



**BROWNFIELD
SOLUTIONS LTD**

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

EMPIRIC (MANCHESTER VICTORIA POINT) LTD

Victoria Point, Manchester

Phase II Geo-Environmental Assessment Report

OS/C5515/12691 Rev B

February 2024

EXECUTIVE SUMMARY	
Ground Conditions	Generalised ground conditions from the ground investigation comprise (top down): • Made ground generally comprising Asphalt, concrete, gravelly sand and sandy gravelly clay from ground level to between 0.40 to 4.15m bgl. • Natural superficial deposits comprising firm to stiff gravelly clay with varying amounts of silt, sand and mudstone proven to depths of between 1.20m and 17.60m bgl. • Solid geology of Chester Formation was encountered between depths of 16.50m and 27.00m bgl. • No groundwater was encountered in shallow boreholes during drilling. Groundwater was encountered in rotary boreholes only during site works at depths from 11.00m and 19.50m bgl; and 25.78m to 34.34m AOD. Perched groundwater recorded in shallow monitoring wells was recorded between 1.25m and 3.41m bgl.
Human Health - Soils Contamination	Testing on soils and comparison against the relevant screening criteria has revealed: • Elevated Benzo(a)pyrene The above pose a risk to human health and require mitigation. Asbestos was detected in one location in the initial site investigation but further investigation did not identify asbestos and therefore this is assumed to have been remediated by virtue of the sampling exercise. The risk was considered to be low, but a watching brief for ACMs should be maintained. Should they be identified further assessment will be required.
Controlled Waters – Surface and Groundwater Contamination	The risk to controlled waters are considered to be low and no further action is required.
Ground Gas	Based on the monitoring, the site is classified as CS1—protection is not required.
Outline Remedial Strategy	Subject to regulatory approval, the following outline remedial strategy is recommended: • Cover system with 450mm thick of 'clean' validated topsoil/subsoil in soft landscaping areas local to SA02. • Verification of the above with validation reports produced.
Waste	Made ground –classified as non-hazardous. Natural – classified as non-hazardous.
Foundations and Floor Slabs	Piled foundations are considered the most suitable foundation option. Estimated axial loads for a single pile of 400mm or 600mm diameter have been presented. Ground bearing and suspended floor slabs may be adopted.
Concrete Classification	DS1 AC1 and DS1 AC1s conditions prevail.
Highways Design	Made Ground CBR – 2% Superficial Strata CBR – cohesive/fine soils– 2% Superficial Strata CBR – granular/coarse soils– 5% The above should be confirmed by in-situ testing at formation level by a specialist geotechnical engineer during construction.
Site Drainage	Drainage to soakaways is considered potentially unsuitable for this site. Indicative soil infiltration rates was 1.40×10^{-5}.
Further Work	The following further works will be required to progress to the construction phase: • Demolition/Refurbishment Asbestos survey. • Detailed foundation design by a structural engineer • Design of Remedial Strategy and confirmation with the Local Authority /EA. • Production of Materials Management Plan (MMP) under the CL:AIRE DoWCoP, if required. • Implementation of the Remedial Strategy and verification of the remedial works.

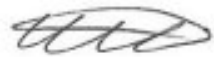
This executive summary should be read in conjunction with the full report, reference OS/C5515/12691 Rev B and not as a standalone document. Report template version 1.5.

PROJECT QUALITY CONTROL DATA SHEET

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DRAWINGS		
Drawing Number	Rev	Title
VICPX-BPA-ZZ-ZZ-SK-A-0071	-	Proposed Development Layout Plan
C5515/01	-	Site Location Plan
C5515/02	-	Site Features Plan
C5515/03	A	Exploratory Hole Location Plan
C5515/04	B	Asbestos Investigation Plan

APPENDICES	
Appendix	Title
Photographs	Site Walkover Photographs
Appendix A	BSL Methodology and Guidance
Appendix B	Exploratory Hole Logs
Appendix C	Chemical Testing Results
Appendix D	Geotechnical Testing Results
Appendix E	Monitoring Results
Appendix F	Waste Assessment Report

1.0 INTRODUCTION

1.1 Context

This report describes a Phase II Geo-Environmental Assessment carried out by Brownfield Solutions Limited (BSL) for Empiric (Manchester Victoria Point) Ltd on a site off Victoria Parks, Manchester and has been completed in general accordance with the following guidance:

-
- Environment Agency guidance - Land Contamination: Risk Management (LCRM).
 - BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites.
 - BS5930: 2015+A1:2020 Code of Practice for Ground Investigations.
 - BS EN 1997-1:2004+A1:2013 Eurocode 7. Geotechnical design. General rules plus UK National Annex.
 - BS EN 1997-2:2007 Eurocode 7 Geotechnical design. Ground investigation and testing plus UK National Annex.
 - NHBC Standards. Chapter 4.1: Land Quality - Managing Ground Conditions.
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Definitions of terms and acronyms used within this report is presented in Section 11.0.

1.2 Proposed Development

The project consists of the redevelopment of existing student accommodation blocks at Victoria Point, Manchester. There are various approaches being considered for the 6 blocks, including lateral and vertical extensions to existing buildings, partial and full demolition works to accommodate new buildings. The site will be retained as a student accommodation area following its redevelopment.

1.3 Previous Reports

The following reports have been produced for the site and should be read in conjunction with this assessment (in date order):

-
- Subsurface Midlands Limited, Ground Investigation Report, ref. M2430, dated June 2004.
 - Entec UK Limited, Geo-Environmental Site Investigation Report for Engineering Works, ref. 0850711 revision B, dated September 2008.
 - AMEC Environment & Infrastructure UK Limited, Interpretative Report, ref. 11324i1, dated July 2011.
 - AMEC Environment & Infrastructure UK Limited, Phase Two Supplementary Site Investigation – Factual Report, ref. 11343i1, dated August 2011.
 - BSL Geo-Environmental Assessment Report, ref. OS/C5515/12598, issued January 2024.
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1.4 Objectives and Scope

The objectives of this report are to determine the geo-environmental setting and ground conditions of the site, highlighting potential risks and areas of concern that may govern the development under the current planning regime.

The factual and interpretive Phase II sections of this report are produced in general accordance with the recommendations for a Tier 2 Generic Quantitative Risk Assessment as described in LCRM guidance. This assessment is also intended to fulfil the requirements of a Ground Investigation Report (GIR) as detailed in BS EN 1997-2:2007.

The ground investigation was also carried out in line with the Preliminary Phase 2 Specification provided to BSL by the client, reference 3124 – Victoria Point – Prelim Phase 2 – Brief (230929). However, it should

be noted that a deviation from section 3 of the scope occurred whereby the point “Assess the capacity of Block 5 foundations for increase in vertical load (typ. Up to 20%)” was not able to be carried out at this time due to the access restrictions to the basement and the nature of the thick concrete encountered there. This was discussed with the client onsite and will be covered in a supplementary ground investigation.

Following the Desk Study, an exploratory intrusive investigation was undertaken to confirm the findings of the preliminary CSM and risk assessment and meet any objectives that had not been satisfied. The exploratory investigation was undertaken using trial pitting, window sampling, rotary drilling, ground gas and groundwater monitoring, laboratory chemical and geotechnical testing, with reporting on the findings.

1.5 Limitations

This assessment has been prepared in accordance with the relevant current legislative framework, guidance and risk assessment methodology as outlined in Appendix A. BSL is not liable for any subsequent changes in the guidance and legislation.

The findings and opinions conveyed via this report are based on information obtained from a number of sources as detailed within this report, BSL have assumed this information is correct and reliable. Nevertheless, BSL cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

BSL have used reasonable skill, care and diligence for the investigation of the site and the production of this report. There may be other conditions prevailing on the site which are outside the scope of work and have not been highlighted by this assessment and therefore have not been considered by this report. Responsibility cannot be accepted for such site conditions not revealed by the assessment.

This report has been prepared for the sole use and reliance of the Client, Empiric (Manchester Victoria Point) Ltd. No other third parties may rely upon or reproduce the contents of this report without the written permission of Brownfield Solutions Ltd (BSL). If any unauthorised third party comes into possession of this report, they rely on it at their own risk and BSL do not owe them any Duty of Care. This report may not be relied upon by the client or submitted to a third party for their reliance for the purposes of valuation, mortgage, insurance and regulatory approval, until all invoices have been settled in full.

The investigation carried out on the site has been conducted to provide the best information on the ground conditions within site access and budgetary constraints. The inherent variation of ground conditions allows only for definition of the actual conditions at the locations and depths of exploratory locations at the time of the investigation. Different ground conditions may exist that have not been identified within this investigation.

The recommendations in this report assume that ground levels will remain as existing, unless stated otherwise within the report. If there is to be any re-profiling (e.g. to create development platforms or flood defences) then the recommendations may not apply.

The groundwater results described are only representative of the dates on which they were recorded, and levels may vary seasonally (e.g. due to changes in weather).

This assessment has been based on the proposed planning layouts provided. Any subsequent change to the planning layout may have an impact on the validity of recommendations made within this report. Furthermore, new information, changed practices or new legislation may necessitate revised interpretation of the report after the date of its submission.

Although every effort has been made to position exploratory holes in the least sensitive areas of the site, exploratory hole positions were located approximately as part of this investigation and no guarantee can be given as to their accuracy. Consideration should be given to the possibility that exploratory holes excavated as part of this investigation and indeed any previous ground investigation work by others may be encountered beneath or within the influence of individual foundations. BSL cannot be held responsible for structural failures caused by the location of foundations of any form of structure within the influence of exploratory holes.

Where it has not been possible to reasonably use an EC7 compliant investigation technique, a practical alternative has been adopted to obtain indicative soil parameters and any interpretation is based upon engineering experience, local precedent where applicable and relevant published information.

The chemical testing carried out for this report was not scoped to comply with the requirements of the water supply company and further work may be required, unless otherwise stated.

Notwithstanding site observations concerning the presence or otherwise of archaeological issues, asbestos-containing materials (ACM) or invasive weeds (e.g. Japanese knotweed), this report does not constitute a formal survey of these potential issues.

Asbestos in structures was not covered in this report. It should be noted that an asbestos demolition survey will be required prior to any demolition of structures. If asbestos is present in soils, these will need to be dealt with in accordance with the Control of Asbestos Regulations (CAR) 2012.

The site plans enclosed in this report should not be scaled off. Any site boundary line depicted on plans does not imply legal ownership of land.

Any recommendations made in this report should be confirmed with the Regulatory Authorities prior to implementation to ensure compliance.

2.0 THE SITE

2.1 Location

The site (approximately centred on the National Grid Ref: 85698 96013) is located in the Victoria Park district of Manchester, M13 0FT, approximately 2.5km south of Manchester City Centre. As shown in Site Location Plan C5515/01.

2.2 Site Description

A site reconnaissance survey was carried out at the site on between the 13th November 2023 and 16th November 2023. The main site features and potential issues identified are detailed below and are shown on the Site Features Plan, Drawing No. C5515/02.

Feature	Description
Site Area	Approximately 1.5 hectares.
Site Access	Access to the site is gained off Hathersage Road to the south.
Current Land Use and Site Features	The site comprises four large, four-storey apartments utilised for student accommodation. Two five-storey apartments utilised for student accommodation are located in the west and south-west of the site. The apartments are interconnected by Bax Road, whilst hard surfaced car parks and open ground with vegetation are situated in between the structures. It is bound to the north by residential structures on Upper West Grove, to the east by residential properties on Brandish Close and Keswick Close, to the south by Victoria Baths situated on Hathersage Road and to the west by Octagon House on Carmoor Road.
Potential Sources of Gross Contamination	There is an electrical substation present in the eastern part of the site. The Victoria Parks public baths are located immediately south of the site location and present is an associated chimney.
Vegetation / Ecology	Soft landscaping (grass) is present between the apartment blocks across the site, sporadic immature trees are present in these areas.
Topography	The site is generally flat however there is an embankment in the northeastern part of the site that slopes down to the south. The hardstanding areas of the site are generally flat, aside from where a number of small vehicular ramps provide access to basement car parking across the site.
Site Boundaries	Brick walls and vegetation enclose the site to the north, east and west. The south of the site is bound by steel palisade fencing.
Surrounding Area	The site is set within a mixed commercial and residential area, bordered by office buildings in the southwest. West of the site is an electrical substation. Residential properties exist to the north and south.

3.0 SUMMARY OF PREVIOUS REPORTS

A summary of the relevant points from the Phase I Geo-Environmental Assessment Report completed by BSL (ref. OS/C5515/12598, dated January 2024) is presented below:

- The site included various previous developments from the date of the first available mapping to present day, including terrace housing in the south-western part of the site and an electricity mains depot in the northern part of the site which extended offsite to the west. An electrical substation is indicated to be onsite from 2009 to present day.
- Historical land use surrounding area has been predominantly mixed commercial and residential, and includes electrical substations, tanks, tramway, a garage and an infilled pond.
- Geology comprises Glacial Till deposits (Diamicton) over Colthurst Sandstone Formation, Halesowen Formation, and Chester Formation.
- A fault is shown in along the north-eastern site boundary which slightly encroaches within the boundary. The fault is trending in a north-west to south-east direction.
- The site lies within the Coal Authority Reporting Area, however, a mining search undertaken revealed no highlighted evidence of mining.
- The nearest watercourse is Gore Brook, located 1100m south of the site.
- The risk to human health is considered to be moderate to low.
- The risk from ground gas is considered to be moderate to low and the site is not located in an area requiring radon protection measures.
- The risk to controlled waters is low.
- A Stage 1 Preliminary UXO Risk Assessment commissioned by BSL detailed a low risk of UXO at the site and a further Detailed UXO Risk Assessment as well as onsite supervision of intrusive works are not required.
- Recommendations were for an appropriate Phase II ground investigation to be carried out to confirm the identified risks and obtain information for preliminary design.

4.0 METHOD OF INVESTIGATION

4.0 Objectives

To confirm the risks to the identified receptors and confirm the ground conditions in respect to the identified geotechnical and geo-environmental risks, an appropriate intrusive investigation was undertaken as per the recommendations of the Phase I Geo-Environmental Assessment and the Heyne Tillet Steel Specification.

The aim of the fieldwork was to:

- Investigate ground conditions on the site and the potential need for detailed investigation.
- Further investigate the ground conditions on site.
- Install standpipes to allow future monitoring.
- Assess the potential contamination on the site and obtain samples for contamination screening.
- Assess the potential impact of any contamination on controlled waters.
- Obtain geotechnical information on the ground conditions at the site for preliminary foundation design and preliminary pavement design purposes.
- Give an assessment of the geo-environmental risks associated with redevelopment of the site.

4.1 Site Works

The following site works have been undertaken as part of the intrusive investigation between the dates of 13th November 2023 and 17th November 2023.

Method	No.	Range Depths (m bgl)	Purpose
Window sample boreholes – Tracked WS rig	6	1.78 – 5.45	Establish general ground conditions on site. Allow Standard Penetration Tests (SPTs) to be carried out and obtain samples for contamination and geotechnical and testing. Determine soil strengths/densities for preliminary foundation design. Installation of ground gas and water monitoring wells.
Dynamic Cone Penetration Testing (DCP)	8	0.50 – 9.68	Obtain parameters on soils strengths and densities. DP01 – DP06, DP08-DP09.
Rotary cored boreholes	3	22.50 – 27.00	Obtain rock core for geotechnical testing and parameters for preliminary foundation design.
Trial pits – JCB 3CX	3	1.00 – 1.70	SA01-SA03 for carrying out soakaway testing and establishing general ground conditions and increase coverage.
Infiltration tests (in Trial Pits)	1	1.70	Obtain infiltration rates for drainage design.
Infiltration tests (in Boreholes)	2	2.79 – 5.45	Obtain indicative infiltration rates for drainage design.

The surveyed locations of the exploratory holes are indicated on the Exploratory Hole Location Plan, Drawing No C5515/03. The exploratory hole logs are presented in Appendix B.

The exploratory holes were logged by an experienced geo-environmental engineer in general accordance with the following guidance:

- BS 5930:2015+A1:2020 Code of Practice for Site Investigations.
- BS EN 14688-1:2018 Geotechnical Investigation and Testing – Identification and classification of soil.

Supplementary site investigation was undertaken on 26th January 2024, local to SA02 as detailed in the table below:

Method	No.	Range Depths (m bgl)	Purpose
Hand excavated trial pits	5	0.50 – 1.10	Delineate area of asbestos impacted made ground around SA02.

Three of the five hand pits (HP02, HP03 and HP05) encountered concrete obstructions which resulted in the pits being terminated before they reached their intended depth of 1.20m bgl. An asphalt obstruction was encountered in HP04 and similarly resulted in the pit being terminated before 1.20m bgl.

An unknown service was identified in HP01 which resulted in the hand pit being terminated. The service was not recorded during the GPRS for the site and may be a discarded cable but works in the area were terminated in line with our Service Clearance Procedure MP 02. Samples from each of the five hand pits were still obtained from the strata of interest.

The above is demonstrated on the Asbestos Investigation Plan (ref. C5515/04 Rev B) and detailed on exploratory hole logs presented in Appendix B.

4.2 Sampling Strategy

Representative samples were taken from exploratory holes at regular intervals to assist in the identification of the soils and to allow subsequent laboratory testing. They were stored and transported in general accordance with BS 10175:2011+A2:2017.

The type of sample was dependent upon the stratum and the purpose of analysis in accordance with current environmental and geotechnical guidance. The distribution of samples taken across the site is recorded on the exploratory logs.

Investigatory hole locations were determined by reference to the conditions identified in the preliminary risk assessment as well as proximity to areas of geotechnical interest. Certain specific features such as the electricity substation and former electricity mains works were targeted for specific investigation, but a reasonably even spacing was used for the remainder of the site. No specific sampling statistics or grid were utilised in this instance.

4.3 Laboratory Testing

As part of the initial assessment for potential contamination of the site, selected samples were taken for the purpose of chemical contamination testing.

In the absence of particularly contaminative processes on site and the lack of visual evidence of potential hydrocarbon impaction representative soil samples were screened for the following general suite of determinands at a UKAS approved laboratory:

Determinand	No of Samples
BSL Default Soil Suite: Arsenic, Cadmium, Chromium (III), Chromium (VI), Copper, Nickel, Mercury, Lead, Zinc, Selenium, speciated polycyclic hydrocarbons (PAH 16), water soluble sulphate (2:1 Extract), soil organic matter (SOM) and pH.	10
Petroleum Hydrocarbons (TPH CWG) inc BTEX and MTBE.	3
Asbestos Screen.	10 (+5)
Asbestos Quantification	1 (+1)
PCB Compounds (7 Congeners).	2
Waste Acceptance Criteria (WAC).	2

The Chemical Laboratory Testing Results are presented in Appendix C.

Representative disturbed samples were obtained for all soil types encountered. Selected samples were scheduled for testing at an approved laboratory in accordance with BS 1377 'Method of Test for Soils for Civil Engineering Purposes' and BS EN ISO 17892- Parts 1-12:2018 'Geotechnical investigation and testing. Laboratory testing of soil'.

Following the positive asbestos result and quantification in SA02, four samples were retrieved from hand pits in the area around SA02 and one within the backfill of SA02 to determine the presence or absence of asbestos. Samples from these hand pits were tested for asbestos screen & ID exclusively and one sample was subsequently scheduled for asbestos quantification as shown in brackets in the above table. This is discussed further in section 8.2.

The following tests were scheduled for geotechnical purposes:

Description	No of Samples
Natural Water Content.	6
Plasticity Index Analysis.	6
pH Value.	6
Water Soluble Sulphate Contents.	6
SD1 BRE Full Suite.	2
Point Load Testing.	9
Unconfined Compressive Strength (UCS).	6

The Geotechnical Laboratory Testing Results are presented in Appendix D.

4.4 Monitoring

Ground gas and ground water monitoring standpipes were installed in a number of boreholes as detailed in the table further below. A total of 6 monitoring visits were undertaken out of 6 proposed as part of the current scope, in line with the recommendations of BS8485.

All gas monitoring was undertaken using either a GA5000 or GFM436 infrared gas meter with integral electronic flow analyser.

Flow measurements on each standpipe (l/hr) were taken. Measurements of the percentage volume in air (%v/v) of oxygen (O₂), carbon dioxide (CO₂) and methane (CH₄) were recorded in addition to the percentage Lower Explosive Limit (%LEL) of methane (Note: 100% LEL equates to 5% by volume), the atmospheric pressure (mb) and average temperature during the visit (°C).

Standpipes were constructed in general accordance with the relevant guidance. A summary of the installation construction is presented in the table below:

Location	Internal Diameter Pipe	Response Zone (m bgl)	Targeted Strata	Purpose
WS01	35mm PVC	1.00 – 5.00	Natural Clay	Ground Gas and Groundwater
WS02	35mm PVC	1.00 – 5.00	Natural Clay	Ground Gas and Groundwater
WS03	35mm PVC	1.00 – 2.00	Made Ground	Ground Gas and Groundwater
WS05	35mm PVC	1.00 – 2.00	Made Ground	Ground Gas and Groundwater
WS06	35mm PVC	1.00 – 4.00	Made Ground	Ground Gas and Groundwater

The gas monitoring visits recorded peak and steady state conditions. Peak results are those that occur on opening the valve on the borehole tap. Steady state conditions are those that occur a period of time afterwards when the initial (accumulated) gases have been purged from the borehole.

Ground gas monitoring results are presented in Appendix E of this report.

5.0 GROUND CONDITIONS

5.1 Summary

A brief summary of the ground conditions encountered is presented in the table below:

Stratum	Range Depths - Top (m bgl)	Range Depths - Base (m bgl)	Range Thickness' (m)	Brief Description
Made Ground Topsoil	0.00	0.20 – 0.70	0.20 – 0.70	Clayey gravelly SAND
Made Ground	0.20 – 1.20	1.50 – 4.15	1.30 – 2.95	Sandy gravelly CLAY
	0.30 – 0.40	1.00 – 1.40	0.70 – 1.00	Clayey gravelly SAND
	0.30 – 2.50	1.20 – 2.79	0.28 – 0.90	Sandy GRAVEL
Natural Superficial Strata	1.20 – 2.20	16.50 – 17.60	15.30 – 15.40	Gravelly CLAY
Solid Geology	16.50 – 17.60	22.50 – 23.50	6.00 – 5.90	Extremely weak reddish brown partially weathered MUDSTONE
	18.00	22.10 -27.00	4.10 – 9.00	Weak light grey partially weathered SILTSTONE

Details are provided in the logs in Appendix B and the individual strata are described in the sections below.

5.2 Made Ground

Made Ground – Topsoil

Made Ground Topsoil was encountered across the site from ground level, ranging to depths between 0.40m and 0.70m bgl, generally comprising dark brown slightly clayey gravelly sand with occasional rootlets. Sand is fine to coarse. Gravel is fine to medium subrounded of sandstone, mudstone, concrete and brick.

Made Ground – General

Made ground was encountered within all the exploratory holes across the site and was observed from ground level to depths between 0.20m and 4.15m bgl.

Hardstanding surfacing of asphalt was present across the site in road, pavement and car park areas recorded from ground level to between 0.15m and 0.28m bgl. Concrete was present in the basement car parking of the existing building. The base of this was not proven.

The composition of the made ground beneath the hardstanding or topsoil was consistent across the site and represented demolition material comprising gravelly sand. Gravel was typically angular to subangular of brick and sandstone with rare coal, limestone, ceramic and concrete. Cobbles of brick and concrete ranged from low to medium content.

Brick and ceramics associated with previous developments (basements and cellars) were encountered across the site within the trial pits.

Obstructions were noted in SA01 at 1.00m bgl (asphalt) and in SA02 at 1.60m bgl (concrete) terminating both locations.

5.3 Natural Superficial Strata

The natural strata underlying the site was generally firm to stiff clay with varying amounts of silt, sand, mudstone and gravel as minor constituents.

A lens of sand was encountered in BH02 from 10.90m to 15.00m bgl. This was not encountered elsewhere onsite.

Shear vane readings in the cohesive soils indicate the clays are generally medium and high strength.

5.4 Solid Geology

Weak becoming medium strong mudstone bedrock was encountered from depths of between 16.50m and 17.60m bgl. This was interbedded with a weak becoming medium strong siltstone bedrock. The solid geology was proven to a maximum depth of 27.00m bgl across the site and is interpreted to represent the Halesowen Formation.

The discontinuities were described generally as smooth, planar and sub-horizontal (0-10 degrees) across the site.

The overall percentage of Total Core Recovery (TCR) over each core run within an individual borehole varied from 13% to 100%, although averaged at 86%. Similarly, Solid Core Recovery (SCR) ranged between 0% to 100% and averaged 68%.

Rock Quality Designation (RQD) percentages ranged from 0% up to 100%, although considerable variation in the RQD was recorded with depth with an average of 52%.

5.5 Groundwater

Groundwater was not encountered within the shallow ground investigation techniques (window sampling, trial pitting), however, groundwater was encountered in the deeper rotary boreholes. The depths to groundwater and locations present during site works are shown in the table below:

Location	Depth During Site Works (m bgl)	Depth During Site Works (m AOD)
BH01	19.50	25.78
BH02	11.00	34.34
BH03	18.00	26.08

NGW – No Groundwater Encountered.

Post site works monitoring has revealed the following depths to groundwater:

Location	Depth During Monitoring Period (range) (m bgl)	
	Min	Max
Overall min/max		
WS01	1.25	2.90
WS02	1.35	3.41
WS03	2.00	NGW
WS04	2.00	NGW
WS06	1.10	1.50

The absence of groundwater encountered in the window sample boreholes during drilling suggest shallow groundwater is not continuous across the site. The shallow groundwater is likely perched on the top of the superficial deposits given the presence of granular made ground underlain by low permeability clay across the whole site.

Deeper groundwater in BH01 and BH02 was generally identified in the bedrock (siltstone) and is considered to be representative of the Secondary A Aquifer within the Halesowen Formation and not understood to be the Principal Aquifer within the Collyhurst Formation. Groundwater was recorded in BH02 in the centre of the site within the superficial deposits and is considered to represent the Secondary

Undifferentiated Aquifer. As such, groundwater levels vary across the site, generally between 18.00m bgl and 19.50m bgl, and locally to BH02, 11.00m bgl.

5.6 Observations

Contamination

During the works undertaken by BSL, observations for both visual and olfactory evidence of contamination were undertaken. No evidence of contamination was observed at the site.

Stability of Excavations/Boreholes

The borehole sidewalls were generally stable and window sampling progressed without the need to install casing.

Casing was required to prevent collapse with the granular materials during drilling of the window sample boreholes and cable percussive boreholes.

Collapsing of the bedrock occurred in BH01 from 22.50m bgl, collapsing back up to 19.50m bgl.

6.0 TEST RESULTS

6.1 Geotechnical Laboratory Testing

Plasticity Index Analysis

Plasticity index results ranged between 29% and 42%. Associated water contents ranged between 18.7% and 32%.

After modification of particle size in accordance with NHBC Chapter 4.2 the modified plasticity indices are in the range 22.3% to 29% indicating the cohesive soils to be of medium volume change potential.

6.2 Aggressive Ground Conditions – Geotechnical Chemical Testing

The test results for the assessment of aggressive ground conditions are presented in Appendix D. The results are summarised and assessed within Section 8 of this report.

6.3 In Situ Geotechnical Testing

In Situ Hand Shear Vane Tests

Hand shear vane tests were carried out on suitable cohesive soils where possible. Each shear vane result recorded represents the mean value of three tests undertaken at the specified depth.

The results and distribution of the hand shear vane tests are recorded in kPa on the Exploratory Hole Logs which are presented in Appendix E.

In Situ Standard Penetration Tests

Standard Penetration Tests (SPTs) were carried out within the window sample boreholes at regular 1.00m intervals and every 3m from 5m bgl in rotary boreholes. The results of the individual blows and the N-values are recorded on the Exploratory Hole Logs in Appendix B.

All SPT N values are uncorrected. Density and strength descriptors are reported in accordance with the guidelines stated in BS 5930:2015+A1:2020, incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.

Soil Infiltration Test Results

Soil infiltration test results were undertaken within trial pits, a summary of the results is presented in the table below. These were carried out in general accordance with BRE Digest 365 (BRE 2016) where infiltration rates allow three test runs during a working day (or where there is no infiltration), but where low infiltration rates were encountered the available time may not have been sufficient to fully comply with the BRE test method.

Where less than three tests were possible in a particular location the results provided should be considered as indicative only. Further discussion concerning the suitability of infiltration testing at the site is provided in Section 8.0.

Location	Stratum Type	Depth (m)	Infiltration Rate (m/sec)		
			Test 1	Test 2	Test 3
SA02	SI sandy CLAY	1.70	7.80×10^{-7}	NA	NA

The full test results are presented in Appendix D.

Permeability Test Results (Boreholes)

The results of permeability testing in boreholes using falling head methods are presented in the table below. These were carried out in general accordance with BS 5930 & BS 22282.

Location	Response Zone (m)	Stratum Type	Hydraulic Conductivity (m/sec)
WS01	1.00 – 5.00	CLAY	3.41×10^{-6}
WS02	1.00 – 5.00	CLAY	1.69×10^{-6}

The full test results are presented in Appendix D.

6.4 Geo-Environmental Testing

Chemical Laboratory Testing

The chemical test results for soils are presented in Appendix C. The results are summarised and assessed within Section 8.0 of this report.

Ground Gas Monitoring

Ground gas monitoring installations have been monitored on six occasions out of a total of six visits scheduled. The final results are presented in Appendix E and are summarised and assessed within Section 8.0 of this report.

7.0 GEOTECHNICAL ASSESSMENT

7.1 Ground Model

The site is currently occupied by six residential student housing blocks with associated highways, parking and soft landscaping. There are known basements utilised for car parking.

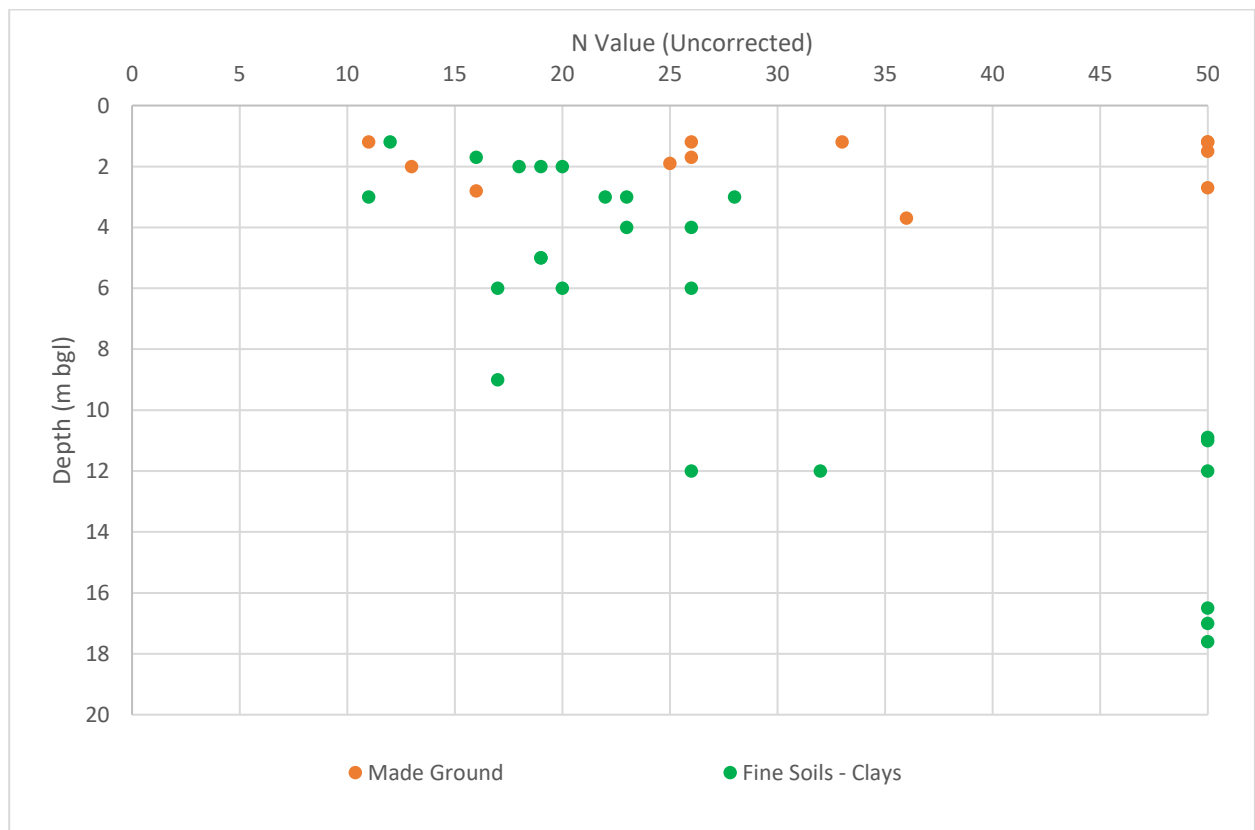
The ground conditions can be summarised as below (top down):

- Made ground topsoil comprising of clayey gravelly sands with fragments of brick and concrete from ground level to between 0.30m and 0.70m bgl.
- Made ground generally comprising light brown sandy gravelly clays with fragments of brick, concrete and coal. Ranging from depths from 0.20m to 4.15m bgl.
- Natural superficial deposits comprising of gravelly sandy clay proven to depths from 1.20m bgl to 17.60m bgl.
- Solid geology comprising weak to medium strong weathered mudstone proven to depths ranging between 22.50m and 27.00m bgl.
- Groundwater was encountered in rotary boreholes only during site works at depths from 11.00m and 19.50m bgl; and 25.78m to 34.34m AOD.
- Post site works monitoring levels ranging between 1.25m and 3.41m bgl.

