential contamination. By law potential risks to human health and the environment from construction activities must appropriately identified and all necessary steps taken to eliminate/manage that risk. Therefore, construction / maintenance workers are excluded as a receptor in the CSM.

4.9 A tabulated version of the Preliminary CSM produced within the Phase 1 is presented in **Table 4-1**, **Table 4-2** and **Table 4-3**.

Table 4-1: Potential Sources of Contamination

Location	Potential Source	Contaminants of Potential Concern (CoPC)
On-site	MADE GROUND associated with previous infrastructure developments such as RAILWAY (TRAM) SIDINGS and ROAD DEVELOPMENT	- Heavy metals - Inorganics, such as cyanides, sulphates and nitrates - Arsenic - Methane, carbon dioxide
	Contamination associated with AGRICULTURAL activities	- Semi-volatile organic compounds (SVOCs) including phenols and polycyclic aromatic hydrocarbons (PAHs) - Inorganics, such as cyanides, sulphates and nitrates - Methane, carbon dioxide
	Gas accumulation in DEEP MINING WORKS	Methane, carbon dioxide
Off-site	Contamination associated with neighbouring activities including RAILWAY CUTTING and QUARRIES	- Heavy metals - Semi-volatile organic compounds (SVOCs) including phenols and polycyclic aromatic hydrocarbons (PAHs) - Petroleum hydrocarbons - Inorganics, such as cyanides, sulphates and nitrates - pH

Table 4-2: Relevant Potential Pathways and Receptors

Receptors	Pathways
Human Health: - Future site users (commercial) - Neighbouring public (residential/commercial) - Intrusive maintenance workers	- Dermal contact with soil or dust - Incidental ingestion of soil and/or dust - Inhalation of dust and/or fibres - Inhalation of vapours - Migration and accumulation of ground gas in enclosed spaces leading to inhalation or explosion
Controlled Waters: - Groundwater (Secondary A Aquifers) - Surface water (Rochdale Canal, Stanney Brook)	- Leaching of soil contaminants - Vertical and lateral migration - Surface run-off
Ecology: Flora and Fauna	- Lateral migration - Uptake and accumulation
Property: - Underground utilities - Building structures	- Direct Contact - Accumulation and explosion of gas

Table 4-3: Preliminary Conceptual Site Model

Source	Pathway	Receptor	Con	Prob	Risk
On-site sources as detailed in Table 4.1.	Dermal contact with, and incidental ingestion of soil and/or dust. Inhalation of dust and/or fibres.	Future site users (commercial)	Md	UI	L
		Intrusive maintenance workers	Md	Lw	M/L
	Inhalation of vapours.	Future site users (commercial)	Md	UI	L
		Neighbouring public	Md	UI	L
		Intrusive maintenance workers	Md	Lw	M/L
	Migration and accumulation of ground gases in enclosed spaces leading to asphyxiation (carbon dioxide) or explosion (methane).	Future site users (commercial)	Md	Lw	M/L
	Leaching and permeation through soil profile.	Groundwater: Underlying Secondary Superficial & Bedrock Aquifers	Md	UI	L
	Vertical and lateral migration of contaminants.		Md	UI	L
	Surface run-off.	Stanney Brook Rochdale Canal	Md	UI	L
	Direct contact.	Water utility pipes	Md	Lw	M/L
		Buried structures/ foundations.	Mi	Lw	L
Off-site sources as detailed in Table 4.1.	Dermal contact with, and incidental ingestion of soil and/or dust.	Future site users (commercial)	Md	UI	L
		Future site users (commercial)	Md	UI	L
	Leaching and permeation through soil profile.	Groundwater: Underlying Secondary Superficial & Bedrock Aquifers	Md	UI	L

Source	Pathway	Receptor	Con	Prob	Risk
	Vertical and lateral migration of contaminants.		Md	UI	L
VH = Very High, H = High, M = Moderate, M/L = Moderate/Low, L = Low, VL = Very Low KEY: Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor, Hi = High, Li = Likely, Lw = Low Likelihood, UI = Unlikely					

5. PHASE II GEO-ENVIRONMENTAL AND GEOTECHNICAL GROUND INVESTIGATION

- 5.1 Additional intrusive ground investigation works for Plot R2 AVIC were undertaken by BWB between 3rd and 5th July 2023 and comprised the following works:
- Clearance of investigation locations by a specialist buried services' tracing company;
 - Collection of coordinates and elevations of exploratory hole locations;
 - The advancement of two cable percussive boreholes (BH01 (2023) and BH02 (2023)) to a maximum depth of 10.45m bgl with completion of SPTs and installations of gas and groundwater monitoring wells;
 - The advancement of four machine excavated trial pits (TP01 to TP04 inclusive) to a maximum depth of 3.90m bgl;
 - Collection of environmental soil and groundwater water samples for chemical analysis at a UKAS and MCERTS accredited laboratory;
 - Collection of large and small disturbed soil samples for geotechnical testing at a UKAS accredited laboratory.
 - Four proposed post investigation ground gas and groundwater level monitoring visits (3 currently completed); and
 - An additional sampling visit to delineate any extent of asbestos (31st August 2023).
- 5.2 An exploratory hole location plan is presented in **Drawings**; this includes the exploratory holes formed within the Plot R2 AVIC site during the 2022 ground investigation. BWB exploratory hole records are presented as **Appendix 2**, the SPT calibration certificate is presented in **Appendix 3**, and the post-investigation gas and groundwater monitoring data is presented as **Appendix 4**.
- 5.3 The site investigation works were carried out in general accordance with BS5930:2015 'Code of Practice for Site Investigations' and BS10175:2011 'Investigation of Potentially Contaminated Sites'.

Chemical Sampling Strategy

- 5.4 There was a non-targeted sampling strategy, considering the anticipated site wide Made Ground (of limited thickness) and the natural shallow soils including areas of natural organic material.
- 5.5 Samples of Made Ground and natural soils were taken and subjected to testing to inform preliminary assessments of the potential for re-use of soils for fill and/or landscaping.
- 5.6 Cable percussive boreholes included single groundwater and gas installations to monitor and characterise the underlying groundwater regime within the Hummocky Glacial Deposits. Installations in the two cable percussive boreholes undertaken during the Plot P investigation are also included below.

Table 5-1: Response Zones

Location	Response zone	Stratum
Borehole BH01 (2023)	Between 3.0m and 10.0m	Hummocky Glacial Deposits (Sand)
Borehole BH02 (2023)	Between 3.0m and 10.0m	Hummocky Glacial Deposits (Sand)
Borehole BH01 (2022)	Between 2.0m and 5.0m	Hummocky Glacial Deposits (Sand)
Borehole BH02 (2022)	Between 3.0m and 12.0m	Hummocky Glacial Deposits (Sand)

Chemical Analytical Strategy

Soil Strategy

5.7 Selected soil samples collected from exploratory hole locations were sent to i2 Analytical Ltd Services (UKAS and MCERTS accredited) for chemical analysis. The following chemical analytical testing was undertaken during the recent investigation:

- 8 no. soil samples were tested for a soil suite (BWB Standard Suite) comprising arsenic, barium, beryllium, water soluble boron, cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, vanadium, zinc, water soluble sulphate (2:1 extract), total phenols, total cyanide, free cyanide, complex cyanide, fraction of organic carbon, pH, Polycyclic Aromatic Hydrocarbons (PAHs) (United States Environment Protection Agency priority 16 compounds) and Total Petroleum Hydrocarbons (TPH) C6-C40;
- 15 no. soil samples underwent asbestos screening (6 during investigation, and 10 post main investigation); and
- 2 no. soil samples tested for TPH speciated to the UK Criteria Working Group (TPHCWG) aliphatic and aromatic compounds.

5.8 Soil testing undertaken in the relevant holes on The Plot R2 AVIC site during the 2022 'Plot P' investigation included:

- Two no. soil samples were tested for a soil suite (BWB Standard Suite) comprising arsenic, barium, beryllium, water soluble boron, cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, vanadium, zinc, water soluble sulphate (2:1 extract), total phenols, total cyanide, free cyanide, complex cyanide, fraction of organic carbon, pH, Polycyclic Aromatic Hydrocarbons (PAHs) (United States Environment Protection Agency priority 16 compounds) and Total Petroleum Hydrocarbons (TPH) C6-C40;
- One soil sample underwent asbestos screening; and
- One soil sample were tested for a suite of common leachable contaminants, namely arsenic, barium, beryllium, water soluble boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium, zinc, water soluble sulphate (2:1 extract), sulphate, total cyanide and pH.

5.9 The results of the soil chemical testing are presented as **Appendix 5**.

Groundwater Strategy

- 5.10 Groundwater was not sampled during the 2023 investigation as there was insufficient water available in the monitoring wells to obtain representative samples for testing. This is likely due to the very dry weather and associated low seasonal groundwater levels.
- 5.11 Groundwater samples undertaken in the relevant Plot P 2022 investigation included:
- 1 no. water sample was tested for arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium, zinc, conductivity, soluble sulphate, ammoniacal nitrogen, total phenols, total cyanide, pH, total organic carbon, PAHs (US EPA priority 16 compounds).
- 5.12 The results of the water chemical testing are presented as **Appendix 6**.

Geotechnical Strategy

- 5.13 The cable percussive borehole locations were positioned around the site, in consideration of the proposed building footprint, to assess underlying ground conditions for geotechnical assessment purposes. The trial pits were positioned to assess ground conditions, strength properties and characteristics across the full site.
- 5.14 In situ soil strength testing comprising SPTs were undertaken at regular depth intervals within the cable percussive boreholes. SPT 'N' values are included on the exploratory hole logs in **Appendix 2**.
- 5.15 Selected large and small disturbed and undisturbed samples were collected from the investigation locations and sent to the geotechnical project laboratory (i2 Analytical Ltd Services), which is UKAS accredited. The following geotechnical testing was undertaken:
- 11 samples tested for moisture content;
 - 4 samples tested for Atterberg (liquid and plastic) limits;
 - 7 samples tested for particle size distribution by sieve and pipette;
 - 2 samples tested for particle size distribution by sedimentation;
 - 10 samples tested for BRE Suite comprising aqueous sulphate and pH;
 - 3 samples underwent (2.5kg rammer) compaction testing; and
 - 2 samples underwent (4.5kg rammer) compaction testing.
- 5.16 The results of the geotechnical testing are included as **Appendix 7**.
- 5.17 Geotechnical Testing undertaken in the relevant Plot P 2022 investigation included:
- 1 sample tested for moisture content;
 - 1 sample tested for Atterberg (liquid and plastic) limits;
 - 2 samples tested for BRE Suite comprising aqueous sulphate and pH;
 - 1 CBR test was undertaken on a recompacted sample (2.5kg rammer);

- 4 particle density tests;
- 3 samples underwent (2.5kg rammer) compaction testing; and
- 1 sample underwent (4.5kg rammer) compaction testing.

6. GROUND CONDITIONS ENCOUNTERED

Geological Summary

- 6.1 The ground conditions recorded from both phases of investigation generally confirmed the published geology discussed in the Phase 1 report, i.e., the site is directly underlain by Hummocky Glacial Deposits, all underlain by Pennine Lower Coal Measures bedrock.
- 6.2 The recorded ground conditions are summarised in **Table 6.1** below. Uncorrected SPT results collected from the borehole locations are presented on the exploratory hole records presented in **Appendix 2**.

Table 6-1: Summary of Ground Conditions

Stratum	Top Depth (m)		Base Depth (m)		Thickness (m)		SPT N Value	
	Min	Max	Min	Max	Min	Max	Min	Max
Topsoil	Ground Level		0.1	0.40	0.10	0.40	-	-
Made Ground	0.00	0.20	0.20	2.30	0.20	2.20	4	6
Hummocky Glacial Deposits (upper clay layer)	0.20	2.50	0.80	3.00	0.00	1.70	10	11
Hummocky Glacial Deposits (Sand and Gravels)	0.80	3.00	Not proven* (base of deepest hole 15.45m)		Not proven (base of deepest hole 15.45m)		12	37
* Note: Hummocky Glacial deposits in BH01 (2022) comprise stiff clay between 11.80m depth and end of hole at 15.45m.								

Geological Descriptions

Topsoil

- 6.3 Topsoil was encountered in BH01 (2023) and TP02 during the Plot R2 AVIC (2023) investigation. It was recorded with thicknesses of between 0.1m and 0.2m, and up to 1.0m thick in BH01 (2022) during the Plot P investigation. Topsoil composition was variable, typically comprising dark brown slightly gravelly silty fine to medium sand with varying rootlet content and with medium to coarse siltstone, brick, and glass gravel content. The topsoil is topped by grass across much of the site.
- 6.4 The depths of topsoil over the site may vary from those encountered at the locations investigated within the scope of this investigation, which should be considered when making estimates of topsoil quantities on the site.

Made Ground

- 6.5 Made Ground was encountered in all exploratory holes in the 2023 investigation and within TP101 and TP105 within the 2022 investigation. It was recorded with thicknesses of between 0.2m and 2.3m.

6.6 The Made Ground encountered was variable in composition. It typically comprised a dark brown gravelly sand. Gravel comprised various natural and artificial inclusions (glass, siltstone, concrete and metal fragments).

6.7 SPT N_{60} values ranged from 4 and 6 within this stratum.

Hummocky Glacial Deposits

6.8 Soils inferred to be Hummocky Glacial Deposits were encountered in all exploratory holes below Topsoil or Made Ground. All exploratory holes terminated within the Hummocky Glacial Deposits, with full thicknesses not proven (extending to at least 15.45m bgl). These deposits typically comprised an upper clayey layer over the deeper predominantly sand horizon:

- The upper clay layer, where present, was encountered to between 0.8m and 3.0m depth. It is present in all holes except BH01, TP101 and TP102 from the Plot P investigation. The material typically comprises a firm light grey mottled orangish brown sandy, silty, slightly gravelly clay. Gravel is subangular to subrounded, fine to medium coal, siltstone and sandstone. Recorded descriptions vary from soft to stiff, but typically recorded as firm. SPT N_{60} values in this stratum ranged between 10 and 11, equivalent to an undrained shear strength around 50kPa for low to medium plasticity clay.
- The underlying sands (depth to base not proven) comprised light brown to brown gravelly sand. Gravel content comprises coal, siltstone and quartz. SPT N_{60} values within the sand dominated Hummocky Glacial Deposits were recorded ranging from 12 to 37.

6.9 An SPT N_{60} versus depth plot is presented as **Figure 6.1**. While N_{60} values generally increased with depth, the data is broadly scattered.

Figure 6.1: SPT ' N_{60} ' Values vs. Depth.

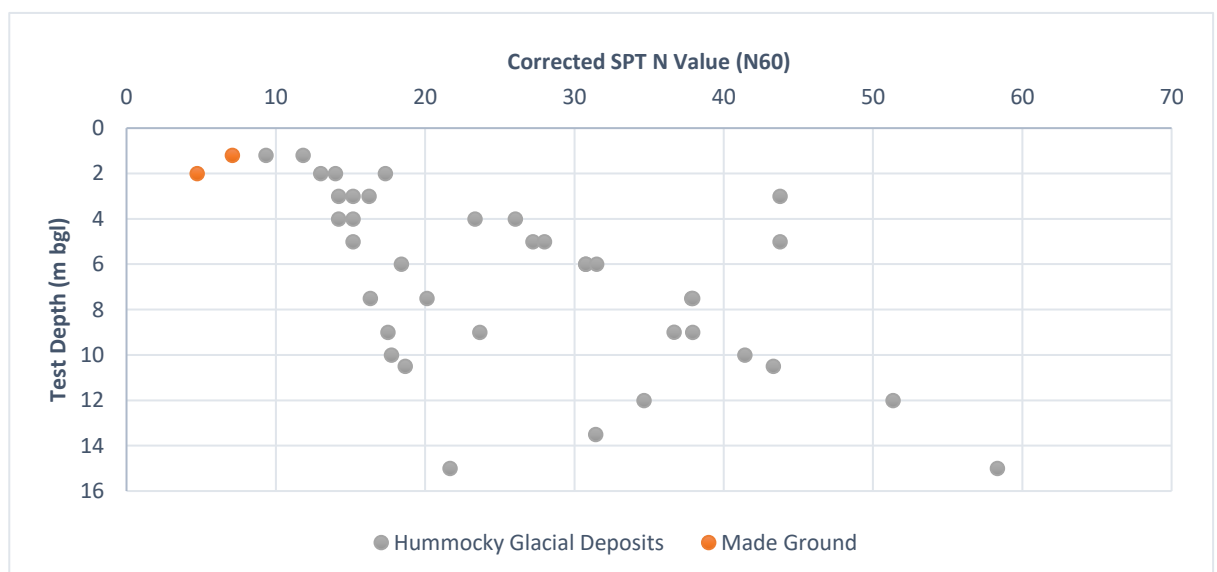
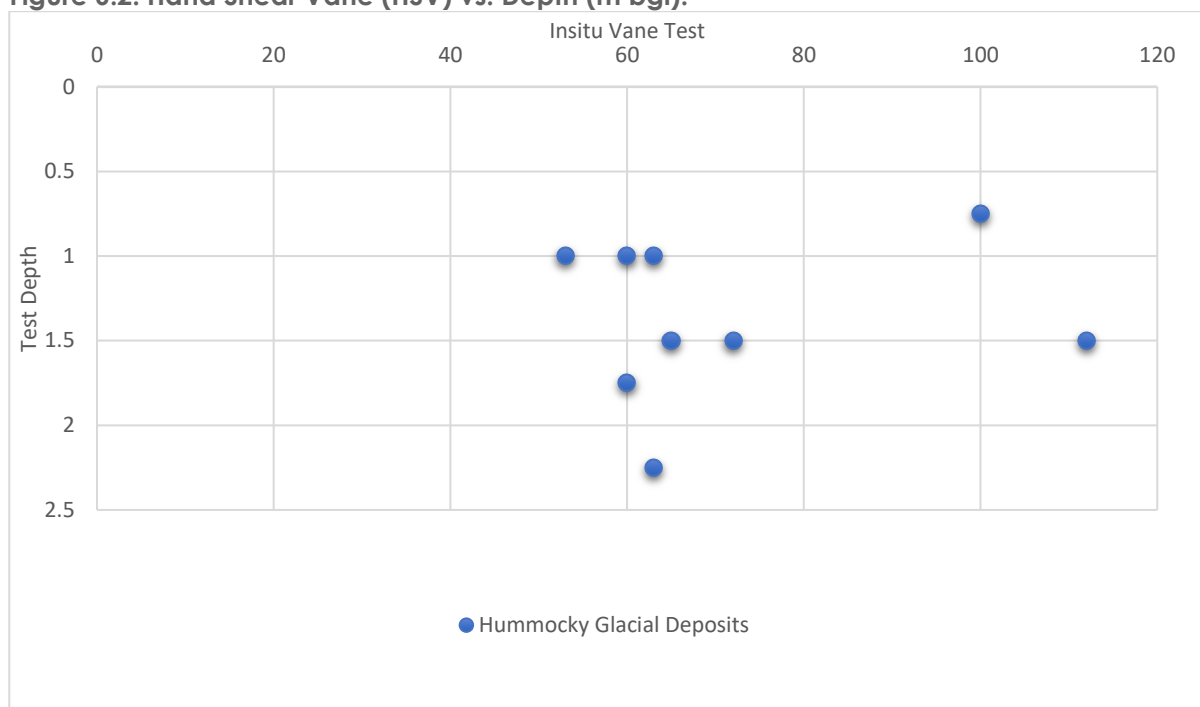


Figure 6.2: Hand Shear Vane (HSV) vs. Depth (m bgl).



6.10 5 no. samples from within the Hummocky Glacial Deposits were tested for Atterberg Limits and indicate a range of low to intermediate plasticity clays. Plasticity Index (PI) results range from 16% to 27%.

6.11 Particle size distribution test results for these strata are summarised below.

Table 6-2: PSD Results Summary (Hummocky Glacial Deposits).

Location	Depth (m)	Cobble Content (%)	Gravel Content (%)	Sand Content (%)	Clay/ Silt Content (%)	Earthworks Classification
TP01 (2023)	3.00-3.50	0	8	85	7	1A
TP02 (2023)	1.00-1.50	0	2	38	61	2A/2B
TP03 (2023)	0.50-1.00	0	20	55	25	2A/2B
TP04 (2023)	0.70-1.10	0	7	44	49	2A/2B
BH01 (2023)	0.50-1.00	0	13	35	52	2A/2B
BH02 (2023)	2.50-3.00	0	5	22	73	2A/2B
BH02 (2023)	5.50-6.00	0	10	86	4	1A
TP105 (2022)	2.50	0	0	93	7	1A

6.12 Three 2.5kg hammer and two 4.5kg hammer “compaction” tests were undertaken; the maximum dry density (MDD) ranged from 1.34 to 1.99 Mg/m³ and the optimum moisture content (omc) from 11% to 28% for the 2.5kg tests, with the MDD ranging from 1.93 to 1.99Mg/m³, and the omc ranging from 12% to 13% respectively for the 4.5kg tests.

Hydrogeology

- 6.13 No groundwater was encountered during hole formation in any exploratory holes during the Plot R2 AVIC investigation. Groundwater monitoring is ongoing.
- 6.14 Groundwater monitoring during the Plot R2 AVIC (2023) investigation recorded levels between 10.4 and 11.2m below ground level.
- 6.15 Groundwater monitoring during the Plot R2 AVIC (2022) investigation recorded levels between 2.04m and 3.13m below ground level.

Hydrology

- 6.16 No surface water features were observed within the site boundary.
- 6.17 No contamination observations were noted during the groundwater sampling visit (2022) or subsequent gas and groundwater monitoring period (2022 and 2023).

7. GEOTECHNICAL ASSESSMENT

Introduction

- 7.1 The proposed development for Plot R2 AVIC is indicated to be a single research & development building including office, laboratory & production space, function space & café, new access, car parking, servicing, boundary treatments, hard and soft landscaping and other associated works. The building is likely to be a steel portal framed structure.
- 7.2 The generalised ground conditions across the development plot consist of Topsoil/ Made Ground up to 2.3m thick, overlying Hummocky Glacial Deposits comprising a layer of firm clay up to 3.0m thick, over medium dense sands which become denser with depth.

Ground Model

- 7.3 For the purpose of geotechnical appraisal, groundwater is considered to be at depths of between 2m and 3m bgl (reduced levels of about 146 – 147m AOD). This is based on levels recorded within the Hummocky Glacial Deposits during the groundwater monitoring at Plot P (2022). BWB's experience of the local area indicates that groundwater varies seasonally and may be recorded at significantly shallower depths after periods of extended rainfall, and dry periods can result in deeper groundwater (around 10m to 11m below ground level during 2023 monitoring).
- 7.4 A geotechnical ground model has been developed and engineering parameter values selected, based on the ground conditions discussed in **Section 6**. This model provides the basis for geotechnical analysis informing this report.
- 7.5 For the purpose of the following appraisal the following 'worst case' model has been adopted:
- Made Ground , maximum 2.3m depth;
 - Firm clay (Hummocky Glacial Deposits), maximum base at 3.0m depth; over
 - Medium dense to dense sands (Hummocky Glacial Deposits) to depths greater than 15m.
- 7.6 Due to the limited strength and potential compressibility of the Made Ground and Hummocky Glacial clays, it is recommended that load-bearing structures are founded in the underlying Hummocky Glacial sands, up to 3m below current ground level.

Foundation Solutions

Simple Foundations Strip or Pads

- 7.7 Anticipated loadings for the development of this nature are up to 150kPa on foundations and 50kPa on floor slabs.

- 7.8 Shallow strip or pad foundations within the upper 3m are not likely to be suitable for this development without ground improvement, given the potential for Made Ground up to 2.3m deep, and the potential compressibility of the underlying Hummocky Glacial Clays.
- 7.9 Shallow bearing capacity calculations based on in situ hand shear vanes, laboratory triaxial testing and an empirical correlation between SPT N_{60} values and undrained shear strength (Stroud 1976, reference in CIRIA143), were undertaken assuming pad/strip foundations were founded within the Hummocky Glacial Clays. Results suggest a safe bearing capacity of around 100kPa, but with potential for settlements in excess of the typical 25mm limit for common structures. Shallow spread foundations transferring loads onto the (untreated) underlying Hummocky Glacial Clays are therefore unlikely to be suitable for the building, as there would be a risk of excessive and unpredictable total and differential settlements.
- 7.10 Bearing capacity and settlement in the sands is unlikely to be a limiting factor, subject to site-specific assessment when proposed loads are available. Pad or strip foundations could be founded in the underlying Hummocky Glacial Sands, typically present below 3m depth, if trench fill or replacement of the overlying Made Ground and natural clays is preferred, but it may be that ground improvement is a more practical and viable option.

Ground Improvement Techniques

- 7.11 Potential ground improvement techniques at this site include vibro-stone columns (VSC) and rigid inclusions (unreinforced concrete columns). Techniques such as vibrating dynamic compaction or falling dynamic compaction are likely to be unsuitable, as the shallow materials to be treated are clays, and therefore low in permeability.
- 7.12 Vibro-stone columns (VSC) could be adopted to support shallow (pad) spread foundations and a ground bearing ground floor slab. Alternatively, the option of ground improvement techniques comprising the installation of rigid inclusions (RIs), with a load transfer platform is also considered feasible, although likely to be more costly.
- 7.13 Assuming vibro stone columns or rigid inclusions are adopted, settlement under the slab and foundations is expected to be limited to 25mm under typically expected loads. This will need to be subject to detailed assessment by the foundation and ground improvement designers when loads are confirmed.
- 7.14 Designs may need to allow for mitigation of differential settlement between the main structure and external areas; this may need to include articulation of threshold elements/structures and or dock levellers.
- 7.15 A specialist ground improvement contractor should be consulted in order to confirm the viability of ground improvement and to advise which technique would be best/most cost effective for this site.

Ground Floor Slabs

- 7.16 Loading requirements of the ground floor slab are expected to be lower than beneath pad or strip foundations, approximately 50kPa. Nevertheless, in order to mitigate risks of excessive total/differential settlement, in situ ground improvement as described above, should also be undertaken beneath the ground floor slab.

Piled Foundations

- 7.17 A piled foundation solution could be adopted for the support of the proposed building but this is likely not a cost-effective solution. A specialist piling contractor should be consulted to further assess the most economical and suitable piling solution if this option is preferred.

Roads and Pavements

- 7.18 Plasticity Index testing undertaken on near-surface cohesive soil samples (upper 1-2m below ground level) are in the range of 16% to 27% (mean value 19%). CBR values of about 3% are indicated based on these PI values with reference to Table C1 of TRRL 1132 (Structural Design of Bituminous Roads) according to guidance in National Highways document CD225, Design for New Pavement Foundations). However, the variability in composition and thickness of Made Ground means this is not necessarily a reliable indication of the surface conditions across the whole site.
- 7.19 Minimum design CBR values for pavement foundations is typically 3% and if pavements are required on the natural soils at the site, local modification of these formation soils (e.g. by lime or cement) will likely be required to achieve the minimum design CBR value. An improved CBR of minimum 5% would likely be possible in modified formation soils.
- 7.20 The design of chemical modification to provide a suitable thickness of subgrade should take account the potentially high organic matter content and high-water contents in the underlying soils. Ground improvement techniques and thickness of improved in situ ground should be designed to limit settlement under pavements to 25mm after the accommodation of the sub-base, base and surface courses. This should be subject to detailed design.
- 7.21 It is recommended that in situ CBR tests at formation level should be carried out during earthworks to confirm the strength of sub grade and finalise the required pavement construction thickness.

Drainage

- 7.22 No soakaway drainage tests have been undertaken at the site. Additional soil infiltration tests would be required to inform whether traditional soakaways would be suitable, if required. However, based on the ground conditions encountered together with the variable and shallow groundwater issues in the area, soakaway drainage is not likely to be a viable solution.

Ease of Excavation

- 7.23 Conventional plant equipment is expected to be suitable for excavations at the site.
- 7.24 Surface conditions are likely to vary seasonally and with rainfall; it is likely that tracked equipment and management of surface water is key to successful earthworks at this site.

Stability of Excavation

- 7.25 Excavations displayed generally poor stability across the site, with all trial pits terminating due to instability. In addition to this, following periods of wet weather, groundwater levels and running sands could present an issue within excavations and the use of temporary shoring may need to be considered. The potential for stability issues will be reduced if works are undertaken in the drier summer months, but the sandy soils will likely need temporary stabilisation regardless.
- 7.26 Excavations may become unstable if left open for any significant periods. Where personnel entry is required for inspection; excavations should be sufficiently enlarged, and an assessment of safe temporary angles should be made. Alternatively, temporary shoring should be provided.

Legislation on Personnel Entry to Excavations

- 7.27 It is recommended that no excavations should be entered without appropriate support and a full risk assessment should be completed prior to entry. Mitigation measures to protect from accumulating ground gases should be implemented.

Groundwater

- 7.28 Groundwater is likely to vary greatly seasonally at the site. The ground investigation, undertaken in early July (after a particularly dry late spring/summer) will have likely captured a lowered groundwater situation at the site, with various areas of the site displaying evidence of historical waterlogging (e.g. reeds).
- 7.29 If, as anticipated, groundwater levels rise following extended periods of wet weather, groundwater control may be required during construction ground works, and standard pumping equipment is likely to be suitable. The local water authority should be consulted to assess whether a temporary drainage consent is required, for discharging to the local drainage network.

Chemical Attack on Buried Concrete

- 7.30 At the site, water soluble sulphate concentrations in soils ranged from 0.0017 g/l to 0.017 g/l with soil pH values ranging from 7.3 to 8.6. Total sulphur concentrations ranged from <0.005% to 0.087%. One result from the 2022 investigation recorded a value of 0.149%.
- 7.31 In accordance with the recommendations of BRE Special Digest 1, 'Concrete in Aggressive Ground' 2005, the conditions of soils at the site would therefore be classed

as Design Sulphate Class DS-1 and ACEC Class AC-1 for soils, when considering the most appropriate type of concrete to be used at the site in order to resist chemical attack from sulphate. One classification of DS2 in the 2022 investigation is not representative of the whole site and therefore can be dismissed.

Earthworks

- 7.32 Small scale earthworks will be required to create a suitable, level development platform across the plot. Based on the results obtained, near-surface soil materials are likely to conform to Highway Works Class 2C general fill.
- 7.33 Based on experience of earthworks on other plots at this site, and compaction tests reported above, site won materials are likely to be wet of optimum moisture content.
- 7.34 The results of the compaction testing (from the 2023 investigation) indicate Optimum Moisture Contents generally in the range of 12 – 13% (4.5kg rammer) and 11 – 16% (2.5 kg/rammer) with one exception of 28% (2.5kg rammer) that appears to be an outlier (the sample in question from TP03 at 0.5m depth was of Made Ground and included fragmented glass). This correlates with Maximum Dry Density values of 1.34 – 1.99 Mg/m³ (2.5 kg rammer) and 1.93 – 1.99 Mg/m³ (4.5 kg rammer). Natural moisture content values were found to range from 8% to 21%.
- 7.35 If, as anticipated/indicated, the near-surface soils likely to be re-used in earthworks are significantly wet of their Optimum Moisture Contents, soils will require drying out (probably via chemical modification) to achieve adequate compaction as engineered fill.
- 7.36 The suitability of earthworks materials has been assessed on the basis of the testing carried out as part of this investigation. The materials encountered on site may vary from those analysed; furthermore, inclement weather, winter working or seasonal variations in groundwater may result in materials being unsuitable for incorporation within the works without modification by lime, cement or other methods. In particular, cohesive soils are very susceptible to 'wet weather working' and BWB strongly recommends that consideration should be given to lime and/or cement stabilisation of these materials if the earthworks are undertaken during inclement weather or the winter period.
- 7.37 Stockpiled materials often deteriorate due to water infiltration, and they may become unsuitable for incorporation in the works; further testing and re-assessment should be made prior to the finalisation and implementation of the earthworks design.

8. GROUND GAS ASSESSMENT

Introduction

- 8.1 Ground gas assessment has been undertaken to assess the risks associated with ground gases and volatile vapours to the proposed new building and occupants. The results obtained have been assessed in line with relevant guidance (notably CIRIA C665).
- 8.2 Based on the desk study and the ground investigation undertaken, the following potential sources of hazardous ground gas have been identified:
- Made Ground across the site; and
 - Underlying locally organic soils in adjacent Plot P.
- 8.3 Based on the potential sources identified, CIRIA C665 guidance indicates that for a site with low/moderate gas generation potential and a low sensitivity development (the proposed commercial land use), a typical monitoring programme may comprise four visits over a period of 2-3 months.
- 8.4 BWB have undertaken three visits (to date) over a period of two months and therefore this assessment is considered to be preliminary in advance of the final monitoring round. An additional monitoring visit is yet to be undertaken. Relevant 2022 results have also been considered.

Methodology

- 8.5 The assessment of potential ground gas generation is based on the observation of trends and changes in gas evolution by the direct measurement of ground gases from gas wells. The works included measurement of methane, carbon dioxide, oxygen, hydrogen sulphide, carbon monoxide, gas flows and barometric pressure. A PID survey was undertaken to measure volatile organic compounds within the borehole response zones.

Results

- 8.6 The minimum and maximum steady state concentrations recorded for borehole flow, oxygen, carbon dioxide and methane are summarised below in **Table 8.1**. Monitoring in boreholes BH01 and BH02 from the 2022 ground investigation were undertaken between August and October 2022. Monitoring in boreholes from the recent 2023 investigation is ongoing. The full set of ground gas monitoring results are presented in **Appendix 4**.

Table 8-1: Summary of Recorded Ground Gas Results

Borehole ID	Targeted Geology	Steady Flow (l/hr)		Carbon Dioxide (%v/v)		Methane (%v/v)	
		min.	max.	min.	max.	min.	max.
BH01 (2022)	GF	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
BH02 (2022)	GF	<0.1	<0.1	<0.1	0.7	<0.1	<0.1

Borehole ID	Targeted Geology	Steady Flow (l/hr)		Carbon Dioxide (%v/v)		Methane (%v/v)	
		min.	max.	min.	max.	min.	max.
BH01 (2023)	GF	<0.1	<0.1	4.9	5.3	<0.1	1.8
BH02 (2023)	GF	<0.1	<0.1	0.9	1.4	<0.1	<0.1

8.7 The atmospheric pressures were recorded as follows (2023 Investigation):

- Round 1 – 1007mB during the site visit falling from 1012mB over the preceding 12 hours.
- Round 2 – 1001mB during the site visit falling from 1003mB over the preceding 12 hours.
- Round 3 - 1007mB during the site visit falling from 1019 over the preceding 12 hours.
- Round 4 - 1017mB during the site visit rising from 1021 over the preceding 12 hours.