7.2 Design Soil Parameters

Characteristic Values – Made Ground and Superficial Deposits

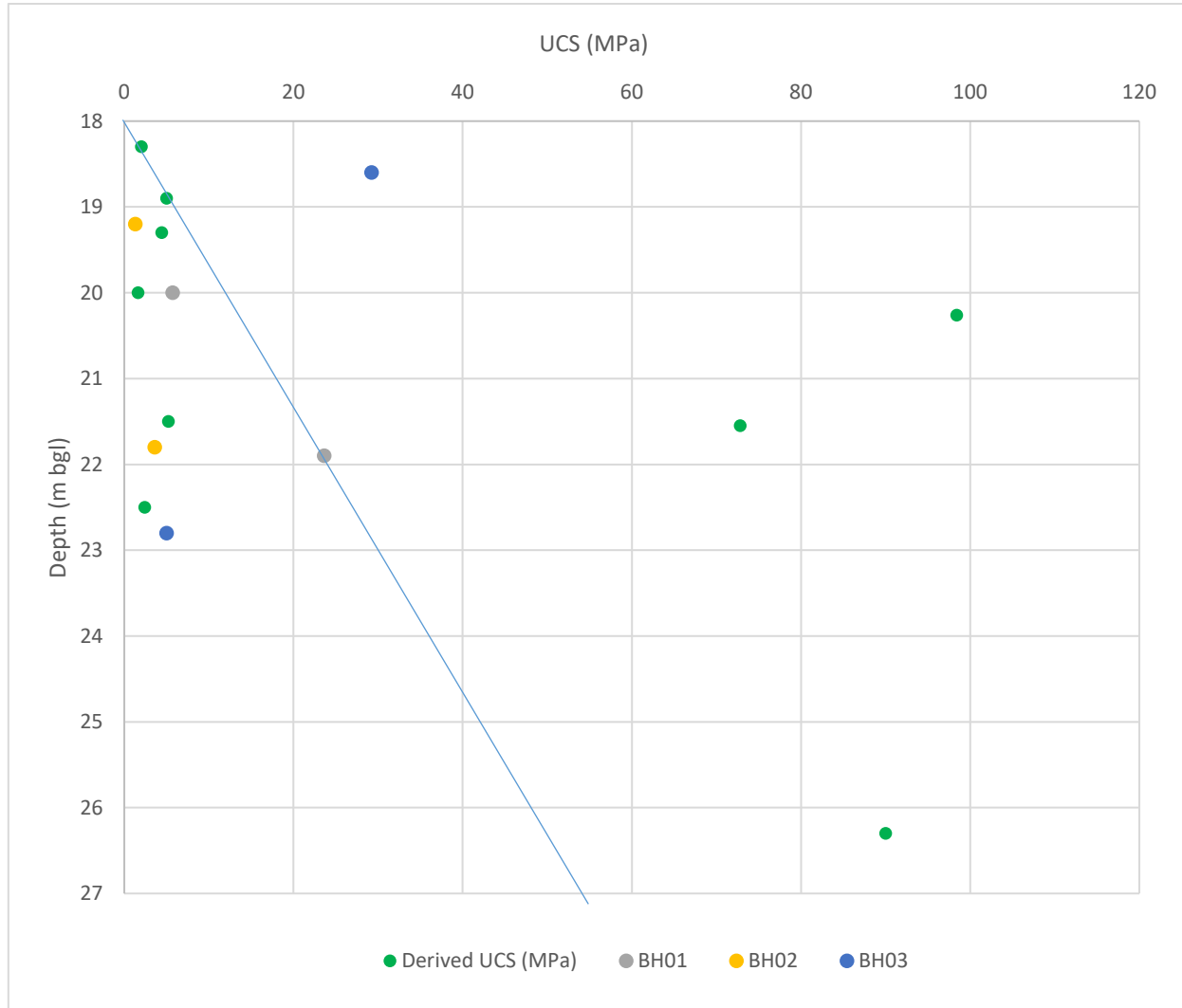
A depth (m bgl) vs SPT N value graph is provided below to provide a profile of the soils underlying the site.



The above graph shows a general increase in soils density as depth increases within both the made ground and superficial strata, with some slight variability between locations.

Characteristic Values – Solid Geology

The Unconfined Compressive Strength (UCS) was determined by laboratory testing. was also derived from laboratory point load testing using the relationship of $UCS=20 \times IS_{50}$ for mudstone (ISRM). A graph showing the variation in UCS, and derived UCS vs depth is presented below to provide a profile of the variation rock strengths with depth.



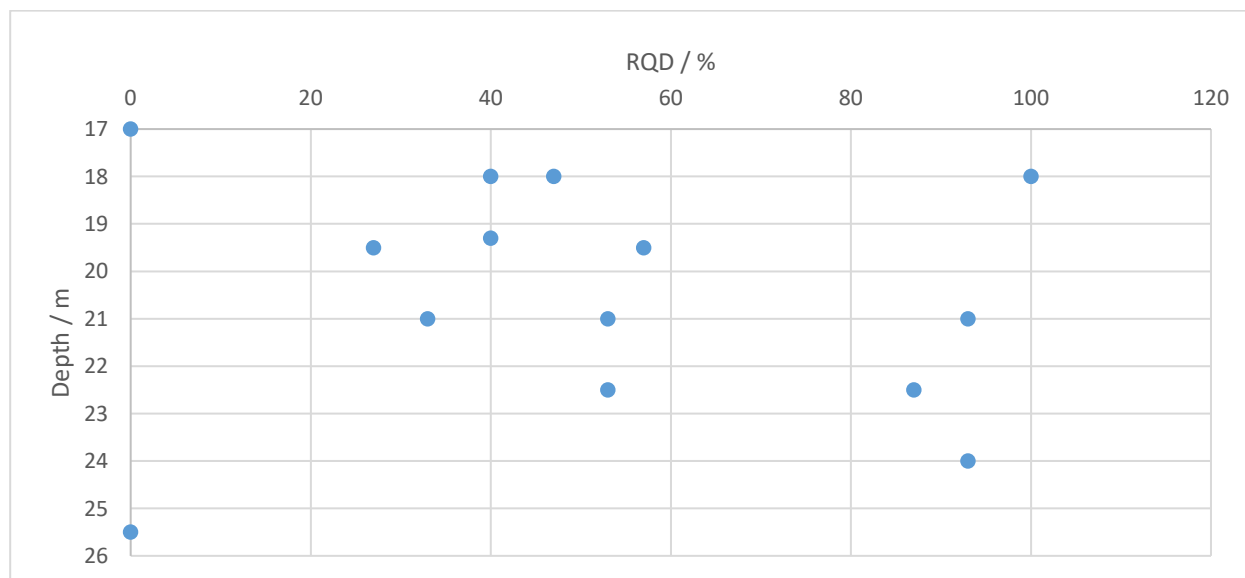
The above graph shows a weak positive correlation between an increase in rock strength with depth. This trend is strengthened with the removal of the correlated Point Load Index results from BH03. There do not appear to be any significant or definitive lower strength zones, with the vast majority of results being above 5 MPa (weak rock) as can be expected of the Halesowen Formation. Note there is a tendency for bias within the UCS and point load data; UCS is typically undertaken on more intact samples, whereas lower strength area of rock tend to provide samples of rock unsuitable for UCS analysis, hence point load data is used as a proxy for UCS strengths. This should be considered during estimation of characteristic values.

Based on field strength descriptions and the laboratory testing, the characteristic UCS for the bedrock underlying the site has been derived and summarised in the table below.

Bedrock Strata	Depth (m)	Characteristic UCS (MPa)
Interbedded Mudstone / Siltstone	19	6
	21	18

Bedrock Strata	Depth (m)	Characteristic UCS (MPa)
	23	30
	25	42

A graph showing the variations in RQD percentages with depth is presented below, where RQD should be considered in respect to reduction factors for shaft resistance during detailed design (Rowe 2001).



The RQD of BH01, BH02 and BH03 averaged 58%, 59%, and 45% respectively along the entire profile. Based on the above, the characteristic RQD values for the solid geology underlying the site at various depths have been derived, taking into consideration the averages above and are summarised in the table below, selected to the nearest 5% RQD:

Bedrock Strata	Depth (m)	Characteristic RQD (%)
Sandstone	19	25
	21	55
	23	80
	25	95

7.3 Foundations

The development will comprise of the redevelopment and extension of five existing residential apartment blocks, along with the complete demolition and construction of one further apartment block, all currently used for student accommodation, and is considered to be classed as Geotechnical Category 2 in accordance with Eurocode 7. The largest of these apartments will be up to 17 storeys in height.

Preliminary design by calculation has been undertaken to determine the design resistance of the bearing strata in the following section. Note that the made ground, present to depths down to 4.15m bgl, is not considered to be a suitable bearing stratum.

No proposed structural loads were available at the time of writing; therefore, the following recommendations are provisional and should be reviewed at the detailed design stage.

This assessment is based on the existing ground levels and does not take into consideration any cut/fill exercise, which should be considered at the detailed design stage.

Piles

Due to the likely magnitude of the column loads expected to be imposed by the proposed multi-storey structure, the most suitable foundation type for the proposed development is considered to be pile foundations. Selection of a pile type and detailed design of pile foundation is typically completed by specialist piling contractors; the following general information is provided for guidance only. Based on the information from the site investigation, the most suitable foundation type is considered to be continuous flight auger (CFA), or displacement piles socketed into the bedrock.

Driven piles including small displacement, large displacement, and driven cast-in-place while considered technically and economically feasible are not recommended for this site as noise from their installation may impact surrounding residents and ground vibrations caused by piling operations may cause damage to nearby structures.

Piles – End Bearing On Rock

Piles should be extended through the made ground and the superficial deposits. Depending on the structural loadings and design requirements, piles will likely utilise a combination of skin friction and end-bearing resistance, transferring the majority of the load to the underlying mudstone bedrock.

The choice of piling system and the detailed design of piles are beyond the scope of this report and should be undertaken by a piling specialist. However, as a guide, the results of the UCS testing have been utilised to provide a preliminary assessment of the allowable loads for piles end bearing within the mudstone bedrock. A summary table is provided below:

Borehole	Proposed Building	UCS Range (MPa)	Ultimate End Bearing Resistance of Rock (MPa)*
BH01	6 Storey	4.4 – 98.4	0.636
BH02	8 Storey	1.3 – 5.2	0.636
BH03	12 Storey	1.6 – 90	0.636

*Ultimate End Bearing Resistance (q_{ub}) derived using Tomlinson, 7.16, and lower end of UCS range.

Based on the available information, preliminary calculations were undertaken for a single 600mm wide circular concrete pile approximately 18.00m in length. The preliminary allowable loads, assuming end bearing only piles for conservatism, are shown in the table below.

Borehole	Proposed Building	Allowable Load (MN)
BH01	6 Storey	0.78
BH02	8 Storey	1.15
BH03	12 Storey	0.95

As the loads and piling details are were unavailable at the time of writing this report, it is suggested that an allowable end bearing capacity of 1MPa is assumed at this stage and this can be reassessed once more details are available.

Piles – Socketed Into Bedrock

Design guidance for piled foundations socketed in bedrock is provided in BS 8004:2015 – Code of practice for foundations. The information provided below should be used for preliminary design/ feasibility purposes only, we recommend that the piles are designed by the contractor and be verified through static pile load testing. Appropriate modelling and settlement analysis will be required at the detailed design stage.

For piles socketed into bedrock, the ultimate shaft resistance for the portion of the pile embedded in the bedrock may be determined through the following equation:

$$q_s = k_1 p_{ref} \left(\frac{q_u}{p_{ref}} \right)^{k_2}$$

In this equation, q_s is the ultimate shaft resistance in kN/m^2 , q_u is the UCS value of the bedrock, p_{ref} is a reference pressure of 100kPa and k_1 and k_2 are coefficients selected from the range presented in BS 8004 as 1.0 and 0.5 respectively.

The ultimate end bearing resistance of the competent bedrock has been determined using the following equation:

$$q_b = k_3 p_{ref} \left(\frac{q_u}{p_{ref}} \right)^{k_4}$$

In this equation, q_s is the ultimate shaft resistance in kN/m^2 , q_u is the UCS value of the bedrock, p_{ref} is a reference pressure of 100kPa and k_1 and k_2 are coefficients selected from the range presented in BS 8004 as 1.0 and 0.6 respectively.

The ultimate shaft resistance for the portion of the pile embedded in granular soil may be determined through the following equation:

$$q_s = K_s \tan \delta \sigma'_v$$

In this equation, q_s is the ultimate shaft resistance in kN/m^2 , K_s is an earth pressure coefficient conservatively assumed as 0.7 for preliminary design purposes, δ is the angle of interface friction 35° , and σ'_v is effective overburden pressure over the embedded length of the pile.

The frictional contribution of the made ground has been omitted from these calculations due to the variability and generally loose nature. Additionally, pile designs should be based on the final ground level, if any excavation is proposed, rather than the current ground elevations.

The ultimate end bearing resistance of the competent bedrock has been determined using the following equation:

$$q_b = k_3 p_{ref} \left(\frac{q_u}{p_{ref}} \right)^{k_4}$$

In this equation, q_b is the ultimate base resistance in kN/m^2 , q_u is the UCS value of the bedrock, p_{ref} is a reference pressure of 100kPa and k_3 and k_4 are coefficients identified in BS 8004 as 15 and 0.5 respectively for cemented materials. The design base resistance may be limited by the compressive strength of the concrete used to construct the pile or the structural capacity of the pile itself.

Based on the available information and methodology outlined above, preliminary calculations were undertaken to provide estimated factored allowable loads for a singular circular concrete pile, to be socketed into bedrock of variable lengths and a variety of diameters (based on standard rotary pile boring equipment). A global factor of safety of 3 has been used in this assessment. The preliminary allowable loads are shown in the table below. Note these recommendations are provisional and subject to review at the detailed design stage.

Profile	Pile Diameter (mm)	Pile Length (m)	Allowable Load (MN)
Generalised Profile	400	23	2.1
	600		3.9
	400	25	2.9

Profile	Pile Diameter (mm)	Pile Length (m)	Allowable Load (MN)
	600		5.2

The above does take into consideration the effects of pile groups or the self-weight of the pile.

As stated above, these calculations are preliminary, should be used only as a guide and reviewed at the detailed design stage. Information gained from this ground investigation should be assessed by experienced piling contractors and suitably qualified structural engineers such that appropriate piles are selected and designed given the site conditions that have been encountered.

Supplementary boreholes are also proposed and the recommendations within this report should be updated once information from those boreholes is available.

During the construction phase supervision should be on a continuous basis to check the design assumptions are correct and construction conforms to design. Supervision should include inspections, Control Ground Investigations and monitoring. If the ground conditions encountered during the construction phase differ significantly to the conditions encountered during construction, work should cease and BSL contacted for further advice.

Trial piles are recommended to verify design assumptions including confirmation that a reasonable socket length into bedrock can be achieved using the proposed rig. Load testing can also be completed on trial piles to confirm a final design, verify that the design resistance can be achieved and confirm settlements are within the required parameters.

Whilst detailed design is beyond the scope of this report, the following should be taken into consideration during the detailed design stage by a suitably competent contractor/engineer:

- Piles should extend a minimum of five pile diameters into the bearing stratum to fully mobilise end-bearing resistance and shaft resistance.
- Higher allowable loads than those listed in the table above could be achieved by increasing the diameter of the piles or by using pile groups.
- Obstructions in the ground (e.g. relict foundations) could cause piles to stop shallower than their anticipated design depth, or deviate from the vertical, therefore reducing their capacity.
- Discussions should be made with the piling contractor regarding the suitability of driven piles due to the levels of disruption to the adjacent residential and commercial properties.
- CFA piles are likely to be a suitable alternative to driven piles to reduce noise levels, although there will be additional costs associated with disposal of excess soils.
- The construction of a basement structure should also be taken into account for foundation and pile design.
- Driven piling work should be undertaken in accordance with BS EN 12699:2015 'Execution of Special Geotechnical Work - Displacement piles', replacement piles should be carried out in accordance with BS EN 1536:2010(+A1:2015) 'Execution of Special Geotechnical Works - Bored Piles'.
- In accordance with Eurocode 7 it would be prudent to verify the compressive resistance of the strata and the pile design by static load testing on working piles to at least 1.5 times the characteristic load on more than 1% of working piles.

Working Platform

Prior to the commencement of piling works, a working platform will be required for tracked plant. This should be designed and installed in accordance with BR470 (BRE 2004) based on the plant requirements, data and rig loadings.

Piling Risk Assessment

A risk assessment is likely to be necessary for piling, as there is a possibility that this could lead to creation of new pathways for migration of contamination.

7.4 Building Near Trees

The clay soils on site are of medium volume change potential. Where foundation excavations (or piles if adopted) encounter cohesive strata in the vicinity of existing, proposed or recently removed trees, foundations should be adjusted in full accordance with BRE 298. All foundations should be deepened below roots of greater than 5mm diameter during excavations for footings.

A survey of all trees and hedges on the site and within influencing distance of the site boundary should be undertaken to identify tree species and heights by a qualified arboriculturist in accordance with BS 5837:2012. This information will be required in order to assess the effects of trees on the cohesive strata.

Where foundation depths due to trees already present or recently removed exceeds 1.50m, there is a possibility for heave to occur on removal of the tree and guidance states that compressible material or void former is required against the inside face of the foundation, unless it can be satisfied that the soil is not desiccated.

7.5 Floor Slabs

Given the thickness of made ground present (generally >600mm), suspended floor slabs should be adopted at the site in accordance with NHBC/LABC standards.

Ground bearing slabs may be adopted providing the following criteria are satisfied:

-
- Any other compressible or unsuitable materials (topsoil containing vegetation and organic matter, including tree roots, are excavated and either improved or removed and replaced with suitable materials.
 - The foundation depth (such as due to the influence of trees) is less than 1.5m.
 - It is demonstrated that desiccation in cohesive soils is not present.
 - Any fill beneath the slab is suitable, well-compacted granular material placed in an appropriate thickness in accordance with a suitable specification (e.g. SHW Series 600) designed and supervised by an appropriately qualified engineer, with the end performance validated.
 - The slab is adequately reinforced.
 - Regular construction joints and ties are provided to allow for differential settlement.
-

7.6 Site Preparation and Construction

The existing structures will need to be demolished and relict foundations/infrastructure grubbed out. Topsoil and subsoil should be removed from beneath all proposed buildings and hardstanding areas.

There are a number of services crossing the site, including low voltage, high voltage and BT cables. To allow remediation and construction, all services will need to be disconnected and any suspected dead services are confirmed as dead by testing.

Instability of excavations through natural soils is not anticipated provided they are not exposed to adverse weather conditions for any substantial period of time. Instability of the made ground should be allowed for. All excavations should be carried out in accordance with CIRIA Report 97 'Trenching Practice'.

Excavation depths should generally be readily achieved using conventional plant (JCB or similar) although high specification plant (tracked 360° or similar) is recommended to maintain the build programme. Breaking equipment may also be required locally to penetrate old foundations associated with former construction.

Recorded post site works groundwater levels ranged between 1.10m and 3.41m bgl. Based on the exploratory holes logs and monitoring, it is considered that methods such as sump pumping are likely to be sufficient to deal with anticipated flows. Further guidance is provided in CIRIA C750 "Groundwater Control: Design and Practice". It should be noted that groundwater levels will vary seasonally, and the timing of construction may influence requirements.

7.7 Concrete Classification

The soluble sulphate and pH test results have been assessed in accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005. The Design Sulphate (DS) classification and the Aggressive Chemical Environment for Concrete (ACEC) classification are presented in the table below.

For the purposes of this assessment, the made ground is considered to be relatively permeable, therefore the groundwater has been classed as mobile. The superficial deposits and bedrock strata are considered to be relatively impermeable, therefore the groundwater in this strata has been classed as static.

Stratum	No. Samples	Characteristic SO ₄ (g/l)	Characteristic pH	DS Class	ACEC Class
Made Ground	5	0.1529	8.35	DS-1	AC-1
Natural Superficial Strata	1	0.0153	9	DS-1	AC-1s
Solid Geology	2	0.0175	8.9	DS-1	AC-1s

Based on the above, the results of laboratory pH and sulphate content, alongside the BRE full suite tests, indicate that sulphate class DS-1 and ACEC Class AC-1s/AC-1 conditions prevail in accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005.

The specific concrete mixes (the Design Concrete Class) to be used on site will be determined by the site-specific concrete requirements in terms of the durability and structural performance. These are assessed in terms of the Structural Performance Level (SPL) and any need for Additional Protective Measures (APM) detailed in Part D of BRE Special Digest 1 with further guidance in Pt E and F.

7.8 Highways

Based on Table 5.1 from DMRB IAN 73/06 Rev 1 equilibrium CBR values of 5% are likely to be achieved in undisturbed natural granular soils and 2% for natural clays soils for pavement design purposes, unless proven otherwise by in-situ testing at formation level by a specialist geotechnical engineer. Equilibrium CBR values are likely to be 2% within the made ground, which is likely to be at formation levels.

Where the CBR is found to be less than 2%, the sub-grade is unlikely to be suitable for both the trafficking of site plant and as a permanent highway foundation without improvement of the soils.

To achieve the required design CBR value, improvement works should be carried out in accordance with DMRB IAN 73/06 Rev 1 Chapter 5 and may include proof rolling, excavation and re-engineering/replacement of weaker soils, the inclusion of a geogrid or use of stabilisation techniques such as the addition of hydraulic binders (e.g. cement/lime).

Based on the fines content of the soils, they are considered to be frost susceptible, therefore highway construction should be a minimum thickness of 450mm to mitigate against the risk.

Care should be taken to ensure the stratum at formation level is protected against inclement weather, as this is likely to lead to surface deterioration and a decrease in soils strengths.

7.9 Site Drainage

The use of soakaways within the natural ground is not considered to be feasible at the site due to the low infiltration rates obtained (on the order of 10^{-7} m/s) and the presence of low permeability cohesive strata underlying the site.

7.10 Earthworks

Where it is proposed to re-use site materials as an engineered fill, it will be necessary to develop an appropriate Earthworks Specification. The basis for the Specification should be BS 6031:2009 and the latest version of the SHW, Series 600 Earthworks. Note testing for earthworks was not within the scope of the investigation but is recommended.

If site-won material is to be re-used on site, it is recommended this is carried out under the CL:AIRE Development Industry Code of Practice (DoWCoP CL:AIRE March 2011).

8.0 GEO-ENVIRONMENTAL RISK ASSESSMENT

8.1 Introduction

The samples were tested for an assessment of the chemical contamination that may pose a risk to human health. The results were examined with reference to a selection of guidance documents as detailed in Appendix A. In this case the LQM/CIEH S4ULs and DEFRA C4SLs for a residential end use without homegrown produce.

The apparent exceedance of the relevant screening value is taken as indicating further detailed assessment or remedial action is required.

A summary assessment sheet is presented in Appendix C alongside the chemical test results. Results are discussed in detail in the sections below.

8.2 Soils Test Results and Risk Assessment – Human Health

Metals

No metals have been detected above the adopted screening criteria.

Asbestos

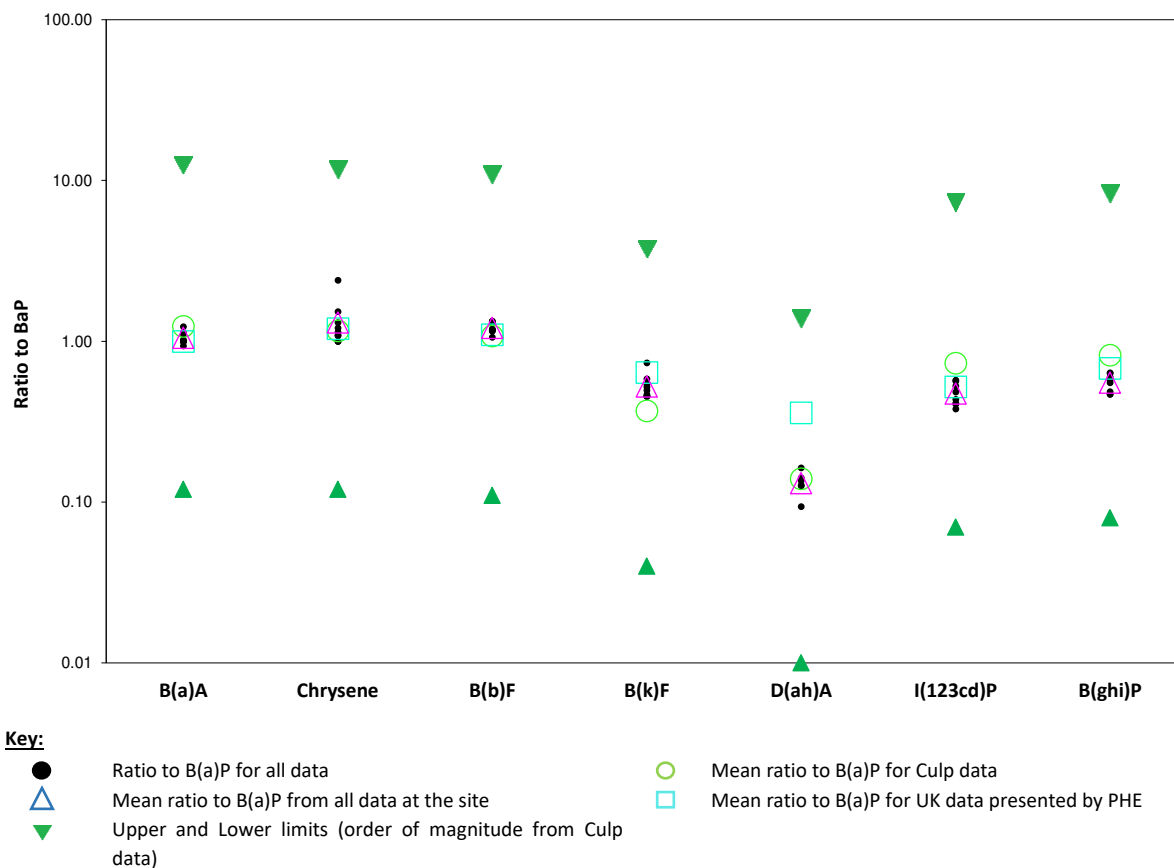
The locations where asbestos has been detected in the made ground, alongside the results of quantification (where carried out) are summarised in the table below:

Exploratory Hole	Depth (m)	Asbestos ID	Concentration by Weight (%)
SA02	0.40 – 1.40	Chrysotile and amphibole loose fibres & loose fibrous debris	0.007
HP04	0.30 - 0.70	Amosite	< 0.001

No visual evidence of asbestos contamination was noted during the investigation, which was undertaken by an engineer with asbestos awareness and>NNLW qualifications.

Poly Aromatic Hydrocarbons (PAHs)

Based on the above approach, the graph below summarises the site data with respect to how the ratios of carcinogenic PAHs relate to B(a)P, within the confidence limits provided in the PHE documents.



All the data points that could be used to calculate ratios fall inside the upper or lower limits (order of magnitude above or below that of the study material). Based on this distribution of data it is considered that B(a)P can be used as a surrogate marker for carcinogenic PAHs and the C4SL criteria is suitable for this dataset.

Based on the above, elevated PAHs were recorded in two locations to date. The locations and elevated species of PAHs are shown in the table below:

Exploratory Hole	Depth (m)	Stratum	Species	Concentration (mg/kg)	Adopted Screening Value (mg/kg)
WS01	0.58 – 0.80	Made Ground	Benzo(a)pyrene	39	5.0
SA02	0.40 – 1.40	Made Ground	Benzo(a)pyrene	16	5.0

* Based on Soil Organic Matter content

BTEX and MTBE

No BTEX or MTBE compounds have been identified above the adopted screening criteria.

Volatile Organic Compounds (VOCs)

No VOCs have been identified above the adopted screening criteria.

Semi-Volatile Organic Compounds (SVOCs)

No SVOCs have been identified above the adopted screening criteria.

8.3 Summary – Human Health Risk Assessment

Based on the testing and assessment undertaken it would appear that there is localised contamination within the made ground in the form PAHs within the made ground strata.

The above poses a risk to human health and will require further consideration.

Chrysotile and crocidolite fibres (loose fibres & loose fibrous debris) have been detected within one sample of the made ground from SA02 at 0.40-1.40m bgl. On quantification analysis, the asbestos level within the sample was 0.007% mass. BSL reattended site on the 26th January 2024 to further investigate the area in the immediate vicinity of SA02. 4 hand pits were dug around the location to depths of 0.50m to 1.10m bgl, whilst HP01 was dug into the backfill of the original soakaway pit to a depth of 0.70m bgl, as shown on the Asbestos Investigation Plan, drawing ref. C5515/04 and the exploratory hole logs are presented in Appendix B.

During this subsequent investigation, no visual source of asbestos contamination was found, a sample from HP04 did return positive for asbestos which was quantified to be trace amounts (< 0.001 % mass). Due to the small quantities in the original SA02 sample, the lack of any visual source for fibres, the negative asbestos results found in HP01 when the location was resampled, as well as there being no positive results for asbestos elsewhere on site, it's possible to consider this area "remediated by sampling" i.e. by virtue of the sampling taking place the limited quantities of asbestos within the made ground here have been removed.

8.4 Soil, Water and Leachate Test Results – Controlled Waters

No significant contaminants were identified in soils as an indicator of potential impact on groundwater.

8.5 Controlled Waters Risk Assessment

Groundwater/surface water testing has not been carried out based on the preliminary CSM risk assessment and the site is not considered to pose a significant risk to controlled water for the following reasons:

- No significant gross or mobile contamination has been identified on site in soils based on the results obtained as a potential indicator of groundwater contamination.
- There is no indication under present conditions of significant pollution of controlled waters and conditions following development of the site will not be any worse, indeed they may improve with increased hard cover.
- The concentrations of leachable substances that could emanate from the site will be subject to dilution and dispersal during transport and so the risks will reduce with distance from the site and into the identified surrounding water bodies.
- The nearest watercourse is over 1700m away, which provides considerable distance for attenuation and contaminant degradation.
- The site is underlain by low permeability clays which will inhibit lateral and vertical contaminant migration.
- There is one groundwater abstraction within 2000m, located 1756m W.
- There are no potable (sensitive) water abstractions within 2000m.
- Evidence indicates the nearby wells are historical and related to low sensitivity commercial use.

8.6 Permanent Ground Gas and Vapours Results

A total of 6 ground gas monitoring visits have been carried out between the dates of 1st December 2023 and 23rd February 2024. Results are summarised in the table below:

	CH ₄ (%)		CO ₂ (%)		O ₂ (%)		CO (ppm)		H ₂ S (ppm)		TVOC (ppm)		Steady Flow (l/hr)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Peak	0.0	3.1	0.0	2.5	0.1	21.5	0.0	0.0	0.0	0.0	0.0	0.0	-1.3	63.8
Steady	0.0	2.0	0.0	2.2	6.5	20.3							0.0	0.4

Notes: CH₄ = Methane; CO₂= Carbon dioxide; O₂= Oxygen; CO= Carbon Monoxide; H₂S= Hydrogen Sulphide; TVOC (PID)= Total Volatile Organic Compounds (as measured with Photo Ionisation Detector); ppm= Parts Per Million.