8.8 The atmospheric pressures were recorded as follows (2022 Investigation):

- Round 1 – 1017mB during the site visit falling from 1019mB over the preceding 12 hours;
- Round 2 – 1015mB during the site visit falling from 1018mB over the preceding 12 hours;
- Round 3 - 991mB during the site visit falling from 1001 over the preceding 12 hours;
- Round 4 - 1015mB during the site visit falling from 1017 over the preceding 12 hours

8.9 On this basis, the monitoring events are considered unlikely to have captured the worst-case gassing scenario at the site as generally, ground gas emissions tend to increase when atmospheric pressure falls rapidly.

8.10 Hydrogen sulphide and carbon monoxide concentrations were generally not recorded above the limit of detection of the equipment during the monitoring visits in the 2023 investigation. This was similarly the case with the 2022 investigation with the exception of carbon monoxide in BH01 (Round 3) at 2.2ppm.

8.11 PID concentrations were recorded above <0.1ppm (the limit of detection of the equipment) with values ranging from 3.2-3.4pm during the 2023 investigation. No PID concentrations were recorded above <0.1ppm (the limit of detection) in the 2022 investigation.

Risk Assessment

8.12 CIRIA Report 665 "Assessing Risks Posed by Hazardous Ground Gases to Buildings" presents current best practice on the assessment of ground gases for commercial and residential buildings (with the exception of low-rise traditional housing). The report presents a risk-based approach based on gas screening levels which depend on both the concentration and emission rate of gas from the ground. Gas screening levels are calculated as follows:

$$\text{Gas screening value (l/hr)} = \frac{\text{gas concentration (\%)} \times \text{measured borehole flow rate (l/h)}}{100}$$

- 8.13 Gas screening values should be calculated on a borehole basis in the first instance. Consideration of worst case i.e., highest flow and highest concentrations should only be considered if the CSM warrants it.
- 8.14 Maximum gas screening levels of 0.005 were recorded giving a classification of 1. Gas protection measures would not be required. Carbon dioxide concentrations above 5% have been recorded in BH01 2023 on two occasions (Round 1 5.3% and Round 2 5.1%) and so consideration should be given to raising the gas classification to 2 (BS8485:2015 (+A1 2019)).
- 8.15 Total Organic Carbon (TOC) content of the Made Ground was recorded at 1.9% (BH01 0.2m-0.3m), 2.3% (TP101 0.3m) and at 2.6% in organic rich Glaciofluvial Deposits (BH02 2.3-2.4m).
- 8.16 CL:AIRE RB17 (November 2012) and Table D.1 included within BS8485:2015 (+A1 2019) recommends a Characteristic Situation 2, for TOC (%) between ≤ 1.0 and $\leq 1.5\%$ and Characteristic Situation 3, for TOC (%) between ≤ 1.5 and $\leq 4.0\%$ recorded in Made Ground with thicknesses of less than 3.0m that has been in place for less than 20 years.

Recommendations

- 8.17 Given the recorded CO₂ concentration and TOC of Made Ground and natural soils, gas protection measures should be installed in accordance with BS848: 2015. Based on a Type D development and CS2 classification a gas protection score of 1.5 will need to be achieved. Type C uses within the larger building (offices etc) would require a gas protection score of 2.5 to be achieved. **Table 8.2** provides suggested combinations of floor slab, ventilation and membrane that can achieve a suitable level of protection.

Table 8-2: Gas Protection Matrix

Building Type	Points score Required	Structural Slab	Ventilation	Membrane
C	2.5	1.0-1.5	1.5-2.5	2
D	1.5	1.0-1.5	1.5-2.5	2

9. CONTAMINANT DISTRIBUTION

Soils

- 9.1 Contamination data have been compared to generic site assessment criteria (GSAC) for a commercial end use. The soil chemical laboratory results are presented as **Appendix 5** and details of the derivation of the GSACs are presented in **Appendix 8**. The criteria include reference to the LQM/CIEH S4ULs for Human Health Risk Assessment Copyright Land Quality Management Limited reproduced with permission; publication number S4UL3271.
- 9.2 A summary of the soil chemical laboratory results across both investigations is presented in **Table 9:1** below.

Table 9-1: Summary of Soil Chemical Testing Results

Contaminant	No of Samples	Range of Concentrations	Generic Screening level (mg/kg)	No of Exceedances
Asbestos	7	-	-	2

- 9.3 Asbestos fibres were recorded in two samples from exploratory holes. These are from TP01 (2023) (0.10-0.20m – Chrysolite and Crocidolite - Loose Fibres and Loose Fibrous Debris), and TP03 (2023) (0.10-0.20m- Chrysolite and Crocidolite - Loose Fibrous Debris).
- 9.4 Quantification results for TP01 (2023) was recorded as <0.001% and for TP03 (2023) as 0.359%.
- 9.5 No visual or olfactory observations of contamination were noted during the ground investigation.
- 9.6 Testing undertaken in the relevant Plot P 2022 investigation exploratory holes recorded no exceedances.
- 9.7 To delineate the extent of the asbestos recorded within the main 2023 investigation, another sampling visit was undertaken on 31/08/23. Ten samples were recovered from the surrounding area of both positive identifications. No positive identification of asbestos fibres were recorded.

Surface Water

- 9.8 No surface water samples were recovered or tested as part of either investigation.

10. HUMAN HEALTH RISK ASSESSMENT

10.1 Soil contaminant data have been compared against Generic Site Assessment Criteria (GSAC) developed by BWB using the CLEA model 1.06 and the updated CLEA framework (2009) for assessing risk from soil contamination to human health. The results of the soil chemical laboratory analysis are provided within **Appendix 5**. Details of the derivation of the GSACs and a table summarising the results presented are presented in **Appendix 8**.

10.2 The GSACs have been developed with the following assumptions which have been changed from the CLEA default parameter set. Soil type is a sandy loam with an organic matter content of 1% for the natural strata and 2.5% for the Made Ground. This is considered to be more representative of natural strata and shallow Made Ground found on site than the CLEA default of 6% organic matter (excluding areas of Peat and visible high organic matter). The building type for a commercial development is assumed to be a post 1970s office which is representative of new commercial buildings.

Pathways

10.3 Contamination data have been compared to generic site assessment criteria (GSAC) for a 'commercial' end use (i.e. using all pathways for that end use) based on an organic matter content of 1% and 2.5%. Details of the derivation of the GSACs are presented in **Appendix 8**. It is noted that 'commercial' assessment criteria also cover the Business and Service proposed end use of the development in question.

10.4 The site is to be developed for commercial end use and therefore the key receptor is considered to be an adult female worker and GSACs for a commercial industrial end use have been adopted.

10.5 Exposure pathways considered in this assessment are presented in **Table 10.1**.

Table 10-1: Commercial Exposure Pathways

Source	Shallow Soils		Deep Soils
Pathway	Commercial / Industrial with managed landscaped areas	Commercial / Industrial with Hard standing areas	Commercial / Industrial
Ingestion of Soil	✓	✗	✗
Ingestion of site derived household dust	✓	✗	✗
Ingestion of contaminated vegetables	✗	✗	✗
Ingestion of soil attached to vegetables	✗	✗	✗
Dermal contact with Soil	✓	✗	✗
Dermal contact with site derived household dust	✓	✗	✗
Inhalation of fugitive soil dust	✓	✗	✗
Inhalation of fugitive site derived household dust	✓	✗	✗

Source	Shallow Soils		Deep Soils
Inhalation of vapours outside	✓	✓	✓
Inhalation of vapours inside	✓	✓	✓

10.6 CLAIRE report "Guidance on Comparing Soil Contamination Data with a Critical Concentration" sets out a structured approach for the statistical assessment of contaminant data with respect to risks to human health. A flow chart showing the approach is presented as **Appendix 8**. The CLEA assessment is made in four stages:

- Stage 1 – The site is split into what are known as Averaging Areas, these are those sections of the site as determined by the assessor as being of a similar nature, this can be defined by strata, contaminant impact, location, development zones, etc.
- Stage 2 – The dataset is reviewed using graphical, visual and statistical tools whereby all the samples (per contaminant) are combined to establish whether or not the highest values recorded are representative or not of the Averaging Area as a whole. This is known as the Outlier Test. A sample that is considered as representative of the whole is referred to as an 'inlier' and one which is considered unrepresentative as an 'outlier'.
- Stage 3 – The samples are assessed using graphical, visual and statistical tools to determine whether the dataset is normally distributed. A statistical calculation is then used to determine the upper confidence level (UCL) of the mean to determine whether or not the Averaging Area, as a whole meets the critical concentration. The UCL value is considered against the appropriate generic or site-specific screening value as to whether or not a risk exists.
- Stage 4 – The outliers in Stage 2 are compared directly against the critical concentration. Thus, indicating whether those removed samples represent an Anomalous Zone (or hotspot).

Sources

10.7 Asbestos fibres recorded in the Made Ground of TP01 and TP03 are considered isolated areas of contamination.

10.8 No further significant sources of soil contamination have been identified on site.

11. CONTROLLED WATERS RISK ASSESSMENT

11.1 Soil leachability has been undertaken for a number of metals on samples from the Made Ground. The soil leachability results are presented within **Appendix 5**.

- The controlled waters assessment considers the potential impact of on-site contamination to pertinent controlled waters receptors identified at the site including;
- Secondary A Aquifer beneath the site within the Hummocky Glacial superficial deposits;
- Secondary A Aquifer in the surrounding area within the Pennine Lower Coal Measures bedrock;
- Surface water (Rochdale Canal, Stanney Brook).

Pathways

11.2 Controlled water risk assessment has been undertaken through assessment of leachable concentrations of contaminants in soil referring to exposure pathways considered and referencing **Table 16**.

Table 11-1: Controlled Water Exposure Pathways

Controlled Waters Exposure Pathway	Receptor
Leaching of soil contamination into recharge infiltration	✓
Vertical migration of impacted pore water through unsaturated zone into underlying aquifer	✓
Horizontal migration of groundwater through aquifer to offsite receptors	✓

Soil Leachability

11.3 All soil leachate testing undertaken was in the Plot P 2022 investigation.

11.4 The soil leachate concentrations have been compared to the UK Drinking Water Standards (UK DWS) to assess the risk to the underlying aquifers. None of the samples screened exceeded the UK DWS.

11.5 In addition, the leachate results were also screened against the Environmental Quality Standards (EQS) for freshwater to assess the risk to surface waters. A summary of the results is presented in **Table 11:2** below.

Table 11-2: Summary of Leachate Exceedances – EQS

Leachable Contaminant	Exceedance Concentration Range (µg/l)	Location (& Depth (m bgl))	EQS (µg/l)
Copper	6.3-16	TP104 0.3m, TP101 0.3m	1
Lead	3.0-5.2	TP104 0.3m, TP101 0.3m	1.2
Nickel	7.3	TP101 0.3m	4
Zinc	17	TP101 0.3m	10.9

- 11.6 BWB consider these exceedances to not be significant given they are within an order of magnitude of the screening criteria and the considering the distances from the site to sensitive surface water receptors. Leachate summary worksheets are presented as **Appendix 9**.

Groundwater Assessment

- 11.7 The following groundwater testing undertaken was undertaken during the Plot P 2022 investigation. The groundwater results have been compared to the EQS freshwater criteria to assess the risk to surface water features and UK DWS for the underlying aquifers. The exceedances following a direct comparison to the screening criteria are detailed in **Table 11.3** and **Table 11.4**. Groundwater summary worksheets are presented as **Appendix 10**.
- 11.8 No groundwater testing was undertaken in the 2023 Investigation with insufficient groundwater to obtain a representative sample.

Table 11-3: Summary of Water Sample Exceedances - EQS

Contaminant	Exceedance Concentration Range (µg/l)	Location	EQS (µg/l)
Cadmium	0.23	BH02	0.08
Copper	1.7	BH02	1
Nickel	4.4	BH02	4
Zinc	42	BH02	10.9
Ammonia	0.07	BH02	0.015

Table 11-4: Summary of Water Sample Exceedances - DWS

Contaminant	Exceedance Concentration Range (µg/l)	Location	DWS (µg/l)
Ammonia	0.07	BH02	0.015

Risk Assessment

- 11.9 Total TPH and PAH were not recorded above the laboratories lowest level of detection, in all (soil, leachate and groundwater) samples tested.
- 11.10 Low concentrations of metals and inorganics have been recorded in the groundwater and leachate samples, with a symmetry between the two sets of results. BWB consider it possible that the shallow soils on site could be impacting upon the site groundwater quality. However, the levels of exceedances are not considered significant to the recorded concentrations of contaminants in samples.
- 11.11 As the proposed development on the site will comprise extensive areas of hardstanding and buildings which will limit further infiltration and leaching, BWB do not consider that the closest nearby controlled water (Stanley Brook 150m to the south) will be exposed to an unacceptable risk as a result of the proposed development.

12. ENVIRONMENTAL RISK ASSESSMENT

Introduction

- 12.1 An updated assessment of pollutant linkages has been undertaken following completion of a ground investigation at the Site. The preliminary risk assessment presented in **Section 4** has been updated in light of the findings of the ground investigation and the revised conceptual site model developed, as presented in **Table 12:1**.

Sources

- Asbestos fibres recorded in the Made Ground of TP01 and TP03 are considered isolated areas of contamination.
- Total Organic Carbon (TOC) content of the Made Ground and Glaciofluvial Deposits (2023 investigation) was recorded between 1.9% and 2.6% respectively;
- Marginally elevated leachable heavy metals have been recorded in the shallow Made Ground above EQS assessment criteria.

Pathways

- Inhalation of fibres and particle dust;
- Dermal contact;
- Vertical migration of contaminants in the soil leachate;
- Lateral migration of contaminants within the groundwater; and
- Accumulation of gas leading to explosion and asphyxiation within the new developments.

Receptors

- Future site users;
- Construction and groundworkers;
- Underlying Secondary Undifferentiated Aquifer & Secondary A Aquifers;
- Stanley Brook 150m to the south and west of the site.

Table 12-1: Preliminary Conceptual Site Model

Source	Pathway	Receptor	Con	Prob	Risk	Potential Mitigation/Investigation Requirements
MADE GROUND Contamination associated with AGRICULTURAL activities Gas accumulation in Made Ground and organic soils Asbestos within TP01 and TP03	Direct contact, incidental ingestion and inhalation of particulates.	Construction/s ervices personnel	Md	Lw	M/L	As part of the Proposed Development, it is anticipated that hardstanding will be created across large areas of the site. This will limit the potential for direct contact with and minimise dust generation from potentially contaminated soils at the site post construction. A clean soil cover system will be required in areas of landscaping.
		Future site users (commercial)	Md	Lw	M/L	The exposure to construction workers/services personnel can be mitigated by utilising appropriate PPE and maintaining good hygiene levels.
	Migration and accumulation of ground gases in enclosed spaces leading to asphyxiation (carbon dioxide) or explosion (methane).	Future site users (commercial) Construction and groundworkers	Sv	Lw	M	Made Ground is present across most of the site. Elevated CO ₂ concentrations and high TOC indicates a potential risk from ground gases. Given the elevated TOC of organic soils on site and the organic nature of soil adjacent to the east, it is considered appropriate to adopt a CS2 classification for the development area. Migration of hazardous ground is not considered to be occurring given the low concentrations being recorded on site. Installing protection measures as described above is considered sufficient to protection end site users from any previously unidentified hazardous gas migration.
	Leaching and permeation through soil profile.	Groundwater: Underlying Secondary Superficial & Bedrock Aquifers	Md	UI	L	The leachate and groundwater concentrations are considered low. Given that the site is principally underlain by low permeability soils, it is considered unlikely that the low leachate and groundwater concentrations would migrate towards the aquifer or nearby surface water bodies at elevated concentrations. The development will be predominantly covered by buildings and hard standing surface cover, therefore limiting any potential for mobilisation of contaminants within the Made Ground. Therefore, BWB considers that leachable contaminants and contaminants within groundwater do not represent a plausible risk to controlled waters. The recommendations of DEFRA and EA guidance document 'Pollution prevention for businesses' should be considered during construction.
	Vertical and lateral migration of contaminants in groundwater.		Md	UI	L	
	Surface run-off.	Stanney Brook Rochdale Canal	Md	UI	L	
	Vertical and lateral migration of contaminants in groundwater.		Md	UI	L	
	VH = Very High, H = High, M = Moderate, M/L = Moderate/Low, L = Low, VL = Very Low					
KEY: Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor, Hi = High, Li = Likely, Lw = Low Likelihood, UI = Unlikely						

Source	Pathway	Receptor	Con	Prob	Risk	Potential Mitigation/Investigation Requirements
Pollutant Linkage Assessment Summary						
When considered in the context of the conceptual site model and the historical activities that have taken place, the proposed development is considered to pose a MODERATE risk to human health. It is considered that the main driver for the risk rating for human health is Migration and accumulation of ground gases related to potential Made Ground and organic rich soils on the site.						
The risk posed to controlled waters is predominantly considered to be LOW due to the limited contaminative sources identified on site.						

13. ENVIRONMENT LIABILITY ASSESSMENT AND DEVELOPMENT IMPLICATIONS

Statutory Liability

- 13.1 Based on the information available regarding the site, the potential for Statutory Authority action based on "*pollution of controlled water*" or "*significant harm*" as defined by Part IIA of the Environmental Protection Act 1990 is considered to be **LOW** based on to lack of significant contaminant sources on site.

Third Party Liability

- 13.2 Based on the information contained in this report, it is the opinion of BWB that the potential for legal action by surrounding landowners, based on the potential for contamination to migrate off-site, is considered to be **LOW** when considering the nature of the surrounding land use.

Public Relations

- 13.3 The likelihood of public relations being tarnished due to contamination issues at the site is considered to be **LOW**.

Development Implications

- 13.4 Further consideration of drainage design would be required as soakaway testing was not completed as part of this assessment. However, in consideration of site ground and groundwater conditions, soakaways are unlikely to be viable for the development.

14. WASTE MANAGEMENT

Waste Classification

- 14.1 Soil samples have been characterised against hazardous waste criteria using Hazwasteonline for both investigations. The results of the waste classification are presented in **Appendix 11**. The assessment indicates that most of the soils analysed are likely to be classified as non-hazardous. The waste classification assessment only applies to those soils that have been tested. If other soils are to be disposed of off-site then further analysis may be required.
- 14.2 Asbestos fibres were recorded in two locations (TP01 and TP03). Quantification results recorded <0.001% and 0.359% respectively. Concentrations of asbestos within the soils in TP03 would be classified as hazardous waste.
- 14.3 To delineate the extent of the asbestos recorded within the main investigation, another sampling visit was undertaken on 30/08/23. Ten samples were recovered from the surrounding area of both positive identifications and no further instances of asbestos fibres were recorded.
- 14.4 The presence of any visible asbestos containing materials in waste or at concentrations exceeding 0.1% by weight will classify the waste as mixed and require disposal as hazardous waste irrespective of the chemical properties of the waste.
- 14.5 Should any soils require disposal off site an assessment of waste classification of the soils for disposal should be made by a competent person. Further chemical analysis may be required to fully characterise waste soils for disposal to landfill or re-use off site. WAC analysis may be required for disposal of soils as inert or hazardous.

Waste Acceptance Criteria

- 14.6 WAC testing was not completed. Should disposal of soils off-site be required, further classification and WAC testing of waste soils should be undertaken in discussion with the proposed landfill destination.

15. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

- 15.1 The proposed development for Plot R2 AVIC is indicated to be a research & development building (Use Class E) including office, laboratory & production space, function space & café, new access, car parking, servicing, boundary treatments, hard and soft landscaping and other associated works. This is likely to be a steel portal framed structure.
- 15.2 The generalised ground conditions across the development plot consist of Topsoil/ Made Ground overlying Hummocky Glacial Deposits comprising upper clays over sands which become denser with depth. Generally, Made Ground was present close to Michael Faraday Avenue, and in other localised zones at the site.

Environmental

- 15.3 No exceedances were recorded when screened against the respective LQM/CIEH S4UL, for a commercial end use, screening criteria for risks to human health. Asbestos was recorded in two of the six Made Ground samples tested. To further delineate the extent of the asbestos recorded, another sampling visit was undertaken. Ten samples were recovered from the shallow Made Ground across the site and surrounding the area of both positive identifications and further instances of asbestos fibres were recorded. It is considered that the asbestos fibres identified in the Made Ground in TP01 and TP03 are isolated areas of contamination.
- 15.4 Low concentrations of metals and inorganics have been recorded in leachate and samples of the groundwater above UK DWS and EQS screening criteria in the 2022 investigation. BWB consider it possible that the shallow soils on site could be impacting upon the groundwater quality. However, the levels of exceedances are not considered significant to the recorded levels of contaminants in samples. No groundwater testing was undertaken during the 2023 investigation as there was insufficient groundwater available to sample.
- 15.5 As the proposed development on the site will comprise large areas with hardstanding and buildings which will limit further infiltration and leaching, BWB does not consider that controlled waters will be exposed to an unacceptable risk as a result of the proposed development.

Geotechnical

- 15.6 Shallow spread foundations transferring loads onto the (untreated) underlying Hummocky Glacial Deposits are unlikely to be suitable for the building, as there would be a risk of excessive and unpredictable total and differential settlements.
- 15.7 Ground improvement will be required. Vibro-stone columns (VSC) to support shallow (pad) spread foundations and a ground bearing floor slab would be feasible. Alternatively, ground improvement comprising installation of rigid inclusions (RIs), with a load transfer platform is considered feasible but likely less cost-effective, as are piled foundations.

- 15.8 Grading and Atterberg Limit tests for the near-surface Hummocky Glacial Deposits indicated that excavated site-won materials would generally classify as either Class 1A/1B and Class 2A/2B or 2C in accordance with 'Table 6/2 of the SHW, Series 600'. Compaction testing indicates soils are generally wet of optimum at natural moisture contents and would require dewatering (via chemical modification) for adequate compaction as engineered fill.
- 15.9 The design sulphate and ACEC class for below ground concrete at the site is DS-1 and AC-1.
- 15.10 Laboratory testing indicates a range of CBR values for the design of new pavements (2022 investigation), with most results giving values of less than 3.0% and often less than 1%. Minimum design CBR values for pavement foundations is typically 3%; for pavements on the natural soils at the site, modification of the formation soils (e.g. by lime or cement) will be required to achieve the required design CBR value.
- 15.11 Based on the ground conditions encountered together with the variable and shallow groundwater issues in the area, soakaway drainage is unlikely to be a viable solution.
- 15.12 Groundwater is likely to vary greatly seasonally at the site. The ground investigation, undertaken in July (after a particularly dry spring/summer), will have likely captured a lowered groundwater situation at the site, with some areas of the site displaying evidence of historical waterlogging (reeds, peat build up).
- 15.13 If groundwater levels rise following extended periods of wet weather, groundwater pumping may be required during construction ground works.

Recommendations

Environmental

- 15.14 A Remediation Strategy should be completed for the site prior to development to provide remediation and mitigation requirements, identify those soils on site likely to require disposal, set remediation targets if required and provide verification requirements of any gas protection measures required.

Geotechnical

- 15.15 Earthworks will need to be undertaken in accordance with a suitable specification document, which will need to be prepared to describe the materials and their requirements including placement and acceptability limits.
- 15.16 Ground improvement will need to be undertaken in accordance with a suitable specification.
- 15.17 Allowance should be made for temporary shoring of excavations due to likely stability issues associated with running sands.
- 15.18 Contingency for groundwater control should be considered especially if development is undertaken during the winter months.

16. REFERENCES

1. British Standards Institution, (BSI), BS 8485:2015+A1:2019, Code of Practice for the characterization and remediation from ground gas in affected developments
2. British Standards Institution, (BSI), BS 8576:2013, Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)
3. British Standards Institution, (BSI), BS 10175:2011+A2:2017, Investigation of Contaminated Sites – Code of Practice
4. British Standards Institution, (BSI), BS5930:2015+A1:2020 Code of practice for ground investigations
5. British Standards Institution, (BSI), BS EN 1997-1:2004+A1:2013, Incorporating corrigendum February 2009, Eurocode 7 – Geotechnical Design – Part 1: General rules.
6. British Standards Institution, (BSI), BS EN 1997-2:2007 Incorporating corrigendum June 2010, Eurocode 7 – Geotechnical Design – Part 2: Ground Investigation and testing.
7. Building Research Establishment Special Digest 1 *Third Edition*. Concrete in Aggressive Ground (2005)
8. Building Research Establishment (BRE) BR211, Radon; Guidance on Protective Measures for New Buildings (2015)
9. Construction Industry Research and Information Association (CIRIA), Report 132, A Guide to Safe working on Contaminated Sites (1996).
10. Construction Industry Research and Information Association (CIRIA). 2001, C522 Contaminated land risk assessment, A guide to good practice.
11. Construction Industry Research and Information Association (CIRIA). 2007, Report C665, Assessing Risk Posed by on Hazardous Ground Gases to Buildings
12. Department for Communities and Local Government (DCLG), 2012, National Planning Policy Framework.
13. Department for Environment Food and Rural Affairs (DEFRA), 2012, Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance.
14. Environment Agency report Land Contamination Risk Management, 2020.
15. Environment Agency 2008, Updated technical background to the CLEA model Science Report – SC050021/SR3
16. Environment Agency 2008, Human health toxicological assessment of contaminants in soil Science Report – SC050021/SR2
17. Environment Agency 2009, CLEA Software (Version 1.05) Handbook Better Regulation Science Programme Science report: SC050021/SR4
18. Environment Agency 2008, A review of body weight and height data used within the Contaminated Land Exposure Assessment model (CLEA) Project SC050021/ Technical Review 1

19. Environment Agency, 2006, Remedial Targets Methodology, Hydrogeological Risk Assessment for Land Contamination
20. Health and Safety Executive (HSE) 'Protection of workers and the general public during the Development of Contaminated Land (1991).

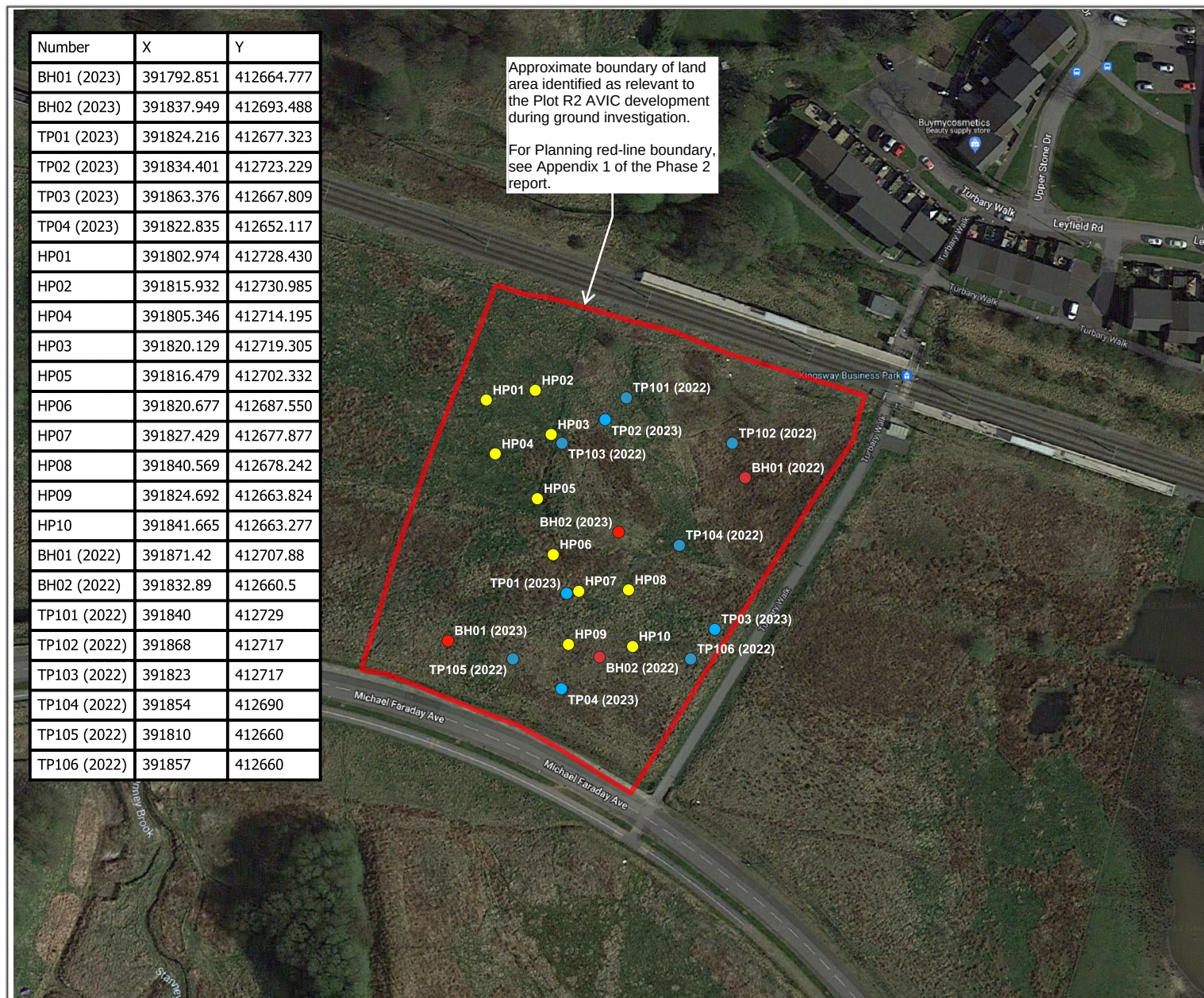
DRAWINGS

Drawing 1: Site Layout

Number	X	Y
BH01 (2023)	391792.851	412664.777
BH02 (2023)	391837.949	412693.488
TP01 (2023)	391824.216	412677.323
TP02 (2023)	391834.401	412723.229
TP03 (2023)	391863.376	412667.809
TP04 (2023)	391822.835	412652.117
HP01	391802.974	412728.430
HP02	391815.932	412730.985
HP04	391805.346	412714.195
HP03	391820.129	412719.305
HP05	391816.479	412702.332
HP06	391820.677	412687.550
HP07	391827.429	412677.877
HP08	391840.569	412678.242
HP09	391824.692	412663.824
HP10	391841.665	412663.277
BH01 (2022)	391871.42	412707.88
BH02 (2022)	391832.89	412660.5
TP101 (2022)	391840	412729
TP102 (2022)	391868	412717
TP103 (2022)	391823	412717
TP104 (2022)	391854	412690
TP105 (2022)	391810	412660
TP106 (2022)	391857	412660

Approximate boundary of land area identified as relevant to the Plot R2 AVIC development during ground investigation.

For Planning red-line boundary, see Appendix 1 of the Phase 2 report.



NOTES

1. DO NOT SCALE THIS DRAWING. ALL DIMENSIONS MUST BE CHECKED/ VERIFIED ON SITE. IF IN DOUBT ASK.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.
3. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE. ALL LEVELS IN METERS UNLESS NOTED OTHERWISE.
4. ANY DISCREPANCIES NOTED ON SITE ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

LEGEND

- Borehole (2023)
- Trial Pit (2023)
- Hand Pit (2023)
- Borehole (2022)
- Trial Pit (2022)



5th Floor, Waterfront House, Station Street,
Nottingham, NG2 3DQ
T 0115 924 1100 F 0115 950 3566 W bwbconsulting.com

Client:

Wilson Bowden Developments Ltd
& Rochdale Borough Council

Project Title:

Plot R2 AVIC, Kingsway Business Park,
Rochdale

Drawing Title:

Site EHLP

Scale:	Date:	Drawn:	Authorised:
Not to Scale	Aug-23	PM	AFB

Drawing Status: FINAL

Drawing No:	Revision:
001	R1

APPENDICES

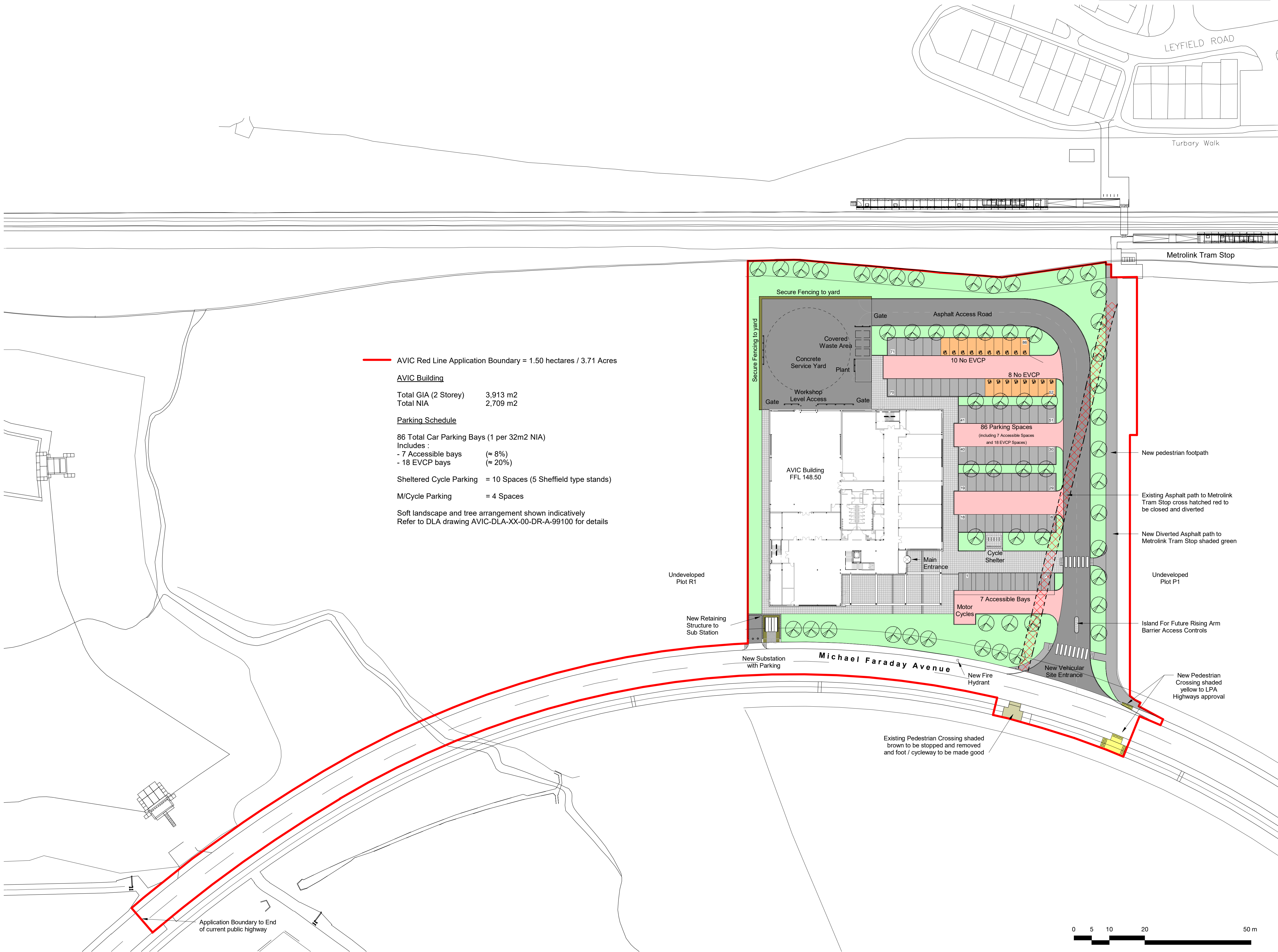
Appendix 1: Masterplan

Note: This is a colour drawing, in order to ensure any subsequent reproduction is viewed correctly it is to be re-printed in full colour

INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE COPYRIGHT OF DLA ARCHITECTURE LTD AND IS NOT TO BE REPRODUCED WITHOUT PERMISSION

DO NOT SCALE, REFER TO FIGURED DIMENSIONS ONLY

REVISIONS		
P01	FIRST ISSUE	15/04/24 PSL
P02	Application boundary revised to accommodate off site earthworks. Updated in line with Client comments	03/05/24 PSL



— AVIC Red Line Application Boundary = 1.50 hectares / 3.71 Acres

AVIC Building

Total GIA (2 Storey) 3,913 m2
Total NIA 2,709 m2

Parking Schedule

86 Total Car Parking Bays (1 per 32m2 NIA)

Includes :
- 7 Accessible bays (≈ 8%)
- 18 EVCP bays (≈ 20%)

Sheltered Cycle Parking = 10 Spaces (5 Sheffield type stands)

M/Cycle Parking = 4 Spaces

Soft landscape and tree arrangement shown indicatively
Refer to DLA drawing AVIC-DLA-XX-00-DR-A-99100 for details

New pedestrian footpath
Existing Asphalt path to Metrolink
Tram Stop cross hatched red to
be closed and diverted
New Diverted Asphalt path to
Metrolink Tram Stop shaded green
Undeveloped Plot P1
Island For Future Rising Arm
Barrier Access Controls
New Pedestrian
Crossing shaded
yellow to LPA
Highways approval

Undeveloped
Plot R1

New Retaining
Structure to
Sub Station

New Substation
with Parking

Michael Faraday Avenue

New Fire
Hydrant

New Vehicular
Site Entrance

Existing Pedestrian Crossing shaded
brown to be stopped and removed
and foot / cycleway to be made good

Application Boundary to End
of current public highway



NORTH



6 East Parade | Leeds | LS1 2AD
0113 887 3100
www.dla-architecture.co.uk

PROJECT
KINGSWAY BUSINESS PARK
PLOT R2

TITLE
GA Site Plan

SCALE
1 : 500 @ A1

DATE
12/04/24

DLA REF
2022-040

DRAWN
PSL

REVIEWED
BLG

DOCUMENT NUMBER
AVIC-DLA-XX-00-DR-A- 99003

DOCUMENT PURPOSE
PLANNING

REVISION
P02

Appendix 2: Exploratory Hole Logs

BOREHOLE LOG

LOCATION ID		Project Name: Plot R Kingsway Business Park					Ground Level (m AOD): 147.94						
BH01		Project Number: 232081					Eastings: 391792.85						
		Client: Wilson Bowden Deveopments Ltd					Northings: 412664.78						
Hole Type: BH		Rig: Dando 2000			Start & End Date: 03/07/2023 - 04/07/2023			Engineer: PM		Checker: AB			
Boring		Strata					Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & [Thickness (m)]	Description	Legend	Depth (m bgl)	Type (U/blows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)	
		[0.10] 147.84 [0.40] 147.44 [2.00]	Grass over dark brown slightly gravelly silty fine to medium SAND with occasional rootlets. Gravel is angular to subrounded medium to coarse siltstone, brick and glass. (Topsoil)		0.10	B	0.10	0.50					
			Dark brown gravelly fine to medium SAND. Gravel is angular to subrounded fine to coarse concrete, brick, glass, mudstone and siltstone. (Made Ground)		0.50	B ES2 D	0.50 0.60 0.80	1.00 0.70					
			Firm brown and light grey mottled slightly gravelly slightly sandy silty CLAY. Gravel is angular to subrounded fine to medium coal and siltstone. (Hummocky Glacial Deposits)						SPT	1.20	N=10 (3,3/2,3,3,2)	10.00m (NR)	
									SPT	2.00	N=11 (1,1/2,2,3,4)	10.00m (NR)	
		145.44 [3.00]	Light brown gravelly fine to medium SAND. Gravel is subangular to subrounded fine to coarse siltstone, sandstone, quartz and coal. (Hummocky Glacial Deposits)		2.50	B	2.50	3.00					
									SPT	3.00	N=12 (3,3/2,3,4,3)	10.00m (NR)	
									SPT	4.00	N=12 (2,3/3,4,2,3)	10.00m (NR)	
									SPT	5.00	N=37 (4,4/7,5,9,16)	10.00m (NR)	
		142.44 [4.95]	Brown slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded siltstone and quartz. (Hummocky Glacial Deposits)		5.50	B	5.50	6.00					
						D	6.00		SPT	6.00	N=26 (4,4/5,6,7,8)	10.00m (NR)	
									SPT	7.50	N=17 (4,4/4,4,4,5)	10.00m (NR)	
			8.00-10.45: Becomes gravelly										
						B	9.00	9.50	SPT	9.00	N=20 (4,5/5,5,5,5)	10.00m (NR)	
Chiselling		Remarks											
From (m bgl)	To (m bgl)	Time (hh:mm)	Reason for Termination:										
			Designation depth reached.										
Groundwater Remarks:			No groundwater encountered.										
Water Added			Other Remarks:										
From (m bgl)	To (m bgl)	Volume (l)	Location cleared of buried services. Hand pit dug to 1.20m bgl.										



BOREHOLE LOG

Scale 1:50

Sheet 2 of 2

LOCATION ID		Project Name: Plot R Kingsway Business Park						Ground Level (m AOD): 147.94								
BH01		Project Number: 232081						Eastings: 391792.85								
		Client: Wilson Bowden Deveopments Ltd						Northings: 412664.78								
Hole Type: BH		Rig: Dando 2000			Start & End Date: 03/07/2023 - 04/07/2023			Engineer: PM			Checker: AB					
Boring		Strata						Samples			In-Situ Tests					
Strike	Well	Level (m AOD) & [Thickness (m)]	Description			Legend	Depth (m bgl)	Type (blows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)		
	<															

BOREHOLE LOG

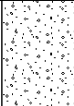
LOCATION ID		Project Name: Plot R Kingsway Business Park					Ground Level (m AOD): 150.39						
BH02		Project Number: 232081					Eastings: 391837.95						
		Client: Wilson Bowden Deveopments Ltd					Northings: 412693.49						
Hole Type: BH		Rig: Dando 2000			Start & End Date: 04/07/2023 - 05/07/2023			Engineer: PM		Checker: AB			
Boring		Strata					Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & [Thickness (m)]	Description	Legend	Depth (m bgl)	Type (U/blows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)	
		(2.30)	Firm dark brown slightly gravelly slightly sandy silty CLAY. Gravel is angular to subrounded fine to coarse brick, concrete, siltstone, sandstone and metal. (Made Ground)			ES1	0.10	0.20					
									SPT	1.00	N=6 (1,1/1,1,2,2)	10.00m (NR)	
									SPT	2.00	N=4 (1,1/1,1,1,1)	10.00m (NR)	
		148.09 [0.20]	Soft dark grey silty CLAY with frequent rootlets (slight natural organic odour). (Hummocky Glacial Deposits)		2.30	ES2	2.30	2.40					
		147.89 [0.50]			2.50	B	2.50	2.60					
						ES3	2.50	3.00					
		147.39 [2.10]	Firm locally stiff friable brown and light grey mottled slightly gravelly slightly sandy CLAY. Gravel is angular to subrounded fine to medium siltstone. (Hummocky Glacial Deposits)		3.00	B	3.00	3.50	SPT	3.00	N=37 (4,7/8,9,10,10)	10.00m (NR)	
						D	3.50						
			Light brown gravelly fine to medium SAND. Gravel is subangular to subrounded fine to medium quartz, siltstone and coal. (Hummocky Glacial Deposits)						SPT	4.00	N=22 (3,3/4,5,6,7)	10.00m (NR)	
									SPT	5.00	N=23 (3,5/5,5,6,7)	10.00m (NR)	
		145.29 [5.35]	Brown slightly gravelly fine to coarse SAND. Gravel is angular to subrounded quartz, siltstone and quartz. (Hummocky Glacial Deposits)		5.10	B	5.50	6.00					
									SPT	6.00	N=26 (3,5/7,5,7,7)	10.00m (NR)	
						D	6.50						
			7.5 - 10.45: Becomes gravelly with frequent horizons of coal-rich gravel						SPT	7.50	N=32 (3,5/8,8,8,8)	10.00m (NR)	
						B	8.50	9.00					
						D	9.00		SPT	9.00	N=31 (5,5/5,8,8,10)	10.00m (NR)	
Chiselling		Remarks											
From (m bgl)	To (m bgl)	Time (hh:mm)	Reason for Termination:										
			Designation depth reached.										
Groundwater Remarks:			No groundwater encountered.										
Water Added			Other Remarks:										
From (m bgl)	To (m bgl)	Volume (l)	Location cleared of buried services. Hand pit dug to 1.20m bgl.										



BOREHOLE LOG

Scale 1:50

Sheet 2 of 2

LOCATION ID		Project Name: Plot R Kingsway Business Park						Ground Level (m AOD): 150.39								
BH02		Project Number: 232081						Eastings: 391837.95								
		Client: Wilson Bowden Devleopments Ltd						Northings: 412693.49								
Hole Type: BH		Rig: Dando 2000			Start & End Date: 04/07/2023 - 05/07/2023			Engineer: PM			Checker: AB					
Boring		Strata						Samples			In-Situ Tests					
Strike	Well	Level (m AOD) & [Thickness (m)]	Description			Legend	Depth (m bgl)	Type (Ublows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)		
		139.94	Brown slightly gravelly fine to coarse SAND. Gravel is angular to subrounded quartz, siltstone and quartz. (Hummocky Glacial Deposits) Hole Terminated at 10.45m bgl.				10.45				SPT	10.00	N=35 (4,8/7,7,9,12)	10.00m (NR)		
		Remarks														
		Chiseling		Reason for Termination:												
		From (m bgl)	To (m bgl)	Time (hh:mm)	Designation depth reached.											
					Groundwater Remarks:											
					No groundwater encountered.											
		Water Added			Other Remarks:											
		From (m bgl)	To (m bgl)	Volume (l)	Location cleared of buried services. Hand pit dug to 1.20m bgl.											

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID:		Project Name: Plot R Kingsway Business Park			1.80 0.80 Pit Dimensions (m) Degrees Stability: Unstable						
TP01		Project Number: 232081									
		Client: Wilson Bowden Deveopments Ltd									
		Plant: 8 Tonne Excavator	Start & End Date: 03/07/2023								
Ground Level (m AOD): 148.47		Eastings & Northings: 391824E 412677N			Engineer: PM		Checker: AB				
Strata						Samples			In-Situ Tests		
Groundwa ter Strike	Backfill	Level (m AOD)	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
		1.00m	Grass over dark brown gravelly fine to medium SAND with occasional concrete cobble content. Gravel is angular to subrounded fine to coarse brick, siltstone, glass and concrete. (Made Ground)			ES	0.10	0.20			
		147.47 0.20m 147.27	Brown slightly gravelly fine to medium SAND. Gravel is subangular to subrounded fine to coarse siltstone. (Hummocky Glacial Deposits)		1.00 1.20	ES	1.00	1.10			
		1.30m	Firm locally stiff friable brown and light grey mottled slightly gravelly slightly sandy silty CLAY. Gravel is angular to subrounded fine to coarse mudstone and coal. (Hummocky Glacial Deposits)			D	1.50				
		145.97	Light brown slightly gravelly fine to medium SAND. Gravel is angular fine coal. (Hummocky Glacial Deposits)		2.50						
		1.40m				B	3.00	3.50			
		144.57	Hole Terminated at 3.90m bgl.		3.90						
Remarks											
Reason for Termination: Pit becoming unstable.											
Groundwater Notes: No groundwater encountered.											
Other Remarks: Location cleared of buried services. Backfilled with arisings.											
BWB CAF GROUP COMPANY AGS REGISTERED USER 2023											

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID:		Project Name: Plot R Kingsway Business Park				1.80 0.80 Pit Dimensions (m) Degrees					
TP02		Project Number: 232081									
		Client: Wilson Bowden Deveopments Ltd									
		Plant: 8 Tonne Excavator	Start & End Date: 03/07/2023								
Ground Level (m AOD): 148.88		Eastings & Northings: 391834E 412723N				Engineer: PM		Checker: AB			
Strata						Samples			In-Situ Tests		
Groundwa ter Strike	Backfill	Level (m AOD)	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
		0.20m	Grass over dark brown slightly gravelly silty fine to medium SAND with occasional rootlets. Gravel is angular to subrounded medium to coarse siltstone, brick and glass. (Topsoil)		0.20	D	0.10	0.20			
		148.68				ES	0.10				
		0.40m				ES	0.30	0.40			
		148.28	Brown slightly gravelly fine to medium SAND. Gravel is subangular to subrounded medium to coarse siltstone. (Hummocky Glacial Deposits)		0.60	B	1.00	1.50			
		1.30m	Firm locally stiff friable brown and light grey mottled slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse mudstone and coal. (Hummocky Glacial Deposits)								
		146.98	Light brown slightly gravelly fine to medium SAND. Gravel is angular fine coal. (Hummocky Glacial Deposits)		1.90						
		1.40m				D	3.00				
		145.58	Hole Terminated at 3.30m bgl.		3.30						
Remarks											
Reason for Termination: Maximum depth reached.											
Groundwater Notes: No groundwater encountered.											
Other Remarks: Location cleared of buried services. Backfilled with arisings.											
BWB CAF GROUP COMPANY AGS REGISTERED USER 2023											

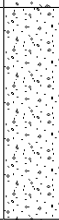
TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID:		Project Name: Plot R Kingsway Business Park				1.80 0.80 Pit Dimensions (m) Degrees					
TP03		Project Number: 232081									
		Client: Wilson Bowden Deveopments Ltd									
		Plant: 8 Tonne Excavator		Start & End Date: 03/07/2023							
Ground Level (m AOD): 149.20		Eastings & Northings: 391863E 412668N				Engineer: PM		Checker: AB			
Strata						Samples		In-Situ Tests			
Groundwa ter Strike	Backfill	Level (m AOD)	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
		0.90m	Grass over dark brown gravelly fine to medium SAND with occasional concrete cobble content. Gravel is angular to subrounded fine to coarse glass, siltstone, brick and concrete. (Made Ground)		0.90	ES	0.20	0.30			
		148.30	Firm locally stiff friable brown and light grey mottled slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse mudstone and coal. (Hummocky Glacial Deposits)			ES	1.00	1.10			
		0.90m									
		147.40	Light brown slightly gravelly fine to medium SAND. Gravel is angular to subrounded fine coal and siltstone. (Hummocky Glacial Deposits)		1.80	B	2.00	2.50			
		1.40m									
		146.00			3.20	D	3.00				
Hole Terminated at 3.20m bgl.											
Remarks											
Reason for Termination: Pit becoming unstable.											
Groundwater Notes: No groundwater encountered.											
Other Remarks: Location cleared of buried services. Backfilled with arisings.											
BWB A CAF GROUP COMPANY AGS REGISTERED USER 2023											

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID:		Project Name: Plot R Kingsway Business Park			1.80 0.80 Pit Dimensions (m) Degrees Stability: Stable						
TP04		Project Number: 232081									
		Client: Wilson Bowden Deveopments Ltd									
		Plant: 8 Tonne Excavator	Start & End Date: 03/07/2023								
Ground Level (m AOD): 148.64		Eastings & Northings: 391823E 412652N			Engineer: PM		Checker: AB				
Strata						Samples			In-Situ Tests		
Groundwa ter Strike	Backfill	Level (m AOD)	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
		0.55m	Grass over dark brown slightly gravelly fine to medium SAND with occasional concrete cobble content and with occasional rootlets. Gravel is angular to subrounded fine to coarse siltstone, brick and glass.		0.55	ES	0.10	0.20			
148.09		(Made Ground)				ES	0.60	0.70			
		Firm locally stiff friable brown and light grey mottled slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse mudstone and coal. (Hummocky Glacial Deposits)			B	0.70	1.10				
1.35m					D	1.00					
		146.74	Light brown slightly gravelly fine to medium SAND. Gravel is fine angular coal. (Hummocky Glacial Deposits)		1.90	B	2.00	2.40			
		1.40m				D	2.50				
		145.34	Hole Terminated at 3.30m bgl.			3.30					
Remarks											
Reason for Termination: Maximum depth reached.											
Groundwater Notes: No groundwater encountered.											
Other Remarks: Location cleared of buried services. Backfilled with arisings.											



CAF GROUP COMPANY



REGISTERED USER 2023

BOREHOLE LOG

LOCATION ID		Project Name: Plot P, Kingsway Business Park					Ground Level (m AOD): 147.28						
BH01		Project Number: 210939					Eastings: 391871.42						
		Client: Wilson Bowden Developments Ltd					Northings: 412707.88						
Hole Type: CP		Rig: Dando 2000			Start & End Date: 02/08/2022			Engineer: TF		Checker: MH			
Boring		Strata					Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & Thickness (m)	Description	Legend	Depth (m bgl)	Type (blows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)	
		148.00 [1.00]	Grass over dark brown slightly clayey fine SAND with high rootlet content. (Topsoil)			B1	0.20	1.00					
		146.28 [0.80]	Loose brown very clayey SAND.()		1.00	B2 D1	1.20 1.20	1.65	SPT	1.20	N=8 (1,1/2,2,2,2)		
		145.48 [0.80]	Medium dense reddish brown clayey SAND.()		1.80	B3 D2	2.00 2.00	2.45	SPT	2.00	N=12 (1,2/3,3,3,3)		
						B4 D3	3.00 3.00	3.45	SPT	3.00	N=13 (2,2/3,3,3,4)		
						B5 D4	4.00 4.00	4.45	SPT	4.00	N=20 (4,4/4,5,5,6)		
						B6 D5	5.00 5.00	5.45	SPT	5.00	N=24 (4,5/6,6,6,6)		
						B7 D6	6.00 6.00	6.45	SPT	6.00	N=27 (4,5/6,7,7,7)		
						D7	7.00	7.00					
						B8 D8	7.50 7.50	7.95	SPT	7.50	N=14 (2,3/3,3,4,4)		
						B9 D9	9.00 9.00	9.45	SPT	9.00	N=15 (2,3/3,4,4,4)		
Chiseling		Remarks											
From (m bgl)	To (m bgl)	Time (hh:mm)	Reason for Termination:										
			Designated depth reached										
Groundwater Remarks:			No groundwater encountered.										
Water Added			Other Remarks:										
From (m bgl)	To (m bgl)	Volume (l)	Cleared of buried services. Handpit dug to 1.20mbgl. Installed with monitoring standpipe upon completion.										



BOREHOLE LOG

LOCATION ID BH01		Project Name: Plot P, Kingsway Business Park						Ground Level (m AOD): 147.28				
		Project Number: 210939						Eastings: 391871.42				
		Client: Wilson Bowden Developments Ltd						Northings: 412707.88				
Hole Type: CP		Rig: Dando 2000			Start & End Date: 02/08/2022			Engineer: TF		Checker: MH		
Boring		Strata				Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & [Thickness (m)]	Description	Legend	Depth (m bgl)	Type (U/blows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)
			Medium dense reddish brown clayey SAND.()			D10	10.00	10.00				
						D11	10.50	10.95	SPT	10.50	N=16 (2,3/4,3,4,5)	
		135.48 [3.20]	Very stiff grey slightly gravelly sandy CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone.()		11.80	D12	11.80	11.80				
						B10	12.00	12.45	SPT	12.00	N=44 (4,8/8,10,12,14)	
						D13	12.00					
						D14	13.00	13.45				
						U1 (120)	13.50	13.95				
						D15	14.00	14.00				
		132.28 [0.16] 132.12	Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone.()		15.00	D16	15.00	15.00	SPT	15.00	50 (25 for 105mm/50 for 50mm)	
			Hole Terminated at 15.16m bgl.		15.16							
Remarks												
Chiseling			Reason for Termination: Designated depth reached									
From (m bgl)	To (m bgl)	Time (hh:mm)										
Water Added			Groundwater Remarks: No groundwater encountered.									
From (m bgl)	To (m bgl)	Volume (l)										
			Other Remarks: Cleared of buried services. Handpit dug to 1.20mbgl. Installed with monitoring standpipe upon completion.									
												

BOREHOLE LOG

LOCATION ID		Project Name: Plot P, Kingsway Business Park					Ground Level (m AOD): 149.09						
BH02		Project Number: 210939					Eastings: 391832.89						
		Client: Wilson Bowden Developments Ltd					Northings: 412660.50						
Hole Type: CP		Rig: Dando 2000			Start & End Date: 04/08/2022 - 05/08/2022			Engineer: TF		Checker: MH			
Boring		Strata					Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & Thickness (m)	Description	Legend	Depth (m bgl)	Type (blows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)	
		1.00	Grass over dark brown slightly clayey fine SAND with high rootlet content. (Topsoil)			B1	0.10	1.00					
		148.09 (0.90)	Firm orange mottled grey sandy CLAY.()		1.00	D1	1.00	1.00					
						U1 (55)	1.20	1.65					
						D2	1.70	1.70					
		147.19 (3.50)	Medium dense orange slightly clayey SAND()		1.90	B2	2.00	2.45	SPT	2.00	N=16 (3,3/3,4,4,5)		
									SPT	3.00	N=15 (2,2/3,4,4,4)		
						D3	3.70	3.70					
						B3	4.00	4.45	SPT	4.00	N=14 (2,3/3,3,4,4)		
						D4	5.00	5.45	SPT	5.00	N=14 (2,2/3,3,4,4)		
		143.69 (9.60) (10.05)	Reddish brown slightly clayey slightly gravelly SAND. Gravel is subangular, fine to medium of sandstone and mudstone()		5.40	B4	6.00	6.45	SPT	6.00	N=17 (2,3/4,4,4,5)		
			Medium dense becoming dense reddish brown slightly clayey slightly gravelly SAND. Gravel is subangular, fine to medium of sandstone and mudstone()			D5	7.00	7.00					
						B5	7.50	7.95	SPT	7.50	N=35 (5,7/7,9,9,10)		
									SPT	9.00	N=35 (4,7/8,8,9,10)		
Chiseling		Remarks											
From (m bgl)	To (m bgl)	Time (hh:mm)	Reason for Termination:										
			Designated depth reached										
Groundwater Remarks:			No groundwater encountered.										
Water Added			Other Remarks:										
From (m bgl)	To (m bgl)	Volume (l)	Cleared of buried services. Handpit dug to 1.20mbgl. Installed with monitoring standpipe upon completion.										



BOREHOLE LOG

Scale 1:50

Sheet 2 of 2

LOCATION ID BH02		Project Name: Plot P, Kingsway Business Park						Ground Level (m AOD): 149.09						
		Project Number: 210939						Eastings: 391832.89						
		Client: Wilson Bowden Developments Ltd						Northings: 412660.50						
Hole Type: CP		Rig: Dando 2000			Start & End Date: 04/08/2022 - 05/08/2022			Engineer: TF		Checker: MH				
Boring		Strata						Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & [Thickness (m)]	Description			Legend	Depth (m bgl)	Type (U/blows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)
			Medium dense becoming dense reddish brown slightly clayey slightly gravelly SAND. Gravel is subangular, fine to medium of sandstone and mudstone()					D6	10.00	10.00				
							B6	10.50	10.95	SPT	10.50	N=40 (6,8/9,10,10,11)		
							D7	11.50	11.50					
							B7	12.00	12.45	SPT	12.00	N=32 (3,5/7,8,9,8)		
							D8	13.80	13.80			SPT	13.50	N=29 (3,5/6,7,8,8)
		134.09					15.00				SPT	15.00	N=20 (2,3/4,4,5,7)	
		133.64	Hole Terminated at 15.45m bgl.				15.45							

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID:		Project Name: Plot P, Kingsway Business Park			2.50 1.00 Pit Dimensions (m) 0Degrees Stability: Unstable below 1.80mbgl						
TP101		Project Number: 210939									
		Client: Wilson Bowden Developments Ltd									
		Plant: JCB 3CX	Start & End Date: 01/08/2022								
Ground Level (m AOD): 148.94		Eastings & Northings: 391840E 412729N			Engineer: TF		Checker: MH				
Strata						Samples			In-Situ Tests		
Groundwater Strike	Backfill	Level (m AOD)	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
		1.80m	Grass over black gravelly SAND with low cobble content. Gravel is subangular to subrounded, fine to coarse of clinker, brick, sandstone and wood. Cobbles are subangular of slag. (Made Ground)			ES1	0.30	0.30			
		147.14	Light brown slightly clayey SAND.()		1.80	B1	1.00	1.00			
		1.70m				ES2	1.50	1.50			
						D1	2.00	2.00			
		145.44	Hole Terminated at 3.50m bgl.		3.50	B2	3.00	3.00			
						D2	3.50	3.50			
Remarks											
Reason for Termination: Sides Collapsing											
Groundwater Notes: No groundwater encountered.											
Other Remarks: Cleared of services, backfilled with arisings											

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID:	Project Name: Plot P, Kingsway Business Park		2.40 1.00 Pit Dimensions (m) 0Degrees								
TP102	Project Number: 210939										
	Client: Wilson Bowden Developments Ltd										
	Plant: JCB 3CX	Start & End Date: 03/08/2022									
Ground Level (m AOD): 147.22		Eastings & Northings: 391868E 412717N		Engineer: OS	Checker: MH						
Strata Samples In-Situ Tests											
Groundwater Strike	Backfill	Level (m AOD)	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
▼		0.30m	Dark brown sightly clayey fine to medium SAND with rootlet content. (Topsoil)		0.30	ES	0.20				
		146.92	Blackish brown slightly gravelly slightly clayey fine to medium SAND with high cobble content. Gravel is subangular, coarse of sandstone. Cobbles are subangular to subrounded of sandstone.()			ES	0.60				
		0.70m									
		146.22	Orangey light grey sightly silty fine to medium SAND.()		1.00						
		0.60m	Orange silty fine to medium SAND.()			B	1.30				
		145.62			ES	1.30					
0.90m											
144.72	Orange slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded, fine to medium of coal and sandstone.()		2.50								
0.70m				B	2.80						
				D	2.80						
		144.02	Hole Terminated at 3.20m bgl.		3.20						
Remarks											
Reason for Termination: Sides Collapsing Groundwater Notes: Seepage at 2.70mbgl Other Remarks: Cleared of services, black plastic sheet at 0.10mmgl, backfilled with arisings											
BWB A CAF GROUP COMPANY											

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID:	Project Name: Plot P, Kingsway Business Park			2.40 1.20 Pit Dimensions (m) 0Degrees Stability: Unstable below 2.00mbgl							
TP103	Project Number: 210939										
	Client: Wilson Bowden Developments Ltd										
	Plant: JCB 3CX	Start & End Date: 01/08/2022									
Ground Level (m AOD): 149.08		Eastings & Northings: 391823E 412714N		Engineer: TF		Checker: MH					
Strata						Samples			In-Situ Tests		
Groundwater Strike	Backfill	Level (m AOD)	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
▼		0.40m	Grass over dark brown clayey SAND with high rootlet content (Topsoil)		0.40	ES1	0.30	0.30	HSV	1.00	(58, 75, 56)kPa
		148.68	Black and brown clayey gravelly SAND with low boulder content. Gravel is subangular to subrounded, fine to coarse of sandstone. Boulders are subangular of sandstone.()			D1	0.50	0.50			
		0.50m				ES2	0.50	0.50			
		148.18				B1	0.80	0.80			
		1.10m				D2	1.00	1.00			
		147.08	Firm light grey mottled orangish brown sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to medium of coal and sandstone.()	0.90	B2	1.80	1.80				
		2.00m			D3	2.50	2.50				
		145.08	Light orangish brown slightly clayey slightly gravelly SAND. Gravel is subrounded, medium to coarse of sandstone.()	2.00	4.00	B3	4.00	4.00			
			Hole Terminated at 4.00m bgl.								
Remarks											
Reason for Termination: Sides Collapsing											
Groundwater Notes: No Groundwater Encountered											
Other Remarks: Cleared of services, backfilled with arisings											
BWB A CAF GROUP COMPANY											

TRIAL PIT LOG

Scale: 1:50

Sheet 1 of 1

Sheet 1 of 1

LOCATION ID:		Project Name: Plot P, Kingsway Business Park		2.30 1.10 Pit Dimensions (m) 0 Degrees	
TP104		Project Number: 210939			
		Client: Wilson Bowden Developments Ltd			
		Plant: JCB 3CX	Start & End Date: 01/08/2022		
Ground Level (m AOD): 149.01		Eastings & Northings: 391854E 412690N		Stability: Unstable below 0.80mbgl	
				Engineer: TF	Checker: MH

Strata						Samples			In-Situ Tests			
Groundwater Strike	Backfill	Level (m AOD)	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result	
		0.20m	Grass over dark brown clayey SAND with high rootlet content (Topsoil)		0.20	ES1	0.10	0.10				
		148.81					ES2	0.30				0.30
		0.60m	Stiff orangish brown mottled light grey sandy gravelly CLAY with high rootlet content.()			B1	0.50	0.50				
						D1	0.70	0.70				
		148.21	Orange clayey slightly gravelly SAND Gravel is subangular to subrounded, fine to coarse of sandstone.()			B2	1.00	1.00				
						D2	1.50	1.50				
		3.00m										
						B3	2.80	2.80				
						D3	3.50	3.50				
			145.21		Hole Terminated at 3.80m bgl.		3.80					

Remarks	
---------	--

Reason for Termination:

Sides Collapsing

Groundwater Notes:

No Groundwater Encountered

Other Remarks:	
----------------	--

Cleared of services, backfilled with arisings



TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID:	Project Name: Plot P, Kingsway Business Park		2.50 1.20 Pit Dimensions (m) 0Degrees		
TP105	Project Number: 210939				
	Client: Wilson Bowden Developments Ltd				
	Plant: JCB 3CX	Start & End Date: 02/08/2022			
Ground Level (m AOD): 148.54		Eastings & Northings: 391810E 412660N		Engineer: TF	Checker: MH

Strata					Samples			In-Situ Tests			
Groundwater Strike	Backfill	Level (m AOD)	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
▼		0.80m	Grass over brown clayey gravelly SAND, with low cobble content. Gravel is subangular to subrounded, fine to coarse of sandstone and brick. Cobbles are subangular to subrounded of sandstone. (Made Ground)		0.80	ES1	0.20	0.20	HSV	1.00	(58, 47, 54)kPa
		147.74	Firm light grey mottled orange silty sandy gravelly CLAY with medium cobble content. Gravel is subangular to subrounded, fine to coarse of sandstone. Cobbles are subrounded of sandstone.()			D1	1.00	1.00			
		1.40m			ES2	1.00	1.00				
			B1		1.50	1.50					
			D2		2.00	2.00					
	146.34	Light grayish brown slightly clayey slightly gravelly SAND. Gravel is subrounded, fine to coarse of sandstone.()	2.20	B2	2.50	2.50					
	2.30m				D3	3.50	3.50				
	144.04	Hole Terminated at 4.50m bgl.			4.50	B3	4.50	4.50			

Remarks

Reason for Termination:

Undercutting below machine

Groundwater Notes:

No Groundwater Encountered

Other Remarks:

Cleared of services, backfilled with arisings

BWB

A CAF GROUP COMPANY

TRIAL PIT LOG

Scale: 1:50

Sheet 1 of 1

LOCATION ID:		Project Name: Plot P, Kingsway Business Park			2.10 1.20 Pit Dimensions (m) 0Degrees Stability: Unstable below 1.70mbgl						
TP106		Project Number: 210939									
		Client: Wilson Bowden Developments Ltd									
		Plant: JCB 3CX	Start & End Date: 02/08/2022								
Ground Level (m AOD): 149.37		Eastings & Northings: 391857E 412660N			Engineer: TF		Checker: MH				
Strata						Samples			In-Situ Tests		
Groundwater Strike	Backfill	Level (m AOD)	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
▼		0.50m	Grass over dark brown slightly clayey gravelly SAND. Gravel is subangular to subrounded, fine to coarse of sandstone and brick. (Made Ground)		0.50	ES1	0.20	0.20	HSV	1.50	(70, 100, 40)kPa
		148.87	Stiff grey mottled brown sandy CLAY.()		ES2	0.60	0.60				
		1.20m			D1	1.00	1.00				
		147.67	Light brownish orange SAND.()		B1	1.50	1.50				
					D2	2.00	2.00				
		2.30m				B2	3.00	3.00			
		145.37	Hole Terminated at 4.00m bgl.		4.00	D3	4.00	4.00			
Remarks											
Reason for Termination: Sides Collapsing Groundwater Notes: No Groundwater Encountered Other Remarks: Cleared of services, backfilled with arisings											

Appendix 3: SPT Calibration Certificate



Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Hammer Ref: PBD5
Test Date: 05/01/2022
Report Date:
File Name: PBD5.spt
Test Operator: B HUNTER