The highest methane concentrations were recorded within WS03 (3.1% v/v) on the first visit, whilst the highest carbon dioxide concentrations were recorded in WS02 (2.5% v/v) on the first visit. The maximum positive flow of 63.8 l/hr was recorded in WS01 on the third visit.

The atmospheric pressure ranged between 974mb and 1013mb over the monitoring period, of which visits were conducted over a range of falling and rising pressure trends.

Groundwater levels were recorded above the response zones in WS06 on all monitoring visits, ranging between 1.10m bgl and 1.50m bgl.

8.7 Ground Gas Risk Assessment

Basis of Assessment

In order to assess the ground gas situation and the requirement for ground gas precautionary measures at the site, guidance was taken from BS8485:2015+A1:2019 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' and CL:AIRE Technical Bulletin TB17 'Ground Gas Monitoring and 'Worst-Case' Conditions'. For sites influenced by mine workings, the CL:AIRE guidance 'Good Practice for Risk Assessment for Coal Mine Gas Emissions' has been utilised.

Rationale and Suitability of Dataset

As per the Phase I Geo-Environmental Assessment, in accordance with BS8485 and as set out in Appendix A of this report, the ground gas generation potential is considered to be **very low** (sources as made ground). The sensitivity of the development is **moderate** on account of the proposed redevelopment of accommodation blocks.

In line with current guidance, it is recommended gas monitoring should comprise 6 visits over a 8-week period. BSL conducted 6 visits in line with guidance between the dates of 1st December 2023 and 23rd February 2024.

Assessment of Data

As the proposed end-use is high-rise residential development, guidance dictates that the gas monitoring results should be assessed in accordance with the Wilson and Card methodology. Derivation of a Gas Screening Values (GSV) has been undertaken based on the guidance with BS8485 using the following equation: (max gas concentration / 100) x maximum steady flow.

The peak flows recorded during the final visits do not appear to be typical of the site and quickly fell back to below detection limits of the instrument in use (i.e. 0.1 l/hr). These flows appear to be driven by rises in groundwater level (causing a piston effect). In addition, the flows appear to correspond to the falling pressure trend of the final visit. Based on the above, a maximum typical steady positive flow of 0.2l/hr has been used to derive the GSVs.

Ground Gas	Adopted Typical Steady Flow Rate (l/hr)	Max Concentration (% v/v)	Worst Credible GSV (l/h)	Classification based on GSV	Typical Threshold Concentration Exceeded
Methane	0.4	3.1	<0.07	CS1	Yes
Carbon Dioxide	0.4	2.5	<0.07	CS1	No

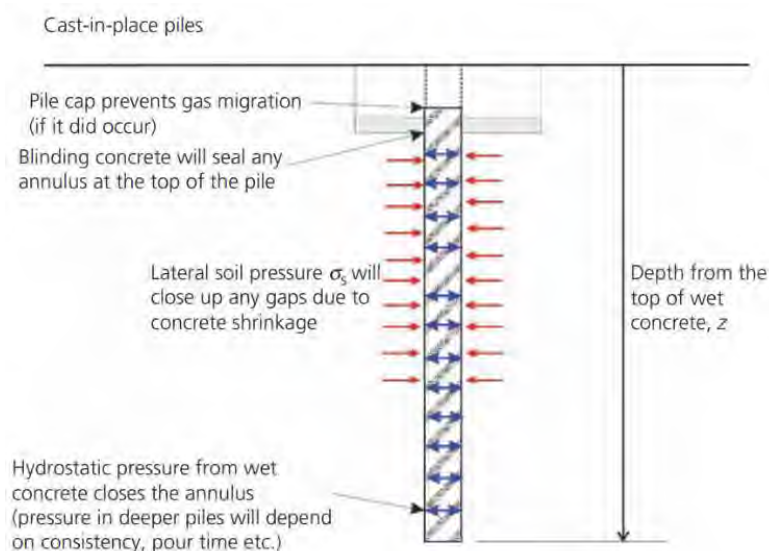
The GSVs place the site the site into Characteristic Situation 1 (CS-1). However, on all six monitoring visits the concentrations of methane in WS03 were recorded in excess of 1% v/v . No significant volatile vapours were identified at the site and no further consideration of vapour risk is required.

Based on the GSVs alone, the site falls into the CS1 classification. Whilst the high peak flows have been discounted, the potential effects of construction affecting the gas regime and creating pathways cannot also be fully ignored.

The site is primarily characterised by carbon dioxide well below 5.0% v/v. Methane has been recorded in 4 No. boreholes (out of 5 No. installations) to be <0.1% within the spot monitoring data. Methane was recorded above 1% consistently within WS03 at the site, ranging between 1.8% and 3.1%. Flow rates are generally low, with steady rates recorded at a maximum of at 0.2l/hr in near surface installations. Higher flows have been recorded but these are believed to be due to a groundwater rise giving a piston effect.

This effect would not be replicated during construction, with piles not considered to be providing a pathway (ICE publishing paper 'Piled foundations and pathways for ground gas migration in the UK' by Wilson and Mortimer. 2017) and as displayed on the diagram overleaf (Fig. 1).

Fig 1. Installation of Piles



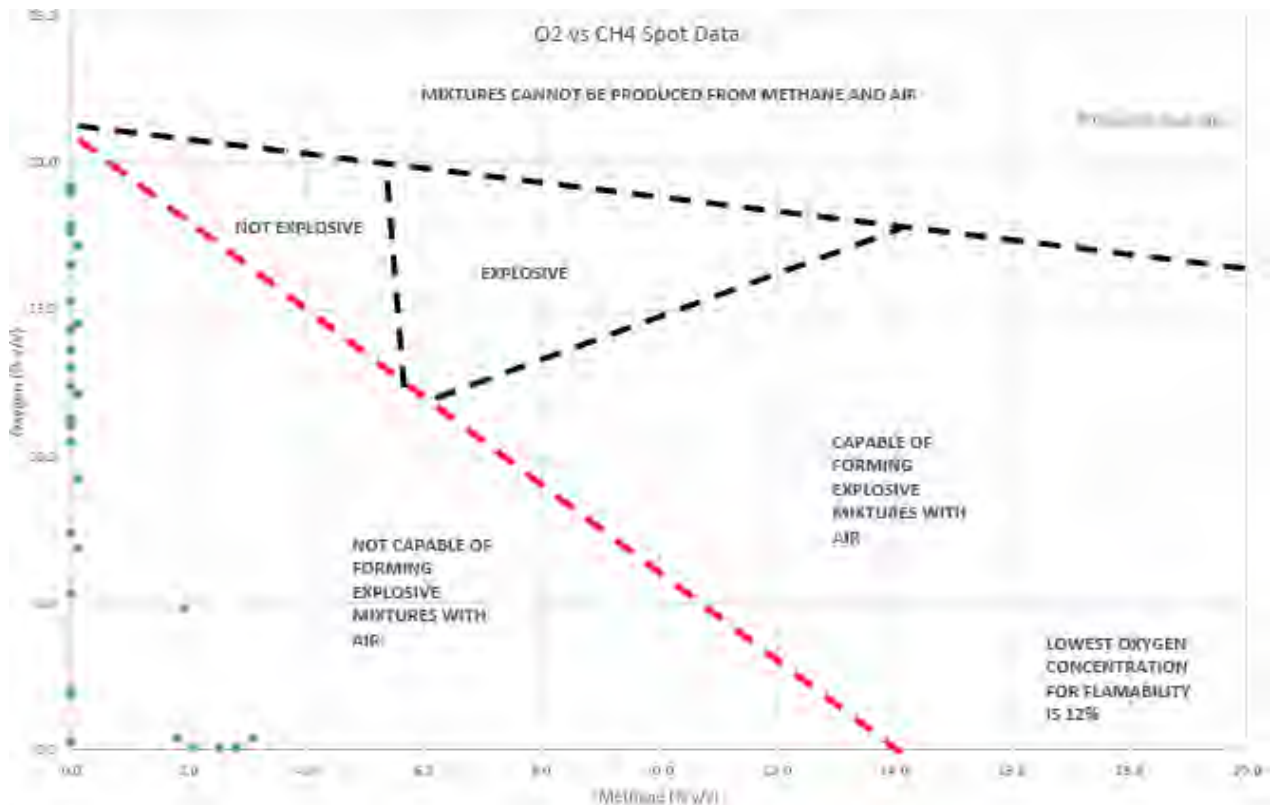
Where methane concentrations above 1% have been recorded, the guidance states that the consideration should be given to increasing the classification based on the CSM; there is no mandatory requirement to do so within the guidance, but the rationale for doing so must be robust and defensible.

In regard to the methane detected, the source of the methane ground gas in BSL WS03 is likely to be the made ground, which is less than 2.95m thick, with no significant putrescible material and underlain by a

thick layer of firm to stiff clay. The made ground itself is cohesive in nature, with minimal pore spaces for ground gas build up or storage; i.e. it is highly unlikely that this material could generate enough ground gas to become hazardous or travel rapidly via advective flow, let alone provide a storage reservoir for gas build up and migration or cause a potentially explosive event.

Based on the existing assessment, there is considered to be no significant driver of gas flows from the likely source (organic matter in natural deposits or the made ground/infilled ground – both very low generation potential sources). This is as suggested within the Ground Gas Handbook (Card, Haines, Wilson) where it states there is typically no main driver for such low generation potential sites.

To further assess the risk from methane and provide further lines of evidence of a minimal risk, we have plotted all methane concentrations from the continuous monitoring data and concentrations above 1% from the spot monitoring data against oxygen concentrations to determine if these mixtures would actually pose a potential explosion risk. This approach has been previously suggested by Steve Wilson, is now included with the NHBC 'Hazardous Ground Gas - An essential guide for housebuilders' 2023 guide and we have further researched the approach using peer reviewed research papers e.g. "Modified explosive diagram for determining gas-mixture explosibility (Cheng)" <https://www.sciencedirect.com/science/article/abs/pii/S0950423013000338>. The plotted data is presented below:



The graph shows methane concentrations and mixtures are not capable of forming explosive mixtures with air in WS03, even at methane concentrations up to around 3%, it is not likely to form an explosive mixture in the space above, showing minimal risk. This supports that the site would not require increasing up to CS2 from CS1. A watching brief would remain in place for any significant degradable matter, which would likely be geotechnically unsuitable for inclusion in permanent works and would likely be removed from site.

As a yet further line of evidence and to add to the post construction CSM, the proposed floor slabs will in effect comprise heavily reinforced monolithic cast in situ structures circa 250-350mm thick which will

provide an inherent resistance to ground gas migration and due to building regulations, the structures will require a good degree of air-tightness to assist with insulation etc.

The structure will also likely include active air ventilation/climate control systems which would further mitigate the minimal risk (exact slab build ups and construction details can be confirmed once more detailed proposals are available). We would also recommend that any service penetrations through the slab are suitable sealed with expanding foam to further mitigate against any significant ingress and further lower the already assessed low level of risk.

The above should be confirmed through three additional gas monitoring visits in line with BS8485.

8.8 Qualitative Risk Assessment

The CSM has been revised based on the findings of the site investigation and laboratory testing results and these are presented overleaf. Unless stated otherwise, in respect to off-site sources, only risks that are assessed as moderate and above within the preliminary CSM have been carried forward to this section, or where a previously unidentified potential source, pathway and / or receptor has been identified from the recent site works.

Human Health						
Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
On site Made Ground Metals, PAHs	Root uptake, ingestion, direct contact, inhalation of dusts	End-users	Low likelihood	Medium	Moderate/ Low	Following the testing and assessment undertaken elevated concentrations of contaminants has been identified in the made ground in the form of PAHs (benzo(a)pyrene) within the made ground strata. It is considered there is a low likelihood that these contaminants associated with the made ground and other past industrial uses will impact the site end users considering the proposed layout comprises either building footprint or hardstanding with limited areas of soft landscaping. The overall risk is therefore considered to be moderate/ low, but moderate risk would be posed in areas of soft landscaping, where mitigation measures would be required. Therefore, it is recommended to implement a remediation strategy in the form of cover system to address these environmental concerns.
On site Made Ground Asbestos	Inhalation of dusts	End-users	Unlikely	Medium	Low	Asbestos is present within the made ground soil generally as chrysotile, it has been detected within one sample. A maximum concentration of 0.007% asbestos was detected as chrysotile. Further investigation in this area did not identify asbestos. A sample within the area around SA02 identified trace amounts of amosite (< 0.001%) within one sample. Based on this assessment it is determined that the asbestos impacted soils have been remediated by virtue of the sampling exercise. It is considered there unlikely that the asbestos contamination made ground will impact the sites end users given the concentrations and the fact that soils are damp, the likelihood of exposure and dust liberation is low considering the proposed layout comprises either building footprint or hardstanding with areas of soft landscaping requiring a cover system. Should visible evidence of asbestos, such as ACMs, are identified at the site, this should be reassessed and an Asbestos Management Plan as well as further assessment / remediation may be required.
On site Made Ground Metals and organic contamination	Migration into/chemical attack of water supply pipelines	Water Pipelines / End users	Low likelihood	Medium	Moderate/ Low	Contaminants within the soil/groundwater could potentially attack the clean potable water supply pipe, contaminants should be assessed in accordance with the relevant guidance to determine the correct pipe material and level of precautions required.
Made Ground	Migration into confined spaces, inhalation and	End-users / property / structures	Unlikely	Severe	Moderate/ Low	No significant elevations of carbon dioxide were detected during the gas monitoring programme. Elevated levels of methane were recorded consistently in WS03 between 1.8% and 3.1% but further assessment did not find these to not

Human Health

Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
Ground Gas (carbon dioxide and methane)	asphyxiation/ explosion					be capable of forming explosive mixtures with air. The maximum steady flow rate was 0.4l/hr, there are no credible sources of ground gas generation, and the site is underlain by low permeability deposits. The risk is considered to be moderate / low. The ground gas risk assessment has characterised the site as Characteristic Situation 1 and no gas protection measures are required.

Controlled Waters

Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
Made Ground PAHs, Metals	Overland flow, / migration through saturated zone	Gore Brook 1100m away (Surface waters)	Negligible	Negligible	No Risk	It is considered contaminants associated with the made ground and other past industrial uses are unlikely to impact the River. This is due to the low permeability of the clays underlying the area, which will inhibit lateral migration, and the potential for contaminants to attenuate and degrade over this distance. The nearest watercourse is approximately 1100m away at its nearest point, given the distance this will allow for the potential for contaminants to attenuate and degrade over this distance. Therefore, no risk is posed to the river from the made ground.
	Leaching through unsaturated zone / Migration through saturated zone	Secondary Undifferentiated Aquifer (Groundwater)	Low Likelihood	Medium	Low	The site is currently surfaced in hardstanding and will remain so, with a new surface water drainage system installed which will further reduce the risk to controlled waters. By virtue of the development taking place, this should contribute to an overall "betterment" of groundwater quality. Given the variation in levels that exist at the site and the proposed formation levels, significant earthworks will be undertaken, and any previously unidentified mobile contamination will be accounted for and appropriately removed from site, further reducing the risk. The risk is therefore considered to be low.
	Migration through saturated zone	Secondary A Aquifer / Principal Aquifer (Groundwater)	Unlikely	Medium	Low	There are no groundwater abstraction licences or Source Protection Zones near the site. As stated above, the site is currently surfaced in hardstanding and will remain so, with a new surface water drainage system installed which will further reduce the risk to controlled waters.

8.9 Outline Remedial Measures

Exceedances of PAHs were identified in SA02 and WS01, and asbestos was also recorded in SA02 and HP04 at the site. Given that WS01 is in an area of proposed building footprint which would mitigate the risk, and that the strata would likely be removed in its entirety to accommodate a piling mat and floor slab for the proposed build this is not considered to pose a risk to the end-user. Whilst further investigation and assessment has noted low risk associated with asbestos recorded in SA02 and HP04 a watching brief should be maintained for the presence of ACMs. Additionally, the presence of elevated PAHs in SA02 would require a cover system to in place localised to this area of soft landscaping and would not be required across the site as a whole.

Where soft landscaping is present a cover of “clean” subsoil and topsoil should be provided to break the pathway to site end users as described in CIRIA Special Publication 124 – Barriers, liners and cover systems for containment and control of land contamination. This should be 450mm in soft landscaping areas (Public Open Space – POS). This will allow plants to be grown and prevent undesirable soils mixing or being brought to the surface. The inclusion of a geotextile marker layer at the base and a coarse granular, ‘hard dig’ layer is recommended due to the presence of asbestos.

Prior to import or re-use of clean cover soils, they should be tested to confirm chemical suitability. After installation of the clean cover, soil depths should be verified by a suitably qualified independent geo-environmental engineer, such as BSL.

Utilities

The level of protection for the clean potable water supply pipes should be determined using the local water company risk assessment criteria in accordance with UKWIR.

As the site is brownfield, there is the assumption that barrier pipe would be utilised, although requirements should be confirmed by risk assessment and with the water supply company.

Ground Gas Protection Systems

Based on the ground gas monitoring results, no mitigation measures are required, and no radon protection is required for new buildings at this location.

General

It is recommended that the approval of the Regulators (Local Authority /NHBC / Environment Agency) is obtained in regard to the above prior to any irrevocable action is taken at the site.

Once the above bodies have approved the above outline remedial proposals, a Remedial Strategy and a Verification Plan for Ground Gas Protection Measures will need to be produced to meet planning requirements and submitted to the regulatory authorities for approval. This will also give guidance to enable a suitably qualified contractor to carry out the works.

In addition, the writing and approval of a Materials Management Plan (MMP) or suitable exemptions/permits will be required to allow re-use of suitable material at the site.

A watching brief is recommended during groundworks for any unidentified sources of contamination. If any gross contaminated material is encountered works should cease in that area and BSL consulted.

Once remediation is complete, verification reports will need to be produced by a suitably qualified independent geo-environmental engineer, such as BSL, in order to achieve regulatory sign off.

8.10 Health and Safety Issues

During the reclamation and construction phases of the site development it will be necessary to protect the health and safety of site personnel. The risk to construction and ground workers is assessed in the table below:

Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk
Made Ground (heavy metals, PAHs)	Ingestion, direct contact, inhalation of dusts.	Construction Workers	Likely	Mild	Moderate/low
Asbestos	Ingestion, direct contact, inhalation of dusts.	Construction Workers	Low likelihood	Medium	Moderate / Low
Ground gas	Inhalation in confined spaces/trenches	Construction Workers	Low likelihood	Severe	Moderate

Elevated levels of chrysotile asbestos have been identified in one sample on the site. The risk from asbestos should be highlighted in the method statements and site induction. If further evidence of asbestos is encountered in the soils, work should cease until asbestos control measures have been agreed and put in place. Asbestos is further discussed in Section 8.11 below.

The risk from made ground will be mitigated by standard PPE including gloves. Welfare facilities should be made available to wash before hand to mouth activities.

It is noted that concentrations of carbon dioxide (an asphyxiant) in the soil exceed HSE Workplace Exposure Limits for personnel in the working environment of 1.5% for short term (15 minutes) exposure and/or 0.5% for long term exposure. Furthermore, soil concentrations of oxygen are below the HSE recommendations of 18%.

Soil gas concentrations are not necessarily reflected by those in the breathing zone, all contractors and maintenance workers should be made aware of the possible presence of carbon dioxide and should take all necessary health and safety precautions when working in trenches or confined spaces.

General guidance on these matters is given in the Health and Safety Executive (HSE) document “Protection of Workers and the General Public during the Redevelopment of Contaminated Land”. In summary, the following measures are suggested to provide a minimum level of protection:

- All ground workers should be issued with the relevant protective clothing, footwear and gloves. These protective items should not be removed from the site and personnel should be instructed as to why and how they are to be used.
- Hand-washing and boot-washing facilities should be provided.
- Care should be taken to minimise the potential for off-site migration of contamination by the provision of dust suppression control and wheel cleaning equipment during the construction works.
- Good practices relating to personal hygiene should be adopted on the site.
- The contractor shall satisfy the Health and Safety Executive with regard to any other matters concerning the health, safety and welfare of persons on the site.

8.11 Asbestos

The investigation of asbestos issues within structures was beyond the scope of this report. However, guidance from UK Government indicates that asbestos should be assumed to be present in buildings unless proven otherwise.

Any asbestos within structures will require removal prior to re-development. This will need to be done by a suitably qualified experienced and licensed contractor, who ensures that adequate PPE is provided to operatives, and that all the relevant legislation is adhered to.

In addition, the presence of asbestos within the ground will require, a safe system of work to be set up on site to deal with the asbestos risk from the made ground. This may include but be not limited to:

-
- The use of qualified personnel where required.
 - Careful segregation of stockpiles on site.
 - Defining transport routes.
 - Cleaning down of machinery in designated areas.
 - Decontamination unit for ground workers.
 - Damping down of soils to prevent dust migration.
-

Asbestos fibres have been identified in one sample at the site with quantification analysis identifying this to be approximately 0.007%, although this is considered to have been remediated by virtue of the sampling exercise. Regardless, at these concentrations the liberation of fibres is considered to be unlikely and no specific precautionary measures with regards to asbestos are likely to be required at the site. The level of precautions required are at the discretion of the principal contractor on site however good site practices including minimising the generation of dusts should be adhered to and sufficient to mitigate against the risk from asbestos. In addition, site personnel should have the risk communicated at the induction stage. It is recommended that the asbestos in construction materials assessment tool is used at the site to inform asbestos licensing and control measures.

Excavations in soils containing asbestos should comply with the CL:AIRE publication 'Interpretation for Managing and working with Asbestos in Soil and Construction and Demolition Materials' (CARSOIL) and CAR 2012. All such works will need to be agreed with the regulatory bodies (HSE and/or LA).

Additional guidance is provided within the BSL methodology Guidance Note in Appendix A.

9.0 WASTE SOIL CLASSIFICATION & ASSESSMENT

9.1 Soils Waste Classification Procedure

As described in the 'Waste Duty of Care Code of Practice (2016)' any substance or object that the holder discards, intends to discard or is required to discard is a waste. It is the responsibility of the waste producer to classify this waste. The classification process is described in the 'Guidance on the classification and assessment of waste' WM3 and aims to determine whether the waste is Hazardous or Non-Hazardous to human health and the environment.

Wastes first need to be classified based on their total concentrations. WAC testing is only required if the end disposal route is a landfill and WAC analysis must not be used for waste classification.

Wastes can only be accepted at a landfill if they meet the relevant Waste Acceptance Criteria (WAC) for that type of landfill. A waste must comply with the WAC limits for the relevant landfill, otherwise the soil will need to be pre-treated. There are three different WAC criteria, these are:

- Inert waste.
- Stable Non-Reactive Hazardous Waste (SNRHW).
- Hazardous waste.

Details of how material should be classified for waste disposal are presented in the BSL Methodology and Guidance in Appendix A and are summarised in the table below:

Classification based on Total Concentrations ¹	PRIOR TO LEAVING SITE			
	Non-Hazardous Waste		Hazardous Waste	
	IF SOILS CANNOT BE RE-USED ELSEWHERE AND MUST GO TO LANDFILL			
WAC testing	Below inert WAC limit values	Above inert WAC limit values	Below hazardous WAC limit values ⁴	> WAC limit values
Landfill requirements	INERT landfill	NON-HAZARDOUS landfill ²	HAZARDOUS landfill	PRE-TREATMENT ³

1 Total concentrations are defined as tests results on solids as opposed to leachate (i.e. a liquid).

2 Individual sites may have certain limit values pre-determined in their licence.

3 After pre-treatment the material characteristics may have changed to an extent that allow the soil to be re-classified.

4 Possibility that wastes could be classified as stable Nonreactive HAZARDOUS waste in non-hazardous Landfill (e.g. soils containing low concentrations of asbestos, gypsum or sulphate bearing soils).

9.2 Waste Classification and Waste Acceptance Criteria (WAC)

We have reviewed the testing results and assessed them through a waste classification database (HazwasteOnline™) which allows users to code and classify waste as defined in the EWC (European Waste Catalogue) based on EC Regulation 1272/2008 on the Classification, Labelling and Packaging of Substances and Mixtures (CLP) and latest Environment Agency guidance (WM3 "Guidance on the classification and assessment of waste -Technical Guidance").

The samples tested were screened against assessment criteria within WM3 using the HazWasteOnline tool to assess whether they contained any contaminants in the hazardous range.

The Waste Classification Report and WAC testing results are presented in Appendix F. Based on the waste classification database assessment, all of the made ground soils assessed have been classified as **non-hazardous**.

Waste Containing Asbestos

Should soils contain asbestos, the concentration and type of asbestos identified, in addition to the chemical composition (i.e. hazardous or non-hazardous detailed above), will determine which waste code is applicable to the soils and which landfill will accept it as summarised below:

Waste	Conc. by Weight (%)	EWIC 2002 Catalogue Entry Code	Waste Disposal Route
Non-hazardous containing asbestos fibres	<0.001 - <0.1%	17 05 04 (soil and stones other than those mentioned in 17 05 03*)	Non-hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a stable non-reactive hazardous landfill site.
Hazardous containing asbestos fibres	<0.001 - <0.1%	17 05 03* (soil and stones containing dangerous substances)	Hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a hazardous landfill site.
Non-hazardous soils containing asbestos fibres	>0.1%	17 05 03* (soil and stones containing dangerous substances)	Hazardous landfill authorised to receive asbestos, or in a stable non-reactive hazardous waste cell at a non-hazardous landfill authorised to receive asbestos.
Non-hazardous Soils containing ACM (Mechanically separable)	>0.1%	17 06 05 (construction material containing asbestos) 17 05 04 (soil and stones other than those mentioned in 17 05 03*)	ACMs disposed of at a hazardous landfill authorised to receive asbestos, or in a stable non-reactive hazardous waste cell at a non-hazardous landfill authorised to receive asbestos. Soils should be disposed of at a non-hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a stable non-reactive hazardous landfill site.
Hazardous soils containing ACM	>0.1%	17 05 03* (soil and stones containing dangerous substances)	Hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a hazardous landfill site.

A summary of locations where asbestos was identified is presented in the table below:

Location	Depth (m)	ACM	Conc. by Weight (%)	Waste Disposal Route
SA02	0.40 – 1.40	Loose fibres and loose fibrous debris	0.007	SNR landfill
HP01	0.30 – 0.70	Loose fibres	<0.001	Non-Hazardous Landfill

General

Following the classification of waste materials, the options available for the waste can be considered in the context of the waste hierarchy as below:

- Onsite re-use (with or without prior treatment) under suitable exceptions/permits.
- Offsite processing for recycling or recovery e.g. screening.
- Offsite disposal (with or without prior treatment) i.e. landfill.

Where feasible, efforts should be made to retain soils for onsite re-use to minimise costs and maximise the sustainability of projects.

If any gross hydrocarbon contaminated material is encountered during the construction phase, it is possible that this may be classified as hazardous and testing should be undertaken at that time.

Where it is necessary to dispose material off site it is recommended that materials are segregated and sufficient time is allowed to further classify the actual soil arisings that constitute the waste, including

discussion with landfill sites and waste transfer stations to find the best disposal route. It is illegal to dilute and mix soils without a suitable permit.

Where possible, the option that the soils could be recycled at a suitable local waste treatment plant or transfer station rather than a landfill disposal route should be explored.

9.3 Re-use of Soils

By definition in law, any material excavated from the ground becomes waste at the moment of excavation. If that soil (now a “waste”) is then placed on another part of the development site (or used on another development site) without an appropriate materials management plan, permit or exemption being in place, by law this material is defined as “illegally deposited waste”.

In order to comply with UK legislation and avoid excessive costs, if the re-use of soils is proposed on site, this should be done in accordance with the relevant exemptions or permits in place.

Soils Re-use Under DoWCoP

One of the main industry mechanisms for allowing the re-use of soils in construction is the CL:AIRE “Development Industry Code of Practice for the Definition of Waste” (CL:AIRE DoWCoP) also known as a Materials Management Plan (MMP). Further guidance is provided in the BSL Methodology and Guidance in Appendix A.

In order to re-use soils under the DoWCoP, there are four key criteria that need to be met:

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- The aims and objectives of the project meet the requirements of the Waste Framework Directive (does not harm human health or the environment).
 - The soils can be demonstrated to be suitable for use (backed up by chemical/geotechnical testing and assessment).
 - There is certainty of use (planning consents are in place alongside materials tracking, which should be in place as part of good site practice in any case).
 - Quantity (the quantity of materials used should be known).
-

Information on existing site levels, proposed levels, volumes generated (e.g. foundation / drainage excavation arisings) would need to be known in order to complete the MMP.

If the DoWCoP is the chosen route, the MMP should be in place and declared by a Qualified Persons (QP) before works commence, otherwise excavated soils could constitute an illegal deposit of waste and enforcement action could be taken by the EA and HMRC.

Once the project is complete, a verification report detailing soils re-use/import will need to be produced and submitted to CL:AIRE, which may be subject to a random audit process. Sites found to be non-compliant with the CoP can be referred to the EA for further investigation.

Note that for re-use of landfilled materials or mining wastes, the DoWCoP may not apply and a Waste Recovery Permit (or others) may be required. Liaison with the Environment Agency would be needed on a case by case basis to determine the best option.

Re-use of soils containing asbestos should comply with the CL:AIRE publication ‘Interpretation for Managing and working with Asbestos in Soil and Construction and Demolition Materials’ (CAR-SOIL™) and CAR 2012.

In terms of the re-use of brick/concrete crush materials, the DoWCoP does cover aggregates, but only on the site of origin, and the EA WRAP aggregate Quality Protocol might best apply to ensure quality standards, which are discussed further below.

Soils Re-use under Exemptions and Permits

Other potentially suitable re-use mechanisms may include U1 Exemptions, WRAP quality protocols (for aggregates) or Waste Framework Directive (WFD) Exclusions, amongst other mechanisms. Further details are provided in Appendix A.

10.0 CONCLUSIONS

10.1 Geo-Environmental

Geo-Environmental – Human Health – Soils

The proposed development is for the redevelopment of existing student accommodation. Soft landscaping is proposed for the site, and the landscaping drawings for the site details that no areas edible plant growth are proposed. Testing of the made ground at the site revealed an exceedance of PAHs, and remedial measures are required. No exceedances of petroleum hydrocarbons, BTEX or MTBE compounds were encountered by BSL.

Chrysotile & crocidolite fibres (loose fibres) was detected in one sample of made ground from SA02. On quantification the asbestos level within the sample to was recorded to be <0.007% mass. Further investigation and assessment in the area revealed one additional location with a positive asbestos ID but on quantification this was recorded to be at trace levels. Resampling of SA02 did not reveal any asbestos suggesting that this area was remediated by virtue of sampling. As such a low risk associated with asbestos recorded in SA02 and HP04 however a watching brief should be maintained for the presence of ACMs. Should ACMs be identified then further assessment should be undertaken to determine the risk.

Geo-Environmental – Ground Gases and Vapours

Ground gas monitoring has revealed a maximum peak carbon dioxide concentration of 2.5%v/v and methane concentrations of 3.1%v/v. Based on the gas monitoring and the ground gas risk assessment, the site is classified as Characteristic Situation 1 and ground gas protection measures are not required.

Geo-Environmental – Controlled Waters

The overall risk to controlled waters is considered to be low and no further action is required.

Waste

Waste classification for the samples of made ground obtained at the site has revealed these to be classified as non-hazardous.

10.2 Geotechnical

Foundations

Based on the proposed development, the recommended foundation type is a replacement pile technique, such as emplacement by rotary bored methods, socketed into competent bedrock. Detailed foundation design should be completed by a suitably qualified specialist.

Floor slabs

Given the thickness of made ground present, suspended floor slabs should be adopted at the site in accordance with NHBC/LABC standards.

Concrete classification

The results of laboratory pH and sulphate content, indicate that sulphate class DS-1 and ACEC AC-1/AC-1s conditions prevail for the made ground, superficial soils and solid geology in accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005.