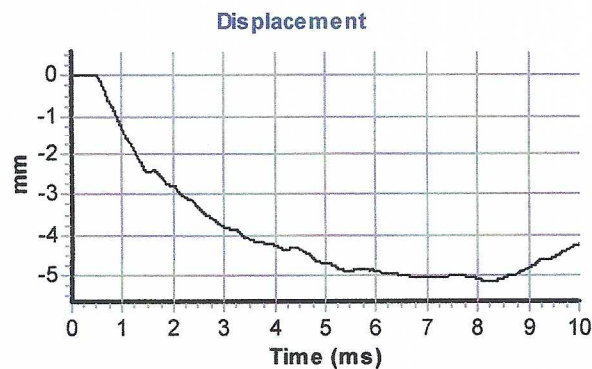
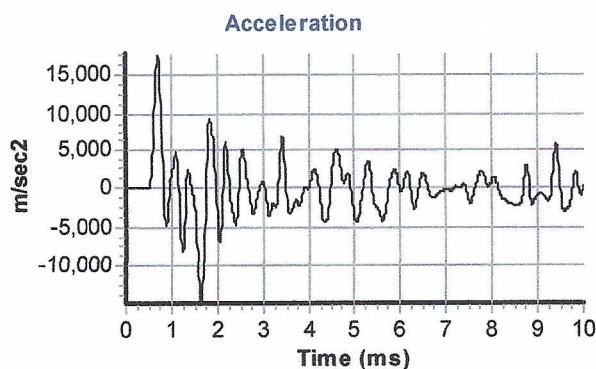
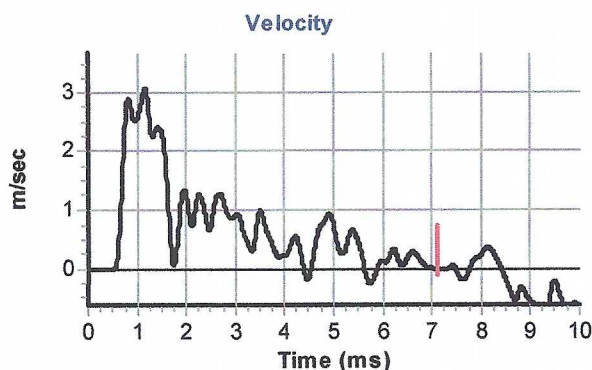
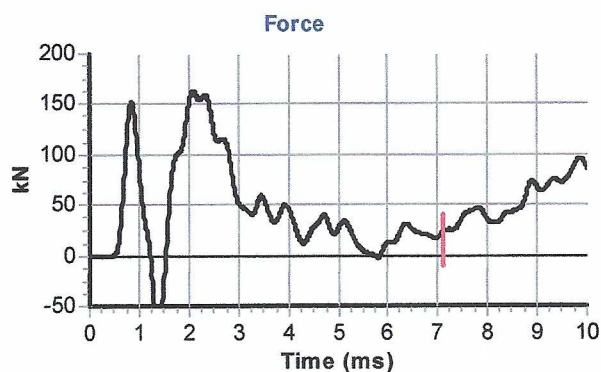
Instrumented Rod Data

Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 62901
Accelerometer No.2: 62902

Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
String Length L (m): 10.0

Comments / Location



Calculations

Area of Rod A (mm^2): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 309

Energy Ratio E_r (%): **65**

Signed:

Title:

Operations Manager

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING UK LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: PBD02
Test Date: 17/02/2022
Report Date: 17/02/2022
File Name: PBD02.spt
Test Operator: CM

Instrumented Rod Data

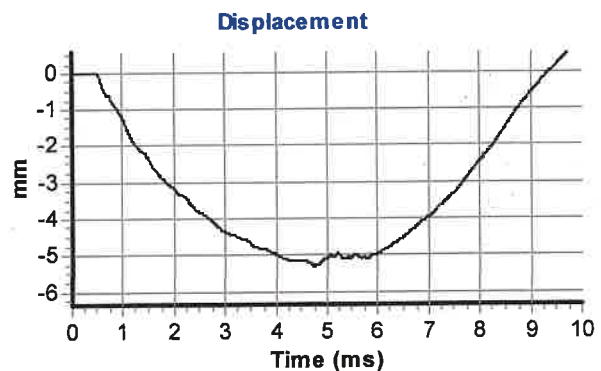
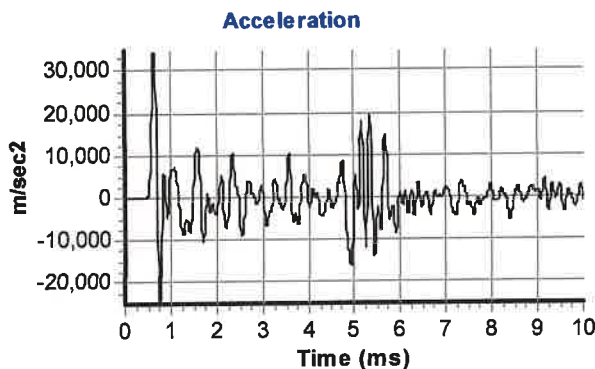
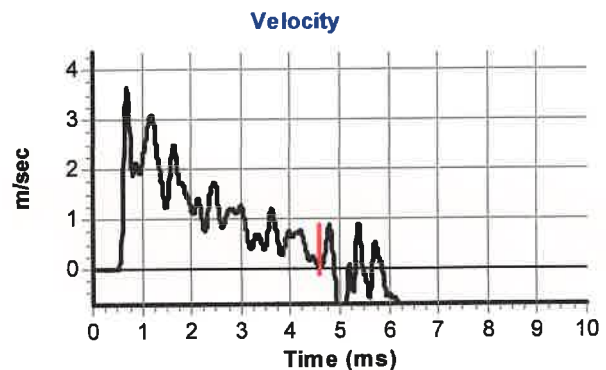
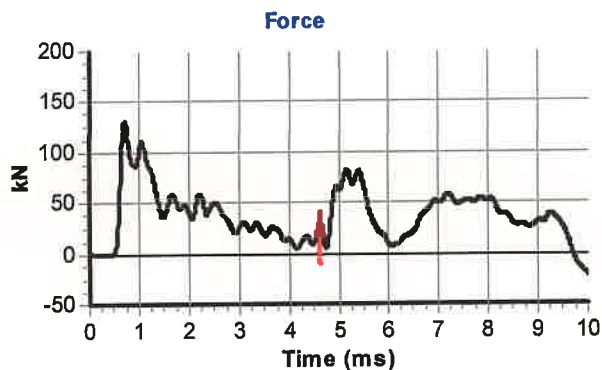
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

PB DRILLING LTD/79197



Calculations

Area of Rod A (mm^2): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 331

Energy Ratio E_r (%): **70**

Signed: C. McCLUSKEY

Title: FITTER

The recommended calibration interval is 12 months



SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Geo Site Surveys Ltd
32 Mersey Road
Sale, Cheshire
M33 6HN
0161 282 8583

SPT Hammer Ref: AR342 SPT1
Test Date: 11/05/2023
Report Date: 11/05/2023
File Name: AR342 SPT1.spt
Test Operator: LUKE KERSHAW

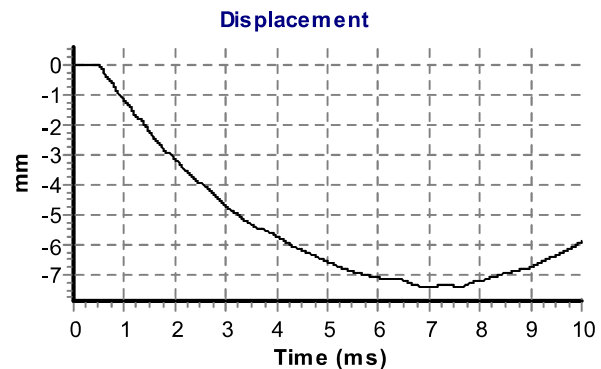
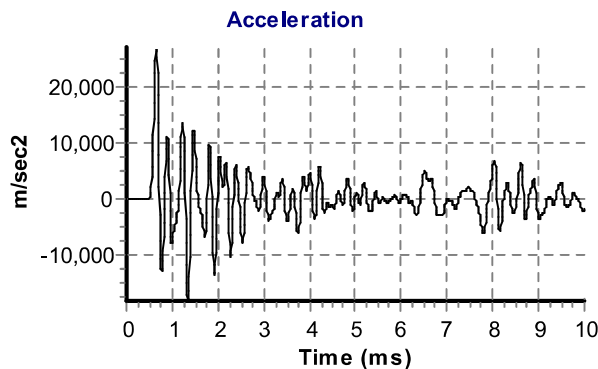
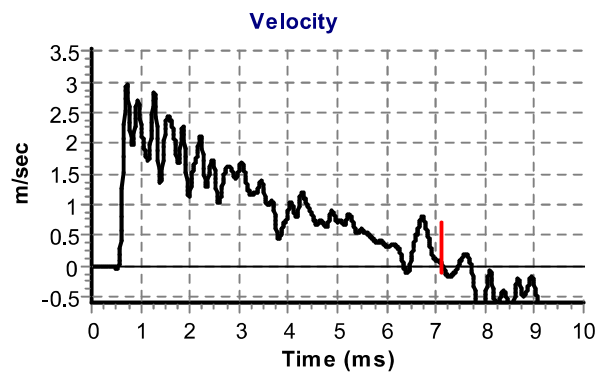
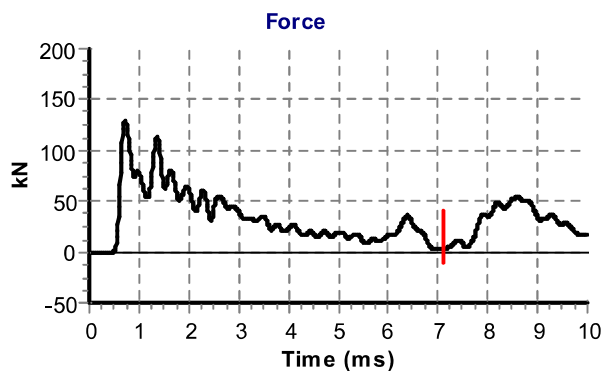
Instrumented Rod Data

Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.5
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 8965
Accelerometer No.2: 6457

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 13.5

Comments / Location



Calculations

Area of Rod A (mm²): 970
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 374

Energy Ratio E_r (%): **79**

Signed: Luke Kershaw
Title: Snr Eng / Supervisor

Appendix 4: Gas and Groundwater Monitoring Data

BWB GAS AND GROUNDWATER MONITORING

Site:		Plot R, Kingsway Business Park
Client:		Wilson Bowden Developments Ltd
Job No.:		232081
Date:		14/07/2023
Start / End Time:		10:30 - 11:00
Engineer:		OS
Monitoring Equipment:	Gas Meter ID	74235
	PID ID	592-908237
	Dip Tape	BWB00962
	Other	

NR = Not Recorded
Dry = No Groundwater



Weather Conditions	Start	End
(Dry / Raining)	Raining	Raining
Wind Strength (m/s)		
Wind Direction (from)		
Temperature (°C)	15.0	15.0
Barometric Pressure (h Pa / mB)	1007.0	1007.0
App 12 Hour Pressure (h Pa / mB)	1012.0	
12 Hour Pressure Trend	Falling	
PID - Air		
PID - Calibration Gas		

[illegible]

BWB

CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

Weather Conditions	Start	End
(Dry / Raining)	Overcast, Dry	Overcast, Dry
Wind Strength (m/s)		
Wind Direction (from)		
Temperature (°C)	21.0	21.0
Barometric Pressure (h Pa / mB)	1001.0	1001.0
App 12 Hour Pressure (h Pa / mB)	1003.0	
12 Hour Pressure Trend	Falling	
PID - Air		
PID - Calibration Gas		

[illegible]

BWB
CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

Weather Conditions	Start	End
(Dry / Raining)	Overcast, Dry	Overcast, Dry
Wind Strength (m/s)		
Wind Direction (from)		
Temperature (°C)	21.0	21.0
Barometric Pressure (h Pa / mB)	1007.0	1007.0
App 12 Hour Pressure (h Pa / mB)	1019.0	
12 Hour Pressure Trend	Falling	
PID - Air		
PID - Calibration Gas		

Site:		Plot R, Kingsway Business Park
Client:		Wilson Bowden Developments Ltd
Job No.:		232081
Date:		16/08/2023
Start / End Time:		13:30 - 14:00
Engineer:		OS
Monitoring Equipment:	Gas Meter ID	74235
	PID ID	592-908237
	Dip Tape	BWB00962
	Other	

[illegible]

BWB GAS AND GROUNDWATER MONITORING

NR = Not Recorded
Dry = No Groundwater



Weather Conditions	Start	End
(Dry / Raining)	Cloudy, Dry	Cloudy, Dry
Wind Strength (m/s)		
Wind Direction (from)		
Temperature (°C)	4.0	14.0
Barometric Pressure (h Pa / mB)	1017.0	1017.0
App 12 Hour Pressure (h Pa / mB)	1021.0	
12 Hour Pressure Trend	Falling	
PID - Air		
PID - Calibration Gas		

Site:		Plot R, Kingsway Business Park
Client:		Wilson Bowden Developments Ltd
Job No.:		232081
Date:		14/09/2023
Start / End Time:		10:30 - 11:00
Engineer:		OS
Monitoring Equipment:	Gas Meter ID	74235
	PID ID	592-908237
	Dip Tape	BWB00962
	Other	

[illegible]

BWB
CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

NR = Not Recorded
Dry = No Groundwater

Site:		Plot P Kingsway Business Park	
Client:		Wilson Bowden Developments	
Job No.:		210939	
Date:		26 August 2022	
Start / End Time:		10:45 - 12:00	
Engineer:		OS	
Monitoring Equipment:	Gas Meter ID		
	PID ID		
	Dip Tape		
	Other		

Weather Conditions	Start	End
(Dry / Raining)	Dry	Dry
Wind Strength (m/s)		
Wind Direction (from)		
Temperature (°C)	14.0	14.0
Barometric Pressure (h Pa / mB)	1017.0	1017.0
App 12 Hour Pressure (h Pa / mB)	1019.0	
12 Hour Pressure Trend		
PID - Air	<0.1	<0.1
PID - Calibration Gas		

[illegible]

Site:		Plot P Kingsway Business Park
Client:		Wilson Bowden Developments
Job No.:		210939
Date:		06/09/2022
Start / End Time:		10:30 - 11:30
Engineer:		OS
Monitoring Equipment:	Gas Meter ID	
	PID ID	
	Dip Tape	
	Other	

BWB
CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

Weather Conditions	Start	End
(Dry / Raining)	Dry	Light rain
Wind Strength (m/s)		
Wind Direction (from)		
Temperature (°C)	10.0	10.0
Barometric Pressure (h Pa / mB)	1015.0	1015.0
App 12 Hour Pressure (h Pa / mB)	1018.0	
12 Hour Pressure Trend		
PID - Air	<0.1	<0.1
PID - Calibration Gas		

[illegible]

Site:		Plot P Kingsway Business Park
Client:		Wilson Bowden Developments
Job No.:		210939
Date:		29/09/2022
Start / End Time:		
Engineer:		OS
Monitoring Equipment:	Gas Meter ID	
	PID ID	
	Dip Tape	
	Other	

BWB

Weather Conditions	Start	End
(Dry / Raining)	Dry	Dry
Wind Strength (m/s)		
Wind Direction (from)		
Temperature (°C)	15.0	14.0
Barometric Pressure (h Pa / mB)	991.0	991.0
App 12 Hour Pressure (h Pa / mB)	1001.0	
12 Hour Pressure Trend		
PID - Air	<0.1	<0.1
PID - Calibration Gas		

[illegible]

BWB GAS AND GROUNDWATER MONITORING

NR = Not Recorded

Dry = No Groundwater



Weather Conditions	Start	End
(Dry / Raining)	Dry	Dry
Wind Strength (m/s)		
Wind Direction (from)		
Temperature (°C)	15.0	15.0
Barometric Pressure (h Pa / mB)	1015.0	1015.0
App 12 Hour Pressure (h Pa / mB)	1017.0	
12 Hour Pressure Trend		
PID - Air		
PID - Calibration Gas		

Site:		Plot P Kingsway Business Park	
Client:		Wilson Bowden Developments	
Job No.:		210939	
Date:		13/10/2022	
Start / End Time:			
Engineer:		OS	
Monitoring Equipment:	Gas Meter ID		
	PID ID		
	Dip Tape		
	Other		

[illegible]

Appendix 5: Soil Chemical Analysis Results



4041

Mike Harper

BWB Consulting Limited
Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

e: mike.harper@bwbcconsulting.com



Environmental Science

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 23-54402

Replaces Analytical Report Number: 23-54402, issue no. 1

Client references/information amended.

Sample depths amended as per client's request.

Project / Site name:	Plot R Kingsway Business Park	Samples received on:	01/09/2023
Your job number:	232081	Samples instructed on/ Analysis started on:	01/09/2023
Your order number:	5912	Analysis completed by:	12/09/2023
Report Issue Number:	2	Report issued on:	13/09/2023
Samples Analysed:	10 soil samples		

Signed:

Joanna Szwagrak
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.



4041



Environmental Science

Analytical Report Number: 23-54402

Project / Site name: Plot R Kingsway Business Park

Your Order No: 5912

Lab Sample Number				2799582	2799583	2799584	2799585	2799586
Sample Reference				HP01	HP02	HP03	HP04	HP05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.30	0.10-0.30	0.10-0.30	0.10-0.30	0.10-0.30
Date Sampled				31/08/2023	31/08/2023	31/08/2023	31/08/2023	31/08/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	EWS	EWS	EWS	EWS	EWS

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



4041



Environmental Science

Analytical Report Number: 23-54402

Project / Site name: Plot R Kingsway Business Park

Your Order No: 5912

Lab Sample Number				2799587	2799588	2799589	2799590	2799591
Sample Reference				HP06	HP07	HP08	HP09	HP10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.30	0.10-0.30	0.10-0.30	0.10-0.30	0.10-0.30
Date Sampled				31/08/2023	31/08/2023	31/08/2023	31/08/2023	31/08/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	EWS	EWS	EWS	EWS	EWS

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



4041



Analytical Report Number : 23-54402

Project / Site name: Plot R Kingsway Business Park

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Mike Harper
 BWB Consulting Limited
 Whitehall Waterfront
 2 Riverside Way
 Leeds
 LS1 4EH

i2 Analytical Ltd.
 7 Woodshots Meadow,
 Croxley Green
 Business Park,
 Watford,
 Herts,
 WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: mike.harper@bwbconsulting.com

Analytical Report Number : 23-43728

Replaces Analytical Report Number: 23-43728, issue no. 1
 Additional analysis undertaken.
 Asbestos Quantification Added to Positive Samples at Clients Request

Project / Site name:	Plot R - Kingsway Business Park	Samples received on:	05/07/2023
Your job number:	232081	Samples instructed on/ Analysis started on:	07/07/2023
Your order number:	5320	Analysis completed by:	24/07/2023
Report Issue Number:	2	Report issued on:	28/07/2023
Samples Analysed:	8 soil samples		

Signed:

Izabela Wójcik

Izabela Wójcik
 Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
 leachates - 2 weeks from reporting
 waters - 2 weeks from reporting
 asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
 Application of uncertainty of measurement would provide a range within which the true result lies.
 An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-43728
 Project / Site name: Plot R - Kingsway Business Park
 Your Order No: 5320

Lab Sample Number				2740096	2740097	2740098	2740099	2740100
Sample Reference				TP01	TP02	TP03	TP04	BH01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.20	0.10-0.20	0.10-0.20	0.10-0.20	0.20-0.30
Date Sampled				03/07/2023	03/07/2023	03/07/2023	03/07/2023	03/07/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	18	17	14	14	12
Total mass of sample received	kg	0.001	NONE	1.3	1.3	0.8	0.8	1.3

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile & Crocidolite	-	Chrysotile & Crocidolite	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Not-detected	Detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	< 0.001	-	0.359	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	< 0.001	-	0.359	-	-
Asbestos Analyst ID	N/A	N/A	N/A	WEM	WEM	WEM	WEM	WEM

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.6	4.9	7.8	7.3	8.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.018	0.0039	0.025	0.0092	0.25
Total Sulphur	mg/kg	50	MCERTS	1200	450	1100	460	550
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.03	0.032	0.03	0.034	0.019

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	1.7	< 1.0	< 1.0	< 1.0
----------------------------	-------	---	--------	-------	-----	-------	-------	-------

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.15	< 0.05	0.4	< 0.05	1.3
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.09	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.32	< 0.05	0.64
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.23	< 0.05	0.49
Phenanthrene	mg/kg	0.05	MCERTS	0.39	0.15	3.6	0.45	4
Anthracene	mg/kg	0.05	MCERTS	0.07	< 0.05	0.55	0.09	0.95
Fluoranthene	mg/kg	0.05	MCERTS	0.51	0.21	5	0.72	4.2
Pyrene	mg/kg	0.05	MCERTS	0.44	0.22	4.5	0.7	4
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.3	0.11	2.1	0.35	1.6
Chrysene	mg/kg	0.05	MCERTS	0.34	0.14	2.2	0.43	1.9
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.38	0.18	2.3	0.48	2
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.16	0.06	1.1	0.17	0.65
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.24	0.12	1.9	0.36	1.7
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.17	0.06	1.2	0.17	0.91
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.23	< 0.05	0.18
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.19	0.09	1.3	0.24	1

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	3.34	1.34	26.9	4.16	25.4
-----------------------------	-------	-----	-----------	------	------	------	------	------

Analytical Report Number: 23-43728
 Project / Site name: Plot R - Kingsway Business Park
 Your Order No: 5320

Lab Sample Number	2740096	2740097	2740098	2740099	2740100
Sample Reference	TP01	TP02	TP03	TP04	BH01
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.10-0.20	0.10-0.20	0.10-0.20	0.10-0.20	0.20-0.30
Date Sampled	03/07/2023	03/07/2023	03/07/2023	03/07/2023	03/07/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	130	17	120	15	11
Barium (aqua regia extractable)	mg/kg	1	MCERTS	2000	87	2200	94	100
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	9	0.91	7.8	0.79	0.66
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	0.7	0.8	0.7	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	41	18	40	18	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	260	41	270	39	31
Lead (aqua regia extractable)	mg/kg	1	MCERTS	220	70	360	70	57
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	100	16	100	16	14
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	260	33	230	29	25
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	230	68	270	74	61

Monoaromatics & Oxygenates

Benzene	µg/kg	5	MCERTS	< 5.0	-	-	-	-
Toluene	µg/kg	5	MCERTS	< 5.0	-	-	-	-
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	-	-	-	-
p & m-xylene	µg/kg	5	MCERTS	< 5.0	-	-	-	-
o-xylene	µg/kg	5	MCERTS	< 5.0	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	-	-	-	-

Petroleum Hydrocarbons

TPH C10 - C40 EH_CU_ID_TOTAL	mg/kg	10	MCERTS	27	14	75	14	72
---	-------	----	--------	----	----	----	----	----

TPH2 (C6 - C10) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
--	-------	-----	------	-------	-------	-------	-------	-------

TPH-CWG - Aliphatic >EC5 - EC6 HS_ID_AL	mg/kg	0.1	NONE	< 0.1	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8 HS_ID_AL	mg/kg	0.1	NONE	< 0.1	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10 HS_ID_AL	mg/kg	0.1	NONE	< 0.1	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_ID_AL	mg/kg	1	MCERTS	< 1.0	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_ID_AL	mg/kg	2	MCERTS	< 2.0	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_ID_AL	mg/kg	8	MCERTS	19	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_ID_AL	mg/kg	10	NONE	21	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7 HS_ID_AR	mg/kg	0.1	NONE	< 0.1	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8 HS_ID_AR	mg/kg	0.1	NONE	< 0.1	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10 HS_ID_AR	mg/kg	0.1	NONE	< 0.1	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_ID_AR	mg/kg	1	MCERTS	< 1.0	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_ID_AR	mg/kg	2	MCERTS	< 2.0	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_ID_AR	mg/kg	10	NONE	< 10	-	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 23-43728
Project / Site name: Plot R - Kingsway Business Park
Your Order No: 5320

Lab Sample Number				2740101	2740102	2740103
Sample Reference				BH02	BH02	BH02
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.20	2.30-2.40	2.50-2.60
Date Sampled				04/07/2023	04/07/2023	04/07/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	21	15
Total mass of sample received	kg	0.001	NONE	1.3	1.3	1.3

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	WEM	N/A	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	7	4.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.055	0.049	0.028
Total Sulphur	mg/kg	50	MCERTS	350	400	220
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.022	0.026	0.0053

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
----------------------------	-------	---	--------	-------	-------	-------

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.17	0.22	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.2	0.45	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.2	0.4	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.07	0.22	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.11	0.27	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.09	0.37	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.08	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.05	0.23	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.15	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.17	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	0.89	2.56	< 0.80
-----------------------------	-------	-----	-----------	------	------	--------

Analytical Report Number: 23-43728
 Project / Site name: Plot R - Kingsway Business Park
 Your Order No: 5320

Lab Sample Number				2740101	2740102	2740103
Sample Reference				BH02	BH02	BH02
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.20	2.30-2.40	2.50-2.60
Date Sampled				04/07/2023	04/07/2023	04/07/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.6	11	6.7
Barium (aqua regia extractable)	mg/kg	1	MCERTS	120	110	190
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.95	0.93	0.98
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	0.4	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	21	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29	30	27
Lead (aqua regia extractable)	mg/kg	1	MCERTS	25	39	14
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	26	22	18
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	26	28	29
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	66	62	37

Monoaromatics & Oxygenates

Benzene	µg/kg	5	MCERTS	< 5.0	-	-
Toluene	µg/kg	5	MCERTS	< 5.0	-	-
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	-	-
p & m-xylene	µg/kg	5	MCERTS	< 5.0	-	-
o-xylene	µg/kg	5	MCERTS	< 5.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	-	-

Petroleum Hydrocarbons

TPH C10 - C40 EH_CU_ID_TOTAL	mg/kg	10	MCERTS	20	< 10	< 10
---	-------	----	--------	----	------	------

TPH2 (C6 - C10) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
--	-------	-----	------	-------	-------	-------

TPH-CWG - Aliphatic >EC5 - EC6 HS_ID_AL	mg/kg	0.1	NONE	< 0.1	-	-
TPH-CWG - Aliphatic >EC6 - EC8 HS_ID_AL	mg/kg	0.1	NONE	< 0.1	-	-
TPH-CWG - Aliphatic >EC8 - EC10 HS_ID_AL	mg/kg	0.1	NONE	< 0.1	-	-
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_ID_AL	mg/kg	1	MCERTS	< 1.0	-	-
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_ID_AL	mg/kg	2	MCERTS	< 2.0	-	-
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	-	-
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	-	-
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_ID_AL	mg/kg	10	NONE	< 10	-	-

TPH-CWG - Aromatic >EC5 - EC7 HS_ID_AR	mg/kg	0.1	NONE	< 0.1	-	-
TPH-CWG - Aromatic >EC7 - EC8 HS_ID_AR	mg/kg	0.1	NONE	< 0.1	-	-
TPH-CWG - Aromatic >EC8 - EC10 HS_ID_AR	mg/kg	0.1	NONE	< 0.1	-	-
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_ID_AR	mg/kg	1	MCERTS	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_ID_AR	mg/kg	2	MCERTS	< 2.0	-	-
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10	-	-
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10	-	-
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_ID_AR	mg/kg	10	NONE	< 10	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 23-43728
Project / Site name: Plot R - Kingsway Business Park
Your Order No: 5320

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
2740096	TP01	0.10-0.20	190	Loose Fibres & Loose Fibrous Debris	Chrysotile & Crocidolite	< 0.001	< 0.001
2740098	TP03	0.10-0.20	121	Loose Fibrous Debris	Chrysotile & Crocidolite	0.359	0.359

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 23-43728

Project / Site name: Plot R - Kingsway Business Park

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2740096	TP01	None Supplied	0.10-0.20	Brown loam and sand with gravel and vegetation.
2740097	TP02	None Supplied	0.10-0.20	Brown loam and clay with gravel and vegetation.
2740098	TP03	None Supplied	0.10-0.20	Brown loam and sand with gravel and vegetation.
2740099	TP04	None Supplied	0.10-0.20	Brown loam and sand with gravel and vegetation.
2740100	BH01	None Supplied	0.20-0.30	Brown loam and clay with gravel and vegetation.
2740101	BH02	None Supplied	0.10-0.20	Brown clay and loam with gravel and vegetation.
2740102	BH02	None Supplied	2.30-2.40	Brown clay and loam with gravel and vegetation.
2740103	BH02	None Supplied	2.50-2.60	Brown clay.

Analytical Report Number : 23-43728

Project / Site name: Plot R - Kingsway Business Park

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH2 (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

Analytical Report Number : 23-43728
Project / Site name: Plot R - Kingsway Business Park

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Appendix 6: Groundwater Analysis Results



4041

Oliver Stewart

BWB Consulting Limited
Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

e: oliver.stewart@bwiconsulting.com



i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 22-87539

Replaces Analytical Report Number: 22-87539, issue no. 1
Additional analysis undertaken.

Project / Site name:	Plot P, Kingsway Business park	Samples received on:	30/09/2022
Your job number:	210939	Samples instructed on/ Analysis started on:	30/09/2022
Your order number:	PO 2881	Analysis completed by:	11/10/2022
Report Issue Number:	2	Report issued on:	17/10/2022
Samples Analysed:	4 water samples		

Signed:

Adam Fenwick
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.



4041



Analytical Report Number: 22-87539

Project / Site name: Plot P, Kingsway Business park

Your Order No: PO 2881

Lab Sample Number				2445272	2445273	2445274	2445275
Sample Reference				BH02	BH03	BH04	BH05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				29/09/2022	29/09/2022	29/09/2022	29/09/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status				

General Inorganics

pH	pH Units	N/A	ISO 17025	6.3	6.4	7.2	7.1
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	320	580	670	430
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10
Sulphate as SO ₄	µg/l	45	ISO 17025	93200	65600	31600	10400
Sulphate as SO ₄	mg/l	0.045	ISO 17025	93.2	65.6	31.6	10.4
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	72	28	25	41
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	2.28	13.3	5.4	18.9

Hardness - Total	mg CaCO ₃ /l	1	ISO 17025	478	374	443	290
------------------	-------------------------	---	-----------	-----	-----	-----	-----

Total Phenols

Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10
----------------------------	------	----	-----------	------	------	------	------

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	< 0.16
-------------------	------	------	-----------	--------	--------	--------	--------



4041



Analytical Report Number: 22-87539

Project / Site name: Plot P, Kingsway Business park

Your Order No: PO 2881

Lab Sample Number				2445272	2445273	2445274	2445275
Sample Reference				BH02	BH03	BH04	BH05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				29/09/2022	29/09/2022	29/09/2022	29/09/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status				

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	83	29	96	20
Calcium (dissolved)	mg/l	0.012	ISO 17025	170	140	120	110
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Magnesium (dissolved)	mg/l	0.005	ISO 17025	12	3.9	34	3.6

Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.16	3.05	0.31	1.34
Barium (dissolved)	µg/l	0.06	ISO 17025	55	190	220	180
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.23	0.04	0.05	0.15
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	1.2	< 0.2	1.4
Copper (dissolved)	µg/l	0.5	ISO 17025	1.7	3	8.6	12
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.2	< 0.2	0.5
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	4.4	5.8	4.8	8.6
Selenium (dissolved)	µg/l	0.6	ISO 17025	1.5	1.5	< 0.6	1
Vanadium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	2.3	0.3	3.8
Zinc (dissolved)	µg/l	0.5	ISO 17025	42	9.6	6.5	4.7

Petroleum Hydrocarbons

TPH1 (C10 - C40) EH_1D_TOTAL_MS	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10
TPH2 (C6 - C10) HS_1D_TOTAL	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample



4041

**Analytical Report Number : 22-87539****Project / Site name: Plot P, Kingsway Business park****Water matrix abbreviations:****Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPH2 (Waters)	Determination of hydrocarbons C6-C10 by headspace GC-MS. Accredited Matrices SW, PW. GW.	In-house method based on USEPA8260	L088-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025

Analytical Report Number : 22-87539

Project / Site name: Plot P, Kingsway Business park

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	ISO 17025

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Sample Deviation Report



Analytical Report Number : 22-87539

Project / Site name: Plot P, Kingsway Business park

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH02	None Supplied	W	2445272	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH02	None Supplied	W	2445272	c	Electrical conductivity at 20oC of water	L031-PL	c
BH02	None Supplied	W	2445272	c	pH at 20oC in water (automated)	L099-PL	c
BH03	None Supplied	W	2445273	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH03	None Supplied	W	2445273	c	Electrical conductivity at 20oC of water	L031-PL	c
BH03	None Supplied	W	2445273	c	pH at 20oC in water (automated)	L099-PL	c
BH04	None Supplied	W	2445274	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH04	None Supplied	W	2445274	c	Electrical conductivity at 20oC of water	L031-PL	c
BH04	None Supplied	W	2445274	c	pH at 20oC in water (automated)	L099-PL	c
BH05	None Supplied	W	2445275	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH05	None Supplied	W	2445275	c	Electrical conductivity at 20oC of water	L031-PL	c
BH05	None Supplied	W	2445275	c	pH at 20oC in water (automated)	L099-PL	c

Appendix 7: Geotechnical Analysis Results

Analytical Report Number: 23-43846
Project / Site name: Plol R, Kingsway Business Park, Rochdale
Your Order No: P05321

Lab Sample Number				2740800	2740801	2740802	2740803	2740804	2740805	2740806	2740807	2740808	2740809
Sample Reference				TP01	TP03	TP03	TP04	BH01	BH01	BH01	BH02	BH02	BH02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.50-1.00	3.00	2.50	0.10-0.50	0.80	6.00	3.50	6.50	9.00
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating	Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status										
Stone Content	%	0.1	NONE	< 0.1	44	< 0.1	< 0.1	19	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	13	7.3	4.6	8.8	15	18	3.9	16	18
Total mass of sample received	kg	0.001	NONE	0.3	0.3	0.7	0.3	0.3	0.3	0.3	0.3	0.7	0.7

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8	7.8	8.2	7.8	7.8	7.5	8.8	8	8.6	7.3
Total Sulphate as SO4	%	0.005	MCERTS	0.014	0.087	0.012	0.007	0.01	0.015	0.006	< 0.005	0.007	0.005
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0084	0.03	0.0067	0.0033	0.01	0.017	0.0017	0.0019	0.0035	0.0025
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	8.4	30.3	6.7	3.3	10.1	16.8	1.7	1.9	3.5	2.5
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	1.7	1.2	0.5	< 0.5	1.1	1.8	2.6	< 0.5	3.2	4.5
Total Sulphur	%	0.005	MCERTS	0.009	0.105	0.009	< 0.005	0.007	0.011	< 0.005	< 0.005	< 0.005	0.006
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	7.1	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	3.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 17/07/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740788

Hole No.: TP02

Sample Reference: Not Given

Sample Description: Brown sandy CLAY

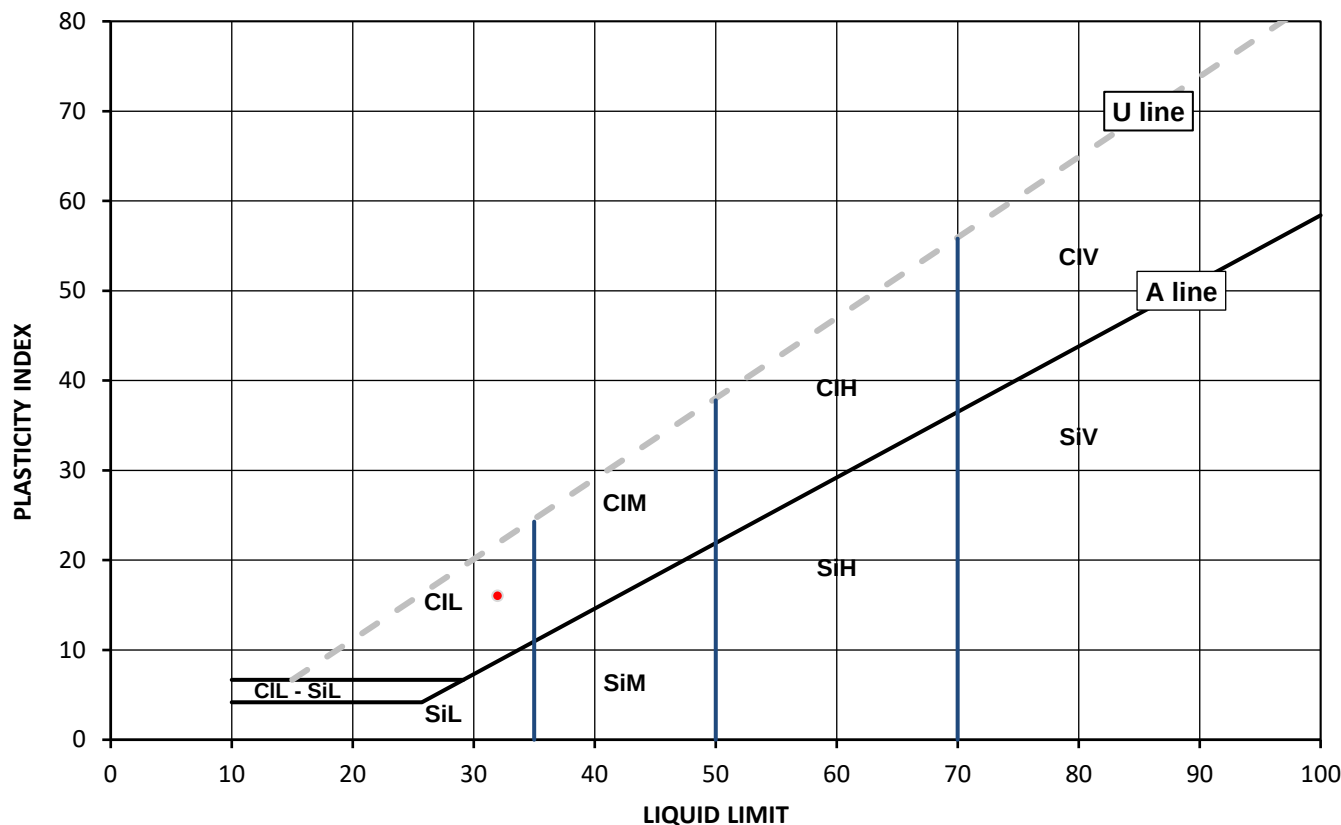
Depth Top [m]: 1.00

Depth Base [m]: 1.50

Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
21	32	16	16	92



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 17/07/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740790

Hole No.: TP04

Sample Reference: Not Given

Sample Description: Brown sandy CLAY

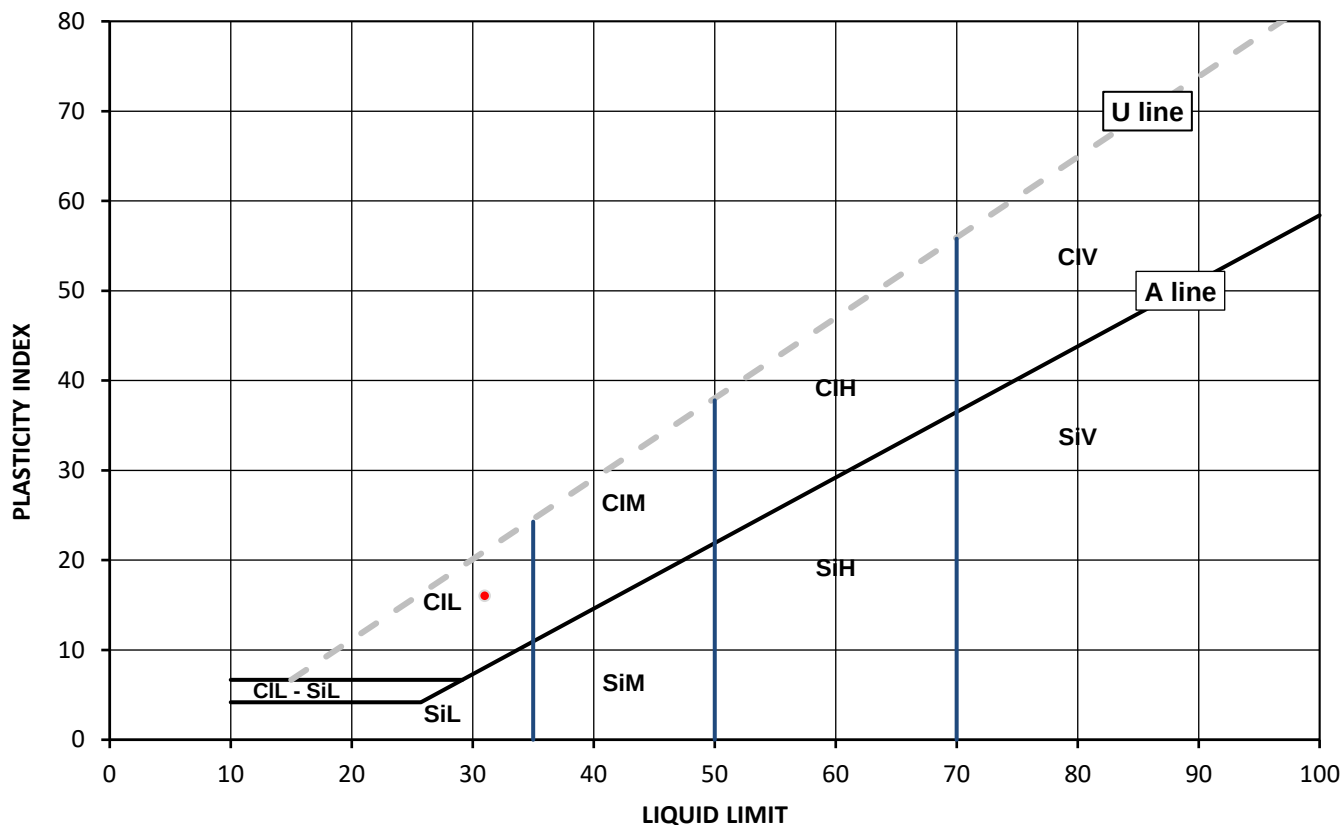
Depth Top [m]: 0.70

Depth Base [m]: 1.10

Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
15	31	15	16	90



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 18/07/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740794

Hole No.: BH01

Sample Reference: Not Given

Sample Description: Brown slightly gravelly very sandy CLAY

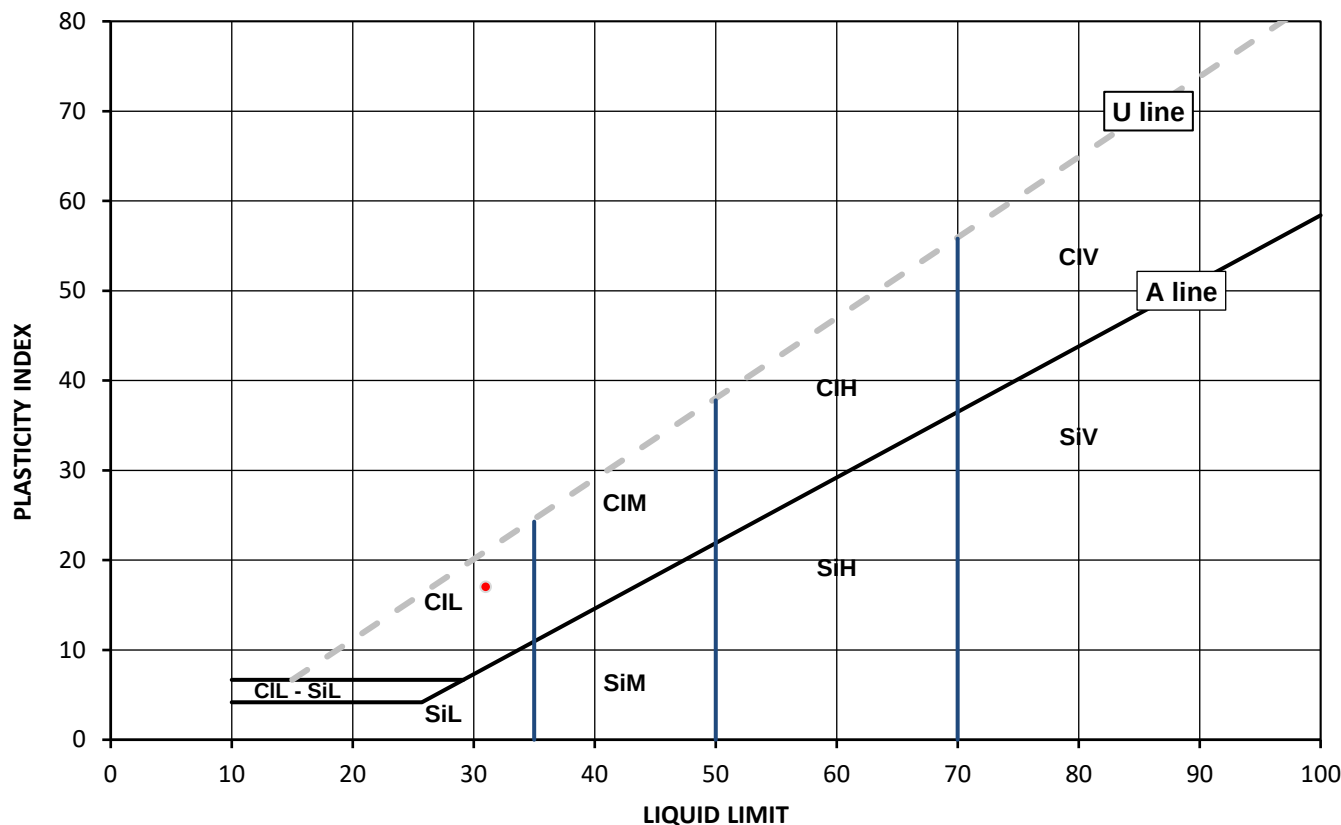
Depth Top [m]: 0.80

Depth Base [m]: Not Given

Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
17	31	14	17	98



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.3 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 17/07/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740796

Hole No.: BH02

Sample Reference: Not Given

Sample Description: Brownish grey sandy CLAY

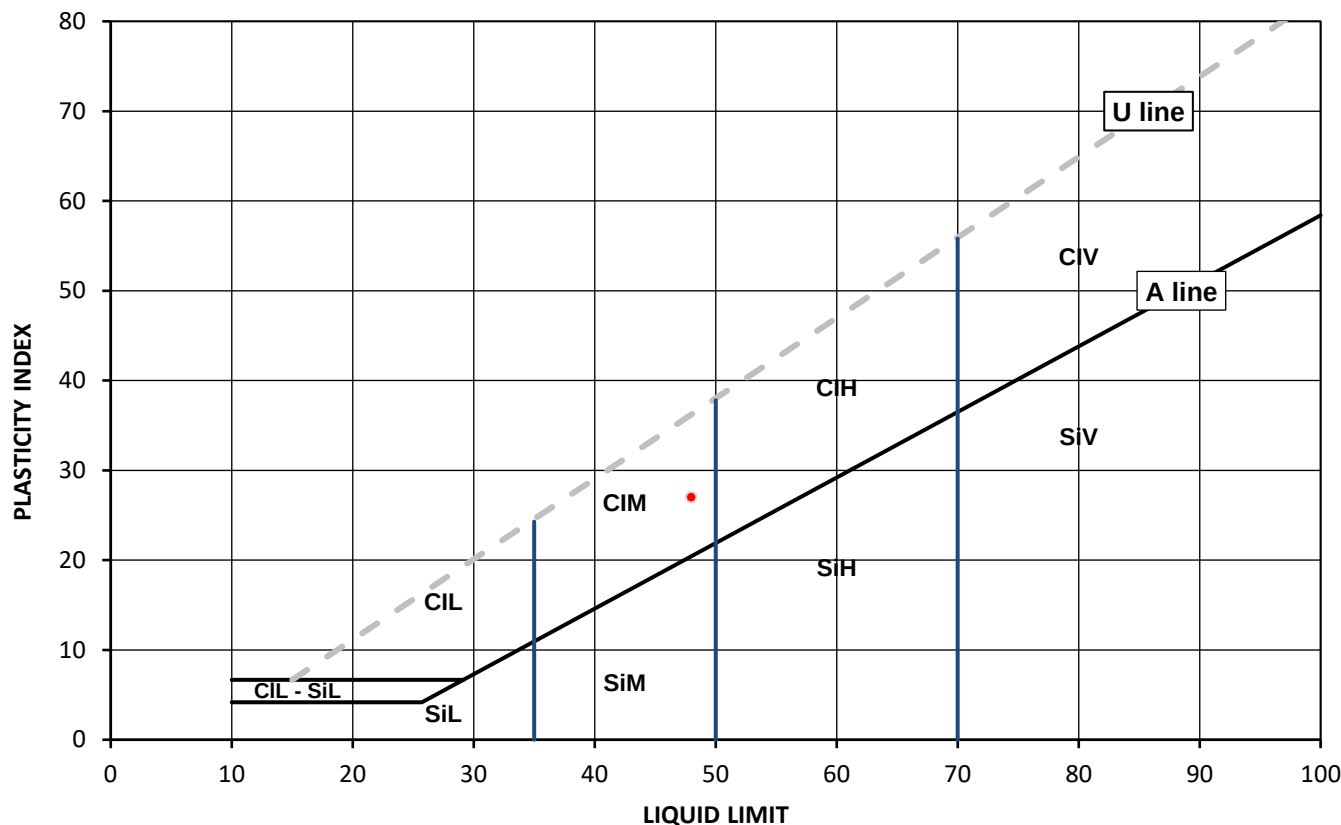
Depth Top [m]: 2.50

Depth Base [m]: 3.00

Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
21	48	21	27	94



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	
	V Very high	
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: BWB Consulting Limited
Client Address: 11 Borough High Street, London, SE1 9SE
Contact: Paolo Moniz
Site Address: Plol R, Kingsway Business Park, Rochdale

Water Content by BS 1377-2:1990: Clause 3.2
Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5

Client Reference: 232081
Job Number: 23-43844-1
Date Sampled: Not Given
Date Received: 05/07/2023
Date Tested: 17/07 - 18/07/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-2 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m						%	%	%	%	Mg/m3	Mg/m3	Mg/m3			
2740787	TP01	Not Given	1.50	Not Given	D	Brown CLAY		23											
2740788	TP02	Not Given	1.00	1.50	B	Brown sandy CLAY	Atterberg 4 Point	21		92	32	16	16						
2740789	TP03	Not Given	0.50	1.00	B	Black gravelly clayey SAND with fragments of glass		21											
2740790	TP04	Not Given	0.70	1.10	B	Brown sandy CLAY	Atterberg 4 Point	15		90	31	15	16						
2740791	TP04	Not Given	2.00	2.40	B	Brown clayey SAND		8.0											
2740792	BH01	Not Given	0.10	0.50	B	Brown gravelly SAND		11											
2740793	BH01	Not Given	0.50	1.00	B	Brown sandy CLAY with fragments of bricks		16											
2740794	BH01	Not Given	0.80	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	17		98	31	14	17						
2740795	BH01	Not Given	6.00	Not Given	D	Brown slightly gravelly SAND		17											
2740796	BH02	Not Given	2.50	3.00	B	Brownish grey sandy CLAY	Atterberg 4 Point	21		94	48	21	27						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



SUMMARY OF CLASSIFICATION TEST RESULTS

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Water Content by BS 1377-2:1990: Clause 3.2 Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5

Client Reference: 232081
Job Number: 23-43844-1
Date Sampled: Not Given
Date Received: 05/07/2023
Date Tested: 17/07 - 18/07/2023
Sampled By: Not Given

Contact: Paolo Moniz
Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

[illegible]

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Katarzyna
Kozier

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 17/07 - 18/07/2023

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2740787	TP01	Not Given	1.50	Not Given	D	Brown CLAY		23	Sample was quartered, oven dried at 108.3 °C			
2740788	TP02	Not Given	1.00	1.50	B	Brown sandy CLAY		21	Sample was quartered, oven dried at 109 °C			
2740789	TP03	Not Given	0.50	1.00	B	Black gravelly clayey SAND with fragments of glass		21	Sample was quartered, oven dried at 109 °C			
2740790	TP04	Not Given	0.70	1.10	B	Brown sandy CLAY		15	Sample was quartered, oven dried at 109 °C			
2740791	TP04	Not Given	2.00	2.40	B	Brown clayey SAND		8.0	Sample was quartered, oven dried at 106 °C			
2740792	BH01	Not Given	0.10	0.50	B	Brown gravelly SAND		11	Sample was quartered, oven dried at 106 °C			
2740793	BH01	Not Given	0.50	1.00	B	Brown sandy CLAY with fragments of bricks		16	Sample was quartered, oven dried at 106 °C			
2740794	BH01	Not Given	0.80	Not Given	D	Brown slightly gravelly very sandy CLAY		17	Sample was quartered, oven dried at 108.3 °C			
2740795	BH01	Not Given	6.00	Not Given	D	Brown slightly gravelly SAND		17	Sample was quartered, oven dried at 108.3 °C			
2740796	BH02	Not Given	2.50	3.00	B	Brownish grey sandy CLAY		21	Sample was quartered, oven dried at 109 °C			

Comments:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



Sampled By: Not Given

[illegible]



4041

**TEST CERTIFICATE****DETERMINATION OF PARTICLE SIZE DISTRIBUTION**

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 17/07/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740786

Hole No.: TP01

Sample Reference: Not Given

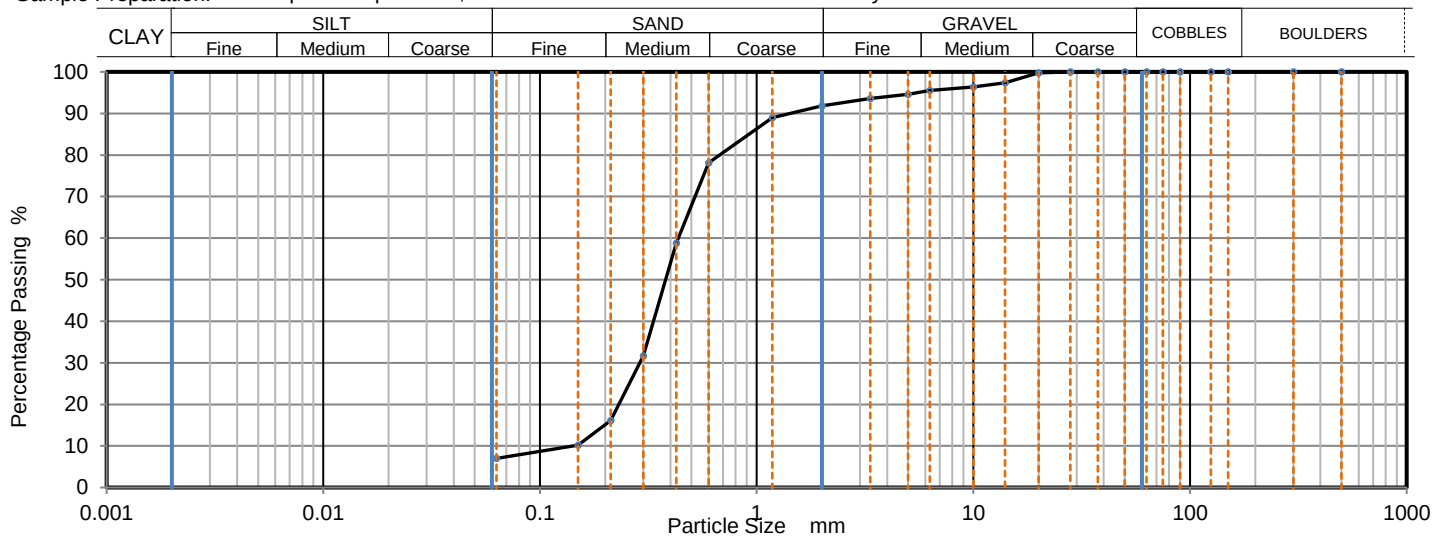
Sample Description: Light brown SAND with fragments of shells

Sample Preparation: Sample was quartered, oven dried at 109.0 °C and broken down by hand.

Depth Top [m]: 3.00

Depth Base [m]: 3.50

Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	97		
10	96		
6.3	96		
5	95		
3.35	94		
2	92		
1.18	89		
0.6	78		
0.425	59		
0.3	32		
0.212	16		
0.15	10		
0.063	7		

Sample Proportions	% dry mass
Very coarse	0
Gravel	8
Sand	85
Fines <0.063mm	7

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:**Signed:**

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



4041

**TEST CERTIFICATE****DETERMINATION OF PARTICLE SIZE DISTRIBUTION**

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 17/07/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740788

Hole No.: TP02

Sample Reference: Not Given

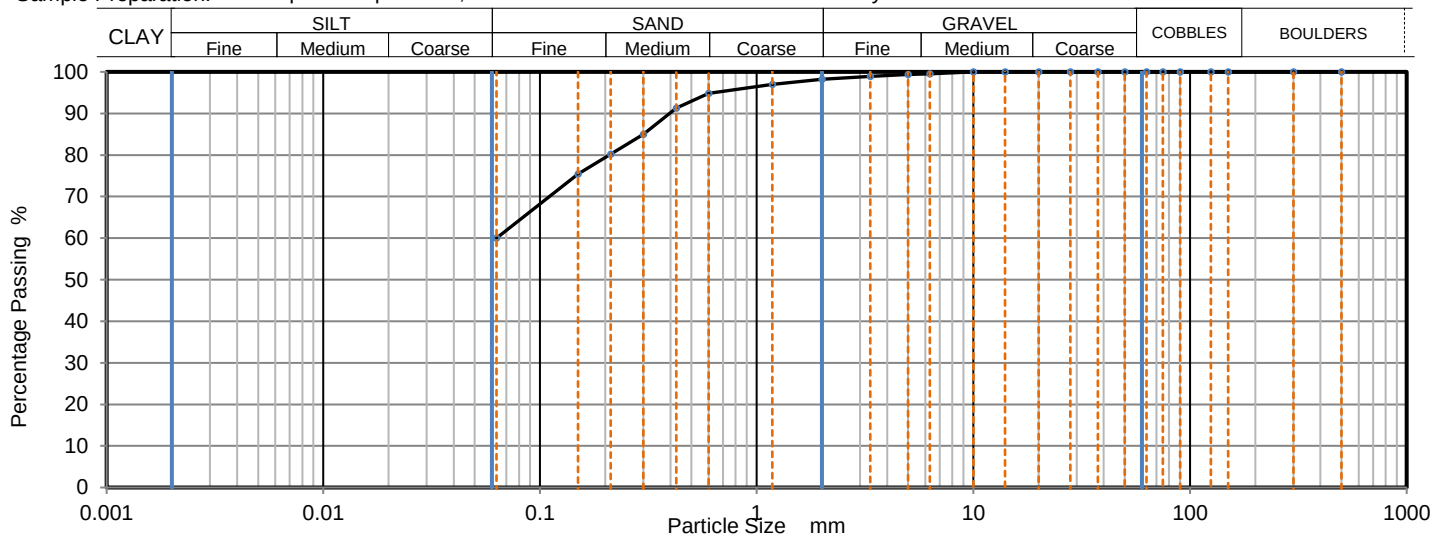
Sample Description: Brown sandy CLAY

Sample Preparation: Sample was quartered, oven dried at 109.0 °C and broken down by hand.

Depth Top [m]: 1.00

Depth Base [m]: 1.50

Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	99		
2	98		
1.18	97		
0.6	95		
0.425	91		
0.3	85		
0.212	80		
0.15	75		
0.063	61		

Sample Proportions	% dry mass
Very coarse	0
Gravel	2
Sand	38
Fines <0.063mm	61

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	N/A
Curvature Coefficient	

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 17/07/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740789

Hole No.: TP03

Sample Reference: Not Given

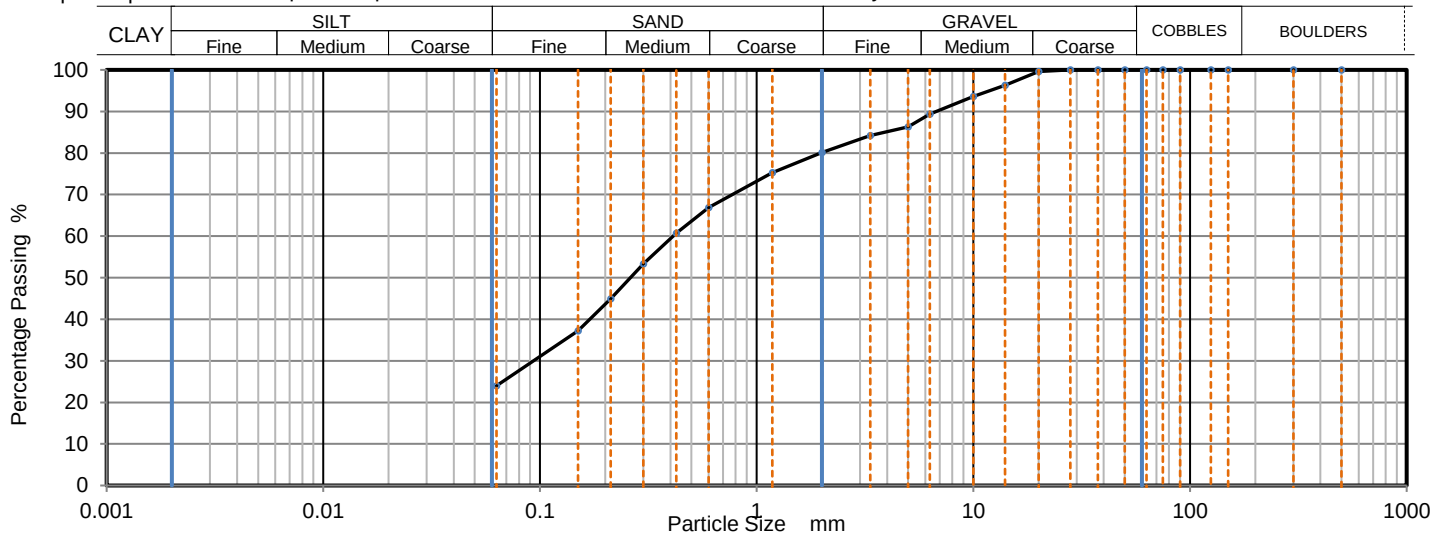
Sample Description: Black gravelly clayey SAND with fragments of glass

Sample Preparation: Sample was quartered, oven dried at 109.0 °C and broken down by hand.

Depth Top [m]: 0.50

Depth Base [m]: 1.00

Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	96		
10	94		
6.3	89		
5	86		
3.35	84		
2	80		
1.18	75		
0.6	67		
0.425	61		
0.3	53		
0.212	45		
0.15	37		
0.063	25		

Sample Proportions	% dry mass
Very coarse	0
Gravel	20
Sand	55
Fines <0.063mm	25

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 6.5
Curvature Coefficient	

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 17/07/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740790

Hole No.: TP04

Sample Reference: Not Given

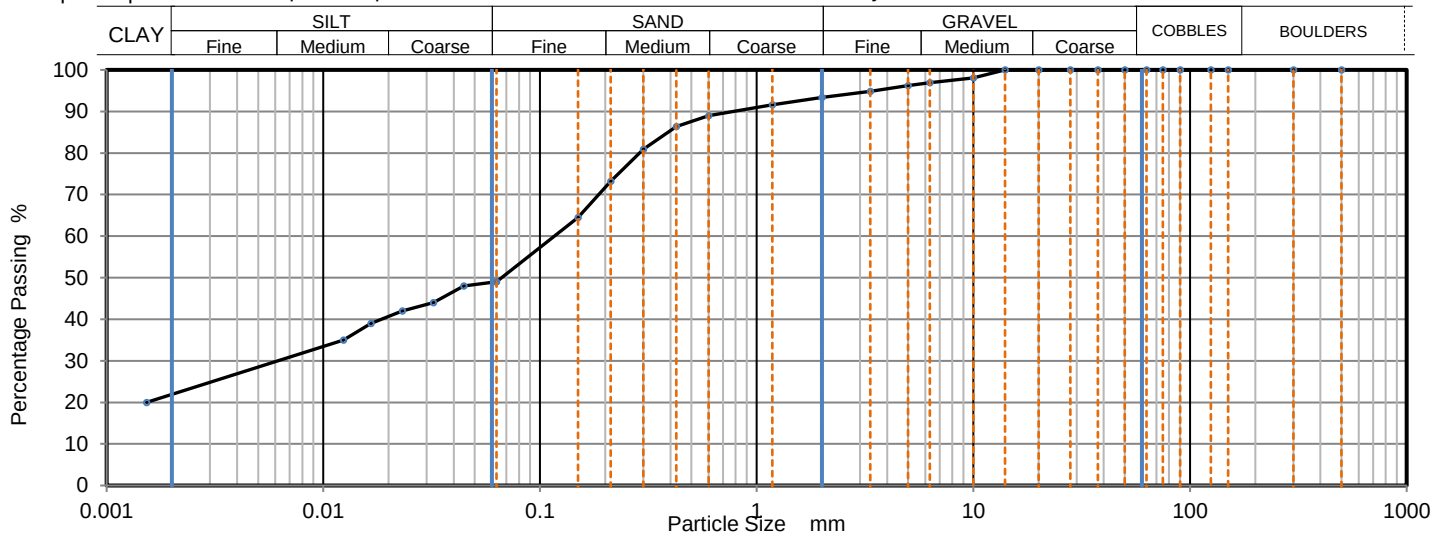
Sample Description: Brown sandy CLAY

Sample Preparation: Sample was quartered, oven dried at 109.0 °C and broken down by hand.

Depth Top [m]: 0.70

Depth Base [m]: 1.10

Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0625	49
300	100	0.0445	48
150	100	0.0322	44
125	100	0.0231	42
90	100	0.0166	39
75	100	0.0124	35
63	100	0.0015	20
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	98		
6.3	97		
5	96		
3.35	95	Particle density (assumed) 2.65 Mg/m3	
2	93		
1.18	92		
0.6	89		
0.425	86		
0.3	81		
0.212	73		
0.15	65		
0.063	49		

Sample Proportions	% dry mass
Very coarse	0
Gravel	7
Sand	44
Silt	27
Clay	22

Grading Analysis	
D100	mm 14
D60	mm 0.116
D30	mm 0.00599
D10	mm
Uniformity Coefficient	> 76
Curvature Coefficient	

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 17/07/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740793

Hole No.: BH01

Sample Reference: Not Given

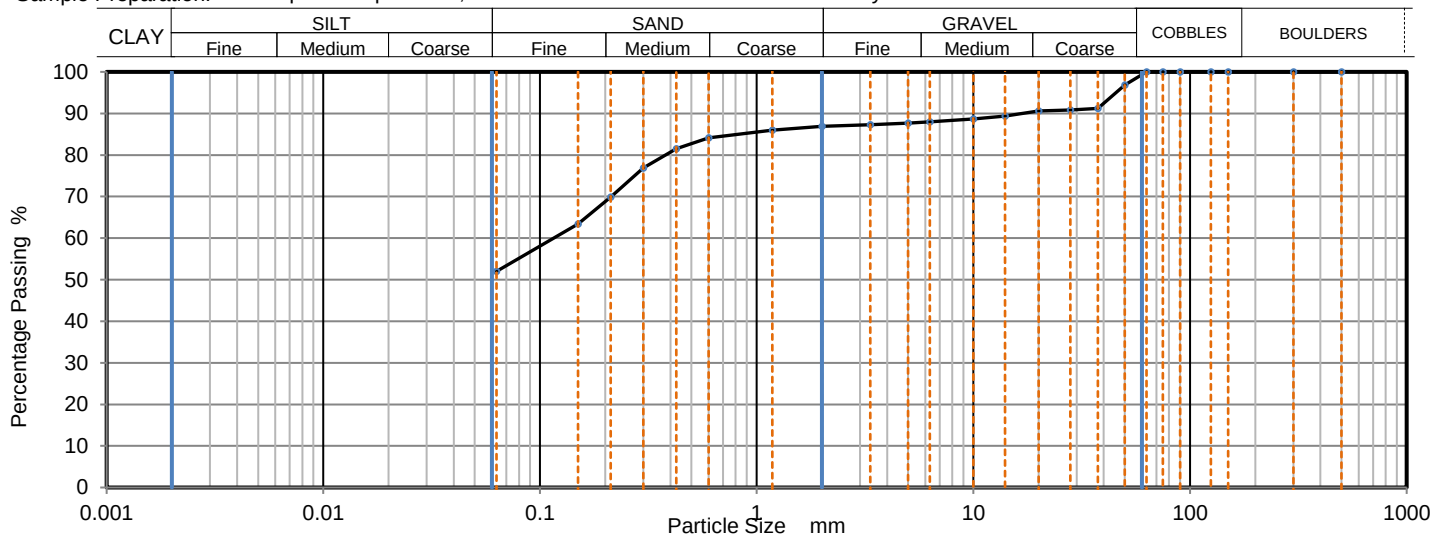
Sample Description: Brown sandy CLAY with fragments of bricks

Sample Preparation: Sample was quartered, oven dried at 106.0 °C and broken down by hand.

Depth Top [m]: 0.50

Depth Base [m]: 1.00

Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	97		
37.5	91		
28	91		
20	91		
14	89		
10	89		
6.3	88		
5	88		
3.35	87		
2	87		
1.18	86		
0.6	84		
0.425	82		
0.3	77		
0.212	70		
0.15	63		
0.063	52		

Sample Proportions	% dry mass
Very coarse	0
Gravel	13
Sand	35
Fines <0.063mm	52

Grading Analysis	
D100	mm 63
D60	mm 0.116
D30	mm
D10	mm
Uniformity Coefficient	> 1.8
Curvature Coefficient	

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 17/07/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740796

Hole No.: BH02

Sample Reference: Not Given

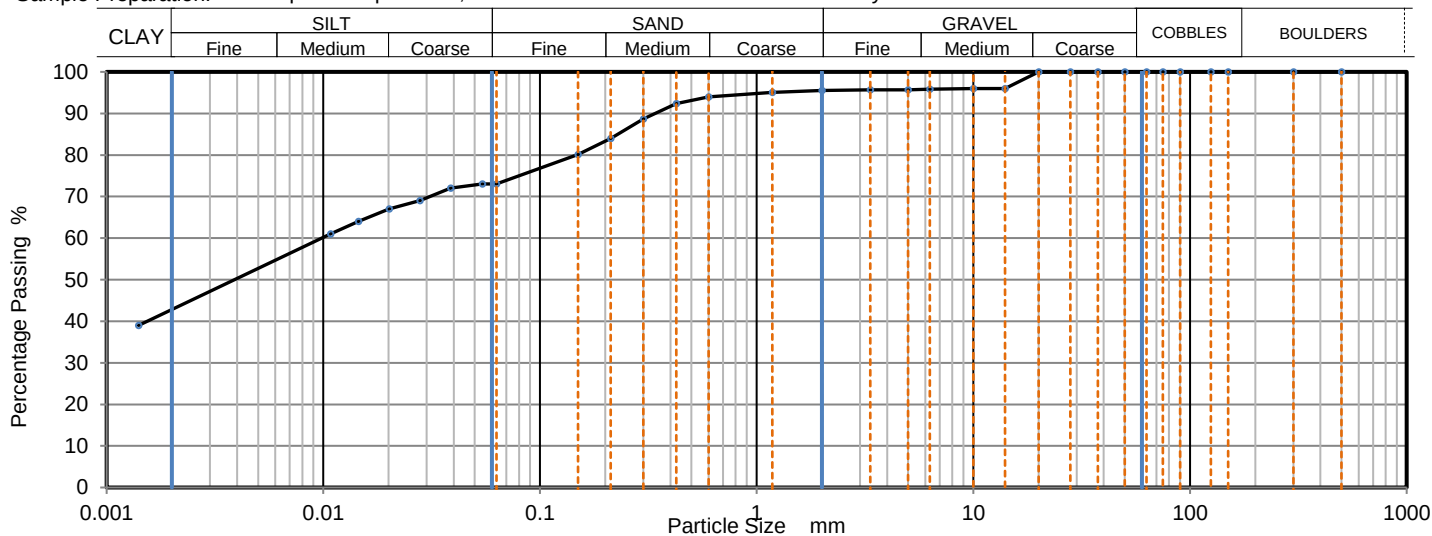
Sample Description: Brownish grey sandy CLAY

Sample Preparation: Sample was quartered, oven dried at 109.0 °C and broken down by hand.