Highways and Earthworks

Based on the fines content of the soils, they are considered to be frost susceptible, therefore highway construction should be a minimum thickness of 450mm to mitigate against the risk.

Drainage (SuDS)

The use of soakaways within the natural ground is not considered to be feasible at the site due to the low infiltration rates obtained and the presence of low permeability cohesive strata underlying the site.

10.3 Further Work

The following further work is considered necessary to progress the site to construction phase:

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- Demolition/Refurbishment Asbestos survey.
 - Detailed foundation design by a structural engineer
 - Design of Remedial Strategy and confirmation with the Local Authority /EA.
 - Production of Materials Management Plan (MMP) under the CL:AIRE DoWCoP, if required.
 - Implementation of the Remedial Strategy and verification of the remedial works.
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11.0 ABBREVIATIONS AND DEFINITIONS

GLOSSARY	
Term / Abbreviation	Definition
AST	Above Ground Storage Tank.
B(a)P	Benzo (a) Pyrene.
BGS	British Geological Survey.
BRE	Building Research Establishment.
BS	British Standard.
BSL	Brownfield Solutions Ltd.
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes.
CBR	California Bearing Ratio (used in pavement/highways design).
CAR 2012	Control of Asbestos Regulations (2012).
CBCB	Cheshire Brine Compensation Board.
CBCD	Cheshire Brine Compensation District.
CBR	California Bearing Ratio.
CIEH	Chartered Institute of Environmental Health.
CIRIA	Construction Industry Research Association.
CL:AIRE	Contaminated Land: Applications in Real Environments.
CLEA	Contaminated Land Exposure Assessment.
CLO	Contaminated Land Officer.
COMAH	Control of Major Accident Hazards.
Contamination	Presence of a substance which is in, on or under land, and which has the potential to cause significant harm or to cause significant pollution of controlled water. There is no assumption in this definition that harm results from the presence of the contamination. Naturally enhanced concentrations of harmful substances can fall within this definition of contamination. Contamination may relate to soils, surface water, groundwater or ground gas.
Controlled Waters	Inland freshwater (any lake, pond or watercourse above the freshwater limit), water contained in underground strata and any coastal water between the limit of highest tide or the freshwater line to the three-mile limit of territorial waters.
CPT	Cone Penetration Test.
CSM	Conceptual Site Model. A schematic hypothesis of the nature and sources of contamination, potential migration pathways (including description of the ground and groundwater) and potential receptors, developed on the basis of the information from the preliminary investigation and refined during subsequent phases of investigation and which is an essential part of the risk assessment process. The conceptual site model is initially derived from the information obtained by the preliminary investigation (i.e. the Phase I Desk Study). This conceptual model is used to focus subsequent investigations, where these are considered to be necessary, in order to meet the objectives of the investigations and the risk assessment. The results of intrusive investigations can provide additional data that can be used to further refine the conceptual site model.
DCP	Dynamic Cone Penetrometer.
DNAPL	Dense Non-Aqueous Phase Liquid.
DoWCoP	Definition of Waste Code of Practice.
DWS	Drinking Water Standard.
EA	Environment Agency.
EHO	Environmental health Officer.
EQS	Environmental Quality Standard.

GLOSSARY	
Term / Abbreviation	Definition
GAC	Generic Assessment Criteria.
GDR	Geotechnical Design Report.
GFR	Geotechnical Feedback Report.
GIR	Ground Investigation Report.
GSV	Gas Screening Value.
Harm	Adverse effect on the health of living organisms, or other interference with ecological systems of which they form part, and, in the case of human health, including property/structures and water supply pipelines.
Hazard	Inherently dangerous quality of a substance, procedure or event.
HDPE	High Density Polyethylene.
HSV	Hand Shear Vane.
K	Modulus of Subgrade Reaction.
LCRM	Land Contamination: Risk Management (EA guidance).
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene).
LOD	Limit of Detection (for particular method adopted).
MMP	Materials Management Plan.
Mv	Modulus of Volume of Compressibility.
ND	Not Detected.
NHBC	National House Building Council.
NR	Not Recorded.
OS	Ordnance Survey.
PAH	Polycyclic Aromatic Hydrocarbon.
Pathway	Mechanism or route by which a contaminant comes into contact with, or otherwise affects, a receptor.
PCB	Poly-Chlorinated Biphenyl.
PCSM	Preliminary Conceptual Site Model.
pH	Scale used to specify how acidic or basic a water-based solution is.
PHC	Petroleum Hydrocarbons.
PID	Photo Ionisation Detector.
PNEC	Predicted No-Effect Concentration.
Precision	Level of agreement within a series of measurements of a parameter.
PSD	Particle Size Distribution.
PVC	Polyvinyl Chloride.
Receptor	Human health, living organisms, ecological systems, controlled waters (surface waters and groundwater within aquifers), atmosphere, structures and utilities that could potentially be adversely affected by contaminant(s).
Risk	Probability of the occurrence, magnitude and consequences of an unwanted adverse effect on a receptor.
Risk Assessment	Process of establishing, to the extent possible, the existence, nature and significance of risk.
Sampling	Methods and techniques used to obtain a representative sample of the material under investigation.
SOM	Soil Organic Matter.
Source	Location from which contamination is, or was, derived. This could possibly be the location of the highest soil, groundwater or gas concentration of the contaminant(s).
SPT	Standard Penetration Test.
SVOCs	Semi Volatile Organic Compounds.
TOC	Total Organic Carbon.

GLOSSARY	
Term / Abbreviation	Definition
TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group).
TVOCs	Total volatile organic compounds.
UCS	Unconfined Compressive Strength.
Uncertainty	Parameter, associated with the result of a measurement that characterises the dispersion of the values that could reasonably be attributed to the measurement.
UST	Underground Storage Tank.
UXO	Unexploded Ordnance.
VCCs	Vibro Concrete Columns.
VSCs	Vibro Stone Columns
VOCs	Volatile Organic Compounds.
WAC	Waste Assessment Criteria.
WFD (in waste context)	Waste Framework Directive.
WFD (in water context)	Water Framework Directive.
Units	Definition
°	Degrees
Φ	Phi angle (in degrees)
g/l	Grams per Litre
Km	Kilometres
kPa	Kilo Pascal (Equivalent to kN/m ²)
kN/m ² /mm	Kilo Newton per metered squared per millimeter
kN/m ²	Kilo Newtons per metre squared
kPa	Kilo Pascal (Equivalent to kN/m ²)
l/hr	Litres per hour
MJ/kg	Mega joule per kilogram
MN	Mega Newton
M ² /MN	Mega Newton per metre squared
M	Metres
m bgl	Metres Below Ground Level
m OD	Metres Ordnance Datum (sea level)
µg/l	Micrograms per Litre (parts per billion)
µm	Micrometre
mb	Millibars (atmospheric pressure)
mg/kg	Milligrams per kilogram (parts per million)
mg/m ³	Milligram per metre cubed
mm	Millimetre
ppb	Parts Per Billion
Ppm	Parts Per Million

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DRAWINGS

Site Plan - Proposed





SITE LOCATION

NEAREST POSTCODE: M13 0FT

SITE ENTRANCE WHAT3WORDS: ///

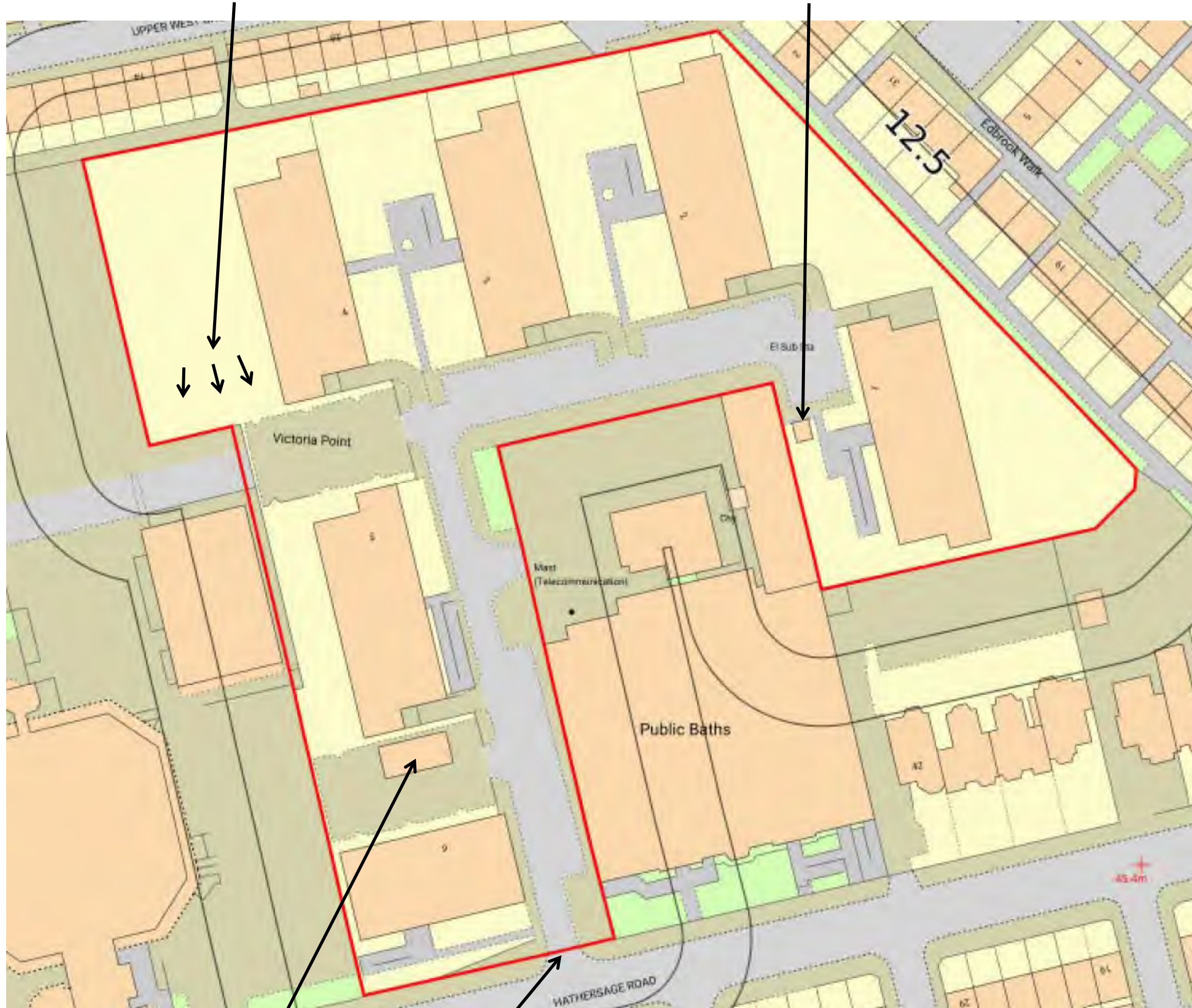


REV	DATE	DESCRIPTION	BY	CKD
 BROWNFIELD SOLUTIONS LTD DESIGN • ENVIRONMENTAL • ENGINEERING • EXCELLENCE				
CLIENT HEYNE TILLETT STEEL				
PROJECT TITLE VICTORIA POINT, MANCHESTER				
DRAWING TITLE SITE LOCATION PLAN				
DRAWING No. C5515/01	REVISION -	SCALE NTS	DATE 03/11/23	
DRAWN BY SD		CHECKED BY JM		



SLOPE IN SOFT LANDSCAPING

ELECTRICAL SUBSTATION



KEY

-  APPROXIMATE SITE BOUNDARY
-  SOFT LANDSCAPING
-  EXISTING BUILDINGS
-  HARDSTANDING

NOTES

1. ALL DIMENSIONS TO BE CHECKED ON SITE BEFORE COMMENCING WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ARCHITECT & ENGINEER FOR VERIFICATION. FIGURED DIMENSIONS ONLY ARE TO BE TAKEN FROM THIS DRAWING.
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REV	DATE	DESCRIPTION	BY	CKD



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PROJECT TITLE
VICTORIA POINT

DRAWING TITLE
SITE FEATURES PLAN

DRAWING No. C5515/02	REVISION -	SCALE NTS	DATE 21/12/23
DRAWN BY OS		CHECKED BY JM	



KEY	
—	APPROXIMATE SITE BOUNDARY
■ TPXX	HAND EXCAVATED TRIAL PIT
■ SAXX	TRIAL PIT
● WSXX	WINDOW SAMPLE BOREHOLE
● BHXX	ROTARY BOREHOLE
● DPXX	DYNAMIC PROBE
● DPXX	DYNAMIC PROBE (BACKUP)
● SAXX	SOAKAWAY INFILTRATION TEST
●	BOREHOLE INSTALLATION

- NOTES
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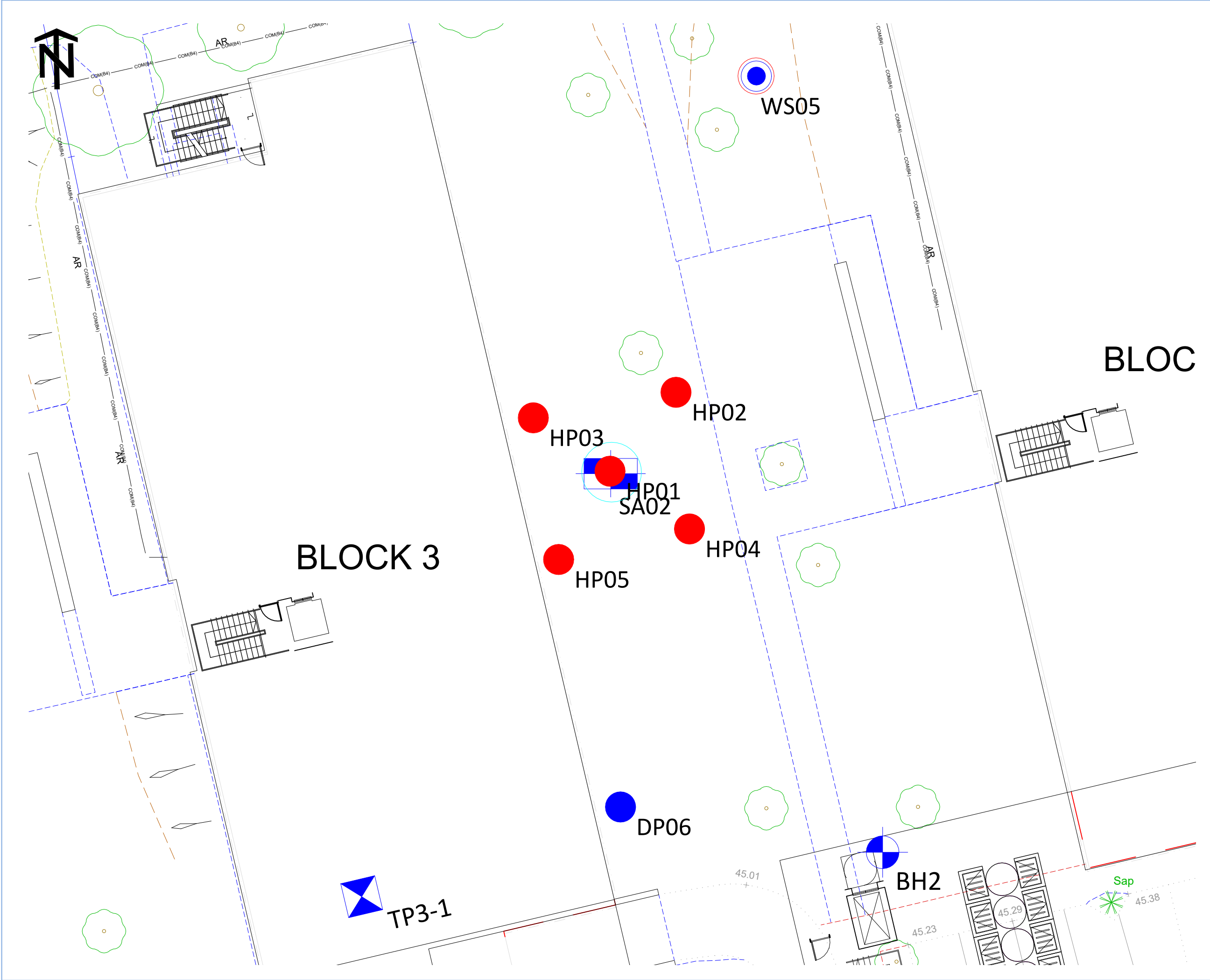


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EMPIRIC (MANCHESTER VICTORIA POINT) LTD

PROJECT TITLE
VICTORIA POINT, MANCHESTER

DRAWING TITLE
EXPLORATORY HOLE LOCATION PLAN

DRAWING No.	REVISION	SCALE	DATE
C5515/04	A	NTS	23/01/24
DRAWN BY NS		CHECKED BY JM	



KEY	
---	APPROXIMATE SITE BOUNDARY
▣ TPXX	HAND EXCAVATED TRIAL PIT
▣ SAXX	TRIAL PIT
● WSXX	WINDOW SAMPLE BOREHOLE
⊕ BHXX	ROTARY BOREHOLE
● DPXX	DYNAMIC PROBE
● DPXX	DYNAMIC PROBE (BACKUP)
○	SOAKAWAY INFILTRATION TEST
○	BOREHOLE INSTALLATION

NOTES

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A	31/01/2024	UPDATED ASBESTOS HOLE PLAN	OS	



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PROJECT TITLE
VICTORIA POINT, MANCHESTER

DRAWING TITLE
ASBESTOS INVESTIGATION PLAN

DRAWING No.	REVISION	SCALE	DATE
C5515/04	B	NTS	23/01/24
DRAWN BY NS		CHECKED BY JM	

APPENDIX A

BSL Methodology and Guidance



BSL Phase I & II Geo-Environmental Assessment Reports - Methodology and Guidance

Background

This Appendix provides information on the approaches, methods and guidance used by Brownfield Solutions Ltd in the preparation of this report.

The term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential soils and groundwater contamination). The term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements). It should be noted that this is an integrated investigation and these two main aspects are related, unless otherwise specified within the report.

Phase I reports are written in general accordance with the description of a Preliminary Investigation as defined in BS10175:2011+A2:2017 and are also produced in general accordance with the recommendations for a Tier 1 Preliminary Risk Assessment as described in LCRM guidance.

The first stage of the investigation and assessment of a site is the Preliminary Investigation/Tier 1 Preliminary Risk Assessment, often referred to as a Phase 1 Desk Study, comprising a desk study and walk-over survey and collation of desk-based searches, which culminates in the Preliminary Risk Assessment and the development of a preliminary/initial **Conceptual Site Model (CSM)**. From this are identified any potential geotechnical and geo-environmental hazards and the qualitative degree of risk associated with them. In the case of the geotechnical hazard identification, this is referred to as the **Ground Model**.

From the geo-environmental perspective, the hazard Identification process uses professional judgement to evaluate all the hazards in terms of possible contaminant linkages (of source-pathway-receptor). Possible contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are normally addressed via intrusive ground investigation and generic risk assessment as part of Phase II investigations and reports.

The second stage is the Ground Investigation, Generic Risk Assessment and Geotechnical Interpretation. This represents the further assessment mentioned above. The Ground Investigation comprises field work and laboratory testing based on the findings of the Preliminary Risk Assessment, to reduce uncertainty in the geotechnical and geo-environmental hazard identification. This may include an exploratory, a detailed or/and supplementary Investigations as described in BS 10175:2011+A2:2017. Phase II Assessments are produced in general accordance with the recommendations for a Tier 2 Generic Quantitative Risk Assessment as described in LCRM guidance and are also intended to fulfil the requirements of a Ground Investigation Report (GIR) as detailed in BS EN 1997-2:2007.

Contaminated Land - Legislative Background

Land contamination can be addressed in several ways, e.g. during planning, under Part 2A, following an incident, during an investigation into environmental damages, or during the application of an environmental permit, or its surrender.

For the planning process the key test is **as a minimum the site cannot be determined as contaminated land**, e.g. there is not significant harm, significant possibility of significant harm to human health or that there is not significant harm to, or the significant possibility that the pollution of controlled waters will occur.

Environmental liabilities and risks have been evaluated in terms of a source -pathway - target relationship in accordance with the approach set out in:

-  The 1995 Environment Act.
-  The Contaminated Land Statutory Guidance, DEFRA – April 2012.
-  The Contaminated Land (England) Regulations 2006.
-  The Contaminated Land (England) Amendment Regulations 2012.
-  Water Resources Act.
-  Water Framework Directive.
-  Environmental Damage Regulations.
-  Environment Agency (EA) - Land Contamination Risk Management (LCRM) 2019.

Contaminated land is defined within the legislative framework as land which is in such condition by reason of substances in, on or under the land that:

- 1) Significant harm is being caused or there is a significant possibility of such harm being caused.
- 2) Significant pollution of controlled waters is being or is likely to be caused.

The potential for harm is based on the presence of three factors:

Source - substances that are potential contaminants or pollutants that may cause harm.

Pathway - a potential route by which contaminants can move from the source to the receptor, and the impact of that migration on the source e.g. attenuation.

Receptor - a receptor that may be harmed, for example the water environment, humans and water, considering the sensitivity of the receptor.

Where a source, pathway and target are all present a pollutant linkage exists and there is potential for harm to be caused.



Where any one of the “pollution linkages” between the above is absent there is deemed to be no risk.

The presence of a source does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors are site specific and will vary according to the intended end use of the site, its characteristics and its surroundings.

The key principle which supports the S-P-R approach is ‘suitable for use’ criteria. This requires remedial action only where contamination is considered to pose unacceptable actual or potential risks to health or the environment and, taking into account the proposed use of the site.

Relevant Guidance Documents

This report has been prepared in accordance with the list of guidance below, however the list is not exhaustive:

- DETR: Circular 02/2000: Environmental Protection Act 1990: Part IIA: Contaminated land. 2012.
- Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002.
- BS 10175:2011+A2:2017.
- Environment Agency (EA) - Land Contamination Risk Management (LCRM). 2019.
- Groundwater Protection <https://www.gov.uk/government/collections/groundwater-protection>
- UK Technical Advisory Group (UKTAG) - Water Framework Directive
- Incidents and their classification: the Common Incident Classification Scheme (CICS) – Used by the Environment Agency to classify pollution incidents.

Relevant Legislative Documents

The following is a non-exhaustive list of legislative framework documents that has been considered in the production of this report:

- The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012).
- The Environment Protection Act (1990).
- The Water Resources Act (1991).
- The Environment Act (1995).
- The Contaminated Land (England) Act (2000).
- The Pollution Prevention and Control (England and Wales) Regulations (2000).
- The Landfill Regulations (England and Wales) Regulations (2002).
- The Landfill (England and Wales) (Amendment) Regulations (2004).
- Contaminated Land (England) Regulations (2012).
- The Environmental Damage (Prevention and Remediation) Regulations (2009).
- Environmental Permitting Regulations (England and Wales) Regulations (2010).
- The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017).
- Health and Safety at Work Act.
- National Planning Policy Framework (NPPF) – latest version.

Contaminated Land Risk Assessment Approach

Contaminated Land Risk Assessment is a technique that identifies and considers the associated risk, determines whether the risks are significant and whether action needs to be taken. The four main stages of risk assessment are:



LCRM outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. The starting point of the risk assessment is to identify the context of the problem and the objectives of the process. Under LCRM, three tiers of risk assessment exist – Stage/Tier Preliminary Risk Assessment, Stage 2 Generic Quantitative and Stage 3 Detailed Quantitative.

Further information can be found at the below site:

<https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>

Formulating and developing a conceptual model for the site is an important requirement of risk assessment, this supports the identification and assessment of pollutant linkages. Development of the conceptual model forms the main part of preliminary risk assessment, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process.

Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk.

The risk assessment process needs to take into account the degree of confidence required in decisions. Identification of uncertainties is an essential step in risk assessment.

The likelihood of an event is classified on a four-point system using the following terms and definitions from CIRIA C552, with reference to Incidents and their classification: the Common Incident Classification Scheme (CICS), Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance 2012 and other guidance as appropriate which will be detailed within the main body of the report if applied.

The likelihood of a given receptor being impacted is related to a number of factors, e.g. the geology which could inhibit contaminant migration. For example, a site with a significant thickness of clay between it and a receptor may reduce migration of contamination via the subsurface, which will reduce the likelihood of a given receptor being impacted. The geology or drainage for example could offer a preferential pathway e.g. mines shafts/faults increasing the likelihood and potential magnitude of an impact. The depth of contamination will also affect the exposure pathway, for example petroleum hydrocarbons at depth are unlikely to reach a receptor via dermal contact but could via vapour pathways which will influence the likelihood of an impact being felt e.g. if there are no buildings on site.

The terms and definitions used for the assessment of the likelihood are provided below:

High likelihood: There is a pollution linkage and an event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.

Examples - Extensive areas with concentrations above saturation limits for mobile contamination e.g. petroleum hydrocarbons within the water table.

Likely: There is a pollution linkage and all the elements are present and in the right place, which means it is probable that an event will occur. Circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term.

Examples – Localised areas of contaminants with concentrations above saturation limits for mobile contamination e.g. localised petroleum hydrocarbons within the water table; shallow contamination above relevant human health generic assessment criteria is present with little or no hardstanding,

Low likelihood: There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain even over a longer period such event would take place, and is less likely in the short term.

Examples - A thickness/distance of low permeability deposits preventing contaminant migration to a receptor is present; a site is mostly covered hard standing preventing exposure to soil contamination.

Unlikely: There is a pollution linkage but circumstances are such that it is improbable the event would occur even in the long term.

Examples – A site is underlain by a substantial thickness of low permeability clays, between the source and potential receptors which will inhibit significantly, but not completely rule out migration to sensitive receptors.

The severity is also classified using a system based on CIRIA C552, with reference to Incidents and their classification: the Common Incident Classification Scheme (CICS), Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance 2012 and other guidance as appropriate which will be detailed within the main body of the report, if applied. The terms and definitions are:

Severe: Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. A short-term risk to a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);

Examples – High concentrations of contaminant on surface of recreation area, major spillage of contaminants from site into controlled waters, explosion causing building to collapse.

Medium: Chronic damage to human health ('significant harm' as defined in DETR 2000). Pollution of sensitive water resources. A significant change in a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);

Examples - Concentrations of contaminants exceed the generic assessment criteria, leaching of contaminants from a site to a Principal or Secondary Aquifer, death of species within a designated nature reserve.

Mild: Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures, services or the environment.

Examples – Pollution of non-classified groundwater or damage to buildings rendering it unsafe to occupy.

Minor: harm, not necessarily significant harm, which may result in financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by use of personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.

Examples – Presence of contaminants at such concentrations PPE is required during site work, loss of plants in landscaping scheme or discolouration of concrete.

Once the likelihood and severity have been determined, a risk category can be assigned using the table below.

		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very Low	Very low
	Negligible	Negligible Risk / No Linkage			

Definitions of the risk categories obtained from the above table are as follows together with an assessment of the further work that might be required:

Very high: There is a high probability that severe harm could arise to a designated receptor from an identified hazard or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability. Urgent investigation and remediation are likely to be required.

High: Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required and remedial works may be necessary in the short term and are likely over the longer term.

Moderate: It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it would be more likely to be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term.

Low: It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.

Very Low: There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

Some linkages may be identified which constitutes a theoretical connection between a source and a receptor, but professional judgement shows them not to be possible for some reason. These are labelled 'negligible risk' and 'no linkage' in the summary table, which give rise to an overall **negligible** risk category and no further action is required.

Contaminated Land Screening Values

In assessing the potential for contamination Brownfield Solutions Limited (BSL) follows UK guidance and current best practice.

General

The purpose of using generic Tier 1 screening levels is to have a simple means of assessing the potential contamination of a site and to inform decisions on whether further investigation is warranted or whether an option to undertake remedial action based on the data to hand is cost effective.

Human Health

Current UK guidance on risks to human health is provided by DEFRA and the Environment Agency (EA). Under the land use planning system where the aim is to demonstrate 'suitability for use' the key will usually be to confidently determine that the level of contamination of the land is low relative to some appropriate measure of risk at a particular critical connection.

Publications forming part of the guidance include the CLEA Model and toxicological reports collectively referred to as the CLEA Guidance. The CLEA Guidance has included a number of publications which have provided initial screening values or Generic Assessment Criteria (GACs) for soils contamination based on standard land uses and soil assumptions. The critical concentrations referred to above can be the relevant GAC.

CLEA guidance has gone through a number of revisions over time. Tier 1 generic S4UL values (or GACs) have been published using the CLEA 1.06 Model by CIEH/LQM. These are the third set of generic assessment criteria generated by CIEH and replace the previous two sets of GACs. The revised S4UL values are based on greater knowledge of relevant toxicology and further consideration of exposure frequencies.

C4SL values for six determinands including lead were published by DEFRA/CL:AIRE in December 2014. Additional determinands were added in 2021. They represent a low risk as opposed to minimal risk, however they are still strongly precautionary. These screening values were published by DEFRA for Part 2A use, although DEFRA have also confirmed acceptability for use under planning. However, S4ULs remain the first reference point for BSL due to the broader range of end uses scenarios and the availability of a wide array of determinands with various soil organic contents.

As part of Tier 1 assessments, the following data sources are used in the order of preference given below, unless further justification is provided to adopt less conservative criteria:

-  CIEH S4UL values (derived by CIEH/LQM).
-  DEFRA/CL:AIRE C4SL's <https://www.claire.co.uk/projects-and-initiatives/category-4-screening-levels>
-  CL:AIRE GAC values.
-  Guidance from other European countries.
-  Guidance from the outside Europe.

Dependent on requirements, test results may be divided into representative data sets for assessment against the above referenced screening criteria, based on the conceptual model and taking into account such characteristics as variation in soil properties, historical, existing or proposed land uses. The soils in these areas are considered likely to form the ground cover in critical receptor areas (e.g. gardens, soft landscaping etc)

where pathways may exist. The critical part of the soil column is typically taken as the upper metre in terms of contact with end users of a development site for the purposes of initial assessment.

The screening criteria adopted by BSL are presented overleaf.

Further Assessment

When screening values are exceeded then further consideration is required. This could include further additional detailed investigation and assessment to further define the risk or to design appropriate remedial measures to either remove the source or break the pathway. In some cases, dependant on the Conceptual Site Model (CSM), no action may be required.

PAHs and B(a)P as a Surrogate Marker for Adoption of C4SLs

As stated above, S4ULs remain the first reference point as screening levels unless further justification is provided. In order to determine if the C4SL can be adopted, benzo(a)pyrene (B(a)P), the following guidance within SP1010 Appendix E for B(a)P and Public Health England (PHE) may be adopted with our assessments where appropriate.

Guidance states that benzo(a)pyrene is considered to be one of the most potent PAHs, and it would be appropriate to assume the cancer risk in a mixture is proportional to the concentration of a surrogate marker PAH (benzo(a)pyrene) in the mixture. The ratio of PAHs within the mixture can be assessed to ensure that the profile is similar to that seen for the test material (coal tar mixtures) in the toxicological study by Culp et al. The International Programme on Chemical Safety (IPCS) considered that the PAH profile of the soil sample may deviate from the average profile by about an order of magnitude (up or down).

A more recent study by Bull et al (2013) which analysed PAH concentrations in soil samples from 274 sites, showed that the levels of PAH relative to B(a)P showed little variability and were similar to that recorded for the coal tar mix used in the Culp et al study. Given this, it was concluded that benzo(a)pyrene is a suitable surrogate marker to represent mixtures of PAH in soil.

In order to risk assess the PAH mixture for site specific soil samples using human health guideline values, notably the C4SLs, as detailed in SP10101 the ratio of the seven genotoxic PAHs as shown below, relative to B(a)P, should be calculated to ensure it is similar to the test material used in the Culp study (PHE 2010). To be considered sufficiently similar, the ratio relative to B(a)P should fit within the upper and lower limits (representing an order of magnitude above and below the mean ratio to B(a)P of test material used in the Culp et al study). In such cases B(a)P is considered an adequate surrogate marker and the Low Level of Toxicological concern (LLTC) for B(a)P (i.e., the C4SL) may be used in the risk assessment.

Statistical Analysis on Soils

Guidance on the use of statistics is taken from the CL:AIRE publication “Comparing Soil Contamination Data with a Critical Concentration” 2020, the basis of which in statistics is termed Central Limit Theorem (CLT), which says “*The distribution of sample means converges to a normal distribution as the sample size increases*”.