Depth Top [m]: 2.50

Depth Base [m]: 3.00

Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0541	73
300	100	0.0387	72
150	100	0.0279	69
125	100	0.0201	67
90	100	0.0145	64
75	100	0.0108	61
63	100	0.0014	39
50	100		
37.5	100		
28	100		
20	100		
14	96		
10	96		
6.3	96		
5	96		
3.35	96	Particle density (assumed) 2.65 Mg/m3	
2	96		
1.18	95		
0.6	94		
0.425	92		
0.3	89		
0.212	84		
0.15	80		
0.063	73		

Sample Proportions	% dry mass
Very coarse	0
Gravel	5
Sand	22
Silt	30
Clay	43

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 6.9
Curvature Coefficient	

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



4041

TEST CERTIFICATE**DETERMINATION OF PARTICLE SIZE DISTRIBUTION**

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 17/07/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740798

Hole No.: BH02

Sample Reference: Not Given

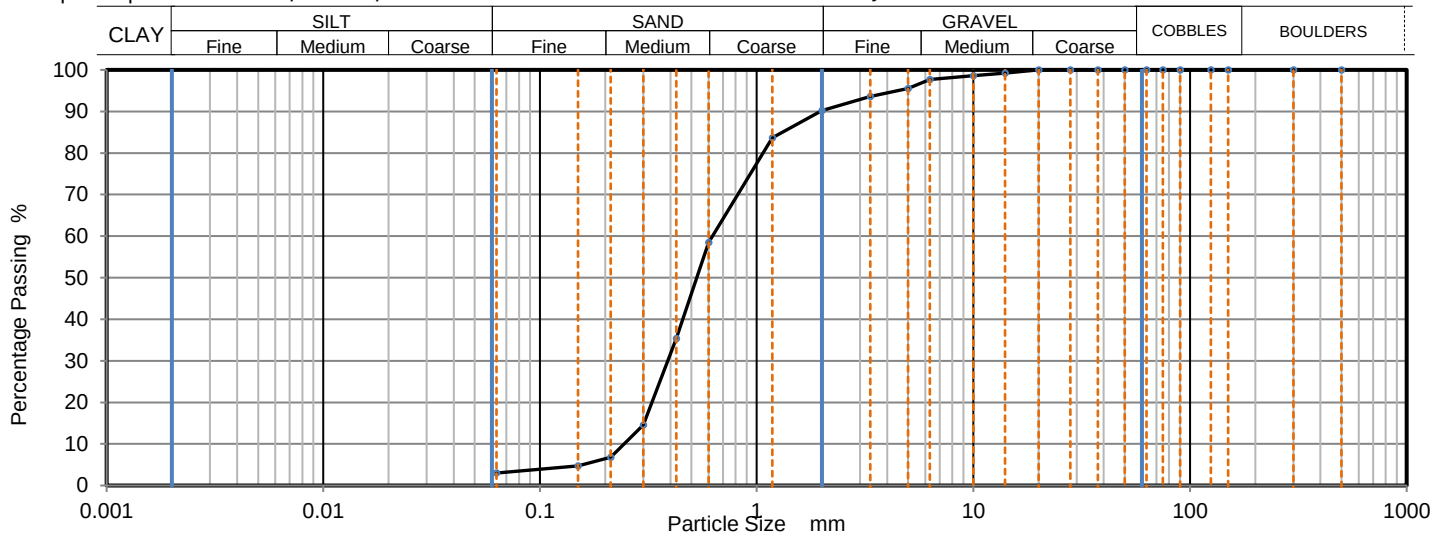
Sample Description: Brown SAND

Sample Preparation: Sample was quartered, oven dried at 109.0 °C and broken down by hand.

Depth Top [m]: 5.50

Depth Base [m]: 6.00

Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	99		
6.3	98		
5	96		
3.35	94		
2	90		
1.18	84		
0.6	59		
0.425	35		
0.3	15		
0.212	7		
0.15	5		
0.063	4		

Sample Proportions	% dry mass
Very coarse	0
Gravel	10
Sand	86
Fines <0.063mm	4

Grading Analysis	
D100	mm 20
D60	mm 0.625
D30	mm 0.388
D10	mm 0.244
Uniformity Coefficient	2.6
Curvature Coefficient	0.99

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Signed:

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



TEST CERTIFICATE

DETERMINATION OF DRY DENSITY/MOISTURE CONTENT RELATIONSHIP METHOD USING 2.5 KG RAMMER

Tested in Accordance with: BS 1377-4: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: BWB Consulting Limited
Client Address: 11 Borough High Street, London,
SE1 9SE
Contact: Paolo Moniz
Site Address: Plol R, Kingsway Business Park, Rochdale

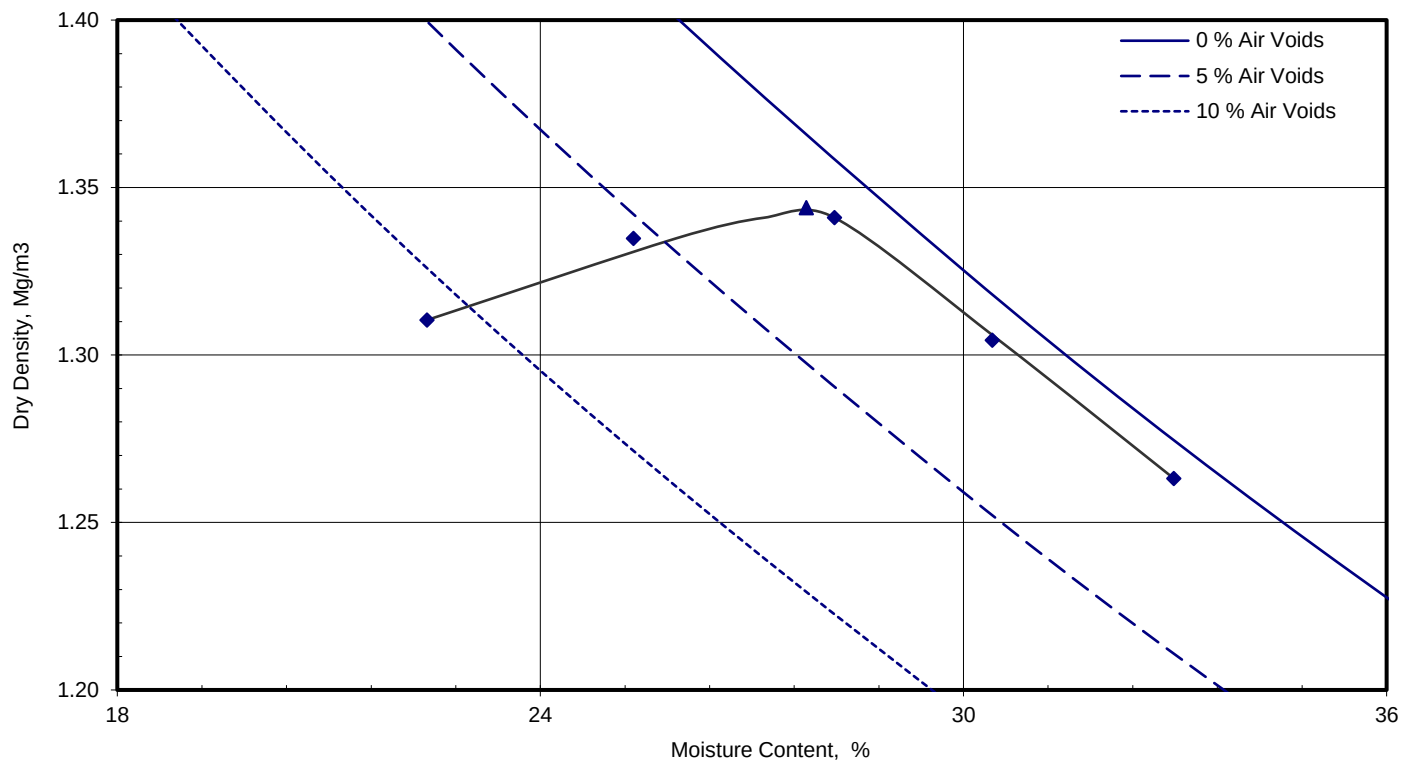
Client Reference: 232081
Job Number: 23-43844-1
Date Sampled: Not Given
Date Received: 05/07/2023
Date Tested: 18/08/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2740789
Hole No.: TP03
Sample Reference: Not Given
Sample Description: Black gravelly clayey SAND with fragments of glass
Sample Preparation: Sample was quartered and broken down by hand. Material used was natural.

Depth Top [m]: 0.50
Depth Base [m]: 1.00
Sample Type: B



Compaction Point No.		1	2	3	4	5
Moisture Content	%	22	25	28	30	33
Dry Density	Mg/m³	1.31	1.33	1.34	1.30	1.26

Mould Type		CBR
Samples Used		Single sample tested
Dry Mass Retained on 37.5 mm Sieve	%	0
Dry Mass Retained on 20.0 mm Sieve	%	1
Particle Density - Assumed	Mg/m³	2.20
As received Moisture Content	%	21
Maximum Dry Density	Mg/m³	1.34

Optimum Moisture Content	%	28
--------------------------	---	----

Note: Tested in Accordance with BS 1377-4: 1990: Clause 3.4 using 2.5kg [light] Rammer

Remarks:

Signed:

Katarzyna
Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



TEST CERTIFICATE

DETERMINATION OF DRY DENSITY/MOISTURE CONTENT RELATIONSHIP METHOD USING 2.5 KG RAMMER

Tested in Accordance with: BS 1377-4: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 18/08/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740791

Hole No.: TP04

Sample Reference: Not Given

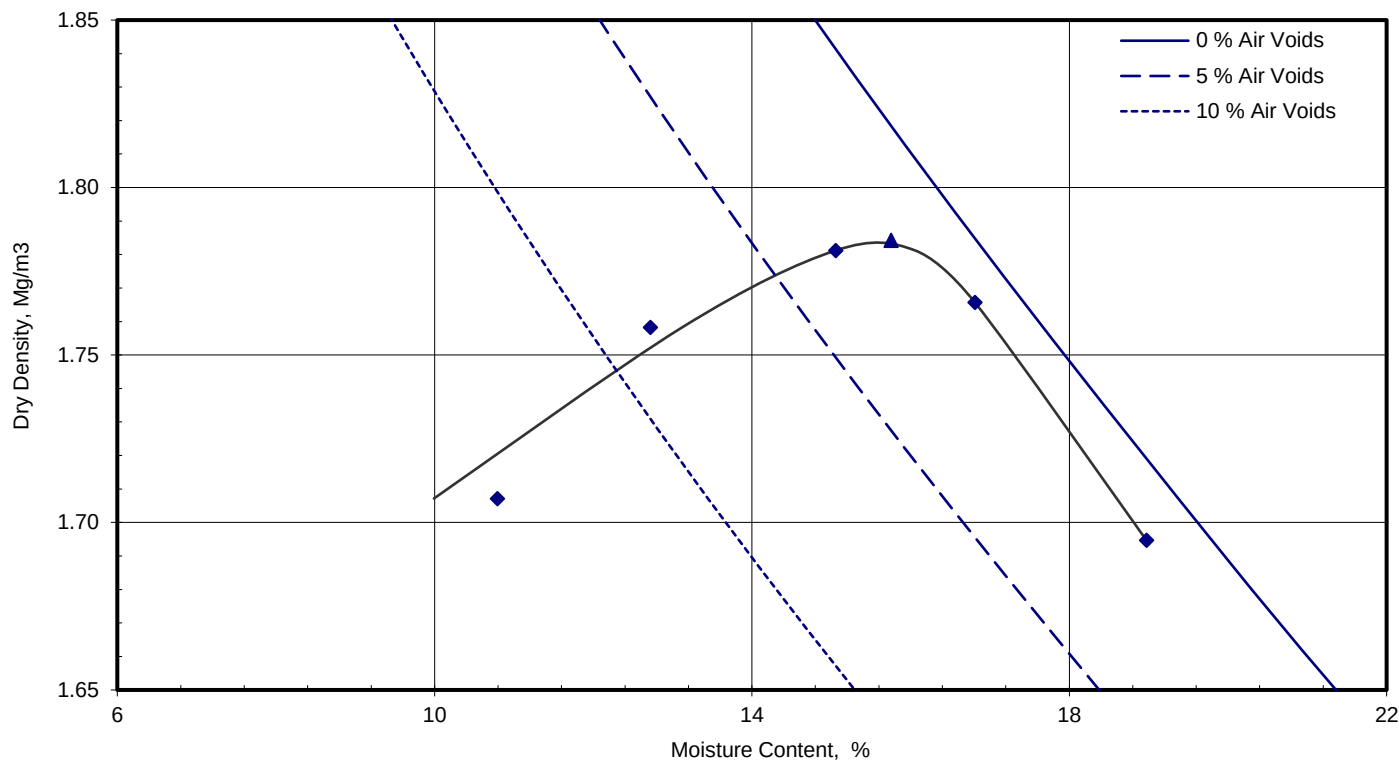
Sample Description: Brown clayey SAND

Sample Preparation: Sample was quartered and broken down by hand. Material used was natural.

Depth Top [m]: 2.00

Depth Base [m]: 2.40

Sample Type: B



Compaction Point No.		1	2	3	4	5
Moisture Content	%	11	13	15	17	19
Dry Density	Mg/m³	1.71	1.76	1.78	1.77	1.69

Mould Type		1 Litre
Samples Used		Single sample tested
Dry Mass Retained on 37.5 mm Sieve	%	0
Dry Mass Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.55
As received Moisture Content	%	8.0
Maximum Dry Density	Mg/m³	1.78

Optimum Moisture Content	%	16
--------------------------	---	----

Note: Tested in Accordance with BS 1377-4: 1990: Clause 3.3 using 2.5kg [light] Rammer

Remarks:

Signed:

Katarzyna
Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



TEST CERTIFICATE

DETERMINATION OF DRY DENSITY/MOISTURE CONTENT RELATIONSHIP METHOD USING 2.5 KG RAMMER

Tested in Accordance with: BS 1377-4: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 18/08/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740792

Hole No.: BH01

Sample Reference: Not Given

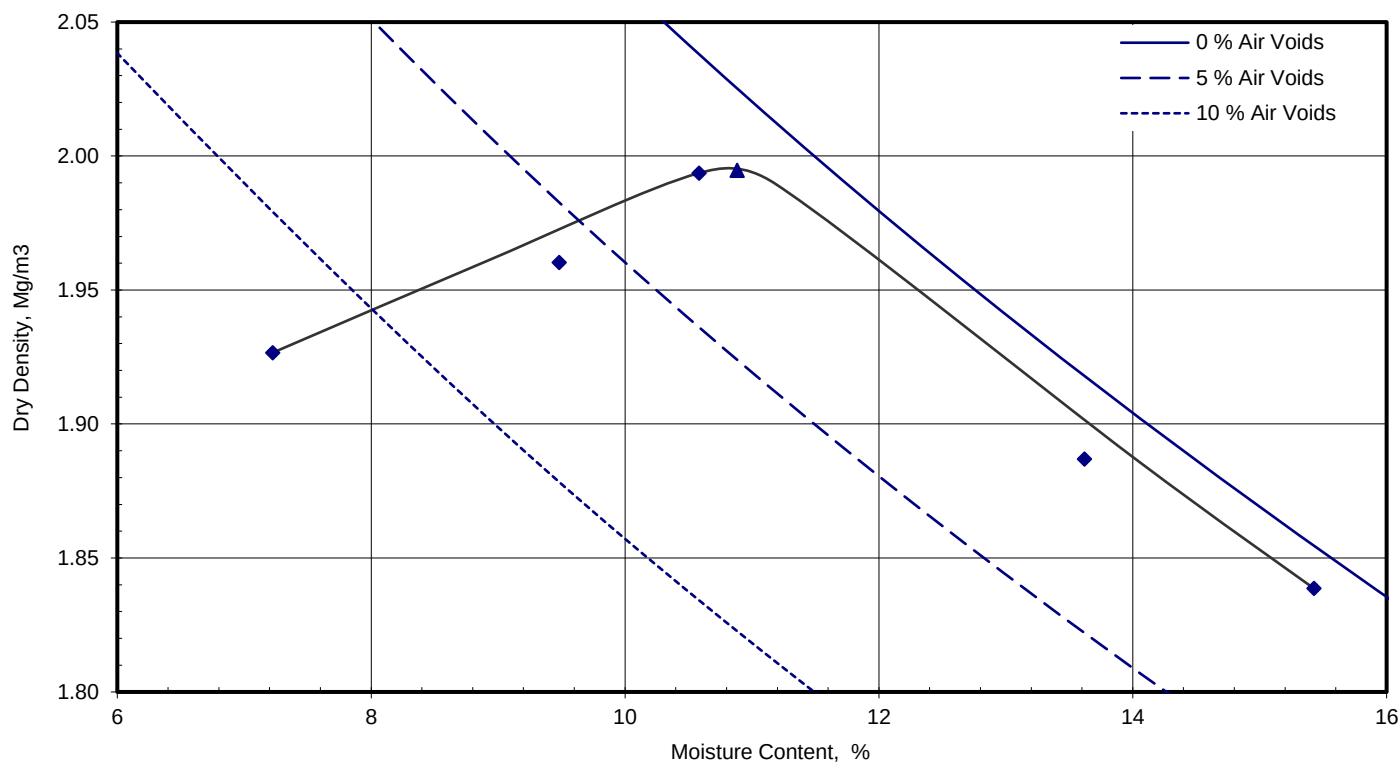
Sample Description: Brown gravelly SAND

Sample Preparation: Sample was quartered and broken down by hand. Material used was natural.

Depth Top [m]: 0.10

Depth Base [m]: 0.50

Sample Type: B



Compaction Point No.		1	2	3	4	5
Moisture Content	%	7.2	9.5	11	14	15
Dry Density	Mg/m³	1.93	1.96	1.99	1.89	1.84

Mould Type		CBR
Samples Used		Single sample tested
Dry Mass Retained on 37.5 mm Sieve	%	10
Dry Mass Retained on 20.0 mm Sieve	%	13
Particle Density - Assumed	Mg/m³	2.60
As received Moisture Content	%	14
Maximum Dry Density	Mg/m³	1.99

Optimum Moisture Content	%	11
--------------------------	---	----

Note: Tested in Accordance with BS 1377-4: 1990: Clause 3.4 using 2.5kg [light] Rammer

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



TEST CERTIFICATE

DETERMINATION OF DRY DENSITY/MOISTURE CONTENT RELATIONSHIP METHOD USING 4.5 KG RAMMER

Tested in Accordance with: BS 1377-4: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 19/08/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740788

Hole No.: TP02

Sample Reference: Not Given

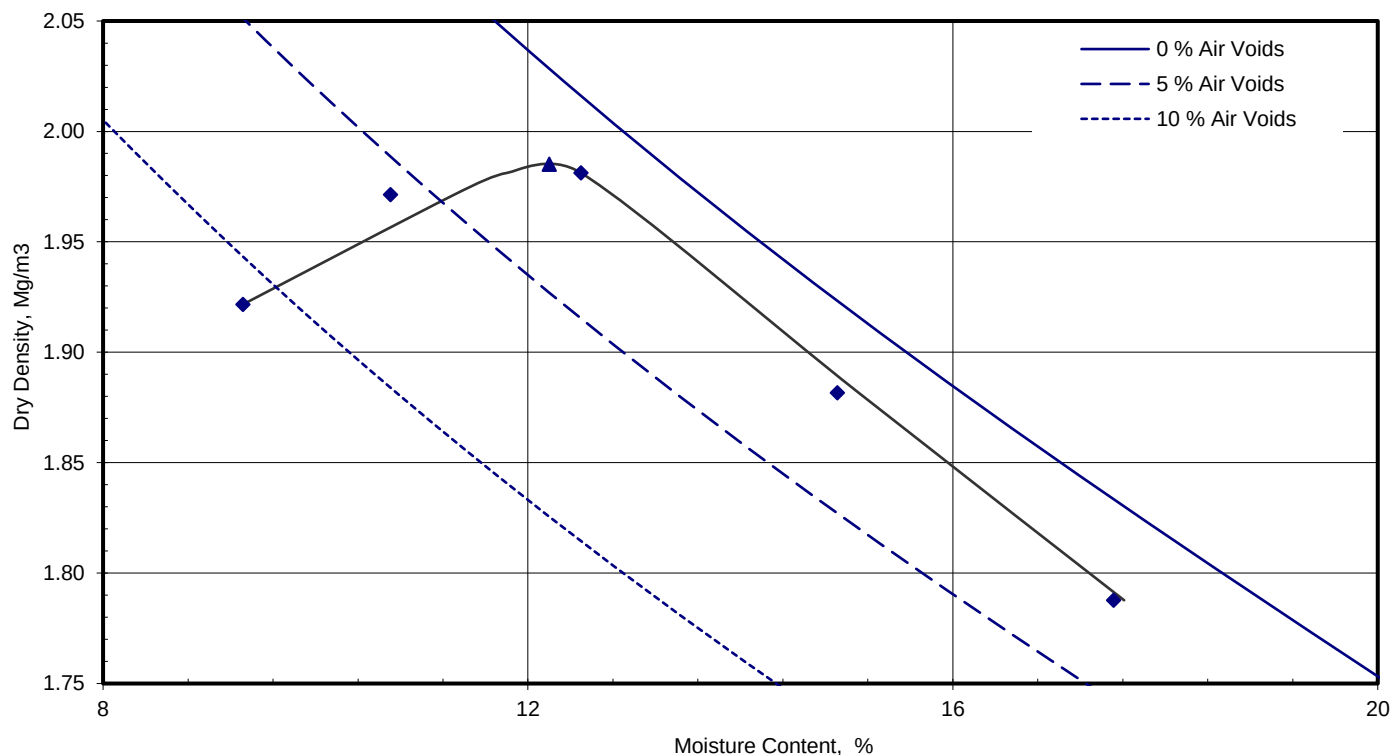
Sample Description: Brown sandy CLAY

Sample Preparation: Sample was quartered and broken down by hand. Material used was natural.

Depth Top [m]: 1.00

Depth Base [m]: 1.50

Sample Type: B



Compaction Point No.		1	2	3	4	5
Moisture Content	%	9.3	11	13	15	18
Dry Density	Mg/m³	1.92	1.97	1.98	1.88	1.79

Mould Type		1 Litre
Samples Used		Single sample tested
Dry Mass Retained on 37.5 mm Sieve	%	0
Dry Mass Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.70
As received Moisture Content	%	20
Maximum Dry Density	Mg/m³	1.99

Optimum Moisture Content	%	12
--------------------------	---	----

Note: Tested in Accordance with BS 1377-4: 1990: Clause 3.5 using 4.5kg [heavy] Rammer

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



TEST CERTIFICATE

DETERMINATION OF DRY DENSITY/MOISTURE CONTENT RELATIONSHIP METHOD USING 4.5 KG RAMMER

Tested in Accordance with: BS 1377-4: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: BWB Consulting Limited

Client Address: 11 Borough High Street, London,
SE1 9SE

Contact: Paolo Moniz

Site Address: Plol R, Kingsway Business Park, Rochdale

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 232081

Job Number: 23-43844-1

Date Sampled: Not Given

Date Received: 05/07/2023

Date Tested: 19/08/2023

Sampled By: Not Given

Test Results:

Laboratory Reference: 2740796

Hole No.: BH02

Sample Reference: Not Given

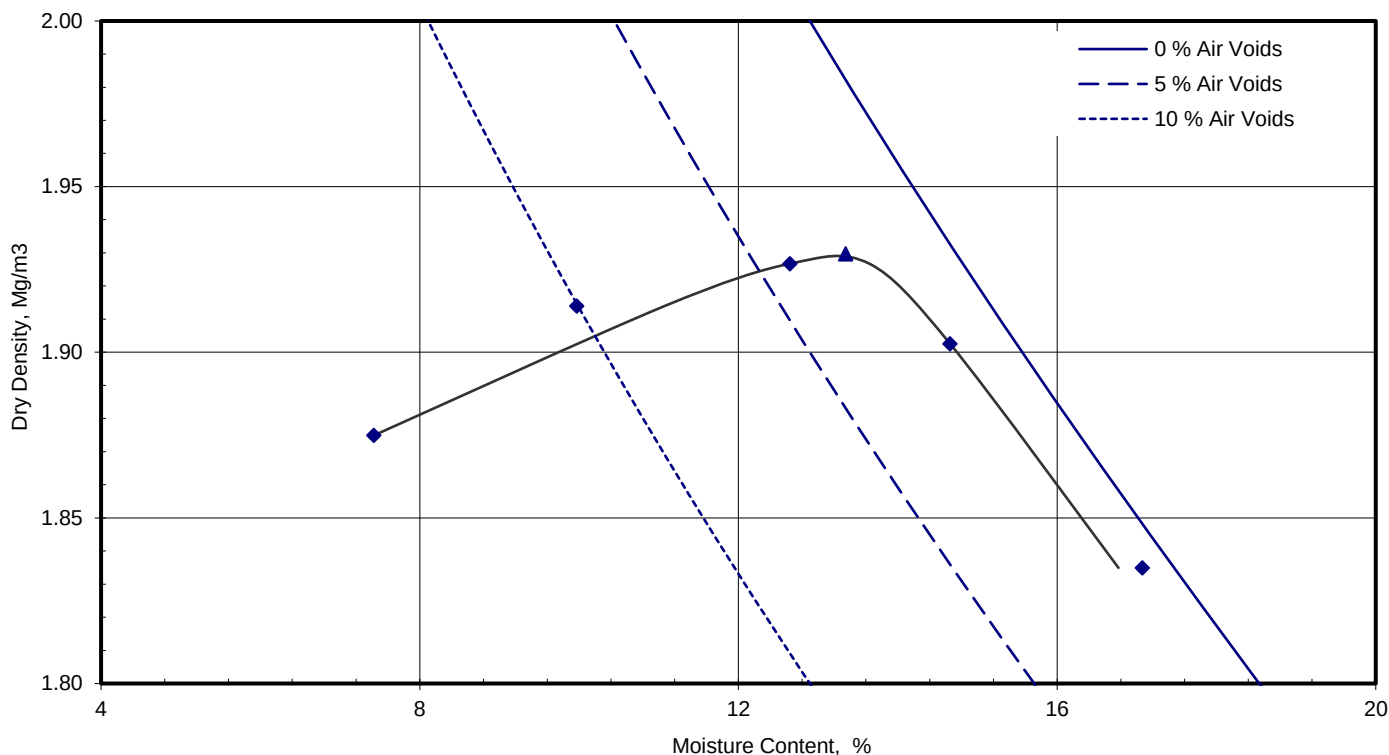
Sample Description: Brownish grey sandy CLAY

Sample Preparation: Sample was quartered and broken down by hand. Material used was natural.

Depth Top [m]: 2.50

Depth Base [m]: 3.00

Sample Type: B



Compaction Point No.		1	2	3	4	5
Moisture Content	%	7.4	10.0	13	15	17
Dry Density	Mg/m³	1.87	1.91	1.93	1.90	1.83

Mould Type		1 Litre
Samples Used		Single sample tested
Dry Mass Retained on 37.5 mm Sieve	%	0
Dry Mass Retained on 20.0 mm Sieve	%	2
Particle Density - Assumed	Mg/m³	2.70
As received Moisture Content	%	21
Maximum Dry Density	Mg/m³	1.93

Optimum Moisture Content	%	13
--------------------------	---	----

Note: Tested in Accordance with BS 1377-4: 1990: Clause 3.6 using 4.5kg [heavy] Rammer

Remarks:

Signed:

Katarzyna
Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Appendix 8: CLEA Assessment Worksheets

STATISTICAL APPROACH FOR ASSESSING RISK TO HUMAN HEALTH FROM CONTAMINATED LAND 2008

CIEH/CLAIRE Guidance on Comparing Soil Contamination Data with a Critical Concentration May 2008

STAGE 1 QA CHECK

Are data of acceptable quality
Lab sampling errors / erroneous results
Are data sufficient to characterise area of interest

No

Review CSM, update sampling and analytical strategy

yes

STAGE 2 DATA SCREENING

Compare all data against GSAC
Do any values exceed GSAC?

No

True mean is less than critical concentration
No action required

Yes

STAGE 3 ZONING AND OUTLIER CHECK

Plot data on bubble chart
Plot histogram
Identify and deal with non

Outliers

Assess Outliers directly against GSAC

Non detects to DL or DL/2
Remove outliers

STAGE 4 UPPER CONFIDENCE LIMIT

With outliers removed
do any values exceed GSAC ?

No

True mean is less than critical concentration
No action required

Yes

With outliers removed are data normally Distributed
Histogram
Shapiro Wilkes test, q-q plot

Normal

Non-normal

Normal Distributed data
UCL from
Students t-test

Non-normal Distributed data
UCL from
Chebychev theorem

Compare UCL to GSAC
Does UCL exceed GSAC?

No

True mean is less than critical concentration
No action required

Yes

true mean is greater than critical concentration
Further action required

Human Health Generic QRA Worksheet



Kingsway Plot R

232081

description

Define CSM – Is site represented by a standard land use?

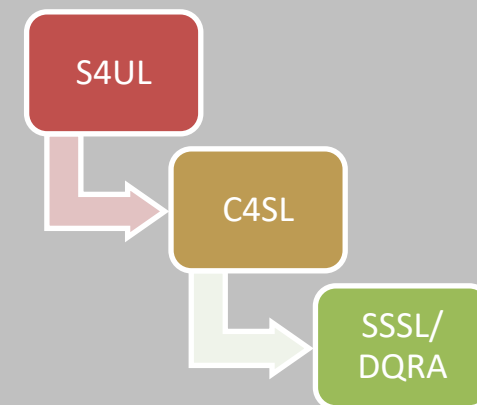
Residential with / without homegrown produce

Commercial / Industrial

Public Open Space - Residential (S4UL/C4SL only)

Public Open Space - Park (S4UL/C4SL only)

GSAC Hierarchy



GSAC Type (BWB, LQM S4UL, C4SL, Bespoke)

LQM CIEH S4UL

Key Receptor/CSM (Residential/Commercial/POS)

S4UL Commercial

Organic Matter % (If unknown use 1%)

2.5

Copyright Land Quality Management Limited reproduced with permission;
Publication Number S4UL3271

V7, December 2018

Generic Assessment Criteria



Kingsway Plot R
232081

S4UL Commercial
mg/kg

Source

Arsenic	6.40E+02	LQM_CIEH_S4UL
Barium	2.21E+04	LQM_CIEH_S4UL
Beryllium	1.20E+01	LQM_CIEH_S4UL
Boron	2.40E+05	LQM_CIEH_S4UL
Cadmium	1.90E+02	LQM_CIEH_S4UL
Chromium VI	3.30E+01	LQM_CIEH_S4UL
Chromium III	8.60E+03	LQM_CIEH_S4UL
Copper	6.80E+04	LQM_CIEH_S4UL
Lead*	2.33E+03	DEFRA_C4SL
Inorganic Mercury	1.10E+03	LQM_CIEH_S4UL
Nickel	9.80E+02	LQM_CIEH_S4UL
Selenium	1.20E+04	LQM_CIEH_S4UL
Vanadium	9.00E+03	LQM_CIEH_S4UL
Zinc	7.30E+05	LQM_CIEH_S4UL
Cyanide (Free)	4.30E+01	BWB
Cyanide (Complex)	2.13E+02	BWB
Phenols (Total)	6.90E+02	LQM_CIEH_S4UL
Benzene	4.70E+01	LQM_CIEH_S4UL
Toluene	1.10E+05	LQM_CIEH_S4UL
Ethyl benzene	1.30E+04	LQM_CIEH_S4UL
Total Xylene	1.40E+04	LQM_CIEH_S4UL
TPH (EC5-6) aliphatic	5.90E+03	LQM_CIEH_S4UL
TPH (>EC6-8) aliphatic	1.70E+04	LQM_CIEH_S4UL
TPH (>EC8-10) aliphatic	4.80E+03	LQM_CIEH_S4UL
TPH (>EC10-12) aliphatic	2.30E+04	LQM_CIEH_S4UL
TPH (>EC12-16) aliphatic	8.20E+04	LQM_CIEH_S4UL
TPH (>EC16-21) aliphatic	1.70E+06	LQM_CIEH_S4UL
TPH (>EC21-35) aliphatic	1.70E+06	LQM_CIEH_S4UL
TPH (>EC35-44) aliphatic	1.70E+06	LQM_CIEH_S4UL
TPH (>EC6-7) aromatic (benzene)	4.60E+04	LQM_CIEH_S4UL
TPH (>EC7-8) aromatic (toluene)	1.10E+05	LQM_CIEH_S4UL
TPH (>EC8-10) aromatic	8.10E+03	LQM_CIEH_S4UL
TPH (>EC10-12) aromatic	2.80E+04	LQM_CIEH_S4UL
TPH (>EC12-16) aromatic	3.70E+04	LQM_CIEH_S4UL
TPH (>EC16-21) aromatic	2.80E+04	LQM_CIEH_S4UL
TPH (>EC21-35) aromatic	2.80E+04	LQM_CIEH_S4UL
TPH (>EC35-44) aromatic	2.80E+04	LQM_CIEH_S4UL
Total TPH	5.00E+02	LQM_CIEH_S4UL
Naphthalene	4.60E+02	LQM_CIEH_S4UL
Acenaphthylene	9.70E+04	LQM_CIEH_S4UL
Acenaphthene	9.70E+04	LQM_CIEH_S4UL
Fluorene	6.80E+04	LQM_CIEH_S4UL
Phenanthrene	2.20E+04	LQM_CIEH_S4UL
Anthracene	5.40E+05	LQM_CIEH_S4UL
Fluoranthene	2.30E+04	LQM_CIEH_S4UL
Pyrene	5.40E+04	LQM_CIEH_S4UL
Benzo(a)anthracene	1.70E+02	LQM_CIEH_S4UL
Chrysene	3.50E+02	LQM_CIEH_S4UL
Benzo(b)fluoranthene	4.40E+01	LQM_CIEH_S4UL
Benzo(k)fluoranthene	1.20E+03	LQM_CIEH_S4UL
Benzo(a)pyrene	3.50E+01	LQM_CIEH_S4UL

Generic Assessment Criteria

Kingsway Plot R
232081

S4UL Commercial
mg/kg



Source

Indeno(1,2,3-c,d)pyrene	5.10E+02	LQM_CIEH_S4UL
Dibenzo(a,h)anthracene	3.60E+00	LQM_CIEH_S4UL
Benzo(g,hi)perylene	4.00E+03	LQM_CIEH_S4UL
Coal Tar (B(a)P as surrogate marker	1.50E+01	LQM_CIEH_S4UL
Tetrachloroethene (PCE)	4.20E+01	LQM_CIEH_S4UL
Trichloroethene (TCE)	2.60E+00	LQM_CIEH_S4UL
cis -1,2-Dichloroethene	2.40E+01	LQM_CIEH_S4UL
Vinyl Chloride (VC)	7.70E-02	LQM_CIEH_S4UL
1,1,2,2-Tetrachloroethane (PCA)	5.50E+02	LQM_CIEH_S4UL
1,1,1-Trichloroethane (TCA)	1.30E+03	LQM_CIEH_S4UL
1,2-Dichloroethane	9.70E-01	LQM_CIEH_S4UL
Carbon Tetrachloride	6.30E+00	LQM_CIEH_S4UL
Carbon disulphide	2.20E+01	LQM_CIEH_S4UL

Determinand	Number of tests	Range (mg/kg)	S4UL Commercial GSAC (m	Detection Limit (mg/kg)	Min	Max	No. of Exceedances	No. Non detects	< or not
Arsenic	8	<6.7 to 130	6.40E+02	0	6.7	130	0	192	<
Barium	8	<87 to 2200	2.21E+04	0	87	2200	0	192	<
Beryllium	8	<0.66 to 9	1.20E+01	0	0.66	9	0	192	<
Boron	8	<0.2 to 0.8	2.40E+05	0	0.2	0.8	0	192	<
Cadmium	8	<0.2 to 0.2	1.90E+02	0	0.2	0.2	0	192	<
Chromium VI	8	<1.8 to 1.8	3.30E+01	0	1.8	1.8	0	192	<
Chromium III	8	<15 to 41	8.60E+03	0	15	41	0	192	<
Copper	8	<27 to 270	6.80E+04	0	27	270	0	192	<
Lead*	8	<14 to 360	2.33E+03	0	14	360	0	192	<
Inorganic Mercury	8	<0.3 to 0.3	1.10E+03	0	0.3	0.3	0	192	<
Nickel	8	<14 to 100	9.80E+02	0	14	100	0	192	<
Selenium	8	<1 to 1	1.20E+04	0	1	1	0	192	<
Vanadium	8	<25 to 260	9.00E+03	0	25	260	0	192	<
Zinc	8	<37 to 270	7.30E+05	0	37	270	0	192	<
Cyanide (Free)	8	<1 to 1	4.30E+01	0	1	1	0	192	<
Cyanide (Complex)	8	<1 to 1	2.13E+02	0	1	1	0	192	<
Phenols (Total)	8	<1 to 1.7	6.90E+02	0	1	1.7	0	192	<
Benzene	2	<0.005 to 0.005	4.70E+01	0	0.005	0.005	0	198	<
Toluene	2	<0.005 to 0.005	1.10E+05	0	0.005	0.005	0	198	<
Ethyl benzene	2	<0.005 to 0.005	1.30E+04	0	0.005	0.005	0	198	<
Total Xylene	2	<0.01 to 0.01	1.40E+04	0	0.01	0.01	0	198	<
TPH (EC5-6) aliphatic	0	<0 to 0	5.90E+03	0	0	0	0	200	<
TPH (>EC6-8) aliphatic	0	<0 to 0	1.70E+04	0	0	0	0	200	<
TPH (>EC8-10) aliphatic	1	<0.1 to 0.1	4.80E+03	0	0.1	0.1	0	198	<
TPH (>EC10-12) aliphatic	0	<0 to 0	2.30E+04	0	0	0	0	199	<
TPH (>EC12-16) aliphatic	0	<0 to 0	8.20E+04	0	0	0	0	199	<
TPH (>EC16-21) aliphatic	0	<0 to 0	1.70E+06	0	0	0	0	200	<
TPH (>EC21-35) aliphatic	2	<8 to 19	1.70E+06	0	8	19	0	198	<
TPH (>EC35-44) aliphatic	0	<0 to 0	1.70E+06	0	0	0	0	198	<
TPH (>EC6-7) aromatic (benzene)	0	<0 to 0	4.60E+04	0	0	0	0	200	<
TPH (>EC7-8) aromatic (toluene)	2	<0.1 to 0.1	1.10E+05	0	0.1	0.1	0	198	<
TPH (>EC8-10) aromatic	2	<0.1 to 0.1	8.10E+03	0	0.1	0.1	0	198	<
TPH (>EC10-12) aromatic	0	<0 to 0	2.80E+04	0	0	0	0	200	<
TPH (>EC12-16) aromatic	2	<2 to 2	3.70E+04	0	2	2	0	198	<
TPH (>EC16-21) aromatic	0	<0 to 0	2.80E+04	0	0	0	0	200	<
TPH (>EC21-35) aromatic	2	<10 to 10	2.80E+04	0	10	10	0	198	<
TPH (>EC35-44) aromatic	0	<0 to 0	2.80E+04	0	0	0	0	200	<
Total TPH	8	<10 to 75	5.00E+02	0	10	75	0	192	<
Naphthalene	8	<0.05 to 1.3	4.60E+02	0	0.05	1.3	0	192	<
Acenaphthylene	8	<0.05 to 0.09	9.70E+04	0	0.05	0.09	0	192	<
Acenaphthene	8	<0.05 to 0.64	9.70E+04	0	0.05	0.64	0	192	<
Fluorene	8	<0.05 to 0.49	6.80E+04	0	0.05	0.49	0	192	<
Phenanthrene	8	<0.05 to 4	2.20E+04	0	0.05	4	0	192	<
Anthracene	8	<0.05 to 0.95	5.40E+05	0	0.05	0.95	0	192	<
Fluoranthene	8	<0.05 to 5	2.30E+04	0	0.05	5	0	192	<
Pyrene	8	<0.05 to 4.5	5.40E+04	0	0.05	4.5	0	192	<
Benzo(a)anthracene	8	<0.05 to 2.1	1.70E+02	0	0.05	2.1	0	192	<
Chrysene	8	<0.05 to 2.2	3.50E+02	0	0.05	2.2	0	192	<
Benzo(b)fluoranthene	8	<0.05 to 2.3	4.40E+01	0	0.05	2.3	0	192	<
Benzo(k)fluoranthene	8	<0.05 to 1.1	1.20E+03	0	0.05	1.1	0	192	<
Benzo(a)pyrene	8	<0.05 to 1.9	3.50E+01	0	0.05	1.9	0	192	<
Indeno(1,2,3-c,d)pyrene	8	<0.05 to 1.2	5.10E+02	0	0.05	1.2	0	192	<
Dibenzo(a,h)anthracene	8	<0.05 to 0.23	3.60E+00	0	0.05	0.23	0	192	<
Benzo(g,hi)perylene	8	<0.05 to 1.3	4.00E+03	0	0.05	1.3	0	192	<
Coal Tar (B(a)P as surrogate mark	8	<0.05 to 1.9	1.50E+01	0	0.05	1.9	0	192	<
Tetrachloroethene (PCE)	0	<0 to 0	4.20E+01	0	0	0	0	200	<
Trichloroethene (TCE)	0	<0 to 0	2.60E+00	0	0	0	0	200	<
cis-1,2-Dichloroethene	0	<0 to 0	2.40E+01	0	0	0	0	200	<
Vinyl Chloride (VC)	0	<0 to 0	7.70E-02	0	0	0	0	200	<
1,1,2,2-Tetrachloroethane (PCA)	0	<0 to 0	5.50E+02	0	0	0	0	200	<

STATISTICAL APPROACH FOR ASSESSING RISK TO HUMAN HEALTH FROM CONTAMINATED LAND 2008

CIEH/CLAIRE Guidance on Comparing Soil Contamination Data with a Critical Concentration May 2008

STAGE 1 QA CHECK

Are data of acceptable quality
Lab sampling errors / erroneous results
Are data sufficient to characterise area

No

Review CSM, update
sampling and
analytical strategy

STAGE 2 DATA SCREENING

Compare all data against GSAC
Do any values exceed GSAC?

No

True mean is less than
critical concentration
No action required

STAGE 3 ZONING AND OUTLIER CHECK

Plot data on bubble chart
Plot histogram
Identify and deal with non

Outliers

Assess Outliers
directly against
GSAC

Non detects to DL or DL/2
Remove outliers

STAGE 4 UPPER CONFIDENCE LIMIT

With outliers removed
do any values exceed GSAC ?

No

True mean is less than
critical concentration
No action required

Yes

With outliers removed are data normally Distributed
Histogram
Shapiro Wilkes test, q-q plot

Normal

Non-
normal

Normal Distributed data
UCL from
Students t-test

Non-normal Distributed data
UCL from
Chebychev theorem

Compare UCL to GSAC
Does UCL exceed GSAC?

No

True mean is less than
critical concentration
No action required

Yes

true mean is greater than
critical concentration
Further action required

Human Health Generic QRA Worksheet



Kingsway Plot R

232081

description

GSAC Hierarchy

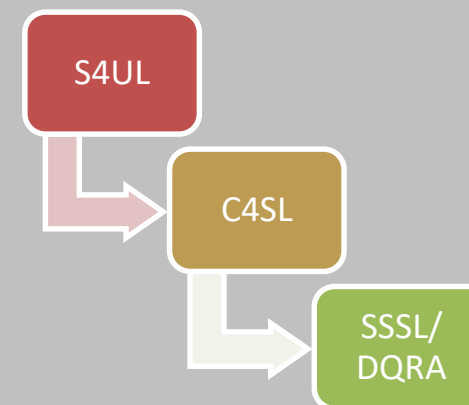
Define CSM – Is site represented by a standard land use?

Residential with / without homegrown produce

Commercial / Industrial

Public Open Space - Residential (S4UL/C4SL only)

Public Open Space - Park (S4UL/C4SL only)



GSAC Type (BWB, LQM S4UL, C4SL, Bespoke)

LQM_CIEH_S4UL

Key Receptor/CSM (Residential/Commercial/POS)

S4UL Commercial

Organic Matter % (If unknown use 1%)

1

Copyright Land Quality Management Limited reproduced with permission;
Publication Number S4UL3271

V7, December 2018

Generic Assessment Criteria

Kingsway Plot R
232081

S4UL Commercial
mg/kg



Source

Arsenic	6.40E+02	LQM_CIEH_S4UL
Barium	2.21E+04	LQM_CIEH_S4UL
Beryllium	1.20E+01	LQM_CIEH_S4UL
Boron	2.40E+05	LQM_CIEH_S4UL
Cadmium	1.90E+02	LQM_CIEH_S4UL
Chromium VI	3.30E+01	LQM_CIEH_S4UL
Chromium III	8.60E+03	LQM_CIEH_S4UL
Copper	6.80E+04	LQM_CIEH_S4UL
Lead*	2.33E+03	DEFRA_C4SL
Inorganic Mercury	1.10E+03	LQM_CIEH_S4UL
Nickel	9.80E+02	LQM_CIEH_S4UL
Selenium	1.20E+04	LQM_CIEH_S4UL
Vanadium	9.00E+03	LQM_CIEH_S4UL
Zinc	7.30E+05	LQM_CIEH_S4UL
Cyanide (Free)	4.30E+01	BWB
Cyanide (Complex)	2.13E+02	BWB
Phenols (Total)	4.40E+02	LQM_CIEH_S4UL
Benzene	2.70E+01	LQM_CIEH_S4UL
Toluene	5.60E+04	LQM_CIEH_S4UL
Ethyl benzene	5.70E+03	LQM_CIEH_S4UL
Total Xylene	5.90E+03	LQM_CIEH_S4UL
TPH (EC5-6) aliphatic	3.20E+03	LQM_CIEH_S4UL
TPH (>EC6-8) aliphatic	7.80E+03	LQM_CIEH_S4UL
TPH (>EC8-10) aliphatic	2.00E+03	LQM_CIEH_S4UL
TPH (>EC10-12) aliphatic	9.70E+03	LQM_CIEH_S4UL
TPH (>EC12-16) aliphatic	5.90E+04	LQM_CIEH_S4UL
TPH (>EC16-21) aliphatic	1.60E+06	LQM_CIEH_S4UL
TPH (>EC21-35) aliphatic	1.60E+06	LQM_CIEH_S4UL
TPH (>EC35-44) aliphatic	1.60E+06	LQM_CIEH_S4UL
TPH (>EC6-7) aromatic (benzene)	2.60E+04	LQM_CIEH_S4UL
TPH (>EC7-8) aromatic (toluene)	5.60E+04	LQM_CIEH_S4UL
TPH (>EC8-10) aromatic	3.50E+03	LQM_CIEH_S4UL
TPH (>EC10-12) aromatic	1.60E+04	LQM_CIEH_S4UL
TPH (>EC12-16) aromatic	3.60E+04	LQM_CIEH_S4UL
TPH (>EC16-21) aromatic	2.80E+04	LQM_CIEH_S4UL
TPH (>EC21-35) aromatic	2.80E+04	LQM_CIEH_S4UL
TPH (>EC35-44) aromatic	2.80E+04	LQM_CIEH_S4UL
Total TPH	5.00E+02	LQM_CIEH_S4UL
Naphthalene	1.90E+02	LQM_CIEH_S4UL
Acenaphthylene	8.30E+04	LQM_CIEH_S4UL
Acenaphthene	8.40E+04	LQM_CIEH_S4UL
Fluorene	6.30E+04	LQM_CIEH_S4UL
Phenanthrene	2.20E+04	LQM_CIEH_S4UL
Anthracene	5.20E+05	LQM_CIEH_S4UL
Fluoranthene	2.30E+04	LQM_CIEH_S4UL
Pyrene	5.40E+04	LQM_CIEH_S4UL
Benzo(a)anthracene	1.70E+02	LQM_CIEH_S4UL
Chrysene	3.50E+02	LQM_CIEH_S4UL
Benzo(b)fluoranthene	4.40E+01	LQM_CIEH_S4UL
Benzo(k)fluoranthene	1.20E+03	LQM_CIEH_S4UL
Benzo(a)pyrene	3.50E+01	LQM_CIEH_S4UL
Indeno(1,2,3-c,d)pyrene	5.00E+02	LQM_CIEH_S4UL

Generic Assessment Criteria

Kingsway Plot R
232081

S4UL Commercial
mg/kg



Source

Dibenzo(a,h)anthracene	3.50E+00	LQM_CIEH_S4UL
Benzo(g,hi)perylene	3.90E+03	LQM_CIEH_S4UL
Coal Tar (B(a)P as surrogate marker	1.50E+01	LQM_CIEH_S4UL
Tetrachloroethene (PCE)	1.90E+01	LQM_CIEH_S4UL
Trichloroethene (TCE)	1.20E+00	LQM_CIEH_S4UL
cis -1,2-Dichloroethene	1.40E+01	LQM_CIEH_S4UL
Vinyl Chloride (VC)	5.90E-02	LQM_CIEH_S4UL
1,1,2,2-Tetrachloroethane (PCA)	2.70E+02	LQM_CIEH_S4UL
1,1,1-Trichloroethane (TCA)	6.60E+02	LQM_CIEH_S4UL
1,2-Dichloroethane	6.70E-01	LQM_CIEH_S4UL
Carbon Tetrachloride	2.90E+00	LQM_CIEH_S4UL
Carbon disulphide	1.10E+01	LQM_CIEH_S4UL

[illegible]

Determinand	Number of tests	Range (mg/kg)	S4UL Commercial GSAC (mg/kg)	Protection Limit (mg/kg)	Min	Max	No. of Exceedances	No. Non detects	< or not
Arsenic	8	<6.7 to 130	6.40E+02	0	6.7	130	0	192	<
Barium	8	<87 to 2200	2.21E+04	0	87	2200	0	192	<
Beryllium	8	<0.66 to 9	1.20E+01	0	0.66	9	0	192	<
Boron	8	<0.2 to 0.8	2.40E+05	0	0.2	0.8	0	192	<
Cadmium	8	<0.2 to 0.2	1.90E+02	0	0.2	0.2	0	192	<
Chromium VI	8	<1.8 to 1.8	3.30E+01	0	1.8	1.8	0	192	<
Chromium III	8	<15 to 41	8.60E+03	0	15	41	0	192	<
Copper	8	<27 to 270	6.80E+04	0	27	270	0	192	<
Lead*	8	<14 to 360	2.33E+03	0	14	360	0	192	<
Inorganic Mercury	8	<0.3 to 0.3	1.10E+03	0	0.3	0.3	0	192	<
Nickel	8	<14 to 100	9.80E+02	0	14	100	0	192	<
Selenium	8	<1 to 1	1.20E+04	0	1	1	0	192	<
Vanadium	8	<25 to 260	9.00E+03	0	25	260	0	192	<
Zinc	8	<37 to 270	7.30E+05	0	37	270	0	192	<
Cyanide (Free)	8	<1 to 1	4.30E+01	0	1	1	0	192	<
Cyanide (Complex)	8	<1 to 1	2.13E+02	0	1	1	0	192	<
Phenols (Total)	8	<1 to 1.7	4.40E+02	0	1	1.7	0	192	<
Benzene	2	<0.005 to 0.005	2.70E+01	0	0.005	0.005	0	198	<
Toluene	2	<0.005 to 0.005	5.60E+04	0	0.005	0.005	0	198	<
Ethyl benzene	2	<0.005 to 0.005	5.70E+03	0	0.005	0.005	0	198	<
Total Xylene	2	<0.01 to 0.01	5.90E+03	0	0.01	0.01	0	198	<
TPH (EC5-6) aliphatic	0	<0 to 0	3.20E+03	0	0	0	0	200	<
TPH (>EC6-8) aliphatic	0	<0 to 0	7.80E+03	0	0	0	0	200	<
TPH (>EC8-10) aliphatic	1	<0.1 to 0.1	2.00E+03	0	0.1	0.1	0	198	<
TPH (>EC10-12) aliphatic	0	<0 to 0	9.70E+03	0	0	0	0	199	<
TPH (>EC12-16) aliphatic	0	<0 to 0	5.90E+04	0	0	0	0	199	<
TPH (>EC16-21) aliphatic	0	<0 to 0	1.60E+06	0	0	0	0	200	<
TPH (>EC21-35) aliphatic	2	<8 to 19	1.60E+06	0	8	19	0	198	<
TPH (>EC35-44) aliphatic	0	<0 to 0	1.60E+06	0	0	0	0	198	<
TPH (>EC6-7) aromatic (benzene)	0	<0 to 0	2.60E+04	0	0	0	0	200	<
TPH (>EC7-8) aromatic (toluene)	2	<0.1 to 0.1	5.60E+04	0	0.1	0.1	0	198	<
TPH (>EC8-10) aromatic	2	<0.1 to 0.1	3.50E+03	0	0.1	0.1	0	198	<
TPH (>EC10-12) aromatic	0	<0 to 0	1.60E+04	0	0	0	0	200	<
TPH (>EC12-16) aromatic	2	<2 to 2	3.60E+04	0	2	2	0	198	<
TPH (>EC16-21) aromatic	0	<0 to 0	2.80E+04	0	0	0	0	200	<
TPH (>EC21-35) aromatic	2	<10 to 10	2.80E+04	0	10	10	0	198	<
TPH (>EC35-44) aromatic	0	<0 to 0	2.80E+04	0	0	0	0	200	<
Total TPH	8	<10 to 75	5.00E+02	0	10	75	0	192	<
Naphthalene	8	<0.05 to 1.3	1.90E+02	0	0.05	1.3	0	192	<
Acenaphthylene	8	<0.05 to 0.09	8.30E+04	0	0.05	0.09	0	192	<
Acenaphthene	8	<0.05 to 0.64	8.40E+04	0	0.05	0.64	0	192	<
Fluorene	8	<0.05 to 0.49	6.30E+04	0	0.05	0.49	0	192	<
Phenanthrene	8	<0.05 to 4	2.20E+04	0	0.05	4	0	192	<
Anthracene	8	<0.05 to 0.95	5.20E+05	0	0.05	0.95	0	192	<
Fluoranthene	8	<0.05 to 5	2.30E+04	0	0.05	5	0	192	<
Pyrene	8	<0.05 to 4.5	5.40E+04	0	0.05	4.5	0	192	<
Benzo(a)anthracene	8	<0.05 to 2.1	1.70E+02	0	0.05	2.1	0	192	<
Chrysene	8	<0.05 to 2.2	3.50E+02	0	0.05	2.2	0	192	<
Benzo(b)fluoranthene	8	<0.05 to 2.3	4.40E+01	0	0.05	2.3	0	192	<
Benzo(k)fluoranthene	8	<0.05 to 1.1	1.20E+03	0	0.05	1.1	0	192	<
Benzo(a)pyrene	8	<0.05 to 1.9	3.50E+01	0	0.05	1.9	0	192	<
Indeno(1,2,3-c,d)pyrene	8	<0.05 to 1.2	5.00E+02	0	0.05	1.2	0	192	<
Dibenzo(a,h)anthracene	8	<0.05 to 0.23	3.50E+00	0	0.05	0.23	0	192	<
Benzo(g,h,i)perylene	8	<0.05 to 1.3	3.90E+03	0	0.05	1.3	0	192	<
Coal Tar (B(a)P as surrogate mark	8	<0.05 to 1.9	1.50E+01	0	0.05	1.9	0	192	<
Tetrachloroethene (PCE)	0	<0 to 0	1.90E+01	0	0	0	0	200	<
Trichloroethene (TCE)	0	<0 to 0	1.20E+00	0	0	0	0	200	<
cis-1,2-Dichloroethene	0	<0 to 0	1.40E+01	0	0	0	0	200	<
Vinyl Chloride (VC)	0	<0 to 0	5.90E-02	0	0	0	0	200	<
1,1,2,2-Tetrachloroethane (PCA)	0	<0 to 0	2.70E+02	0	0	0	0	200	<

Appendix 9: Leachate Screening Worksheets

*EQS Standard: Phenol and Benzene annual average of 300µg/l; Toluene 500µg/l for Freshwater, 400µg/l for Saltwater; 1,1,1-TCA 1,000µg/l.

Project Name:	Plot P (Plot R)
Project Number:	232081
Assessment for:	Soil Leachate Assessment
Laboratory:	I2
Receptor:	Drinking Water
Receptor Water Hardness:	>200



100 = Assessment Criteria Exceedance)
50 = M-BAT Bioavailability Assessment Required

Contaminant		Units	Detection Limit	Guideline Concentration	Source	Number of Samples	Min	Max	No of Exceedences	TP104	TP101				
										0.30	0.30				
Heavy Metals	Arsenic	µg/l	1	10	UK DWS	1	2.70	2.70	0	2.70	< 1.0				
	Barium	mg/l	0.05	700	UK DWS	2	1.60	94.00	0	1.60	94.00				
	Beryllium	µg/l	0.2	None Available		2	0.30	0.30	0	0.30	0.30				
	Cadmium	µg/l	0.08	3	UK DWS	0	0.00	0.00	0	< 0.08	< 0.08				
	Chromium III	µg/l	0.4	4.7	UK DWS	2	0.60	1.10	0	0.60	1.10				
	Chromium VI	µg/l		3.4	EQS Freshwater	0	0.00	0.00	0						
	Copper	µg/l	0.7	2000	UK DWS	2	6.30	16.00	0	6.30	16.00				
	Lead	µg/l	1	10	UK DWS	2	3.00	5.20	0	3.00	5.20				
	Mercury	µg/l	0.5	1	UK DWS	0	0.00	0.00	0	< 0.5	< 0.5				
	Nickel	µg/l	0.3	20	UK DWS	2	3.50	7.30	0	3.50	7.30				
	Selenium	µg/l	4	10	UK DWS	0	0.00	0.00	0	< 4.0	< 4.0				
	Vanadium	µg/l	1.7	None Available		1	6.80	6.80	0	< 1.7	6.80				
	Zinc	µg/l	0.4	5000	EQS Freshwater	2	8.20	17.00	0	8.20	17.00				
	Sulphate	mg/l	0.1	250	EQS Freshwater	2	1.40	14.40	0	1.40	14.40				
	Boron	µg/l	10	300	UK DWS	2	13.00	18.00	0	13.00	18.00				
	pH					0	0.00	0.00	0						
Inorganics	Cyanide (total)	µg/l	10	70	UK DWS	0	0.00	0.00	0	< 10	< 10				
	Phenol*	µg/l		7.7	EQS Freshwater	0	0.00	0.00	0						
	Ammonia (NH3 as N)	mg/l		0.015	EQS Freshwater	0	0.00	0.00	0						

*EQS Standard: Phenol and Benzene annual average of 300µg/l; Toluene 500µg/l for Freshwater, 400µg/l for Saltwater; 1,1,1-TCA 1,000µg/l.

Project Name:	Plot P (Plot R)
Project Number:	232081
Assessment for:	Soil Leachate Assessment
Laboratory:	I2
Receptor:	Freshwater
Receptor Water Hardness:	>200



100 = Assessment Criteria Exceedance)
50 = M-BAT Bioavailability Assessment Required

Contaminant		Units	Detection Limit	Guideline Concentration	Source	Number of Samples	Min	Max	No of Exceedences	TP104	TP101				
										0.30	0.30				
Heavy Metals	Arsenic	µg/l	1	50	EQS Freshwater	1	2.70	2.70	0	2.70	< 1.0				
	Barium	mg/l	0.05	700	UK DWS	2	1.60	94.00	0	1.60	94.00				
	Beryllium	µg/l	0.2	None Available		2	0.30	0.30	0	0.30	0.30				
	Cadmium	µg/l	0.08	0.25	EQS Freshwater	0	0.00	0.00	0	< 0.08	< 0.08				
	Chromium III	µg/l	0.4	4.7	EQS Freshwater	2	0.60	1.10	0	0.60	1.10				
	Chromium VI	µg/l		3.4	EQS Freshwater	0	0.00	0.00	0						
	Copper	µg/l	0.7	1	EQS Freshwater	2	6.30	16.00	2	6.30	16.00				
	Lead	µg/l	1	1.2	EQS Freshwater	2	3.00	5.20	2	3.00	5.20				
	Mercury	µg/l	0.5	0.07	EQS Freshwater	0	0.00	0.00	0	< 0.5	< 0.5				
	Nickel	µg/l	0.3	4	EQS Freshwater	2	3.50	7.30	1	3.50	7.30				
	Selenium	µg/l	4	10	UK DWS	0	0.00	0.00	0	< 4.0	< 4.0				
	Vanadium	µg/l	1.7	None Available		1	6.80	6.80	0	< 1.7	6.80				
	Zinc	µg/l	0.4	10.9	EQS Freshwater	2	8.20	17.00	1	8.20	17.00				
	Sulphate	mg/l	0.1	400	EQS Freshwater	2	1.40	14.40	0	1.40	14.40				
	Boron	µg/l	10	2000	EQS Freshwater	2	13.00	18.00	0	13.00	18.00				
	pH					0	0.00	0.00	0						
Inorganics	Cyanide (total)	µg/l	10	1	EQS Freshwater	0	0.00	0.00	0	< 10	< 10				
	Phenol*	µg/l		7.7	EQS Freshwater	0	0.00	0.00	0						
	Ammonia (NH3 as N)	mg/l		0.015	EQS Freshwater	0	0.00	0.00	0						

Appendix 10: Groundwater Screening Worksheets

*EQS Standard: Phenol and Benzene annual average of 300µg/l; Toluene 500µg/l for Freshwater, 400µg/l for Saltwater; 1,1,1-TCA 1,000µg/l.

Project Name:	Plot P Kingsway (Plot R)
Project Number:	232081
Assessment for:	Water Assessment
Laboratory:	I2
Receptor:	Freshwater
Receptor Water Hardness:	<40 (No Data)



100 = Assessment Criteria Exceedance)
50 = M-BAT Bioavailability Assessment Required

Contaminant		Units	Detection Limit	Guideline Concentration	Source	Number of Samples	Min	Max	No of Exceedences	BH02					
Heavy Metals	Arsenic	µg/l	0.15	50	EQS Freshwater	1	0.16	0.16	0	0.16					
	Barium	mg/l	0.06	700	UK DWS	1	55.00	55.00	0	55.00					
	Beryllium	µg/l	0.10	None Available		0	0.00	0.00	0	< 0.1					
	Cadmium	µg/l	0.02	0.08	EQS Freshwater	1	0.23	0.23	1	0.23					
	Chromium III	µg/l	0.20	4.7	EQS Freshwater	0	0.00	0.00	0	< 0.2					
	Copper	µg/l	0.50	1	EQS Freshwater	1	1.70	1.70	1	1.70					
	Lead	µg/l	0.20	1.2	EQS Freshwater	0	0.00	0.00	0	< 0.2					
	Mercury	µg/l	0.05	0.07	EQS Freshwater	0	0.00	0.00	0	< 0.05					
	Nickel	µg/l	0.50	4	EQS Freshwater	1	4.40	4.40	1	4.40					
	Selenium	µg/l	0.60	10	UK DWS	1	1.50	1.50	0	1.50					
	Vanadium	µg/l	0.20	None Available		0	0.00	0.00	0	< 0.2					
	Zinc	µg/l	0.50	10.9	EQS Freshwater	1	42.00	42.00	1	42.00					
	Sulphate	mg/l	0.045	400	EQS Freshwater	1	93.20	93.20	0	93.20					
	Boron	µg/l	10.00	2000	EQS Freshwater	1	83.00	83.00	0	83.00					
	pH					1	6.30	6.30	0	6.30					
Inorganics	Cyanide (total)	µg/l	10	1	EQS Freshwater	0	0.00	0.00	0	< 10					
	Phenol*	µg/l	10	7.7	EQS Freshwater	0	0.00	0.00	0	< 10					
	Ammonia (NH3 as N)	mg/l		0.015	EQS Freshwater	1	0.07	0.07	1	0.07					

*EQS Standard: Phenol and Benzene annual average of 300µg/l; Toluene 500µg/l for Freshwater, 400µg/l for Saltwater; 1,1,1-TCA 1,000µg/l.

Project Name:	Plot P Kingsway (Plot R)
Project Number:	232081
Assessment for:	Water Assessment
Laboratory:	I2
Receptor:	Drinking Water
Receptor Water Hardness:	<40 (No Data)



100 = Assessment Criteria Exceedance)
50 = M-BAT Bioavailability Assessment Required

Contaminant		Units	Detection Limit	Guideline Concentration	Source	Number of Samples	Min	Max	No of Exceedences	BH02					
Heavy Metals	Arsenic	µg/l	0.15	10	UK DWS	1	0.16	0.16	0	0.16					
	Barium	mg/l	0.06	700	UK DWS	1	55.00	55.00	0	55.00					
	Beryllium	µg/l	0.10	None Available		0	0.00	0.00	0	< 0.1					
	Cadmium	µg/l	0.02	3	UK DWS	1	0.23	0.23	0	0.23					
	Chromium III	µg/l	0.20	4.7	UK DWS	0	0.00	0.00	0	< 0.2					
	Copper	µg/l	0.50	2000	UK DWS	1	1.70	1.70	0	1.70					
	Lead	µg/l	0.20	10	UK DWS	0	0.00	0.00	0	< 0.2					
	Mercury	µg/l	0.05	1	UK DWS	0	0.00	0.00	0	< 0.05					
	Nickel	µg/l	0.50	20	UK DWS	1	4.40	4.40	0	4.40					
	Selenium	µg/l	0.60	10	UK DWS	1	1.50	1.50	0	1.50					
	Vanadium	µg/l	0.20	None Available		0	0.00	0.00	0	< 0.2					
	Zinc	µg/l	0.50	5000	UK DWS	1	42.00	42.00	0	42.00					
	Sulphate	mg/l	0.045	250	UK DWS	1	93.20	93.20	0	93.20					
	Boron	µg/l	10.00	1000	UK DWS	1	83.00	83.00	0	83.00					
	pH					1	6.30	6.30	0	6.30					
Inorganics	Cyanide (total)	µg/l	10	70	UK DWS	0	0.00	0.00	0	< 10					
	Phenol*	µg/l	10	7.7	EQS Freshwater	0	0.00	0.00	0	< 10					
	Ammonia (NH3 as N)	mg/l		0.015	EQS Freshwater	1	0.07	0.07	1	0.07					

Appendix 11: Waste Classification

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

- understand the origin of the waste
- select the correct List of Waste code(s)
- confirm that the list of determinands, results and sampling plan are fit for purpose
- select and justify the chosen metal species (Appendix B)
- correctly apply moisture correction and other available corrections
- add the meta data for their user-defined substances (Appendix A)
- check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)



UHVAO-AOUGT-6N615

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

Job name

232081 Plot R Kingsway

Description/Comments

Project

232081

Site

Plot R Kingsway, Rochdale

Classified by

Name: **Timothy Hull**
Date: **04 Aug 2023 13:26 GMT**
Telephone: **0115 924 1100**
Company: **BWB Consulting Ltd**

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification:

-

Course

Hazardous Waste Classification

Date

-

Purpose of classification

2 - Material Characterisation

Address of the waste

Plot R Kingsway Business Park, Rochdale

Post Code N/A

SIC for the process giving rise to the waste

41201 Construction of commercial buildings

Description of industry/producer giving rise to the waste

Development of site for commercial buildings

Description of the specific process, sub-process and/or activity that created the waste

Waste created during construction of foundations and drainage.