If the critical concentrations have been exceeded, as part of a further assessment, statistical analysis may be undertaken on a dataset to demonstrate that the mean concentration on the site (or a particular area) is actually below the critical concentration. The true mean concentration of a contaminant is never known because all the site soil has not been tested. An estimation of the true mean can be obtained from the samples tested during the investigation. The greater the number of samples tested, the closer the mean of these values is to the true mean.

As discussed above, test results are typically divided into representative data sets for assessment and may be referred to as ‘averaging areas’ to which statistics can be applied, although several statements need to be satisfied before applying the guidance:

-  Averaging areas have been defined based on the CSM.
-  Sample locations – random/grid sampling adopted as opposed to targeted investigation.
-  Samples are evenly spread and not clustered.

- Analysis do not suggest a hotspot/outlier or cluster established by histogram or other means.
- Samples are of same/similar depth and taken from one population (e.g. just topsoil).
- Analyses do not show a spatial trend or other spatial pattern across that zone.
- The number of samples has been shown to be sufficient for statistical analysis.

Once the above have been satisfied, when undertaking statistical analysis, the question “*are mean soil concentrations within the averaging area equal to, or greater than, the GAC?*” is being asked. Typically, outliers or “hotspots” are treated as separate zones or averaging areas. The sampling strategy and assessment should also take into account uncertainty (for example, spatial heterogeneity) in contaminant concentrations. There is the assumption that sampling was random or stratified and systematic (e.g. on a grid) and not targeted at specific sources; data from such targeted areas should be omitted from the statistical analysis. Data should be from one population (i.e. the same materials).

The statistical test that is carried out is used to demonstrate that there is a certain probability that the true mean falls below the critical concentration (typically the GAC in a screening exercise). The main tool used to draw conclusions based on the 2020 guidance is a comparison of a 2-way confidence interval with the critical concentration. A confidence interval consists of two sets of numbers; an interval i.e. a range of values plus a pre-determined level of confidence e.g. 80%. A common interpretation of a confidence interval of say 80% is that “*there is an 80% chance that the true mean concentration level of the contaminant in a sampling zone lies between X concentration and Y concentration*”.

The current guidance for planning says that the site has to be “safe” which suggests we should use a large confidence interval such as 95% or higher to make a decision. This means that there is a 95% chance of the true mean concentration lying in this interval, there is also a 5% chance it lies outside this interval. One could then conclude that the requirements of planning have been met if the 95% confidence interval lies below the critical concentration.

The guidance recommends that at least two confidence levels are used such as 90% and 99% or 80% and 95%. By using two differing confidence intervals, we can use the smaller confidence interval (e.g. 80% confidence interval) to say “*we think the mean is most likely to be inside this range*” and the larger confidence interval (e.g. 95% confidence interval) to say “*we think the mean is most unlikely to be outside this range*”.

If the confidence interval extends to above the critical concentration, then further action may be required.

Controlled Waters

The European Water Framework Directive (WFD) became UK law in December 2003. It was created to ensure that European countries manage their rivers, groundwater and lakes so that they stay healthy for people and for wildlife.

This is achieved by the use of chemical standards (Water Quality Targets – WQTs) for surface waters and groundwater. These values describe concentrations of chemicals that are not expected to cause harm to environmental organisms or human health, provided they are not exceeded. The same chemical may have several standards for different environmental regimes, and for different protection objectives.

Statutory Standards are set in legislation and if exceeded, this constitutes non-compliance with statutory obligations. European Directives are implemented in England and Wales by corresponding statutory instruments (i.e. regulations- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 and The Private Water Supplies (England) Regulations 2016. SI 2016 / 618). In Scotland, the Public Water Supplies (Scotland) Regulations 2014 apply. The statutory instruments can be the exact same standards as they appear in the Directive or be more stringent.

A number of non-statutory standards also exist, these are set by various organisations (including the EA) for chemicals that are considered to be of concern, but are not covered by any specific legislation.

The chemical standards used in the UK to control impaction of contamination on controlled waters are Environmental Quality Standards (EQS). These cover a large number of compounds. EQS are available for inland surface waters (freshwater) and other surface waters (transitional and marine).

Several EQS are based on bioavailable metal proportions (i.e. copper, lead, manganese, nickel and zinc). A software tool (M-BAT) is available from the Water Framework Directive - UK TAG website for calculating the bioavailable fraction. Where this tool has been used, the bioavailability has been taken into account by calculating site-specific $PNEC_{dissolved}$ (Predicted No Effect Concentration) values. These enable the dissolved concentration data to be compared with the PNEC as if it were an EQS.

UK Drinking Water Standards (DWS) apply to waters abstracted for human consumption. Where no UK or EU drinking water standard exists, reference is made to the World Health Organisation criteria (2011).

The DWS apply to groundwater or to surface water used for abstraction and the EQS apply to surface water where the aquatic ecosystem is the receptor. Where the most appropriate water quality target cannot be determined with certainty, the lowest one is adopted in line with the precautionary principle.

In some instances, the laboratory detection limits (LODs) may be greater than the water quality target it is being screened against, but it should be noted that these comparisons are an initial screening assessment. It may be the case that lower LODs could be obtained using a more specialised technique, but it would be disproportionately expensive to adopt the more costly specialist technique for initial screening exercises.

The preference of BSL is to have testing carried out on actual samples of ground/surface water rather than theoretical values obtained from leachate testing, which is considered to often be highly conservative. Data from water samples obtained or from leachate analysis is then compared against the screening criteria adopted by BSL, which are presented overleaf.

When screening values are exceeded then further consideration is required. This could include further additional detailed investigation and detailed quantitative risk assessment (DQRA) to further define the risk or to design appropriate remedial measures to either remove the source or break the pathway.

Ground Gas Risk Assessment

BS8485:2015+A1:2019, BS 8576:2013, CL:AIRE RB17, and NHBC 'Hazardous Ground Gas - An essential guide for housebuilders' 2023, are the current guidance which gives up-to-date advice on all aspects of permanent ground gas risk. BS8576 alongside CIRIA C682 also provides guidance on assessment of hydrocarbon vapour intrusion.

The CL:AIRE publication 'Good Practice for Coal Mine Gas Emissions' 2021 provides guidance on the assessment of risks from mine gas sources.

The above all outline good practice in investigation, the collection of relevant data and monitoring programmes in a risk-based approach to ground gas contamination. The aim of the guidance is for a consistent approach to decision making, particularly relating to the scope of protective design measures on a site-specific basis.

Legislative Framework

BS8485:2015+A1:2019, BS 8576:2013 and CIRIA C665 provides technical guidance, however they also recognise the context into which the guidance has to be employed. Government policy is based upon a "suitable for use approach", which is relevant to both the current and proposed future use of land. When considering the current use of land, Part IIA of the Environment Protection Act 1990 provides the regulatory regime. The presence of hazardous ground gases could provide the "source" in a "pollutant linkage" which could lead the regulator to determine that considerable harm or there is a significant possibility of such harm being caused. Under such circumstances, the regulator would determine the land to be "contaminated land" under the provisions of the Act, setting out the process of remediation as described in the DETR Circular 02/2000 *Statutory guidance on contaminated land*.

Generation Potential of Sources

BS 8576:2013 Figure 6 provides a basis for assessing the generation potential from sources identified as part of the Phase I Assessment. These are summarised below:

Generation Potential	Typical Sources
Very Low	- Natural carbonate soil and strata, e.g. chalk and limestone. - Natural soil strata with a low degradable organic content, e.g. alluvium, peat. - In-filled pond less than 15 m diameter, in-filled before 1930s to 1940s. - Made ground with low degradable organic content (e.g. up to 5% organic material such as pieces of wood, pieces of paper, rags, etc. with a high proportion of ash and no food or other easily degradable waste). - Mine workings shallow or shaft (where there is clear evidence that they are flooded). - Inert landfill sites (and pre -1945 landfills).
Low	- Natural soil strata with a high degradable organic content (DOC). - Made ground with total organic carbon (TOC) up to 6% (e.g. dock silt, no food or other easily degradable waste). - Foundry sand (includes phenolic binders, rags and wood that decay, albeit at low rates). - Landfill 1945 to mid 1960s (see also Moderate below).
Moderate	- Sewage sludge. - Mine workings – unflooded, more than 50 years since last worked (gas is liberated from coal when mine workings are excavated; this continues for up to about 50 years). - Landfill 1945 to mid 1960s (this could also be “low” or, if disturbed, “high”).
High	- Landfill mid 1960s to early 1990s. - Mine workings – unflooded – less than 50 years since last worked.
Very High	- Municipal landfill sites. - Landfill early 1990s onward.

Frequency and Duration of Monitoring

BS8576 notes to determine where and how to monitor ground gases requires consideration of credible pathways of possible exposure of the receptors, taking into account what is known about the geology and hydrogeology, building construction and services layout, foreseeable events such as flooding, changes in groundwater level, climate change, extreme weather conditions, the closure of mines, and possible changes to the gas regime caused by future development.

The monitoring period for a specific site should cover the “worst case” scenario. A “worst case” scenario will typically occur during falling atmospheric pressure and, in particular, weather conditions such as rainfall, frost and dry weather.

The benefits of additional information and whether it is likely to change the scope of gas protection should be considered, as are the consequences of failing to characterise adequately pollutant linkages. Investigations concerned with ground gas are required to provide monitoring data sufficient to allow prediction of worst case conditions enabling the confident assessment of risk and subsequent design of appropriate gas protection schemes. Monitoring programmes should not be an academic exercise in data collection. CL:AIRE publication TB17 “Ground Gas Monitoring and ‘Worst-Case’ Conditions” provides further guidance.

Below are matrices that will aid in determining an appropriate number of gas monitoring visits and the length of monitoring period.

Typical/idealised periods of monitoring

		Generation of Potential Source				
		Very Low	Low	Moderate	High	Very High
Sensitivity of Development	Low (Commercial)	1 month	2 months	3 months	6 months	12 months
	Moderate (Apartments)	2 months	3 months	6 months	12 months	24 months
	High (Low rise Residential)	3 months	6 months	6 months	12 months	24 months

Typical/idealised frequency of monitoring/Number of Visits Required

		Gas Generation of Potential Source				
		Very Low	Low	Moderate	High	Very High
Sensitivity of Development	Low (Commercial)	4	6	6	12	12
	Moderate (Apartments)	6	6	9	12	24
	High (Low rise Residential)	6	9	12	24	24

Notes

- 1 Generation potential of sources based on descriptions within BS 8576:2013.
- 2 At least two sets of readings should be at low and falling atmospheric pressure (but not restricted to periods below <1000 mb) known as worst case conditions. Historical data can be used as part of the data set (Table 5.5b).

It is recommended that newly installed monitoring wells are left for 24 hours to allow the soil gas to reach equilibrium. It should be recognised, however, that some soil gas regimes could take considerably longer (up to seven days). Interpretation of any initial readings should take this equilibrium process into account.

Gas Risk Assessment

Within BS8485:2015+A1:2019 a semi-quantitative method is set out for the assessment of risk.

This method (Modified Wilson and Card) uses the concept of Gas Screening Values (GSVs) and typical threshold concentrations of carbon dioxide and methane to identify levels of risk. Sites are then classified into a 'Characteristic Situation' or 'CS' from CS1 where no mitigation is required and CS2 increasing up to CS6 where protection measures are required.

The NHBC guide 'Hazardous Ground Gas - An essential guide for housebuilders' 2023 provides further assessment tools for ground gas monitoring data, including the use of ternary plots to determine ground gas sources.

A separate approach to assessment without monitoring data is discussed under the RB17 header further below.

CIRIA C682 and BS 8576:2013 provide guidance on assessment of VOC intrusion risk.

Ground Gas Mitigation

Where a risk is determined to be present by assessment, BS8485:2015+A1:2019 provides guidance for the design of protection systems based on a points scoring system depending on the characteristic situation, structure type, structural barrier types, ventilation and a gas resistant membrane. Source removal can also be considered.

The design requires the structures to be categorised into one of four building types: Type A, Type B, Type C or Type D, related to the construction and end use of the building, together with the control of future structural changes and maintenance.

CIRIA C748 provides advice on the use of membranes as VOC vapour barriers.

CIRIA C735 sets out the approach for verification of installed mitigation measures. Note that if a membrane is installed it must be verified in accordance with CIRIA C735 or it will score zero points and assumed to not afford any protection.

RB17 Approach

CL:AIRE RB17 (Card et al 2012) is a pragmatic approach to ground gas risk assessment and was developed because gas concentration, pressure and flow rate measured in a well headspace may not be representative of the conditions in the surrounding formation.

In these low-risk situations, the approach is to use the conceptual site model and the estimation of the likely gas generation from a source to identify where or if gas monitoring is required to better define the risks.

Under this approach, for sites with natural soils only with no credible methane source, then no action is required (no monitoring or gas protection measures) as this represents Characteristic Situation 1 (CS1).

Radon

Advice on radon protection in England is provided by the UK Health Security Agency, <https://www.ukradon.org/information/ukmaps> and by the BRE (BR 211 (Scivyer 2023)).

Areas of the country can be categorised according to the percentage of existing homes where radon is present above the Action Level:

-  0-1% lower probability.
-  1-3% and 3-10% intermediate probability.
-  >10% higher probability.

Basic radon protection measures are required in new buildings and extensions in areas of England and Wales where 3-10% of properties exceed the Action Level and full radon protection measures where >10% exceed the Action Level.

Unexploded Ordnance (UXO) Guidance

Clients have a legal duty under the CDM 2015 Regulations to provide designers and contractors with project-specific health and safety information needed to identify hazards and risks. This includes the possibility of unexploded ordnance (UXO) being encountered on the site. Further details are given in CIRIA report C681.

BSL carry out non-specialist UXO screening exercises by considering any evidence of UK defence activities on or near the site evident from gathered desk study information and the unexploded aerial delivered bomb (UXB) online risk maps produced by Zetica. Other data sources are available, but as a first stage screening exercise the freely available online Zetica maps have been used. The level of risk stated is that determined by Zetica, a company experienced and considered competent in the assessment of UXO.

Geotechnical Guidance

A preliminary risk assessment of geotechnical hazards is carried out at the desk study stage and confirmed (or amended) at the ground investigation stage.

The CD 622 'Managing Geotechnical Risk' guidance document defines the technical approval and certification procedures to be used to ensure that the risk associated with the geotechnical activities are appropriately managed.

The desk-based stage may also include the requirements for a Coal Mining Risk Assessment (CMRA) which specifically assesses the risks from mining induced instability and related issues in high risk development areas: <https://www.gov.uk/guidance/planning-applications-coal-mining-risk-assessments>.

In order to establish the requirements of a project, the Geotechnical Category which is based on a consideration of project complexity, proposed geotechnical activities, presence of geo-hazards and severity of geotechnical risks, shall also be considered. These range from Category 1 (small/simple structures) to Category 3 (very large, unusual or complex activities/structures, such as tunnels). It is envisaged most projects typically fall into Category 2, including conventional types of geotechnical structures, earthworks and activities.

In the case of the geotechnical hazard identification at the intrusive investigation stage, this is referred to as the **ground model**.

The geotechnical sections of the report contain the factual information on the geology and relevant site data, including both in situ and laboratory testing, with a geotechnical evaluation of the information stating the assumptions made in the interpretation of the data.

Derived values of geotechnical parameters are obtained from test results by theory (book values), correlation or empiricism in general accordance with BS EN 1997-2:2007 (EC7).

Where derived geotechnical parameters are to be used in designs in accordance with EC7, the selection of characteristic values for geotechnical parameters using the derived values is carried out by well-established experience.

The characteristic value is a cautious estimate of the value affecting the occurrence of the limit state. For any particular material type there may be more than one characteristic value for each parameter because there may be more than one limit state.

The second stage is the selection of design values. The design values are either derived from the characteristic value by applying the relevant partial factors or assessed directly. Similarly, there can be several design values for the same material type.

In the event that geotechnical designs are included in this report, selection of the characteristic and design values is included. Otherwise, it is the duty of the geotechnical designer to determine these within a separate design report (a GDR).

Where it has not been possible to reasonably use an EC7 compliant technique, a practical alternative has been adopted to obtain indicative soil parameters and any interpretation is based upon engineering experience, local precedent where applicable and relevant published information.

In addition to the above:

-  Assessments for highways designs are based on CD 622 Managing Geotechnical Risk.
-  The assessment of sustainable drainage is based on BRE365 and CIRIA C753 'The SuDS Manual'.
-  Earthworks Assessments are based on SHW Series 600 and BS6031.
-  Risks from mining (both at the desk based and intrusive stages) are assessed adopting guidance from CIRIA C758.

Re-Use of Waste Soils Guidance

Definition of Waste

The Environment Agency considers waste to be “...any material that is discarded, or intended to be discarded...” this includes any soil from drainage trenches, foundation arisings, site strips etc. It is no longer required in its original location, therefore it is considered to be waste. Without an appropriate materials management plan, permit or exemption in place, by law this material is defined as “illegally deposited waste”.

Landfill tax rules allow HM Revenue & Customs (HMRC) to recover landfill tax on illegally deposited waste on construction sites. This could lead to excessive costs without the correct documentation in place. In addition, a

person who makes, knowingly causes or knowingly facilitates a disposal to be made at an unauthorised site is also liable to pay Landfill Tax.

CL:AIRE: Code of Practice

Where materials are excavated for construction purposes, wherever possible these should be retained on site for engineering purposes if they are suitable for use. This can be implemented under the CL:AIRE “Development Industry Code of Practice for the Definition of Waste” (CL:AIRE DoWCoP), also commonly referred to as a “Materials Management Plan”.

<https://www.claire.co.uk/projects-and-initiatives/dow-cop>

Developers and contractors are advised to complete all works under the DoWCoP where applicable.

To implement the DoWCoP (for Route A), there is a requirement to notify the Environment Agency and Local Authority of the intention to use the code of practice in principle, after which there is a 21-day notice period for their response.

In order to re-use soils under the DoWCoP, there are four key criteria that need to be met:

- The aims and objectives of the project meet the requirements of the Waste Framework Directive (does not harm human health or the environment).
- The soils can be demonstrated to be suitable for use (backed up by chemical/geotechnical testing and assessment).
- There is certainty of use (planning consents are in place alongside materials tracking, which should be in place as part of good site practice in any case).
- Quantity (the quantity of materials used should be known).

Potential scenarios where soils may be able to be re-used:

- Material capable of being used in another place on the same site without treatment.
- Material capable of being used in another place on the same site following ex-situ treatment on site.
- Material capable of being used in another development site without treatment (Direct Transfer).
- Material capable of being used in another development site following ex-situ treatment on another site e.g. Hub site.

In order to satisfy these requirements, the following are required:

- i) Consultation/approval with Local Authority & Environment Agency to confirm they have no objections to the proposed re-use of waste soils, or the risk assessments for the site.
- ii) Risk Assessments to demonstrate that the site does not present an Environmental Hazard.
- iii) Remediation Strategy for contaminated sites (or Design Statement for non-contaminated sites).
- iv) Materials Management Plan (MMP) which details material generated stockpiles and the end use.
- v) Volume calculations.
- vi) Planning permission for the development.
- vii) Contractual details to be clear, regarding who steps in if a contractor goes into administration/liquidation.

The use of the CoP is effectively industry regulated, there is a requirement to appoint an independent Qualified Person (QP) who checks all the requirements have been met and registers the documentation with the Environment Agency. This person must not have had any involvement with the preparing of the risk assessments or remedial strategy on the site.

Soils which require treatment on site (e.g. bioremediation, stabilisation etc) may require an Environmental Permit for treatment, together with justification and validation to prove, once treated, this material is suitable for use.

Construction activities carried out on uncontaminated soils solely for the purpose of improving geotechnical properties are not generally regarded as waste treatment operations and do not require a permit.

Site management procedures need to be in place to ensure that material is tracked through from excavation stockpiling, treatment and remediation processes. Should the process of material tracking be considered non-robust, or not adhered to, this may fail the test whether excavated materials may be considered non-waste.

Any declared MMP should be amended as new import sources are added.

Regardless of implementing re-use under the code of practice or not, all sites should have some form of materials tracking in place in compliance with current legislation. Any re-use scheme should also be designed to minimise disposal costs. Note that for re-use of landfilled materials or mining wastes, the DoWCoP may not apply and a Waste Recovery Permit (or others) may be required. Liaison with the Environment Agency would be needed on a case by case basis to determine the best option.

Once the project is complete, a verification report detailing soils re-use/import will need to be produced and submitted to CL:AIRE, which may be subject to a random audit process. Sites found to be non-complaint with the CoP can be referred to the EA for further investigation.

Soils Re-use under Exemptions and Permits

Other potential options to allow the re-use and/or import of soils and aggregates on site are provided in the table below. Applies to England/Wales only – Scotland differs.

Re-use Mechanism	Description
U1 Exemption	Can be applied to re-use/import of soils and stones, but only up to 1000 tonnes or for brick and concrete up to 5000 tonnes. This is usually an efficient way to re-use small volumes of waste materials. However, only one U1 can be filled in per site in any 3-year period. Quick and free via online registration.
WRAP Quality Protocols	Describes how processed demolition arisings can be removed from regulatory waste regime. Requires a demonstration of appropriateness by: • Factory Production Control Manual. • Facility Permit (or Exemption). • Grading Analysis.
Waste Framework Directive (WFD) exclusion	In regard to “clean” naturally occurring soils only that are to be re-used on their site of origin, these are covered by a Waste Framework Directive (WFD) exclusion which is an EA regulatory position statement. So long as the project can prove the four criteria listed above for the DoWCoP, then permits or the DoWCoP are not required. However, many projects still use the CoP to ensure compliance.
T5 Screening and blending of waste	The T5 exemption allows you to temporarily treat waste on a small scale to produce aggregate or soil at a particular location, such as a construction or demolition site. The limit is 5,000 tonnes. This applies to: • Screening soil on a demolition site to remove wood and rubble. • Blending soil and compost that has been produced under an exemption on a construction site to produce better soil for landscaping on that site (e.g. peaty deposits). • Crushing waste (except bricks, tiles and concrete) before screening or blending • Grading waste concrete after it has been crushed to produce a certain type of aggregate.
T7 Exemption	The T7 allows treatment of waste bricks, tiles and concrete by crushing, grinding or reducing in size. This needs to be registered with the Local Authority.
Other Permitting Routes	Other options include use under an Environmental Permit (Standard or Bespoke Rules), however these may be a time consuming and costly route, where use of the other above options (if applicable) are likely to be more feasible in construction.

There are also potential non-enforcement positions for re-use e.g. a site has a large volume waste illegally deposited on it (not by landowner). The new owner is keen to re-use waste where possible to reprofile the site (planning condition granted). The DoWCoP could not be used as materials already excavated and deposited as a waste (illegally). The EA may agree that although the DoWCoP not applicable, they would take a non-enforcement position if the works were completed in accordance with the DoWCoP – this would need to be agreed in advance.

Waste Classification and Disposal Guidance for Soils

Introduction

As described in the 'Waste Duty of Care Code of Practice (2016)' any substance or object that the holder discards, intends to discard or is required to discard is a waste. Waste producers have a duty of care to classify the waste they are producing:

-  Before it is collected, disposed of or recovered.
-  To identify the controls that apply to the movement of the waste.
-  To complete waste documents and records.
-  To identify suitably authorised waste management options.
-  To prevent harm to people and the environment.

The most sustainable and economic method of dealing with waste soil is usually the retention and re-use on site. Where this is not possible there are three main options for the disposal of soils:

1. Disposal to a permitted waste recycling facility.
2. Re-use on another site (subject to the suitability).
3. Disposal to a landfill site.

The disposal to a permitted facility will be subject to the **specific conditions of the permits for each individual facility** and will vary dependent on location and environmental sensitivity of the receiving site. Re-use on another site will also be subject to the acceptability criteria of that site.

The guidance below relates to disposal to **landfill sites only**.

Background for Landfill Disposal

The Landfill Directive places controls on waste disposal. These controls include requirements to follow the waste acceptance procedures and criteria that have been agreed by the Council of the European Union and are laid out in Council Decision 2003/33/EC.

Before a waste can be accepted at a landfill site, the landfill **operator** must be satisfied that the waste meets permit conditions, the waste acceptance procedures (WAP) and waste acceptance criteria (WAC).

If disposal to landfill is the best management option for the waste soils, these procedures **must** be followed or the operator may refuse to accept the waste.

Key Points:

-  Not all waste can be landfilled.
-  Landfills are classified according to whether they can accept hazardous, non-hazardous or inert wastes.
-  Wastes can only be accepted at a landfill if they meet the waste acceptance criteria (WAC) for that class of landfill.
-  Most wastes must be treated before you can send them to landfill.
-  There are formal processes for identifying and checking wastes that must be followed before wastes can be accepted at a landfill site.

Classification

Wastes are listed in the European Waste Catalogue and grouped according to generic industry, process or waste types. Wastes within the EWC are either hazardous or non-hazardous. Some of these wastes are hazardous without further assessment (absolute entries) or are 'mirror' entries that require further assessment of their hazardous properties in order to determine whether they are hazardous waste.

Waste soil has mirror entries on the EWC and as such the first phase of the waste classification process is that of determining if the waste is hazardous or not i.e. the hazard assessment. The most common EWC waste codes related to soil are:

17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil
17 05 03*	soil and stones containing dangerous substances
17 05 04	soil and stones other than those mentioned in 17 05 03

Soils may contain certain contaminants (e.g. asbestos, oil,) which have prescribed concentration thresholds, that if breached will render the material hazardous waste. These are based on specific "hazardous properties" which include hazards such as carcinogenicity, flammability and toxicity.

In the first instance the concentrations of plausible contaminants within the soil should be identified and wastes should be **classified based on their total concentrations** and classified as either hazardous or non-hazardous waste. WAC analysis must not be used for waste classification.

Waste Definitions

Inert	- Will not undergo any significant physical, chemical or biological transformations. - Will not dissolve. - Will not burn. - Will not physically or chemically react. - Will not biodegrade. - Will not adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health. - Has insignificant total leachability and pollutant content. - Produces a leachate with an ecotoxicity that is insignificant (if it produces leachate).
Non-Hazardous	Is not inert (see above). Is not hazardous (see below).
Hazardous	Soil has hazardous properties as defined in WM3 (Guidance on the classification and assessment of waste (1st edition 2015)- Technical Guidance).
Stable Non-reactive hazardous waste#	Hazardous waste, the leaching behaviour of which will not change adversely in the long-term, under landfill design conditions or foreseeable accidents either: in the waste alone (for example, by biodegradation), under the impact of long-term ambient conditions (for example, water, air, temperature or mechanical constraints) or by the impact of other wastes (including waste products such as leachate and gas).

This option allows hazardous waste that is stable and thus has a low leaching potential to be deposited in cells with a standard of containment consistent with non-hazardous wastes.

WAC Testing

The purpose of WAC analysis is to confirm that the waste complies with the relevant WAC for the receiving landfill. If the waste has any disposal route other than a landfill site (e.g. recycling facility, incineration etc) then WAC is not relevant. Furthermore, the WAC limits **cannot** be used to make an assessment of whether a waste is hazardous. WAC testing does however define if a non-hazardous waste is suitable for an inert landfill.

Classification based on Total Concentrations ¹	Non-Hazardous Waste		Hazardous Waste	
	Below inert WAC limit values:	Above inert WAC limit values:	Below hazardous WAC limit values	> WAC limit values
WAC testing				

Landfill requirements	INERT landfill	NON-HAZARDOUS landfill ²	HAZARDOUS landfill	PRE-TREATMENT ³
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- 1 Total concentrations are defined as tests results on solids as opposed to leachate (i.e. a liquid).
- 2 Individual sites may have certain limit values pre-determined in their licence.
- 3 After pre-treatment the material characteristics may have changed to an extent that allow the soil to be re-classified.
- 4 Possibility that wastes could be classified as stable Nonreactive HAZARDOUS waste in non-hazardous Landfill (e.g. soils containing low concentrations of asbestos, gypsum or sulphate bearing soils).

Waste classified as non-hazardous can be accepted into a non-hazardous landfill without having to pass any numerical WAC.

Soils above hazardous WAC limit values require pre-treatment prior to disposal. The effective pre-treatment, typically involving separation, sorting and screening, can offer cost savings through reducing the hazardous nature and volumes of soil. Costs for disposal of non-hazardous/hazardous soils are significant compared to the disposal of inert material.

Greenfield Sites and Inert Waste

The possibility of automatic inert classification naturally occurring “clean” soils should be explored in accordance with the requirements of paragraph 10 (wastes acceptable without testing at landfills for inert waste) of the Landfill (England and Wales) (Amendment) Regulations (2005). This is the case if:

- They are single stream waste of a single waste type (although different waste types from the list may be accepted together if they are from a single source); and
- There is no suspicion of material or substances such as metals, asbestos, plastics, chemicals, etc to an extent which increases the risk associated with the waste sufficiently to justify contamination and they do not contain other classes of landfill (e.g. the waste producer can characterise the waste based on visual assessment and written description with supporting evidence such as a desk study, subject to agreement by the landfill operator).

Hydrocarbons in Soils

WM3 uses the term Oil or Waste Oil to cover hydrocarbons products such as fuel oil, petrol or diesel. These are defined by WM3 as hazardous under an absolute entry in the List of Wastes. However, hydrocarbons in soils are a mixture rather than a pure product and are therefore not absolute entries.

Known Oils

The simplest scenario is where the identity of the contaminating oil is known or can be identified. If the oil is known the manufacturer’s or supplier’s REACH compliant safety data sheet for the specific oil can be obtained and the hazard statement codes on that Safety Data Sheet can be used for the hazardous waste assessment.

Where the identity of the oil can only be identified down to a petroleum group level (i.e. the contaminating oil is known to be diesel, but the specific type/brand is unknown), then the classification of that petroleum group should be used in the assessment. The marker compounds associated with that petroleum group may be used to confirm carcinogenicity.

Oils may contain a range of hydrocarbons, so the presence of for instance Diesel Range Organics (DRO) does not enable the assessor to conclude that diesel is present. These hydrocarbons may have arisen from other oils, the laboratory needs to provide an interpretation of the chromatograph to determine if it is consistent with diesel or weathered diesel as a whole.

The concentration of known oils should be determined using a method that as a minimum spans the range in which the carbon numbers for that known oil fall.

Unknown Oils

Where hydrocarbons are contaminating soils, it is likely that the oil will be unknown or cannot be determined.

WM3 states that:

For contaminated land specific consideration must be given to the following before proceeding:

- The presence of other organic contaminants, for example solvents or coal tar that could be detected as hydrocarbons. Coal Tar is not an oil and is considered separately in WM3 example 2. Where the site history or investigation indicates the presence of hydrocarbons from oil and other sources (e.g. coal tar), and the origin of the hydrocarbons cannot reliably be assigned to either, then a worst case approach of considering the hydrocarbons both as waste oil (in accordance with this example) and from other sources, for example coal tar should be taken.
- The presence of diesel, or weathered diesel, should be specifically considered by the laboratory and where this is confirmed by the hydrocarbon profile the oil should be assessed as a known or identified oil (diesel).

The use of marker compounds is optional; however, it is recommended that where possible the marker compounds should be used. WM3 states:

If the identity of the oil is unknown, and the petroleum group cannot be established, then the oil contaminating the waste can be classified as non-carcinogenic/mutagenic due to the presence of oil if all three of the following criteria are met:

- The waste contains benzo[a]pyrene (BaP) at a concentration of less than 0.01% (1/10,000th) of the TPH concentration (This is the carcinogenic limit specified in table 3.1 of the CLP for BaP)
- This has been determined by an appropriate and representative sampling approach in accordance with the principles set out in Appendix D of WM3, and
- The analysis clearly demonstrates, for example by carbon bands or chromatograph, and the laboratory has reasonably concluded that the hydrocarbons present have not arisen from petrol or diesel.