Description of the waste

Made ground and natural soils

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	TP01	0.10-0.20	Non Hazardous		3
2	TP02	0.10-0.20	Non Hazardous		6
3	TP03	0.10-0.20	Non Hazardous		9
4	TP04	0.10-0.20	Non Hazardous		12
5	BH01	0.20-0.30	Non Hazardous		15
6	BH02	0.10-0.20	Non Hazardous		18
7	BH02[2]	2.30-2.40	Non Hazardous		21
8	BH02[3]	2.50-2.60	Non Hazardous		23

Related documents

#	Name	Description
1	BWB Contaminated Land Suite WM3	waste stream template used to create this Job

Report

Created by: Timothy Hull

Created date: 04 Aug 2023 13:26 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	25
Appendix B: Rationale for selection of metal species	26
Appendix C: Version	27

Classification of sample: TP01

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
TP01	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.10-0.20 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
18%	
(no correction)	

Hazard properties

None identified

Determinands

Moisture content: 18% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	confirm TPH has NOT arisen from diesel or petrol				☒						
2	arsenic { arsenic trioxide }				130 mg/kg	1.32	171.642 mg/kg		0.0172 %		
	033-003-00-0	215-481-4	1327-53-3								
3	beryllium { beryllium oxide }				9 mg/kg	2.775	24.978 mg/kg		0.0025 %		
	004-003-00-8	215-133-1	1304-56-9								
4	boron { boron tribromide/trichloride/trifluoride (combined) }				0.4 mg/kg	13.43	5.372 mg/kg		0.000537 %		
			10294-33-4, 10294-34-5, 7637-07-2								
5	cadmium { cadmium sulfide }			1	<0.2 mg/kg	1.285	<0.257 mg/kg		<0.00002 %		<LOD
	048-010-00-4	215-147-8	1306-23-6								
6	chromium { chromium(III) oxide (worst case) }				41 mg/kg	1.462	59.924 mg/kg		0.00599 %		
		215-160-9	1308-38-9								
7	copper { dicopper oxide; copper (I) oxide }				260 mg/kg	1.126	292.731 mg/kg		0.0293 %		
	029-002-00-X	215-270-7	1317-39-1								
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	220 mg/kg		220 mg/kg		0.022 %		
	082-001-00-6										
9	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg		<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7								
10	nickel { nickel dihydroxide }				100 mg/kg	1.579	157.95 mg/kg		0.0158 %		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg		<0.000141 %		<LOD
	034-002-00-8										
12	zinc { zinc sulphate }				230 mg/kg	2.469	567.938 mg/kg		0.0568 %		
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
13	pH				6.6 pH		6.6 pH		6.6 pH		
			PH								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
14	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
	006-007-00-5									
15	TPH (C6 to C40) petroleum group				27 mg/kg		27 mg/kg	0.0027 %		
			TPH							
16	benzene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
17	ethylbenzene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
18	toluene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
19	xylene				<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
20	acenaphthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9							
21	acenaphthylene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8							
22	anthracene				0.07 mg/kg		0.07 mg/kg	0.000007 %		
		204-371-1	120-12-7							
23	benzo[a]anthracene				0.3 mg/kg		0.3 mg/kg	0.00003 %		
	601-033-00-9	200-280-6	56-55-3							
24	benzo[a]pyrene; benzo[def]chrysene				0.24 mg/kg		0.24 mg/kg	0.000024 %		
	601-032-00-3	200-028-5	50-32-8							
25	benzo[b]fluoranthene				0.38 mg/kg		0.38 mg/kg	0.000038 %		
	601-034-00-4	205-911-9	205-99-2							
26	benzo[ghi]perylene				0.19 mg/kg		0.19 mg/kg	0.000019 %		
		205-883-8	191-24-2							
27	benzo[k]fluoranthene				0.16 mg/kg		0.16 mg/kg	0.000016 %		
	601-036-00-5	205-916-6	207-08-9							
28	chrysene				0.34 mg/kg		0.34 mg/kg	0.000034 %		
	601-048-00-0	205-923-4	218-01-9							
29	dibenz[a,h]anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
30	fluoranthene				0.51 mg/kg		0.51 mg/kg	0.000051 %		
		205-912-4	206-44-0							
31	fluorene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7							
32	indeno[123-cd]pyrene				0.17 mg/kg		0.17 mg/kg	0.000017 %		
		205-893-2	193-39-5							
33	naphthalene				0.15 mg/kg		0.15 mg/kg	0.000015 %		
	601-052-00-2	202-049-5	91-20-3							
34	phenanthrene				0.39 mg/kg		0.39 mg/kg	0.000039 %		
		201-581-5	85-01-8							
35	pyrene				0.44 mg/kg		0.44 mg/kg	0.000044 %		
		204-927-3	129-00-0							
36	phenol				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
Total:								0.154 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Trace levels of longer chain hydrocarbons. No volatility risk

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0027%)

Classification of sample: TP02

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
TP02	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.10-0.20 m	
Moisture content:	
17%	
(no correction)	

Hazard properties

None identified

Determinands

Moisture content: 17% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	confirm TPH has NOT arisen from diesel or petrol				☑						
2	arsenic { arsenic trioxide }				17 mg/kg	1.32	22.446 mg/kg		0.00224 %		
	033-003-00-0	215-481-4	1327-53-3								
3	beryllium { beryllium oxide }				0.91 mg/kg	2.775	2.526 mg/kg		0.000253 %		
	004-003-00-8	215-133-1	1304-56-9								
4	boron { boron tribromide/trichloride/trifluoride (combined) }				0.7 mg/kg	13.43	9.401 mg/kg		0.00094 %		
			10294-33-4, 10294-34-5, 7637-07-2								
5	cadmium { cadmium sulfide }			1	<0.2 mg/kg	1.285	<0.257 mg/kg		<0.00002 %		<LOD
	048-010-00-4	215-147-8	1306-23-6								
6	chromium { chromium(III) oxide (worst case) }				18 mg/kg	1.462	26.308 mg/kg		0.00263 %		
		215-160-9	1308-38-9								
7	copper { dicopper oxide; copper (I) oxide }				41 mg/kg	1.126	46.161 mg/kg		0.00462 %		
	029-002-00-X	215-270-7	1317-39-1								
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	70 mg/kg		70 mg/kg		0.007 %		
	082-001-00-6										
9	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg		<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7								
10	nickel { nickel dihydroxide }				16 mg/kg	1.579	25.272 mg/kg		0.00253 %		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg		<0.000141 %		<LOD
	034-002-00-8										
12	zinc { zinc sulphate }				68 mg/kg	2.469	167.912 mg/kg		0.0168 %		
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
13	pH				4.9 pH		4.9 pH		4.9 pH		
			PH								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
14	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg		<0.000188 %		<LOD
	006-007-00-5										
15	TPH (C6 to C40) petroleum group				14 mg/kg		14 mg/kg		0.0014 %		
			TPH								
16	acenaphthene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		201-469-6	83-32-9								
17	acenaphthylene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		205-917-1	208-96-8								
18	anthracene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		204-371-1	120-12-7								
19	benzo[a]anthracene				0.11 mg/kg		0.11 mg/kg		0.000011 %		
	601-033-00-9	200-280-6	56-55-3								
20	benzo[a]pyrene; benzo[def]chrysene				0.12 mg/kg		0.12 mg/kg		0.000012 %		
	601-032-00-3	200-028-5	50-32-8								
21	benzo[b]fluoranthene				0.18 mg/kg		0.18 mg/kg		0.000018 %		
	601-034-00-4	205-911-9	205-99-2								
22	benzo[ghi]perylene				0.09 mg/kg		0.09 mg/kg		0.000009 %		
		205-883-8	191-24-2								
23	benzo[k]fluoranthene				0.06 mg/kg		0.06 mg/kg		0.000006 %		
	601-036-00-5	205-916-6	207-08-9								
24	chrysene				0.14 mg/kg		0.14 mg/kg		0.000014 %		
	601-048-00-0	205-923-4	218-01-9								
25	dibenz[a,h]anthracene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3								
26	fluoranthene				0.21 mg/kg		0.21 mg/kg		0.000021 %		
		205-912-4	206-44-0								
27	fluorene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		201-695-5	86-73-7								
28	indeno[123-cd]pyrene				0.06 mg/kg		0.06 mg/kg		0.000006 %		
		205-893-2	193-39-5								
29	naphthalene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3								
30	phenanthrene				0.15 mg/kg		0.15 mg/kg		0.000015 %		
		201-581-5	85-01-8								
31	pyrene				0.22 mg/kg		0.22 mg/kg		0.000022 %		
		204-927-3	129-00-0								
32	phenol				1.7 mg/kg		1.7 mg/kg		0.00017 %		
	604-001-00-2	203-632-7	108-95-2								
Total:									0.0391 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Trace levels of longer chain hydrocarbons. No volatility risk

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."



CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

HazWasteOnline™

Report created by Timothy Hull on 04 Aug 2023

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0014%)

Classification of sample: TP03

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
TP03	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.10-0.20 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
14%	
(no correction)	

Hazard properties

None identified

Determinands

Moisture content: 14% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	confirm TPH has NOT arisen from diesel or petrol				☑						
2	arsenic { arsenic trioxide }				120 mg/kg	1.32	158.439 mg/kg		0.0158 %		
	033-003-00-0	215-481-4	1327-53-3								
3	beryllium { beryllium oxide }				7.8 mg/kg	2.775	21.648 mg/kg		0.00216 %		
	004-003-00-8	215-133-1	1304-56-9								
4	boron { boron tribromide/trichloride/trifluoride (combined) }				0.8 mg/kg	13.43	10.744 mg/kg		0.00107 %		
			10294-33-4, 10294-34-5, 7637-07-2								
5	cadmium { cadmium sulfide }			1	<0.2 mg/kg	1.285	<0.257 mg/kg		<0.00002 %		<LOD
	048-010-00-4	215-147-8	1306-23-6								
6	chromium { chromium(III) oxide (worst case) }				40 mg/kg	1.462	58.462 mg/kg		0.00585 %		
		215-160-9	1308-38-9								
7	copper { dicopper oxide; copper (I) oxide }				270 mg/kg	1.126	303.99 mg/kg		0.0304 %		
	029-002-00-X	215-270-7	1317-39-1								
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	360 mg/kg		360 mg/kg		0.036 %		
	082-001-00-6										
9	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg		<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7								
10	nickel { nickel dihydroxide }				100 mg/kg	1.579	157.95 mg/kg		0.0158 %		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg		<0.000141 %		<LOD
	034-002-00-8										
12	zinc { zinc sulphate }				270 mg/kg	2.469	666.71 mg/kg		0.0667 %		
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
13	pH				7.8 pH		7.8 pH		7.8 pH		
			PH								

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
14		cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
15		TPH (C6 to C40) petroleum group				75	mg/kg		75	mg/kg	0.0075 %		
				TPH									
16		acenaphthene				0.32	mg/kg		0.32	mg/kg	0.000032 %		
			201-469-6	83-32-9									
17		acenaphthylene				0.09	mg/kg		0.09	mg/kg	0.000009 %		
			205-917-1	208-96-8									
18		anthracene				0.55	mg/kg		0.55	mg/kg	0.000055 %		
			204-371-1	120-12-7									
19		benzo[a]anthracene				2.1	mg/kg		2.1	mg/kg	0.00021 %		
		601-033-00-9	200-280-6	56-55-3									
20		benzo[a]pyrene; benzo[def]chrysene				1.9	mg/kg		1.9	mg/kg	0.00019 %		
		601-032-00-3	200-028-5	50-32-8									
21		benzo[b]fluoranthene				2.3	mg/kg		2.3	mg/kg	0.00023 %		
		601-034-00-4	205-911-9	205-99-2									
22		benzo[ghi]perylene				1.3	mg/kg		1.3	mg/kg	0.00013 %		
			205-883-8	191-24-2									
23		benzo[k]fluoranthene				1.1	mg/kg		1.1	mg/kg	0.00011 %		
		601-036-00-5	205-916-6	207-08-9									
24		chrysene				2.2	mg/kg		2.2	mg/kg	0.00022 %		
		601-048-00-0	205-923-4	218-01-9									
25		dibenz[a,h]anthracene				0.23	mg/kg		0.23	mg/kg	0.000023 %		
		601-041-00-2	200-181-8	53-70-3									
26		fluoranthene				5	mg/kg		5	mg/kg	0.0005 %		
			205-912-4	206-44-0									
27		fluorene				0.23	mg/kg		0.23	mg/kg	0.000023 %		
			201-695-5	86-73-7									
28		indeno[123-cd]pyrene				1.2	mg/kg		1.2	mg/kg	0.00012 %		
			205-893-2	193-39-5									
29		naphthalene				0.4	mg/kg		0.4	mg/kg	0.00004 %		
		601-052-00-2	202-049-5	91-20-3									
30		phenanthrene				3.6	mg/kg		3.6	mg/kg	0.00036 %		
			201-581-5	85-01-8									
31		pyrene				4.5	mg/kg		4.5	mg/kg	0.00045 %		
			204-927-3	129-00-0									
32		phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
Total:												0.184 %	

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and ≤ 75°C"

Force this Hazardous property to non hazardous because Trace levels of longer chain hydrocarbons. No volatility risk

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0075%)

Classification of sample: TP04

 **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
TP04	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.10-0.20 m	
Moisture content:	
14%	
(no correction)	

Hazard properties

None identified

Determinands

Moisture content: 14% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	confirm TPH has NOT arisen from diesel or petrol				☒						
2	arsenic { arsenic trioxide }				15 mg/kg	1.32	19.805 mg/kg	0.00198 %			
	033-003-00-0	215-481-4	1327-53-3								
3	beryllium { beryllium oxide }				0.79 mg/kg	2.775	2.193 mg/kg	0.000219 %			
	004-003-00-8	215-133-1	1304-56-9								
4	boron { boron tribromide/trichloride/trifluoride (combined) }				0.7 mg/kg	13.43	9.401 mg/kg	0.00094 %			
			10294-33-4, 10294-34-5, 7637-07-2								
5	cadmium { cadmium sulfide }			1	<0.2 mg/kg	1.285	<0.257 mg/kg	<0.00002 %			<LOD
	048-010-00-4	215-147-8	1306-23-6								
6	chromium { chromium(III) oxide (worst case) }				18 mg/kg	1.462	26.308 mg/kg	0.00263 %			
		215-160-9	1308-38-9								
7	copper { dicopper oxide; copper (I) oxide }				39 mg/kg	1.126	43.91 mg/kg	0.00439 %			
	029-002-00-X	215-270-7	1317-39-1								
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	70 mg/kg		70 mg/kg	0.007 %			
	082-001-00-6										
9	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
10	nickel { nickel dihydroxide }				16 mg/kg	1.579	25.272 mg/kg	0.00253 %			
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %			<LOD
	034-002-00-8										
12	zinc { zinc sulphate }				74 mg/kg	2.469	182.728 mg/kg	0.0183 %			
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
13	pH				7.3 pH		7.3 pH	7.3 pH			
			PH								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
14	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg		<0.000188 %		<LOD
	006-007-00-5										
15	TPH (C6 to C40) petroleum group				14 mg/kg		14 mg/kg		0.0014 %		
			TPH								
16	acenaphthene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		201-469-6	83-32-9								
17	acenaphthylene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		205-917-1	208-96-8								
18	anthracene				0.09 mg/kg		0.09 mg/kg		0.000009 %		
		204-371-1	120-12-7								
19	benzo[a]anthracene				0.35 mg/kg		0.35 mg/kg		0.000035 %		
	601-033-00-9	200-280-6	56-55-3								
20	benzo[a]pyrene; benzo[def]chrysene				0.36 mg/kg		0.36 mg/kg		0.000036 %		
	601-032-00-3	200-028-5	50-32-8								
21	benzo[b]fluoranthene				0.48 mg/kg		0.48 mg/kg		0.000048 %		
	601-034-00-4	205-911-9	205-99-2								
22	benzo[ghi]perylene				0.24 mg/kg		0.24 mg/kg		0.000024 %		
		205-883-8	191-24-2								
23	benzo[k]fluoranthene				0.17 mg/kg		0.17 mg/kg		0.000017 %		
	601-036-00-5	205-916-6	207-08-9								
24	chrysene				0.43 mg/kg		0.43 mg/kg		0.000043 %		
	601-048-00-0	205-923-4	218-01-9								
25	dibenz[a,h]anthracene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3								
26	fluoranthene				0.72 mg/kg		0.72 mg/kg		0.000072 %		
		205-912-4	206-44-0								
27	fluorene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		201-695-5	86-73-7								
28	indeno[123-cd]pyrene				0.17 mg/kg		0.17 mg/kg		0.000017 %		
		205-893-2	193-39-5								
29	naphthalene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3								
30	phenanthrene				0.45 mg/kg		0.45 mg/kg		0.000045 %		
		201-581-5	85-01-8								
31	pyrene				0.7 mg/kg		0.7 mg/kg		0.00007 %		
		204-927-3	129-00-0								
32	phenol				<1 mg/kg		<1 mg/kg		<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2								
Total:									0.0403 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Trace levels of longer chain hydrocarbons. No volatility risk

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."



CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

HazWasteOnline™

Report created by Timothy Hull on 04 Aug 2023

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0014%)

Classification of sample: BH01

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
BH01	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.20-0.30 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
12%	
(no correction)	

Hazard properties

None identified

Determinands

Moisture content: 12% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	confirm TPH has NOT arisen from diesel or petrol				☒						
2	arsenic { arsenic trioxide }				11 mg/kg	1.32	14.524 mg/kg		0.00145 %		
	033-003-00-0	215-481-4	1327-53-3								
3	beryllium { beryllium oxide }				0.66 mg/kg	2.775	1.832 mg/kg		0.000183 %		
	004-003-00-8	215-133-1	1304-56-9								
4	boron { boron tribromide/trichloride/trifluoride (combined) }				0.4 mg/kg	13.43	5.372 mg/kg		0.000537 %		
			10294-33-4, 10294-34-5, 7637-07-2								
5	cadmium { cadmium sulfide }			1	<0.2 mg/kg	1.285	<0.257 mg/kg		<0.00002 %		<LOD
	048-010-00-4	215-147-8	1306-23-6								
6	chromium { chromium(III) oxide (worst case) }				15 mg/kg	1.462	21.923 mg/kg		0.00219 %		
		215-160-9	1308-38-9								
7	copper { dicopper oxide; copper (I) oxide }				31 mg/kg	1.126	34.903 mg/kg		0.00349 %		
	029-002-00-X	215-270-7	1317-39-1								
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	57 mg/kg		57 mg/kg		0.0057 %		
	082-001-00-6										
9	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg		<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7								
10	nickel { nickel dihydroxide }				14 mg/kg	1.579	22.113 mg/kg		0.00221 %		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg		<0.000141 %		<LOD
	034-002-00-8										
12	zinc { zinc sulphate }				61 mg/kg	2.469	150.627 mg/kg		0.0151 %		
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
13	pH				8.5 pH		8.5 pH		8.5 pH		
			PH								

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number								
14		cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD	
		006-007-00-5										
15		TPH (C6 to C40) petroleum group				72 mg/kg		72 mg/kg	0.0072 %			
				TPH								
16		acenaphthene				0.64 mg/kg		0.64 mg/kg	0.000064 %			
			201-469-6	83-32-9								
17		acenaphthylene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD	
			205-917-1	208-96-8								
18		anthracene				0.95 mg/kg		0.95 mg/kg	0.000095 %			
			204-371-1	120-12-7								
19		benzo[a]anthracene				1.6 mg/kg		1.6 mg/kg	0.00016 %			
		601-033-00-9	200-280-6	56-55-3								
20		benzo[a]pyrene; benzo[def]chrysene				1.7 mg/kg		1.7 mg/kg	0.00017 %			
		601-032-00-3	200-028-5	50-32-8								
21		benzo[b]fluoranthene				2 mg/kg		2 mg/kg	0.0002 %			
		601-034-00-4	205-911-9	205-99-2								
22		benzo[ghi]perylene				1 mg/kg		1 mg/kg	0.0001 %			
			205-883-8	191-24-2								
23		benzo[k]fluoranthene				0.65 mg/kg		0.65 mg/kg	0.000065 %			
		601-036-00-5	205-916-6	207-08-9								
24		chrysene				1.9 mg/kg		1.9 mg/kg	0.00019 %			
		601-048-00-0	205-923-4	218-01-9								
25		dibenz[a,h]anthracene				0.18 mg/kg		0.18 mg/kg	0.000018 %			
		601-041-00-2	200-181-8	53-70-3								
26		fluoranthene				4.2 mg/kg		4.2 mg/kg	0.00042 %			
			205-912-4	206-44-0								
27		fluorene				0.49 mg/kg		0.49 mg/kg	0.000049 %			
			201-695-5	86-73-7								
28		indeno[123-cd]pyrene				0.91 mg/kg		0.91 mg/kg	0.000091 %			
			205-893-2	193-39-5								
29		naphthalene				1.3 mg/kg		1.3 mg/kg	0.00013 %			
		601-052-00-2	202-049-5	91-20-3								
30		phenanthrene				4 mg/kg		4 mg/kg	0.0004 %			
			201-581-5	85-01-8								
31		pyrene				4 mg/kg		4 mg/kg	0.0004 %			
			204-927-3	129-00-0								
32		phenol				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD	
		604-001-00-2	203-632-7	108-95-2								
Total:									0.0411 %			

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and ≤ 75°C"

Force this Hazardous property to non hazardous because Trace levels of longer chain hydrocarbons. No volatility risk

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."



CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

HazWasteOnline™

Report created by Timothy Hull on 04 Aug 2023

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0072%)

Classification of sample: BH02



Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
BH02	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.10-0.20 m	
Moisture content:	
17%	
(no correction)	

Hazard properties

None identified

Determinands

Moisture content: 17% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	confirm TPH has NOT arisen from diesel or petrol				☒						
2	arsenic { arsenic trioxide }				8.6 mg/kg	1.32	11.355 mg/kg	0.00114 %			
	033-003-00-0	215-481-4	1327-53-3								
3	beryllium { beryllium oxide }				0.95 mg/kg	2.775	2.637 mg/kg	0.000264 %			
	004-003-00-8	215-133-1	1304-56-9								
4	boron { boron tribromide/trichloride/trifluoride (combined) }				0.3 mg/kg	13.43	4.029 mg/kg	0.000403 %			
			10294-33-4, 10294-34-5, 7637-07-2								
5	cadmium { cadmium sulfide }			1	<0.2 mg/kg	1.285	<0.257 mg/kg	<0.00002 %			<LOD
	048-010-00-4	215-147-8	1306-23-6								
6	chromium { chromium(III) oxide (worst case) }				21 mg/kg	1.462	30.693 mg/kg	0.00307 %			
		215-160-9	1308-38-9								
7	copper { dicopper oxide; copper (I) oxide }				29 mg/kg	1.126	32.651 mg/kg	0.00327 %			
	029-002-00-X	215-270-7	1317-39-1								
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	25 mg/kg		25 mg/kg	0.0025 %			
	082-001-00-6										
9	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
10	nickel { nickel dihydroxide }				26 mg/kg	1.579	41.067 mg/kg	0.00411 %			
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %			<LOD
	034-002-00-8										
12	zinc { zinc sulphate }				66 mg/kg	2.469	162.974 mg/kg	0.0163 %			
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
13	pH				7.5 pH		7.5 pH	7.5 pH			
			PH								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
14	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg		<0.000188 %		<LOD
	006-007-00-5										
15	TPH (C6 to C40) petroleum group				20 mg/kg		20 mg/kg		0.002 %		
			TPH								
16	benzene				<0.005 mg/kg		<0.005 mg/kg		<0.0000005 %		<LOD
	601-020-00-8	200-753-7	71-43-2								
17	ethylbenzene				<0.005 mg/kg		<0.005 mg/kg		<0.0000005 %		<LOD
	601-023-00-4	202-849-4	100-41-4								
18	toluene				<0.005 mg/kg		<0.005 mg/kg		<0.0000005 %		<LOD
	601-021-00-3	203-625-9	108-88-3								
19	xylene				<0.005 mg/kg		<0.005 mg/kg		<0.0000005 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]								
20	acenaphthene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		201-469-6	83-32-9								
21	acenaphthylene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		205-917-1	208-96-8								
22	anthracene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		204-371-1	120-12-7								
23	benzo[a]anthracene				0.07 mg/kg		0.07 mg/kg		0.000007 %		
	601-033-00-9	200-280-6	56-55-3								
24	benzo[a]pyrene; benzo[def]chrysene				0.05 mg/kg		0.05 mg/kg		0.000005 %		
	601-032-00-3	200-028-5	50-32-8								
25	benzo[b]fluoranthene				0.09 mg/kg		0.09 mg/kg		0.000009 %		
	601-034-00-4	205-911-9	205-99-2								
26	benzo[ghi]perylene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		205-883-8	191-24-2								
27	benzo[k]fluoranthene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
	601-036-00-5	205-916-6	207-08-9								
28	chrysene				0.11 mg/kg		0.11 mg/kg		0.000011 %		
	601-048-00-0	205-923-4	218-01-9								
29	dibenz[a,h]anthracene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3								
30	fluoranthene				0.2 mg/kg		0.2 mg/kg		0.00002 %		
		205-912-4	206-44-0								
31	fluorene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		201-695-5	86-73-7								
32	indeno[123-cd]pyrene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
		205-893-2	193-39-5								
33	naphthalene				<0.05 mg/kg		<0.05 mg/kg		<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3								
34	phenanthrene				0.17 mg/kg		0.17 mg/kg		0.000017 %		
		201-581-5	85-01-8								
35	pyrene				0.2 mg/kg		0.2 mg/kg		0.00002 %		
		204-927-3	129-00-0								
36	phenol				<1 mg/kg		<1 mg/kg		<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2								
Total:									0.0337 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Trace levels of longer chain hydrocarbons. No volatility risk

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.002%)

Classification of sample: BH02[2]

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
BH02[2]	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
2.30-2.40 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
21%	
(no correction)	

Hazard properties

None identified

Determinands

Moisture content: 21% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	confirm TPH has NOT arisen from diesel or petrol				☑						
2	arsenic { arsenic trioxide }				11 mg/kg	1.32	14.524 mg/kg		0.00145 %		
	033-003-00-0	215-481-4	1327-53-3								
3	beryllium { beryllium oxide }				0.93 mg/kg	2.775	2.581 mg/kg		0.000258 %		
	004-003-00-8	215-133-1	1304-56-9								
4	boron { boron tribromide/trichloride/trifluoride (combined) }				0.4 mg/kg	13.43	5.372 mg/kg		0.000537 %		
			10294-33-4, 10294-34-5, 7637-07-2								
5	cadmium { cadmium sulfide }			1	<0.2 mg/kg	1.285	<0.257 mg/kg		<0.00002 %		<LOD
	048-010-00-4	215-147-8	1306-23-6								
6	chromium { chromium(III) oxide (worst case) }				21 mg/kg	1.462	30.693 mg/kg		0.00307 %		
		215-160-9	1308-38-9								
7	copper { dicopper oxide; copper (I) oxide }				30 mg/kg	1.126	33.777 mg/kg		0.00338 %		
	029-002-00-X	215-270-7	1317-39-1								
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	39 mg/kg		39 mg/kg		0.0039 %		
	082-001-00-6										
9	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg		<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7								
10	nickel { nickel dihydroxide }				22 mg/kg	1.579	34.749 mg/kg		0.00347 %		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg		<0.000141 %		<LOD
	034-002-00-8										
12	zinc { zinc sulphate }				62 mg/kg	2.469	153.096 mg/kg		0.0153 %		
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
13	pH				7 pH		7 pH		7pH		
			PH								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
14	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
	006-007-00-5									
15	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
			TPH							
16	acenaphthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9							
17	acenaphthylene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8							
18	anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		204-371-1	120-12-7							
19	benzo[a]anthracene				0.22 mg/kg		0.22 mg/kg	0.000022 %		
	601-033-00-9	200-280-6	56-55-3							
20	benzo[a]pyrene; benzo[def]chrysene				0.23 mg/kg		0.23 mg/kg	0.000023 %		
	601-032-00-3	200-028-5	50-32-8							
21	benzo[b]fluoranthene				0.37 mg/kg		0.37 mg/kg	0.000037 %		
	601-034-00-4	205-911-9	205-99-2							
22	benzo[ghi]perylene				0.17 mg/kg		0.17 mg/kg	0.000017 %		
		205-883-8	191-24-2							
23	benzo[k]fluoranthene				0.08 mg/kg		0.08 mg/kg	0.000008 %		
	601-036-00-5	205-916-6	207-08-9							
24	chrysene				0.27 mg/kg		0.27 mg/kg	0.000027 %		
	601-048-00-0	205-923-4	218-01-9							
25	dibenz[a,h]anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
26	fluoranthene				0.45 mg/kg		0.45 mg/kg	0.000045 %		
		205-912-4	206-44-0							
27	fluorene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7							
28	indeno[123-cd]pyrene				0.15 mg/kg		0.15 mg/kg	0.000015 %		
		205-893-2	193-39-5							
29	naphthalene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
30	phenanthrene				0.22 mg/kg		0.22 mg/kg	0.000022 %		
		201-581-5	85-01-8							
31	pyrene				0.4 mg/kg		0.4 mg/kg	0.00004 %		
		204-927-3	129-00-0							
32	phenol				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
Total:								0.0332 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH02[3]

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
BH02[3]	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
2.50-2.60 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
15%	
(no correction)	

Hazard properties

None identified

Determinands

Moisture content: 15% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	confirm TPH has NOT arisen from diesel or petrol				☑						
2	arsenic { arsenic trioxide }				6.7 mg/kg	1.32	8.846 mg/kg	0.000885 %			
	033-003-00-0	215-481-4	1327-53-3								
3	beryllium { beryllium oxide }				0.98 mg/kg	2.775	2.72 mg/kg	0.000272 %			
	004-003-00-8	215-133-1	1304-56-9								
4	boron { boron tribromide/trichloride/trifluoride (combined) }				<0.2 mg/kg	13.43	<2.686 mg/kg	<0.000269 %			<LOD
			10294-33-4, 10294-34-5, 7637-07-2								
5	cadmium { cadmium sulfide }			1	<0.2 mg/kg	1.285	<0.257 mg/kg	<0.00002 %			<LOD
	048-010-00-4	215-147-8	1306-23-6								
6	chromium { chromium(III) oxide (worst case) }				25 mg/kg	1.462	36.539 mg/kg	0.00365 %			
		215-160-9	1308-38-9								
7	copper { dicopper oxide; copper (I) oxide }				27 mg/kg	1.126	30.399 mg/kg	0.00304 %			
	029-002-00-X	215-270-7	1317-39-1								
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	14 mg/kg		14 mg/kg	0.0014 %			
	082-001-00-6										
9	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
10	nickel { nickel dihydroxide }				18 mg/kg	1.579	28.431 mg/kg	0.00284 %			
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %			<LOD
	034-002-00-8										
12	zinc { zinc sulphate }				37 mg/kg	2.469	91.364 mg/kg	0.00914 %			
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
13	pH				4.7 pH		4.7 pH	4.7 pH			
			PH								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
14	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
	006-007-00-5									
15	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
			TPH							
16	acenaphthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9							
17	acenaphthylene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8							
18	anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		204-371-1	120-12-7							
19	benzo[a]anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-033-00-9	200-280-6	56-55-3							
20	benzo[a]pyrene; benzo[def]chrysene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
21	benzo[b]fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-034-00-4	205-911-9	205-99-2							
22	benzo[ghi]perylene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-883-8	191-24-2							
23	benzo[k]fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-036-00-5	205-916-6	207-08-9							
24	chrysene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-048-00-0	205-923-4	218-01-9							
25	dibenz[a,h]anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
26	fluoranthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0							
27	fluorene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7							
28	indeno[123-cd]pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5							
29	naphthalene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
30	phenanthrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8							
31	pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0							
32	phenol				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
Total:								0.0231 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non GB MCL determinands

confirm TPH has NOT arisen from diesel or petrol

Description/Comments: Chapter 3, section 4b requires a positive confirmation for benzo[a]pyrene to be used as a marker in evaluating Carc. 1B; H350 (HP 7) and Muta. 1B; H340 (HP 11)
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

boron tribromide/trichloride/trifluoride (combined) (CAS Number: 10294-33-4, 10294-34-5, 7637-07-2)

Description/Comments: Combines the hazard statements and the average of the conversion factors for boron tribromide, boron trichloride and boron trifluoride
Data source: N/A
Data source date: 06 Aug 2015
Hazard Statements: EUH014, Acute Tox. 2; H330, Acute Tox. 2; H300, Skin Corr. 1A; H314, Skin Corr. 1B; H314

chromium(III) oxide (worst case) (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: <https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806>
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332, Acute Tox. 4; H302, Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Resp. Sens. 1; H334, Skin Sens. 1; H317, Repr. 1B; H360FD, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

lead compounds with the exception of those specified elsewhere in this Annex (worst case)

GB MCL index number: 082-001-00-6
Description/Comments: Worst Case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following MCL protocols, considers lead compounds from smelting industries, flue dust and similar to be Carcinogenic category 1A
Additional Hazard Statement(s): Carc. 1A; H350
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 1A; H350 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html (worst case lead compounds). Review date 29/09/2015

pH (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex

GB MCL index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
20 Nov 2021 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

TPH (C6 to C40) petroleum group (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226, Asp. Tox. 1; H304, STOT RE 2; H373, Muta. 1B; H340, Carc. 1B; H350, Repr. 2; H361d, Aquatic Chronic 2; H411

ethylbenzene (EC Number: 202-849-4, CAS Number: 100-41-4)

GB MCL index number: 601-023-00-4
Description/Comments:
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Aquatic Acute 1; H400, Aquatic Chronic 1; H410, Aquatic Chronic 2; H411

■ **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

■ **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

■ **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

■ **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

■ **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case species based on risk phrases

beryllium {beryllium oxide}

Worst case species based on risk phrases

boron {boron tribromide/trichloride/trifluoride (combined)}

Worst case species based on risk phrases

cadmium {cadmium sulfide}

Worst case species based on risk phrases

chromium {chromium(III) oxide (worst case)}

Chromium VI not detected

copper {dicopper oxide; copper (I) oxide}

Most likely common species

lead {lead compounds with the exception of those specified elsewhere in this Annex (worst case)}

Chromium VI not detected

mercury {mercury dichloride}

Worst case species based on risk phrases

nickel {nickel dihydroxide}

Worst case species based on risk phrases

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Worst case species based on risk phrases

zinc {zinc sulphate}

Chromium VI not detected

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Worst case species

Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.2.GB - Oct 2021**

HazWasteOnline Classification Engine Version: 2023.208.5698.10490 (27 Jul 2023)

HazWasteOnline Database: 2023.208.5698.10490 (27 Jul 2023)

This classification utilises the following guidance and legislation:

WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

2nd ATP - Regulation 286/2011/EC of 10 March 2011

3rd ATP - Regulation 618/2012/EU of 10 July 2012

4th ATP - Regulation 487/2013/EU of 8 May 2013

Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017

13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

14th ATP - Regulation (EU) 2020/217 of 4 October 2019

15th ATP - Regulation (EU) 2020/1182 of 19 May 2020

The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit)

Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020

The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020

GB MCL List - version 1.1 of 09 June 2021