For example:

TPH Concentration (mg/kg)	Petrol or Diesel	BaP (mg/kg)	Classification
10,000	No	0.9	Non- Hazardous
1,000	No	Not available	Hazardous
1,000	Yes	Not relevant	Hazardous

References

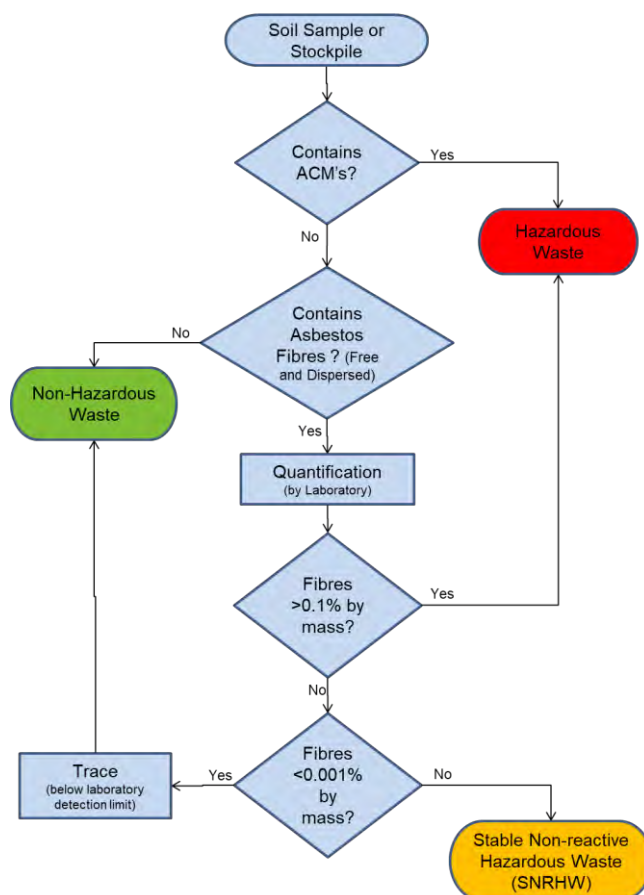
1. Environmental Permitting (England and Wales) Regulations 2010 (as amended) (EP Regulations), the Landfill Directive (1999/31/EC) and the subsequent Council Decisions.
2. Environment Agency Environmental Permitting Regulations: "Inert Waste Guidance- Standards and Measures for the Deposit of Inert Waste on Land" 2009.
3. Environment Agency "Waste acceptance at landfills - Guidance on waste acceptance procedures and criteria" Nov 2010.
4. Environment Agency "Guidance on the classification and assessment of waste (Technical Guidance WM3)".
5. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).
6. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.
7. 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament.
8. Environmental Permitting Guidance The Landfill Directive For the Environmental Permitting (England and Wales) Regulations 2010 Updated March 2010 Version 3.1.
9. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).

Waste Containing Asbestos

The assessment of asbestos containing waste is dependent on whether the asbestos is present as:

- Fibres that are free and dispersed, or
- Identifiable pieces of asbestos containing materials (ACM's).

Identifiable pieces of asbestos are any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye. The result is that commonly soils with visible ACM's are sorted and the ACM's removed by hand picking and separate disposal.



Should soils contain asbestos, the concentration and type of asbestos identified, in addition to the chemical composition (i.e. hazardous or non-hazardous detailed above), will determine which waste code is applicable to the soils and which landfill will accept it as summarised below:

Waste	Conc. by Weight (%)	EWG 2002 Catalogue Entry Code	Waste Disposal Route
Non-hazardous containing asbestos fibres	<0.001 - <0.1%	17 05 04 (soil and stones other than those mentioned in 17 05 03*)	Non-hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a stable non-reactive hazardous landfill site.
Hazardous containing asbestos fibres	<0.001 - <0.1%	17 05 03* (soil and stones containing dangerous substances)	Hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a hazardous landfill site.
Non-hazardous soils containing asbestos fibres	>0.1%	17 05 03* (soil and stones containing dangerous substances)	Hazardous landfill authorised to receive asbestos, or in a stable non-reactive hazardous waste cell at a non-hazardous landfill authorised to receive asbestos.

Waste	Conc. by Weight (%)	EW C 2002 Catalogue Entry Code	Waste Disposal Route
Non-hazardous Soils containing ACM (Mechanically separable)	>0.1%	17 06 05 (construction material containing asbestos) 17 05 04 (soil and stones other than those mentioned in 17 05 03*)	ACMs disposed of at a hazardous landfill authorised to receive asbestos, or in a stable non-reactive hazardous waste cell at a non-hazardous landfill authorised to receive asbestos. Soils should be disposed of at a non-hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a stable non-reactive hazardous landfill site.
Hazardous soils containing ACM	>0.1%	17 05 03* (soil and stones containing dangerous substances)	Hazardous landfill subject to achieving Waste Acceptance Criteria (WAC) for a hazardous landfill site.

Asbestos concentrations below 0.001% by mass are below standard laboratory detection limits and are not currently regarded as containing asbestos for the purposes of disposal and may be disposed of to an inert landfill site¹. These levels are often termed “trace” by laboratories.

Asbestos concentrations between 0.001% and 0.1% are stable non-reactive hazardous waste (SNRHW)¹. Waste transfer stations where soil recycling takes place may be able to take SNRHW, but are unlikely to take soils containing asbestos above trace concentrations.

The following codes should be assigned to the asbestos waste as appropriate:

17 06	Insulation materials and asbestos-containing construction materials
17 06 01	Insulation materials containing asbestos
17 06 03	Other insulation materials consisting of or containing hazardous substances
17 06 04	Insulation materials other than those mentioned in 17 06 01 and 17 06 03
17 06 05	Construction material containing asbestos

WM3 indicates that 17 06 05 would normally be used in preference to 17 06 01 for the asbestos in asbestos contaminated soil and stones.

Construction materials containing asbestos and “*other suitable materials*” may be landfilled at landfills for non-hazardous waste in accordance with the Landfill Directive without testing.

This means that wastes that are only hazardous because of their asbestos content can be disposed of at landfills for non-hazardous waste in separate landfill cells that only accept asbestos wastes and other suitable materials. The Landfill Directive requires that stable non-reactive hazardous waste shall not be deposited with biodegradable waste (for example organic material, household waste, paper etc..) and must meet the waste acceptance criteria set out in accordance with Annex II.

Construction

Health and Safety Executive (HSE) guidance on asbestos is not directly related to soil and much of the guidance focuses on the removal of asbestos from buildings. The overarching legislation is the Control of Asbestos Regulation (CAR 2012). However, where work involves (or is likely to involve) contact with asbestos then CAR 2012 requires a risk assessment including whether the work is licensed or notifiable non-licensed work and may require an Asbestos Management Plan. Work becomes notifiable if it is considered that the control limit could be exceeded.

Brownfield sites frequently have soils that contain asbestos and the presence of asbestos needs to be considered within the context of construction, particularly in relation to groundworks. The exposure of soils and the use of excavators and plant to move soil around increases the possibility of fibres becoming airborne. However, it is good site practice to not generate dusts and to employ dust suppression on all sites regardless of the presence of asbestos.

The legal control limit for asbestos is 0.1f/ml over a continuous four-hour period. The control limit is not a 'safe' level and exposure from work activities involving asbestos must be reduced to as far below the control limit as possible.

Clearly the higher the concentrations in the soil the greater potential there is for fibres to be released, however IOM publication TM/88/14 "the release of dispersed asbestos fibres from soil" 1988 concludes that:

- Mixtures of asbestos in dry soils with asbestos content as low as 0.001% can produce airborne respirable asbestos concentrations greater than 0.1f/ml in dust clouds where the respirable dust concentrations are less than 5mg/m³.
- An action limit is recommended of no higher than 0.001% asbestos in soils above which steps should be taken to minimise exposure to airborne fibres (e.g. by wetting).
- The addition of relatively small quantities (10%) of water can reduce the airborne fibre concentrations by an order of magnitude.

Where asbestos has been identified at concentrations above 0.001% as free and dispersed fibres in the soil precautions need to be adopted. Concentrations below this are considered to be normal background, although good site practice dictates that the generation of dusts should be avoided and therefore any fugitive fibre release from minor concentrations should be kept to a practical minimum.

End Use

The use of materials containing asbestos and material containing asbestos is prohibited under EU legislation.

Asbestos containing materials can remain in situ under a suitable cover system which may be hard surfacing or soft landscaping (with or without hard dig layers and markers).

There is a risk that future maintenance may compromise such systems and details of the presence of asbestos should be kept in the Health and Safety File.

Publications from the JIWG provide guides for decision making in relation to construction.

The re-use of waste soils should be undertaken in accordance with the CL:AIRE Code of Practice and is subject to suitable risk assessments demonstrating low risk. There is nothing that specifically excludes the re-use of soils containing asbestos as fill to raise levels. However, the movement of materials increases the risk of fibres becoming airborne and suitable precautions will be required. Re-use of soils containing asbestos should be as per CARSOILS.

The re-use of soils containing asbestos at concentrations above hazardous waste levels may be met with regulatory opposition. Assuming a suitable strategy could be agreed this would take a considerable amount of time and is only likely to be feasible where there is a long program for implementation.

Asbestos in Soil as Free Fibres

Concentration (by weight)	Waste Disposal				Construction Issues	End Use	
	Recycle	Inert	SNR	Haz		Suitable for re-use on site	Precautions
Not detected	✓	✓			No precautions necessary, however on a brownfield site asbestos not previously identified may be found during works and a statement within the contractor's method statement for how they will deal with this unforeseen asbestos would be good practice to ensure compliance with CAR2012.	Yes.	None.
Trace (<0.001%)		✓ ²			Precautions are unlikely to be required, however a detailed method statement may be required to ensure compliance with CAR2012. Basic asbestos management good practice will be required. Typically precautions would include: - Ensuring soils do not dry out to become dusty. - Site personnel have the risk communicated at induction stage.	Yes Soils can be re-used under CL:AIRE CoP with the correct precautions in place.	Generally clean cover or hardstanding cover required.
0.001% – 0.099%			✓		Contractor needs to produce an Asbestos Management Plan in accordance with CAR2012 as part of their method statement. Typical precautions would include: - Site personnel have the risk communicated at induction stage. - Ensuring personnel have suitable training. - Task monitoring to inform PPE requirements. - Ensuring soils do not dry out to become dusty and that misting is available during groundworks. - Separate stockpiling. - Clean haulage routes.	Possibly. Soils may be able to be re-used under CL:AIRE CoP, subject to a satisfactory Risk Assessment and regulatory agreement with the correct precautions in place.	Clean cover with hard dig/demarcation layer or hardstanding cover required.
0.1+%				✓	Contractor needs to produce an Asbestos Management Plan in accordance with CAR2012 as part of their method statement. Typical precautions would include: - Site personnel have the risk communicated at induction stage. - Ensuring personnel have suitable training. - Task monitoring to inform PPE requirements. - Site wide and or perimeter monitoring. - Ensuring soils do not dry out to become dusty and that misting is available during groundworks. - Separate stockpiling.	Unlikely ³ Re-use of soils containing asbestos within an earthworks scheme will involve significant engineering and the risk for generating dusts will be significantly	Clean cover and a hard dig / demarcation layer. A plan should be in place for future excavations as part of the Health and Safety File.

Concentration (by weight)	Waste Disposal				Construction Issues	End Use	
	Recycle	Inert	SNR	Haz		Suitable for re-use on site	Precautions
					- Clean haulage routes. - Decontamination unit	increased with repeated handling and compaction.	

1. The standard laboratory detection limit is normally 0.001%. Below 0.001% is trace and currently regarded as not containing asbestos for the purposes of disposal off site. However the waste producer has a duty to fully classify the waste and the presence of trace asbestos should be declared. Consequently it is unlikely that a waste treatment site will take this soil and an inert landfill may make a commercial decision to only take it under some circumstances.
2. The re-use of soils containing asbestos at concentrations above hazardous waste is likely to meet with regulatory opposition. Assuming a suitable strategy could be agreed this would take a considerable amount of time and is only likely to be warranted where there a long program for implementation.

APPENDIX B

Exploratory Hole Logs

 BROWNFIELD SOLUTIONS LTD							Rotary Borehole No.								
							BH01								
							Sheet 1 of 3								
PROJECT NO: C5515							CO-ORDS: 385642E, 396017N		Hole Type						
PROJECT NAME: VICTORIA POINT, MANCHESTER							LEVEL: 45.28m OD		RC						
									Scale						
									1:50						
CLIENT: HEYNE TILLET STEEL							DATES: 14/11/23 - 15/11/23		Logged	Checked					
									AH/OS	NS					
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description							
		Depth (m)	Type	Results											
					0.30	44.98		TOPSOIL: Dark brown slightly gravelly clayey sand with occasional rootlets. Sand is fine to coarse. Gravel is fine to medium subrounded of sandstone.	1.0						
					1.20	44.08		MADE GROUND: Dark grey clayey sandy gravel with low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of brick, concrete, sandstone and coal. Cobbles are angular to subangular of brick.							
					1.70	43.58		Gravelly CLAY (Drillers Description).							
		1.70	SPT	N=16 (3,4/3,4,4,5)				Brown boulder CLAY (Drillers Description). <i>Becoming stiff below 1.70m bgl.</i>							
		6.00	SPT	N=20 (3,3/5,5,5,5)											
		9.00	SPT	N=17 (5,4/5,4,4,4)											
Remarks							1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. Hand dug inspection pit to 1.20m bgl. 3. Fast groundwater strike encountered at 19.50m bgl. 4. Unstable sides. 5. Borehole terminated at 22.5m bgl due to collapse of bedrock back to 19.00m bgl. 5. Backfilled with arisings upon completion.								
							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane								

Borehole Log							Rotary Borehole No.		
							BH01		
							Sheet 2 of 3		
PROJECT NO: C5515							CO-ORDS: 385642E, 396017N		
PROJECT NAME: VICTORIA POINT, MANCHESTER							Hole Type		
							RC		
							Scale		
							1:50		
CLIENT: HEYNE TILLET STEEL							DATES: 14/11/23 - 15/11/23		
							Logged	Checked	
							AH/OS	NS	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		12.00	SPT	N=26 (2,3/6,7,7,6)	12.00	33.28			10.0
									11.0
									12.0
									13.0
									14.0
									15.0
									16.0
									17.0
									18.0
									19.0
		17.60	SPT	N≥50 (25 for 125mm/50 for 135mm)	17.60	27.68		Gravelly CLAY (Drillers Description). <i>Clay is stiff at 12.00m bgl.</i>	12.0
									13.0
									14.0
									15.0
									16.0
									17.0
									18.0
									19.0
									20.0
									21.0
		18.00 - 19.50	2	NI 100 93 100 80 67 40 TCR SCR RQD	18.00 18.10 18.20	27.28 27.18 27.08		Weak brownish red partially weathered MUDSTONE. Medium strong light grey partially weathered SILTSTONE. <i>18.00-18.10m bgl: Non-intact recovered as brownish red sandy gravel. Sand is fine to coarse. Gravel is sub-angular fine to coarse of mudstone.</i> Weak brownish red partially weathered MUDSTONE. <i>18.10-18.20m bgl: Siltstone band</i> Medium strong light grey partially weathered SILTSTONE. <i>18.20-18.50m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).</i>	18.0
									19.0
									20.0
									21.0
									22.0
									23.0
									24.0
									25.0
									26.0
									27.0
Remarks									
1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. Hand dug inspection pit to 1.20m bgl. 3. Fast groundwater strike encountered at 19.50m bgl. 4. Unstable sides. 5. Borehole terminated at 22.5m bgl due to collapse of bedrock back to 19.00m bgl. 5. Backfilled with arisings upon completion.									
ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane									



Rotary Borehole No.

BH01

Sheet 3 of 3

Hole Type

RC

Scale

1:50

Logged

Checked

AH/OS

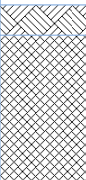
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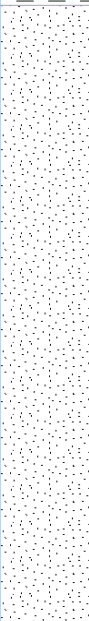
Well	Water Strike	Depth (m)	Type / FI	Coring			Depth (m)	Level (m OD)	Legend	Stratum Description		
				TCR (%)	SCR (%)	RQD (%)						
		19.50 - 21.00	NR	100	50	33	20.00	25.28	XXXXXXXXXX	19.50- 19.80m bgl: No recovery.	20.0	
			NI						XXXXXXXXXX	19.80-20.00m bgl: Non-intact recovered as brownish red sandy gravel.		
									XXXXXXXXXX	Sand is fine to coarse. Gravel is sub-angular fine to coarse of mudstone.		
			4						XXXXXXXXXX	Medium strong brownish red partially weathered MUDSTONE.		
		21.00 - 22.50	1					20.50	24.78	XXXXXXXXXX	Medium strong light grey partially weathered SILTSTONE.	21.0
										XXXXXXXXXX	20.50-21.00m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).	
			NI							XXXXXXXXXX	21.00-21.20m bgl: Non-intact recovered as brownish red sandy gravel.	
			1							XXXXXXXXXX	Sand is fine to coarse. Gravel is sub-angular fine to coarse of mudstone and siltstone.	
			NI							XXXXXXXXXX	Medium strong partially weathered light grey SILTSTONE.	
										XXXXXXXXXX	21.35-21.90m bgl: Non-intact recovered as brownish red sandy gravel.	
	XXXXXXXXXX		Sand is fine to coarse. Gravel is sub-angular fine to coarse of siltstone.									
	XXXXXXXXXX											
		21.00 - 22.50	1	100	50	33	21.30	23.98	XXXXXXXXXX	21.35-21.90m bgl: Non-intact recovered as brownish red sandy gravel.	22.0	
			NI						XXXXXXXXXX	Sand is fine to coarse. Gravel is sub-angular fine to coarse of mudstone and siltstone.		
									XXXXXXXXXX	Medium strong partially weathered light grey SILTSTONE.		
									XXXXXXXXXX	21.35-21.90m bgl: Non-intact recovered as brownish red sandy gravel.		
		21.00 - 22.50	1					22.10	23.18	XXXXXXXXXX	22.10-22.20m bgl: Non-intact recovered as brownish red sandy gravel.	22.0
			NI							XXXXXXXXXX	Sand is fine to coarse. Gravel is sub-angular fine to coarse of mudstone.	
										XXXXXXXXXX	Medium strong partially weathered brownish red MUDSTONE.	
			2							XXXXXXXXXX	22.10-22.20m bgl: Non-intact recovered as brownish red sandy gravel.	
										XXXXXXXXXX	Sand is fine to coarse. Gravel is sub-angular fine to coarse of mudstone.	
										XXXXXXXXXX	22.20-22.50m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).	
		21.00 - 22.50		100	50	33	22.10	23.18	XXXXXXXXXX	22.20-22.50m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).	23.0	
									XXXXXXXXXX	End of Borehole at 22.50m		
									XXXXXXXXXX			
									XXXXXXXXXX			
		21.00 - 22.50						22.50	22.78	XXXXXXXXXX		23.0
										XXXXXXXXXX		
										XXXXXXXXXX		
										XXXXXXXXXX		
										XXXXXXXXXX		
										XXXXXXXXXX		

Remarks

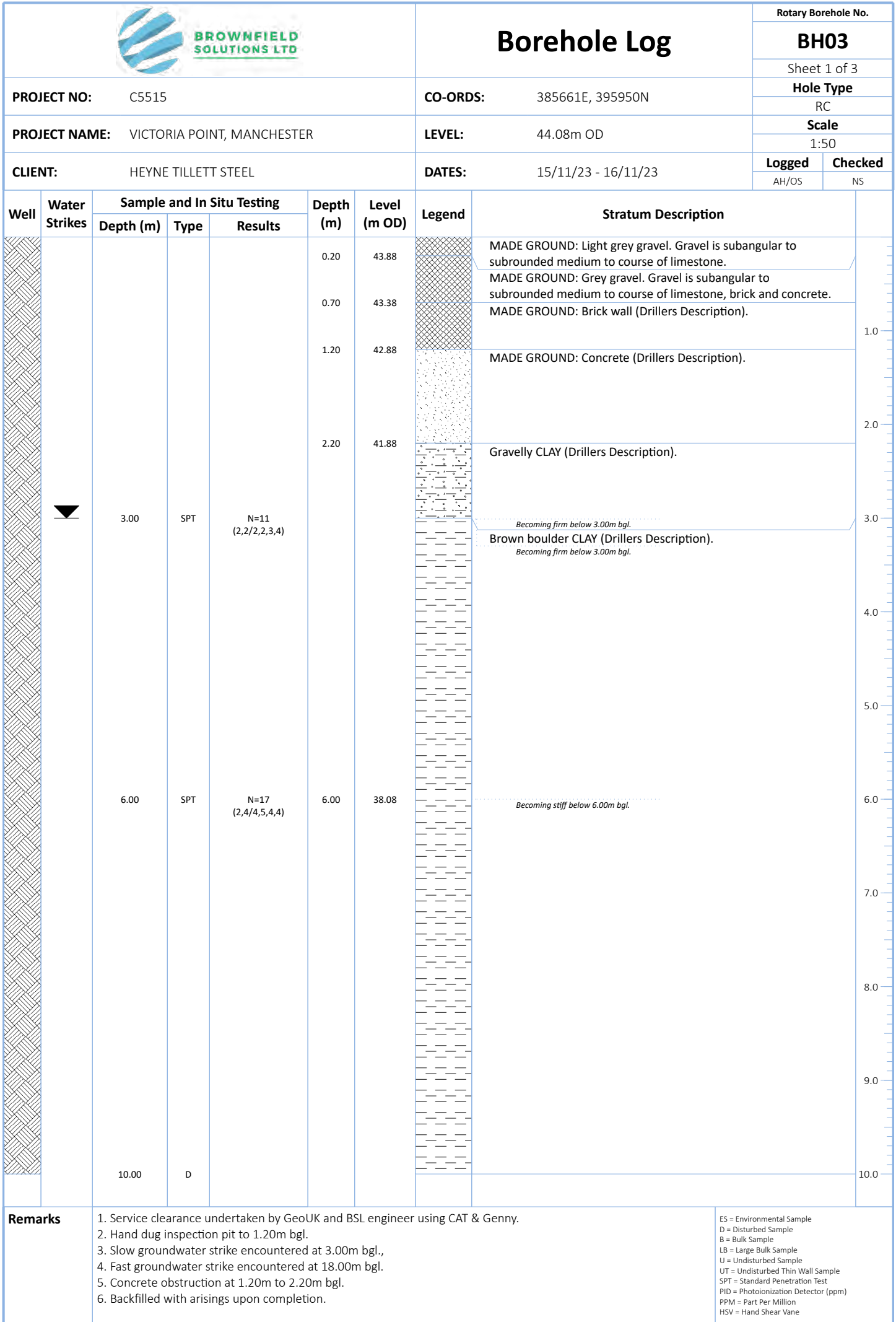
1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny.
2. Hand dug inspection pit to 1.20m bgl.
3. Fast groundwater strike encountered at 19.50m bgl.
4. Unstable sides.
5. Borehole terminated at 22.5m bgl due to collapse of bedrock back to 19.00m bgl.
5. Backfilled with arisings upon completion.

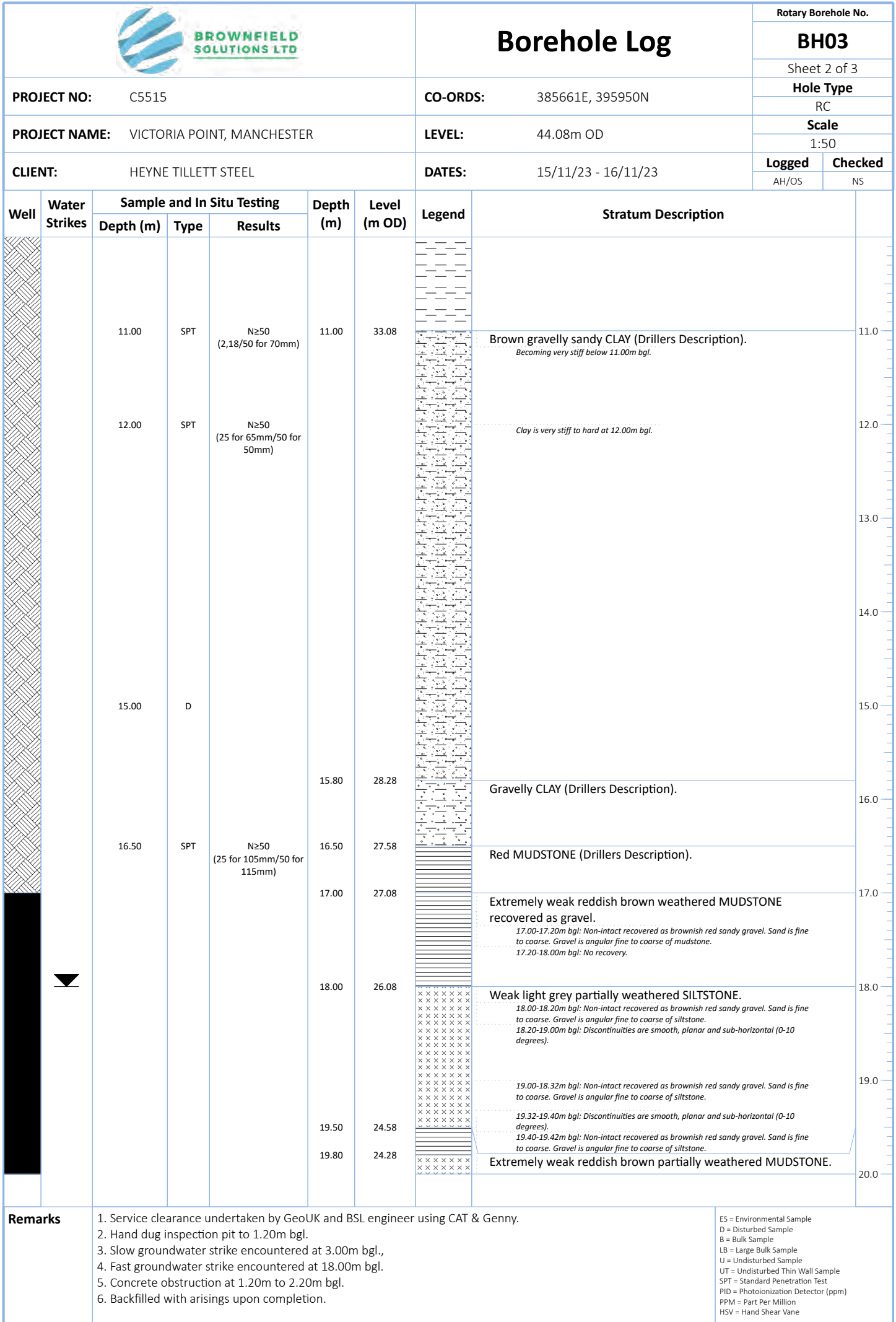
ES = Environmental Sample
D = Disturbed Sample
B = Bulk Sample
LB = Large Bulk Sample
U = Undisturbed Sample
UT = Undisturbed Thin Wall Sample
SPT = Standard Penetration Test
PID = Photoionization Detector (ppm)
PPM = Part Per Million
HSV = Hand Shear Vane

 BROWNFIELD SOLUTIONS LTD							Borehole Log		Rotary Borehole No.		
									BH02		
									Sheet 1 of 3		
PROJECT NO: C5515							CO-ORDS: 385718E, 396029N			Hole Type	
PROJECT NAME: VICTORIA POINT, MANCHESTER							LEVEL: 45.34m OD			RC	
										Scale	
										1:50	
CLIENT: HEYNE TILLET STEEL							DATES: 13/11/23 - 14/11/23			Logged	Checked
										AH/OS	NS
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					0.20	45.14		TOPSOIL: Dark brown to grey slightly clayey gravelly sand with rootlets. Sand is fine to coarse. Gravel is fine to medium subrounded of sandstone, brick, coal, slate, mudstone.		1.0	
					1.20	44.14		MADE GROUND: Light brown soft to firm sandy gravelly clay with rare cobble. Sand is fine to coarse. Gravel is fine to coarse subangular of sandstone, limestone and coal. Cobbles are subangular of brick.			
		2.00	SPT	N=19 (2,4/4,5,5,5)	2.00	43.34		Grey CLAY (Drillers Description).		2.0	
								Brown boulder CLAY (Drillers Description). <i>Becoming stiff below 2.00m bgl.</i>			
		6.00	SPT	N=26 (2,4/5,5,6,10)						6.0	
								Clay is stiff at 6.00m bgl.			
		7.00	D							7.0	
										8.0	
								9.0			
Remarks		1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. Hand dug inspection pit to 1.20m bgl. 3. Slow groundwater strike encountered at 11.00m bgl. 4. Backfilled with arisings upon completion.							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane		

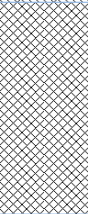
BROWNFIELD SOLUTIONS LTD										Rotary Borehole No.				
										BH02				
										Sheet 2 of 3				
PROJECT NO: C5515										CO-ORDS: 385718E, 396029N				
PROJECT NAME: VICTORIA POINT, MANCHESTER										LEVEL: 45.34m OD				
CLIENT: HEYNE TILLET STEEL										DATES: 13/11/23 - 14/11/23				
										Logged	Checked			
										AH/OS	NS			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description						
		Depth (m)	Type	Results										
		10.90	SPT	N≥50 (25 for 70mm/50 for 125mm)	10.90	34.44		SAND (Drillers Description). <i>Becoming dense below 12.00m bgl.</i>	10.0					
		12.00	D SPT	N=32 (10,7/7,9,8,8)					11.0					
									12.0					
									13.0					
									14.0					
					15.00	30.34		Brown boulder CLAY (Drillers Description).	15.0					
									16.0					
		17.00	SPT	N≥50 (25 for 70mm/50 for 105mm)	17.00	28.34			17.0					
									18.0					
			18.00 - 19.50	NI	100	80		40	18.00	27.34		Medium strong light grey partially weathered SILTSTONE. <i>18.00-18.30m bgl: Non-intact recovered as brownish red sandy gravel. Sand is fine to coarse. Gravel is angular fine to coarse of siltstone.</i> <i>18.30-19.50m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).</i>	18.0	
				13										19.0
					TCR	SCR		RQD						
		Remarks		1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. Hand dug inspection pit to 1.20m bgl. 3. Slow groundwater strike encountered at 11.00m bgl. 4. Backfilled with arisings upon completion.							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane			

BROWNFIELD SOLUTIONS LTD								Borehole Log		Rotary Borehole No.		
										BH02		
										Sheet 3 of 3		
PROJECT NO: C5515								CO-ORDS: 385718E, 396029N		Hole Type		
										RC		
PROJECT NAME: VICTORIA POINT, MANCHESTER								LEVEL: 45.34m OD		Scale		
										1:50		
CLIENT: HEYNE TILLET STEEL								DATES: 13/11/2023 - 14/11/2023		Logged	Checked	
										AH/OS	NS	
Well	Water Strike	Depth (m)	Type / FI	Coring			Depth (m)	Level (m OD)	Legend	Stratum Description		
		19.50 - 21.00	5	100	87	53	20.30	25.04	XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX	19.50-20.30m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).		
			1							Weak brownish red partially weathered MUDSTONE. 20.30-20.60m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees). 20.60-20.64m bgl: Non-intact recovered as brownish red sandy gravel. Sand is fine to coarse. Gravel is angular fine to coarse of mudstone. 20.64-21.00m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees). 21.00-21.20m bgl: Non-intact recovered as brownish red sandy gravel. Sand is fine to coarse. Gravel is angular fine to coarse of mudstone. 21.20-22.50m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).		
			4									
			NI									
		21.00 - 22.50	7	100	100	87	23.20	22.14	XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX			
			2									
		22.50 - 24.00	2	22.50-23.20m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).								
					Medium strong light grey partially weathered SILTSTONE. 23.20-23.8m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).							
								24.00	21.34		End of Borehole at 24.00m	

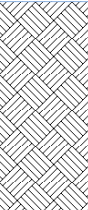
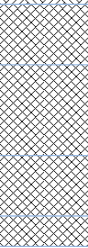


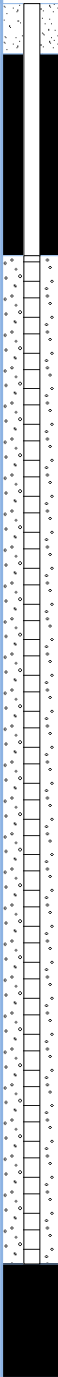
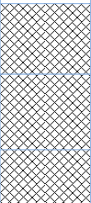
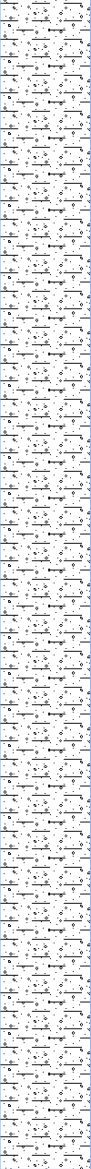


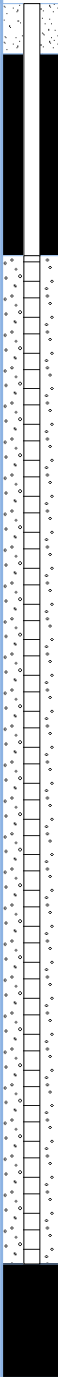
 BROWNFIELD SOLUTIONS LTD							Rotary Borehole No.		
							BH03		
							Sheet 3 of 3		
PROJECT NO: C5515							CO-ORDS: 385661E, 395950N		
PROJECT NAME: VICTORIA POINT, MANCHESTER							Hole Type RC		
							Scale 1:50		
CLIENT: HEYNE TILLET STEEL							Logged	Checked	
							AH/OS	NS	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
					20.10	23.98	XXXXXXXXXX	19.50-20.20m bgl: Non-intact recovered as brownish red sandy gravel. Sand is fine to coarse. Gravel is angular fine to coarse of mudstone.	
					21.00	23.08		Extremely weak light grey partially weathered SILTSTONE.	
								Extremely weak reddish brown partially weathered MUDSTONE.	
								20.20-20.30m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).	
								20.30-20.50m bgl: Non-intact recovered as brownish red sandy gravel. Sand is fine to coarse. Gravel is angular fine to coarse of mudstone.	
								20.50-21.00m bgl: No Recovery.	21.0
					23.50	20.58		Medium strong reddish brown partially weathered MUDSTONE.	
								21.00-21.90m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).	
								21.90-21.93m bgl: Non-intact recovered as brownish red sandy gravel. Sand is fine to coarse. Gravel is angular fine to coarse of mudstone.	22.0
								21.93-22.50m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).	
								22.50-23.50m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).	23.0
					24.10	19.98		22.71- 22.73m bgl: No recovery.	
								Weak light grey partially weathered SILTSTONE.	
								23.50-24.00m bgl: Non-intact recovered as brownish red sandy gravel. Sand is fine to coarse. Gravel is angular fine to coarse of siltstone.	24.0
								24.00-24.10m bgl: Non-intact recovered as brownish red sandy gravel. Sand is fine to coarse. Gravel is angular fine to coarse of siltstone.	
								Medium strong light grey partially weathered SILTSTONE.	
					25.50	18.58		24.10- 24.20m bgl: Vertical fracture.	
								24.20-25.30m bgl: Discontinuities are smooth, planar and sub-horizontal (0-10 degrees).	25.0
								25.30- 25.70m bgl: No recovery.	
								Weak light grey partially weathered SILTSTONE.	
								25.70-26.02m bgl: Non-intact recovered as brownish red sandy gravel. Sand is fine to coarse. Gravel is angular fine to coarse of siltstone.	26.0
					26.02	18.06		Medium strong light grey partially weathered SILTSTONE.	
								26.02-26.20m bgl: Non-intact recovered as brownish red sandy gravel. Sand is fine to coarse. Gravel is angular fine to coarse of mudstone.	
								26.20-27.00m bgl: No recovery.	27.0
								End of Borehole at 27.00m	
									28.0
									29.0
									30.0
Remarks		1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. Hand dug inspection pit to 1.20m bgl. 3. Slow groundwater strike encountered at 3.00m bgl., 4. Fast groundwater strike encountered at 18.00m bgl. 5. Concrete obstruction at 1.20m to 2.20m bgl. 6. Backfilled with arisings upon completion.					ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane		

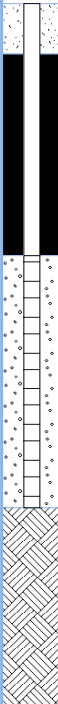
						Trial Pit Log		No. SA01 Sheet 1 of 1	
PROJECT NO: C5515						CO-ORDS: 385630E, 396040N		Hole Type TP	
PROJECT NAME: VICTORIA POINT, MANCHESTER						LEVEL: 45.56m OD		Scale 1:25	
CLIENT: HEYNE TILLET STEEL						DATES: 15/11/23		Logged AH	Checked NS
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
	0.00-0.30	ES					TOP SOIL: Dark brown clayey gravelly sand with occasional rootlets. Sand is fine to coarse. Gravel is fine to coarse subangular of sandstone.		
	0.30-1.00	ES		0.30	45.26		MADE GROUND: Dark grey slightly clayey gravelly sand with medium cobble content and rare boulders. Sand is fine to coarse. Gravel is fine to coarse of brick, ceramics, sandstone and coal. Cobbles are subangular of brick. Boulder is subangular of concrete 2.00m in diameter.		
				1.00	44.56		Excavation Terminated at 1.00m bgl due to asphalt obstruction. End of Trial Pit at 1.00m		1.0
									2.0
									3.0
									4.0
									5.0
Remarks		1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. No groundwater encountered. 3. Soakaway test not undertaken in pit and excavation terminated due to asphalt obstruction at 1.00m bgl. 4. Excavation backfilled with arisings upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

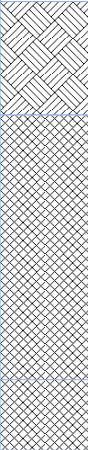
						Trial Pit Log		No. SA02	
PROJECT NO: C5515						CO-ORDS: 385706E, 396044N		Sheet 1 of 1	
PROJECT NAME: VICTORIA POINT, MANCHESTER						LEVEL: 45.48m OD		Hole Type TP	
CLIENT: HEYNE TILLET STEEL						DATES: 15/11/23		Scale 1:25	
								Logged OS	Checked NS
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
	0.00-0.40	ES					TOP SOIL: Dark brown clayey gravelly sand. Sand is fine to coarse. Gravel is fine to coarse subangular of brick and concrete. With occasional rootlets.		
	0.40-1.40	ES					MADE GROUND: Dark brown clayey gravelly sand. Sand is ine to coarse. Gravel is fine to coarse of brick, concrete and ceramics. Low cobble content of brick. Rare concrete boulder of 400mm.		
	1.40-1.70	D		1.40	44.08		Concrete obstruction at 1.20m bgl in the north of the excavation.		
	1.50	HSV	120kPa	1.70	43.78		MADE GROUND: Stiff light brown slightly sandy CLAY. Sand is fine to medium. Gravel is fine to coarse subangular of brick, concrete, and sandstone. Concrete obstruction at 1.60m bgl across the centre of the excavation. Excavation Terminated at 1.70m bgl due to obstructions. End of Trial Pit at 1.70m		
Remarks						1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. No groundwater encountered. 3. Soakaway test undertaken in pit within clay. 4. Concrete obstructions encountered at 1.20m bgl in the north 1.60m bgl in the in the centre, excavation was extended south after the first obstruction. 5. Trial pit sides stable. 6. Excavation backfilled with arisings upon completion.			
						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane			

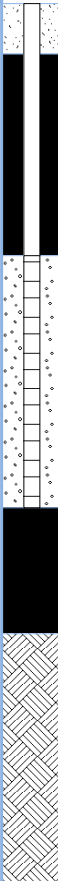
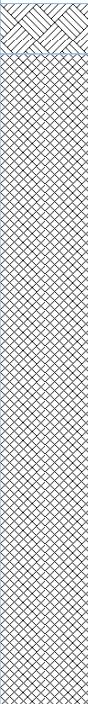
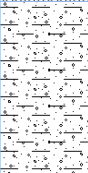
						Trial Pit Log		No. SA03	
PROJECT NO: C5515						CO-ORDS: 385753E, 395989N		Sheet 1 of 1	
PROJECT NAME: VICTORIA POINT, MANCHESTER						LEVEL: 46.70m OD		Hole Type TP	
CLIENT: HEYNE TILLET STEEL						DATES: 15/11/23		Scale 1:25	
								Logged AH	Checked NS
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
	0.70-0.80	ES		0.70	46.00		TOPSOIL: Dark brown clayey gravelly sand. Sand is fine to coarse. Gravel is fine to coarse subangular of sandstone, mudstone and brick.		
	0.90-1.20	ES		0.90	45.80			MADE GROUND: Dark grey to brown slightly sandy, very gravelly clay with high cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular of brick, concrete, ceramics and sandstone. Cobbles are subangular of concrete and brick.	1.0
				1.20	45.50			MADE GROUND: Red gravelly sand with high cobble and boulder content. Sand is fine to coarse. Gravel is fine to coarse subangular of concrete, ceramics. Cobbles are subangular of brick and concrete. Boulders are subangular of concrete up to 1.00m in diameter.	
				1.40	45.30			MADE GROUND: Black asphalt.	
				1.50	45.20			Asphalt obstruction at 1.20m bgl.	
							MADE GROUND: Light brown slightly sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular of sandstone.	2.0	
							Concrete obstruction at 1.50m bgl.		
							End of Trial Pit at 1.50m		
								3.0	
								4.0	
								5.0	
Remarks		1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. No groundwater encountered. 3. Unstable sides. 4. Soakaway test not undertaken in pit and excavation terminated due to sides collapsing and concrete obstruction at 1.50m bgl. 5. Excavation backfilled with arisings upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

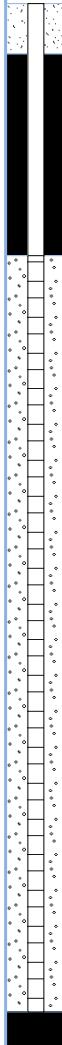
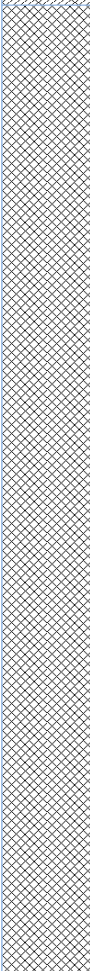
BROWNFIELD SOLUTIONS LTD							Borehole Log		Window Sampler No.
									WS01
									Sheet 1 of 1
PROJECT NO: C5515							CO-ORDS: 385685E, 395945N		Hole Type
									WS
PROJECT NAME: VICTORIA POINT, MANCHESTER							LEVEL: 44.35m OD		Scale
									1:30
CLIENT: HEYNE TILLET STEEL							DATES: 13/11/23		Logged
									Checked
									AH
									NS
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.28	44.07		MADE GROUND: Black asphalt.	
					0.58	43.77		MADE GROUND: White sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular of limestone.	
					0.80	43.55		MADE GROUND: Orange and dark brown slightly sandy gravel, with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular of brick, limestone, concrete. Cobble is subangular of brick.	
		1.20	SPT	N=12 (2,2/2,3,3,4)				Firm light brown slightly gravelly slightly sandy CLAY with occasional silt bands. Sand is fine to coarse. Gravel is fine to coarse subangular of sandstone, mudstone, coal and limestone.	
		2.00	SPT	N=18 (2,3/4,4,4,6)				Becoming stiff from 2.00m bgl.	
		3.00	SPT	N=22 (2,3/4,5,6,7)					
		4.00	SPT	N=26 (4,4/5,6,7,8)					
		5.00	SPT	N=19 (3,3/4,4,5,6)					
					5.45	38.90		End of Borehole at 5.45m	
Remarks		1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. Hand dug inspection pit excavated to 1.20m bgl. 3. No groundwater encountered. 4. Installation to 5.00m bgl: 1.00m plain 35mm PVC, 4.00m slotted PVC upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

 BROWNFIELD SOLUTIONS LTD							Borehole Log		Window Sampler No.	
									WS02	
									Sheet 1 of 1	
PROJECT NO: C5515							CO-ORDS: 385670E, 396008N		Hole Type	
									WS	
PROJECT NAME: VICTORIA POINT, MANCHESTER							LEVEL: 44.27m OD		Scale	
									1:30	
CLIENT: HEYNE TILLET STEEL							DATES: 13/11/23		Logged	Checked
									OS	NS
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.15-1.00	ES		0.15	44.12		MADE GROUND: Black asphalt.		1.0
								MADE GROUND: Light grey slightly sandy gravel. Sand is coarse. Gravel is fine to medium subangular of limestone.		
		1.00	D		1.00	43.27		MADE GROUND: Light brown slightly gravelly firm clay. Gravel is fine to medium subangular of coal. With occasional silt bands.		2.0
		1.20	SPT	N=11 (2,3/2,3,3,3)						
					1.50	42.77		Firm light brown slightly gravelly CLAY with the occasional silt lens. Gravel is fine to medium subangular of coal and sandstone.		
		2.00	SPT	N=20 (2,3/4,4,5,7)				Becoming stiff from 2.00m bgl.		3.0
		3.00	SPT	N=23 (4,4/4,5,6,8)						
		3.50	D							
		4.00	SPT	N=23 (4,4/4,6,6,7)						
		4.50	D							
		5.00	SPT	N=19 (4,4/4,4,5,6)						
					5.45	38.82	End of Borehole at 5.45m		6.0	
Remarks		1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. Hand dug inspection pit excavated to 1.20m bgl. 3. No groundwater encountered. 4. Borehole backfilled with arisings upon completion.							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

BROWNFIELD SOLUTIONS LTD							Borehole Log		Window Sampler No. WS03 Sheet 1 of 1 Hole Type WS Scale 1:30 Logged AH Checked NS		
PROJECT NO: C5515							CO-ORDS: 385636E, 396050N				
PROJECT NAME: VICTORIA POINT, MANCHESTER							LEVEL: 45.55m OD				
CLIENT: HEYNE TILLET STEEL							DATES: 13/11/23				
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.00-0.30	ES					TOPSOIL: Dark brown slightly gravelly clayey sand with occasional rootlets. Sand is fine to coarse. Gravel is fine to medium subrounded of sandstone.	1.0		
		0.30-1.20	ES		0.30	45.25		MADE GROUND: Dark grey clayey sandy gravel with low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of brick, concrete, sandstone and coal. Cobbles are angular to subangular.			
		1.20	SPT	N≥50 (3,3/4,13,17,16)	1.20	44.35		MADE GROUND: light brown soft lightly sandy gravelly clay. Sand is fine to coarse. Gravel is fine to coarse subangular of brick, concrete, sandstone, coal and limestone.			
		1.50	D						2.0		
		1.70	SPT	N=26 (12,10/9,6,6,5)							
		2.50	D		2.50	43.05	MADE GROUND: White sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular of limestone.				
		2.70	SPT	N≥50 (25 for 20mm/50 for 70mm)	2.79	42.76	Refused on limestone at 2.70m bgl.	End of Borehole at 2.79m		3.0	
									4.0		
									5.0		
									6.0		
Remarks		1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. Hand dug inspection pit excavated to 1.20m bgl. 3. No groundwater encountered. 4. Installation to 2.50m bgl: 1.00m plain 35mm PVC, 1.00m slotted PVC upon completion.							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane		

Borehole Log							Window Sampler No.						
							WS04						
							Sheet 1 of 1						
PROJECT NO: C5515							CO-ORDS: 385673E, 396057N						
PROJECT NAME: VICTORIA POINT, MANCHESTER							Hole Type						
							WS						
CLIENT: HEYNE TILLET STEEL							Scale						
							1:30						
DATES: 13/11/23							Logged	Checked					
							OS	NS					
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description					
		Depth (m)	Type	Results									
		0.00-0.45	ES		0.45	45.34		TOPSOIL: Dark brown slightly clayey gravelly sand with occasional rootlets. Sand is fine to coarse. Gravel is fine to medium subrounded of sandstone.	1.0				
								MADE GROUND: light brown firm sandy gravelly clay with bands of coal and bands of silt. Sand is fine to coarse. Gravel is fine to coarse subangular of brick, concrete and sandstone.					
		1.20	SPT	N≥50 (3,21/50 for 150mm)	1.50	44.29		 <i>Thin band of coal up to 100mm.</i>					
		1.30	D										
		1.50	SPT	N≥50 (7,7/50 for 125mm)				MADE GROUND: White sandy gravel. Sand is fine to coarse. Gravel is fine to coarse subangular of limestone.					
					1.78	44.01		<i>Refused at 1.50m bgl.</i>	2.0				
								End of Borehole at 1.78m					
												3.0	
													4.0
									6.0				
Remarks		1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. Hand dug inspection pit excavated to 1.20m bgl. 3. No groundwater encountered. 4. Borehole backfilled with arisings upon completion.							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane				

Borehole Log							Window Sampler No.		
							WS05		
							Sheet 1 of 1		
PROJECT NO: C5515							CO-ORDS: 385710E, 396064N		
PROJECT NAME: VICTORIA POINT, MANCHESTER							Hole Type		
							WS		
CLIENT: HEYNE TILLET STEEL							Scale		
							1:30		
DATES: 13/11/23							Logged	Checked	
							OS	NS	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.00-0.20	ES		0.20	46.10		TOPSOIL: Dark brown to grey slightly clayey gravelly sand with rootlets. Sand is fine to coarse. Gravel is fine to medium subrounded of sandstone, brick, coal, slate, mudstone. MADE GROUND: Light brown soft to firm sandy gravelly clay with rare cobble. Sand is fine to coarse. Gravel is fine to coarse subangular of sandstone, limestone and coal. Cobbles are subangular of brick.	1.0
		0.20-2.80	ES						
		1.20	SPT	N=33 (5,6/7,10,8,8)	2.80	43.50		Stiff light brown to grey gravelly sandy CLAY with occasional silt bands. Sand is fine to coarse. Gravel is fine subangular of coal and mudstone.	3.0
		1.90	SPT	N=25 (5,5/6,5,6,8)					
		3.00	D SPT	N=28 (4,5/6,7,7,8)					
				3.50	42.80		End of Borehole at 3.50m	4.0	
								5.0	
								6.0	
Remarks		1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. Hand dug inspection pit excavated to 1.20m bgl. 3. No groundwater encountered. 4. Installation to 3.50m bgl: 1.00m slotted 35mm PVC, 1.00m plain PVC upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

Borehole Log							Window Sampler No.			
							WS06			
							Sheet 1 of 1			
PROJECT NO: C5515							CO-ORDS: 385758E, 396037N			
PROJECT NAME: VICTORIA POINT, MANCHESTER							Hole Type			
							WS			
CLIENT: HEYNE TILLET STEEL							Scale			
							1:30			
DATES: 13/11/23							Logged	Checked		
							OS	NS		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.00-0.30	ES					TOPSOIL: Dark brown slightly clayey gravelly clay. Sand is fine to coarse. Gravel is fine to coarse subangular of brick, coal, sandstone. With frequent rootlets.		
		0.30-4.15	D		0.30	46.30			MADE GROUND: Light brown soft sandy gravelly clay. Sand is fine to coarse. Gravel is fine to coarse subangular of brick, coal, sandstone. With rare cobble.	
		1.20	SPT	N=26 (1,2/4,4,8,10)						1.0
		2.00	SPT	N=13 (1,2/2,3,3,5)						2.0
		2.80	SPT	N=16 (6,7/3,4,4,5)						3.0
		3.50	D							
		3.70	SPT	N=36 (13,6/7,9,10,10)						4.0
					4.15	42.45				
										5.0
									6.0	
End of Borehole at 4.15m										
Remarks							1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. Hand dug inspection pit to excavated 1.20m bgl. 3. No groundwater encountered. 4. Installation to 5.00m bgl: 4.00m slotted 35mm PVC, 1.00m plain PVC upon completion.			
							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane			



Probe Log

Borehole No.

DP01

Sheet 1 of 1

Project Name: VICTORIA POINT,
MANCHESTER

Project No.
C5515

Co-ords: 385677.48 - 395933.15

Hole Type
DP

Location: MANCHESTER

Level: 44.36

Scale
1:25

Client: HEYNE TILLET STEEL

Dates: 14/11/2023 - 14/11/2023

Logged By
OS

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					
1					
2					
3					
4					
5					

Remarks

1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny.
2. Refused at 0.50m bgl.

Fall Height 500

Hammer Wt 64

Probe Type DPSH- A

Cone Base Diameter

Final Depth 0.50

Log Scale 1:25





Probe Log

Borehole No.

DP02

Sheet 1 of 1

Project Name: VICTORIA POINT,
MANCHESTERProject No.
C5515

Co-ords: 385656.51 - 395956.99

Hole Type
DP

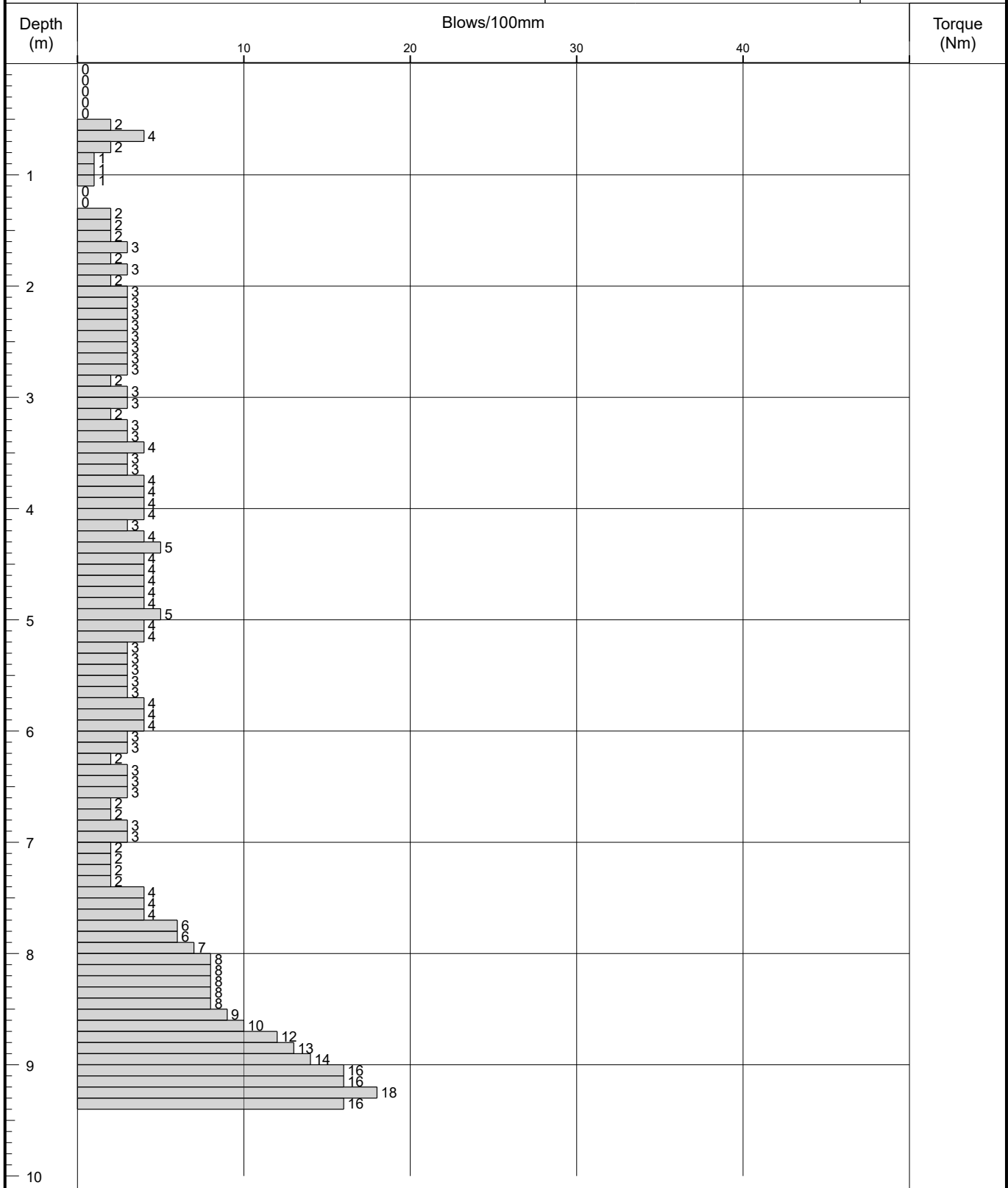
Location: MANCHESTER

Level: 43.88

Scale
1:50

Client: HEYNE TILLET STEEL

Dates: 14/11/2023 - 14/11/2023

Logged By
OS

Remarks

- Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny.
- Refused at 9.40m bgl.

Fall Height 500

Cone Base Diameter

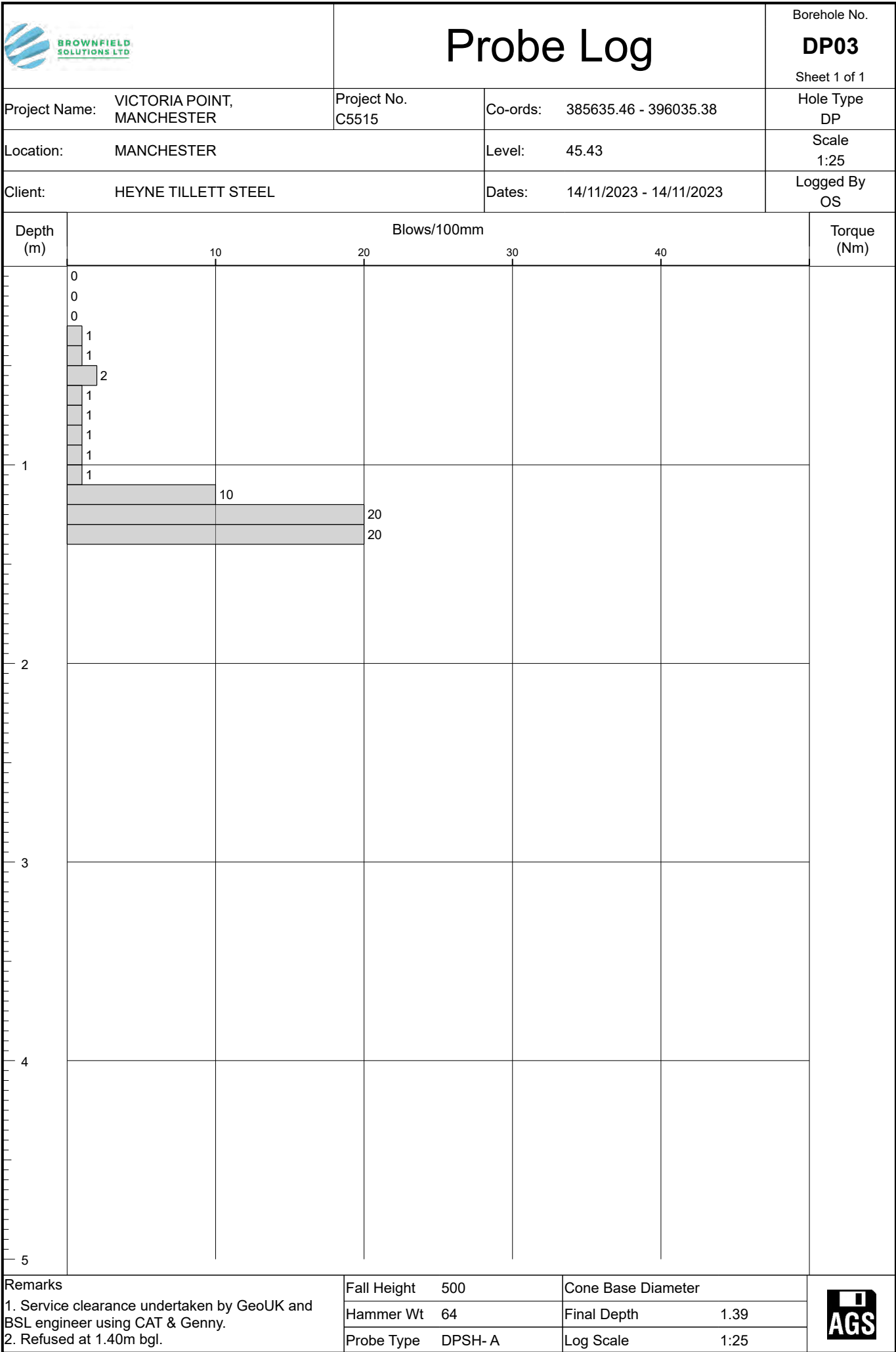
Hammer Wt 64

Final Depth 9.38

Probe Type DPSH- A

Log Scale 1:50







Probe Log

Borehole No.

DP04

Sheet 1 of 1

Project Name: VICTORIA POINT,
MANCHESTERProject No.
C5515

Co-ords: 385635.70 - 396014.24

Hole Type
DP

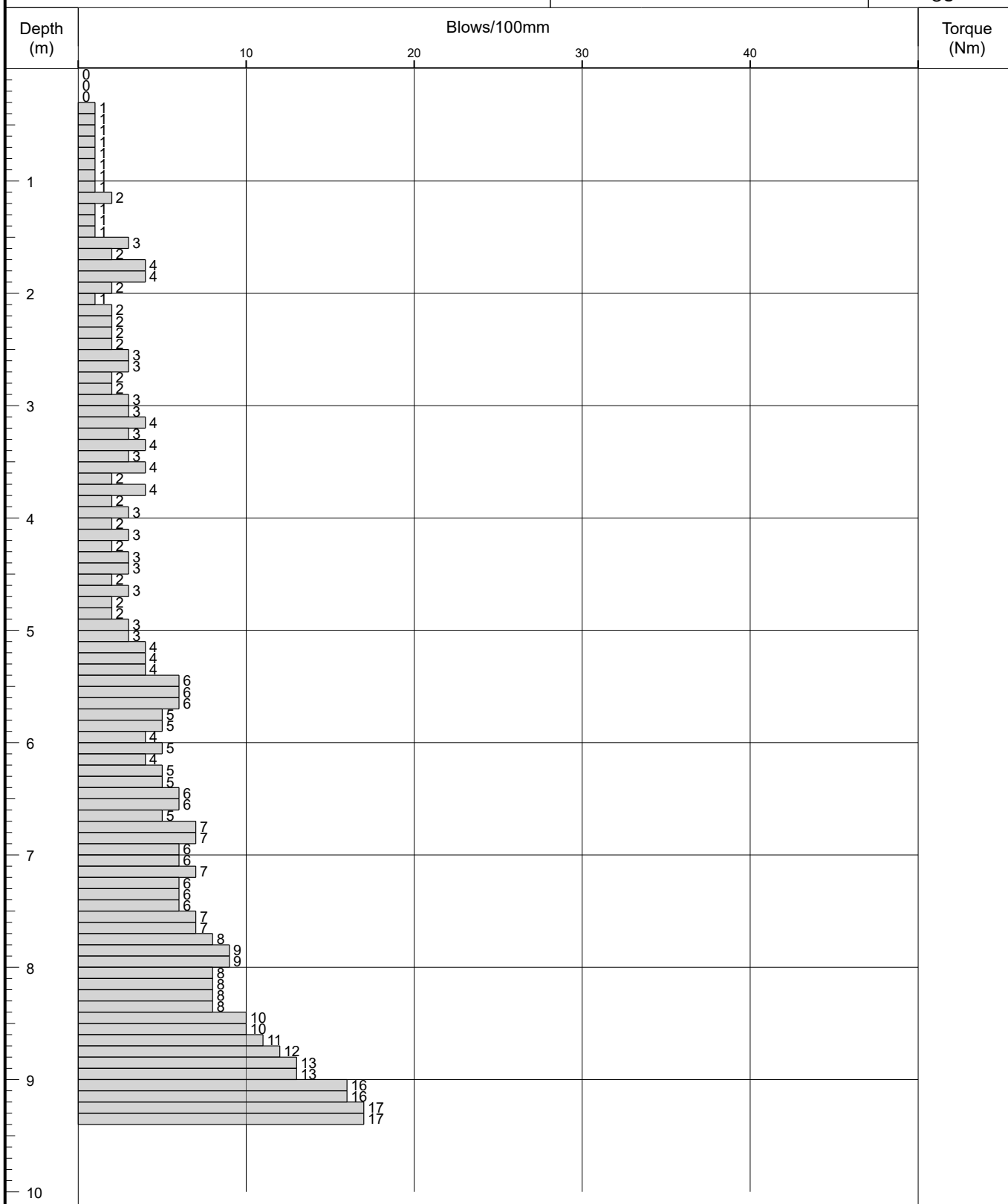
Location: MANCHESTER

Level: 45.18

Scale
1:50

Client: HEYNE TILLET STEEL

Dates: 14/11/2023 - 14/11/2023

Logged By
OS

Remarks

- Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny.
- Refused at 9.40m bgl.

Fall Height 500

Hammer Wt 64

Probe Type DPSH- A

Cone Base Diameter

Final Depth 9.39

Log Scale 1:50





Probe Log

Borehole No.

DP05

Sheet 1 of 1

Project Name: VICTORIA POINT,
MANCHESTERProject No.
C5515

Co-ords: 385671.66 - 396023.09

Hole Type
DP

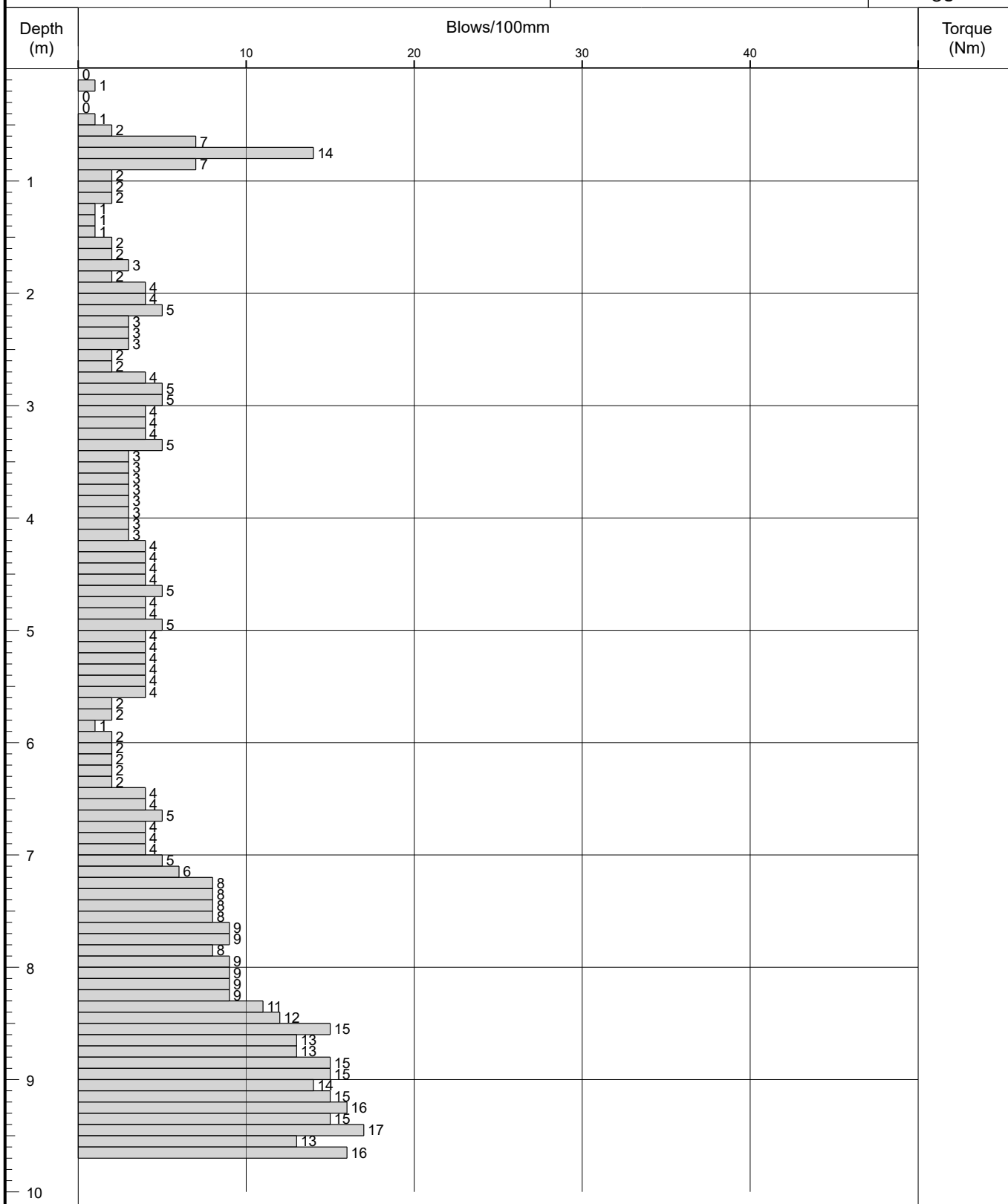
Location: MANCHESTER

Level: 44.83

Scale
1:50

Client: HEYNE TILLET STEEL

Dates: 14/11/2023 - 14/11/2023

Logged By
OS

Remarks

- Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny.
- Refused at 9.70m bgl.

Fall Height 500

Cone Base Diameter

Hammer Wt 64

Final Depth 9.68

Probe Type DPSH- A

Log Scale 1:50





Probe Log

Borehole No.

DP06

Sheet 1 of 1

Project Name: VICTORIA POINT,
MANCHESTER

Project No.
C5515

Co-ords: 385706.48 - 396029.82

Hole Type
DP

Location: MANCHESTER

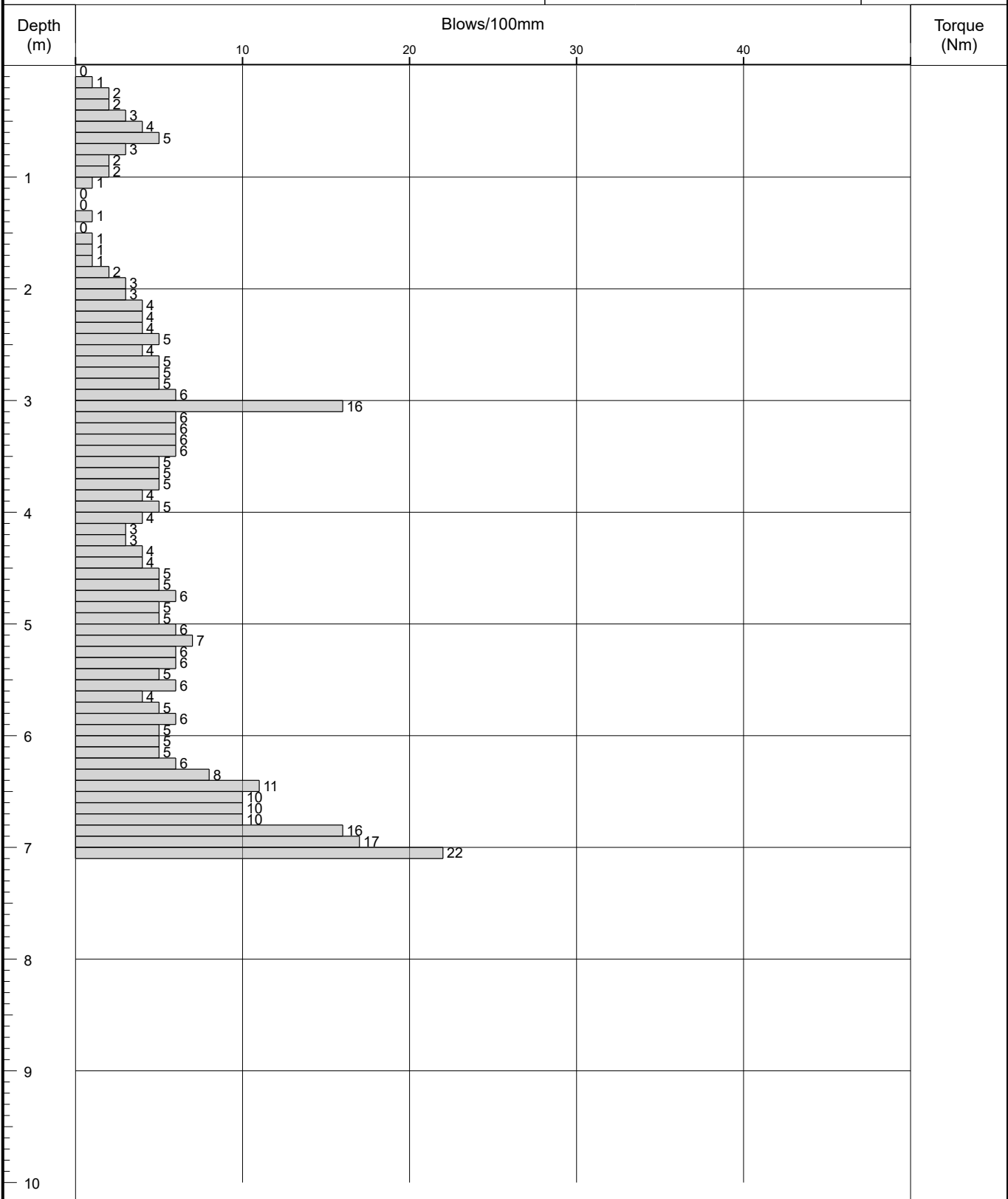
Level: 44.84

Scale
1:50

Client: HEYNE TILLET STEEL

Dates: 14/11/2023 - 14/11/2023

Logged By
OS



Remarks

- Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny.
- Refused at 7.10m bgl.

Fall Height 500

Hammer Wt 64

Probe Type DPSH- A

Cone Base Diameter

Final Depth 7.06

Log Scale 1:50







Probe Log

Borehole No.

DP09

Sheet 1 of 1

Project Name: VICTORIA POINT,
MANCHESTER

Project No.
C5515

Co-ords: 385775.26 - 396022.92

Hole Type
DP

Location: MANCHESTER

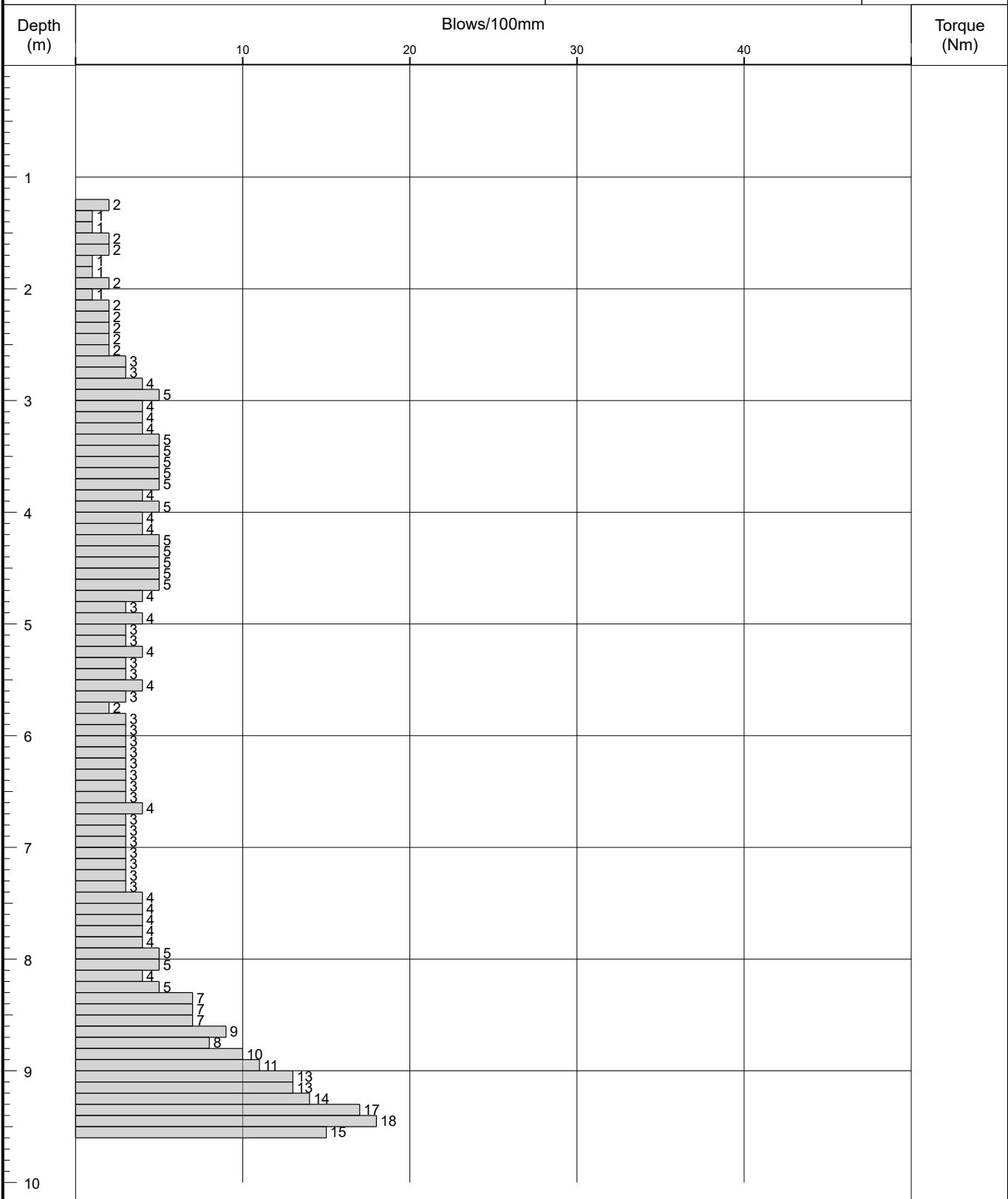
Level: 45.60

Scale
1:50

Client: HEYNE TILLET STEEL

Dates: 14/11/2023 - 14/11/2023

Logged By
OS



Remarks 1. Service clearance undertaken by GeoUK and BSL engineer using CAT & Genny. 2. Refused at 9.60m bgl.	Fall Height	500	Cone Base Diameter	
	Hammer Wt	64	Final Depth	9.57
	Probe Type	DPSH- A	Log Scale	1:50

					Trial Pit Log		No.		
PROJECT NO: C5515		CO-ORDS:		HP01					
				Sheet 1 of 1					
PROJECT NAME: VICTORIA POINT, MANCHESTER					LEVEL:		Hole Type		
CLIENT: HEYNE TILLET STEEL							TP		
DATES: 26/01/24					Logged OS		Scale		
DATES: 26/01/24							1:25		
DATES: 26/01/24					Checked NS		Legend		
DATES: 26/01/24							Stratum Description		
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
	0.00-0.35	ES					MADE GROUND TOPSOIL: Grass over dark brown gravelly sand. Sand is fine to coarse. Gravel is fine to coarse subangular of brick and concrete. With occasional rootlets.		
	0.35-0.70	ES		0.35			MADE GROUND: Brown gravelly clayey sand with low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular brick, concrete and sandstone. Cobbles are up to 80mm in diameter of brick.		
				0.70			Excavation terminated at 0.70m bgl due to encountered service. End of Trial Pit at 0.70m		
1.0									
2.0									
3.0									
4.0									
5.0									
Remarks		1. Service clearance undertaken by BSL engineer using CAT & Genny. 2. No groundwater encountered. 3. Hand pit backfilled with arisings upon completion. 4. Excavation terminated due to encountered service at 0.70m bgl.					ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane		

 BROWNFIELD SOLUTIONS LTD						Trial Pit Log		No. HP02 Sheet 1 of 1	
PROJECT NO: C5515						CO-ORDS:		Hole Type TP	
PROJECT NAME: VICTORIA POINT, MANCHESTER						LEVEL:		Scale 1:25	
CLIENT: HEYNE TILLET STEEL						DATES: 26/01/24		Logged OS Checked NS	
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		1.0 2.0 3.0 4.0 5.0
	Depth (m)	Type	Results						
	0.00-0.30	ES							
	0.30-0.60	ES							
	0.60-0.90	ES		0.60			MADE GROUND: Brown sandy gravel with high cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular brick. Cobbles are up to 90mm in diameter of brick.		
				0.90			MADE GROUND: Brown gravelly clayey sand with low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular of brick and concrete. With occasional rootlets.		
							MADE GROUND TOPSOIL: Grass over dark brown gravelly sand. Sand is fine to coarse. Gravel is fine to coarse subangular of brick and concrete. With occasional rootlets.		
Excavation terminated at 0.90m bgl due to concrete obstruction. End of Trial Pit at 0.90m									
Remarks		1. Service clearance undertaken by BSL engineer using CAT & Genny. 2. No groundwater encountered. 3. Hand pit backfilled with arisings upon completion. 4. Excavation terminated due to concrete obstruction at 0.90m bgl.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

						Trial Pit Log		No. HP03	
PROJECT NO: C5515						CO-ORDS:		Sheet 1 of 1	
PROJECT NAME: VICTORIA POINT, MANCHESTER						LEVEL:		Hole Type TP	
CLIENT: HEYNE TILLET STEEL						DATES: 26/01/24		Scale 1:25	
								Logged OS	
								Checked NS	
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
	0.00-0.30	ES					MADE GROUND TOPSOIL: Grass over dark brown gravelly sand. Sand is fine to coarse. Gravel is fine to coarse subangular of brick. With occasional rootlets.		
	0.30-0.50	ES		0.30			MADE GROUND: Brown gravelly clayey sand with low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular brick and concrete. Cobbles are up to 80mm in diameter of brick.		
				0.50			Excavation terminated at 0.50m bgl due to concrete obstruction. End of Trial Pit at 0.50m		
									1.0
									2.0
									3.0
									4.0
									5.0
Remarks		1. Service clearance undertaken by BSL engineer using CAT & Genny. 2. No groundwater encountered. 3. Hand pit backfilled with arisings upon completion. 4. Excavation terminated due to concrete obstruction at 0.50m bgl.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	



No.

HP04

Sheet 1 of 1

PROJECT NO: C5515

CO-ORDS:

Hole Type

Hole Type

PROJECT NAME: VICTORIA POINT, MANCHESTER

LEVEL:

Scale

1:25

CLIENT: HEYNE TILLET STEEL

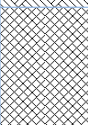
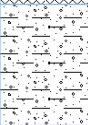
DATES: 26/01/24

Logged

Checked

OS

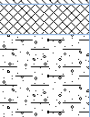
NS

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.00-0.30	ES		0.30			MADE GROUND TOPSOIL: Grass over dark brown clayey gravelly sand. Sand is fine to coarse. Gravel is fine to coarse subangular brick. With occasional rootlets.	1.0
	0.30-0.70	ES					MADE GROUND: Brown gravelly clayey sand with low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular brick, concrete and sandstone. Cobbles are up to 70mm in diameter of brick.	
	0.70-1.10	ES					Soft brown gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular brick, concrete and sandstone.	
	Excavation terminated at 1.10m bgl due to asphalt obstruction. End of Trial Pit at 1.10m							
								2.0
								3.0
								4.0
								5.0

Remarks

1. Service clearance undertaken by BSL engineer using CAT & Genny.
2. No groundwater encountered.
3. Hand pit backfilled with arisings upon completion.
4. Excavation terminated due to asphalt obstruction at 1.10m bgl.

ES = Environmental Sample
D = Disturbed Sample
B = Bulk Sample
LB = Large Bulk Sample
U = Undisturbed Sample
UT = Undisturbed Thin Wall Sample
SPT = Standard Penetration Test
PID = Photoionization Detector (ppm)
PPM = Part Per Million
HSV = Hand Shear Vane

 BROWNFIELD SOLUTIONS LTD						Trial Pit Log		No. HP05 Sheet 1 of 1 Hole Type TP Scale 1:25 Logged OS Checked NS	
PROJECT NO: C5515						CO-ORDS:			
PROJECT NAME: VICTORIA POINT, MANCHESTER						LEVEL:			
CLIENT: HEYNE TILLET STEEL						DATES: 26/01/24			
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		1.0 2.0 3.0 4.0 5.0
	Depth (m)	Type	Results						
	0.00-0.30	ES							
	0.30-0.40	ES							
	0.40-0.80	ES		0.30		 MADE GROUND TOPSOIL: Grass over dark brown clayey gravelly sand. Sand is fine to coarse. Gravel is fine to coarse subangular brick. With occasional rootlets.			
				0.40		 MADE GROUND: Brown gravelly clayey sand. Sand is fine to coarse. Gravel is fine to coarse subangular brick, concrete and sandstone. Cobbles are up to 80mm in diameter of brick.			
				0.80		 Soft to firm brown gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular brick, concrete and sandstone. Excavation terminated at 0.80m bgl due to concrete obstruction. End of Trial Pit at 0.80m			
Remarks		1. Service clearance undertaken by BSL engineer using CAT & Genny. 2. No groundwater encountered. 3. Hand pit backfilled with arisings upon completion. 4. Excavation terminated due to concrete obstruction at 0.80m bgl.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

APPENDIX C

Chemical Testing Results



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Analytical Report Number : 23-71305

Replaces Analytical Report Number: 23-71305, issue no. 1
Additional analysis undertaken.
Quantification added to positive sample as per client's requested.

Project / Site name:	Victoria Point Manchester	Samples received on:	24/11/2023
Your job number:	C5515	Samples instructed on/ Analysis started on:	24/11/2023
Your order number:	C5515 4774 JM	Analysis completed by:	14/12/2023
Report Issue Number:	2	Report issued on:	16/12/2023
Samples Analysed:	12 soil samples		

Signed:

Dominika Liana
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.



Analytical Report Number: 23-71305
Project / Site name: Victoria Point Manchester
Your Order No: C5515 4774 JM

Lab Sample Number				2891024	2891025	2891026	2891027	2891028
Sample Reference				WS01	WS04	WS04	WS05	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.58-0.80	0.00-0.45	0.45-1.00	0.20-2.80	0.15-1.00
Date Sampled				13/11/2023	13/11/2023	13/11/2023	13/11/2023	13/11/2023
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	58	< 0.1	70	< 0.1	35
Moisture Content	%	0.01	NONE	13	19	9.1	16	2
Total mass of sample received	kg	0.001	NONE	0.8	0.8	0.8	0.8	0.8

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	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	EWS	EWS	EWS	EWS	EWS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.7	8.2	8.7	8.8	11.1
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	71	20	110	45	45
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0355	0.0101	0.0569	0.0227	0.0225
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	35.5	10.1	56.9	22.7	22.5
Organic Matter (automated)	%	0.1	MCERTS	2.9	3.8	1.1	1.2	4.2

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	1.8	< 0.05	0.83	0.98	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	4.1	0.06	0.12	0.06	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	5.7	0.14	0.15	0.09	< 0.05
Fluorene	mg/kg	0.05	MCERTS	7.2	0.09	0.14	0.09	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	64	0.93	1.1	0.51	0.16
Anthracene	mg/kg	0.05	MCERTS	16	0.23	0.3	0.13	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	100	1.9	2.3	0.81	0.23
Pyrene	mg/kg	0.05	MCERTS	98	1.8	2.3	0.79	0.28
Benzo(a)anthracene	mg/kg	0.05	MCERTS	48	0.94	1.1	0.4	0.17
Chrysene	mg/kg	0.05	MCERTS	51	1	1.2	0.41	0.36
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	46	1.2	1.3	0.43	0.2
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	21	0.42	0.57	0.21	0.11
Benzo(a)pyrene	mg/kg	0.05	MCERTS	39	0.92	1.1	0.36	0.15
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	17	0.52	0.63	0.19	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	5.3	0.15	0.14	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	19	0.58	0.63	0.23	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	545	11	13.9	5.69	1.66
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Analytical Report Number: 23-71305

Project / Site name: Victoria Point Manchester

Your Order No: C5515 4774 JM

Lab Sample Number	2891024	2891025	2891026	2891027	2891028
Sample Reference	WS01	WS04	WS04	WS05	WS02
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.58-0.80	0.00-0.45	0.45-1.00	0.20-2.80	0.15-1.00
Date Sampled	13/11/2023	13/11/2023	13/11/2023	13/11/2023	13/11/2023
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	12	14	7.1	9.1	1.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.8	< 0.2	0.4	< 0.2	0.6
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	15	17	15	29	5.7
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	17	15	29	5.7
Copper (aqua regia extractable)	mg/kg	1	MCERTS	50	45	20	25	3.8
Lead (aqua regia extractable)	mg/kg	1	MCERTS	140	100	32	20	12
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	15	16	17	39	4
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	110	85	48	60	16

Monoaromatics & Oxygenates

Total BTEX & MTBE	mg/kg	0.007	NONE	< 0.007	< 0.007	< 0.007	-	-
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Monoaromatics & Oxygenates

Benzene	mg/kg	0.005	MCERTS	< 0.005	< 0.005	< 0.005	-	-
Toluene	mg/kg	0.005	MCERTS	< 0.005	< 0.005	< 0.005	-	-
Ethylbenzene	mg/kg	0.005	MCERTS	< 0.005	< 0.005	< 0.005	-	-
p & m-xylene	mg/kg	0.005	MCERTS	< 0.005	< 0.005	< 0.005	-	-
o-xylene	mg/kg	0.005	MCERTS	< 0.005	< 0.005	< 0.005	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.005	NONE	< 0.005	< 0.005	< 0.005	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 _{HS_1D_AL}	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020	-	-
TPH-CWG - Aliphatic >EC6 - EC8 _{HS_1D_AL}	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020	-	-
TPH-CWG - Aliphatic >EC8 - EC10 _{HS_1D_AL}	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050	-	-
TPH-CWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL}	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
TPH-CWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL}	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	-	-
TPH-CWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	-	-
TPH-CWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	24	< 8.0	< 8.0	-	-
TPH-CWG - Aliphatic >EC16 - EC35 _{EH_CU_1D_AL}	mg/kg	10	MCERTS	24	< 10	< 10	-	-
TPH-CWG - Aliphatic >EC35 - EC40 _{EH_CU_1D_AL}	mg/kg	10	NONE	< 10	< 10	< 10	-	-
TPH-CWG - Aliphatic (EC5 - EC35) _{EH_CU+HS_1D_AL}	mg/kg	10	NONE	31	< 10	< 10	-	-

TPH-CWG - Aromatic >EC5 - EC7 _{HS_1D_AR}	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010	-	-
TPH-CWG - Aromatic >EC7 - EC8 _{HS_1D_AR}	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010	-	-
TPH-CWG - Aromatic >EC8 - EC10 _{HS_1D_AR}	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050	-	-
TPH-CWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR}	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR}	mg/kg	2	MCERTS	31	< 2.0	< 2.0	-	-
TPH-CWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	210	< 10	< 10	-	-
TPH-CWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	290	< 10	21	-	-
TPH-CWG - Aromatic >EC35 - EC40 _{EH_CU_1D_AR}	mg/kg	10	NONE	23	< 10	18	-	-
TPH-CWG - Aromatic (EC5 - EC35) _{EH_CU+HS_1D_AR}	mg/kg	10	NONE	530	13	24	-	-
TPH Total C5 - C40 _{EH_CU+HS_1D_TOTAL}	mg/kg	10	NONE	600	13	50	-	-

TPH (C5 - C10) _{HS_1D_TOTAL}	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	-	-
TPH (C10 - C16) _{EH_CU_1D_TOTAL}	mg/kg	10	NONE	33	< 10	< 10	-	-
TPH (C16 - C40) _{EH_CU_1D_TOTAL}	mg/kg	10	NONE	560	13	50	-	-



Analytical Report Number: 23-71305
Project / Site name: Victoria Point Manchester
Your Order No: C5515 4774 JM

Lab Sample Number				2891024	2891025	2891026	2891027	2891028
Sample Reference				WS01	WS04	WS04	WS05	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.58-0.80	0.00-0.45	0.45-1.00	0.20-2.80	0.15-1.00
Date Sampled				13/11/2023	13/11/2023	13/11/2023	13/11/2023	13/11/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-

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



Analytical Report Number: 23-71305
Project / Site name: Victoria Point Manchester
Your Order No: C5515 4774 JM

Lab Sample Number				2891029	2891030	2891031	2891032	2891033
Sample Reference				WS03	SA02	WS01	SA01	WS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.30	0.40-1.40	0.80-1.00	0.30-1.00	0.28-0.58
Date Sampled				13/11/2023	15/11/2023	13/11/2023	15/11/2023	13/11/2023
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	24	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	21	16	13	10	3.2
Total mass of sample received	kg	0.001	NONE	0.8	0.8	0.8	0.8	0.8

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile & Crocidolite	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	0.007	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	0.007	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	EWS	EWS	EWS	EWS	EWS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5	10.1	8.8	9.4	9.4
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	31	600	97	230	93
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0154	0.301	0.0487	0.115	0.0464
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	15.4	301	48.7	115	46.4
Organic Matter (automated)	%	0.1	MCERTS	4.4	4	1.6	4	5.8

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.48	1.4	< 0.05	0.98	0.32
Acenaphthylene	mg/kg	0.05	MCERTS	0.07	0.3	< 0.05	0.14	0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.18	2.3	< 0.05	0.31	0.3
Fluorene	mg/kg	0.05	MCERTS	0.12	1.8	< 0.05	0.36	0.22
Phenanthrene	mg/kg	0.05	MCERTS	1.2	17	< 0.05	2.8	1.3
Anthracene	mg/kg	0.05	MCERTS	0.27	5.4	< 0.05	0.74	0.45
Fluoranthene	mg/kg	0.05	MCERTS	2.3	29	< 0.05	3.9	3.1
Pyrene	mg/kg	0.05	MCERTS	2.3	31	< 0.05	4	3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.2	15	< 0.05	1.9	1.5
Chrysene	mg/kg	0.05	MCERTS	1.2	16	< 0.05	2.3	2.3
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	1.4	17	< 0.05	2.2	2
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.56	7.3	< 0.05	0.94	0.68
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.2	16	< 0.05	1.9	1.5
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.58	6.5	< 0.05	0.72	0.62
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.17	1.5	< 0.05	0.24	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.72	7.5	< 0.05	0.89	0.83

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	14	174	< 0.80	24.3	18.1
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Analytical Report Number: 23-71305
Project / Site name: Victoria Point Manchester
Your Order No: C5515 4774 JM

Lab Sample Number				2891029	2891030	2891031	2891032	2891033
Sample Reference				WS03	SA02	WS01	SA01	WS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.30	0.40-1.40	0.80-1.00	0.30-1.00	0.28-0.58
Date Sampled				13/11/2023	15/11/2023	13/11/2023	15/11/2023	13/11/2023
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	16	26	9.1	6.8	2.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	1	< 0.2	0.4	0.8
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	17	20	30	9.9	7.5
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	20	30	9.9	7.5
Copper (aqua regia extractable)	mg/kg	1	MCERTS	50	130	24	18	8.6
Lead (aqua regia extractable)	mg/kg	1	MCERTS	110	310	13	45	18
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	37	36	11	9.3
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	92	160	60	51	26

Monoaromatics & Oxygenates

Total BTEX & MTBE	mg/kg	0.007	NONE	-	-	-	-	-
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Monoaromatics & Oxygenates

Benzene	mg/kg	0.005	MCERTS	-	-	-	-	-
Toluene	mg/kg	0.005	MCERTS	-	-	-	-	-
Ethylbenzene	mg/kg	0.005	MCERTS	-	-	-	-	-
p & m-xylene	mg/kg	0.005	MCERTS	-	-	-	-	-
o-xylene	mg/kg	0.005	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.005	NONE	-	-	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 _{HS_1D_AL}	mg/kg	0.02	NONE	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8 _{HS_1D_AL}	mg/kg	0.02	NONE	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10 _{HS_1D_AL}	mg/kg	0.05	NONE	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL}	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL}	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC35 _{EH_CU_1D_AL}	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC35 - EC40 _{EH_CU_1D_AL}	mg/kg	10	NONE	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35) _{EH_CU+HS_1D_AL}	mg/kg	10	NONE	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7 _{HS_1D_AR}	mg/kg	0.01	NONE	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8 _{HS_1D_AR}	mg/kg	0.01	NONE	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10 _{HS_1D_AR}	mg/kg	0.05	NONE	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR}	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR}	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC35 - EC40 _{EH_CU_1D_AR}	mg/kg	10	NONE	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35) _{EH_CU+HS_1D_AR}	mg/kg	10	NONE	-	-	-	-	-
TPH Total C5 - C40 _{EH_CU+HS_1D_TOTAL}	mg/kg	10	NONE	-	-	-	-	-

TPH (C5 - C10) _{HS_1D_TOTAL}	mg/kg	1	NONE	-	-	-	-	-
TPH (C10 - C16) _{EH_CU_1D_TOTAL}	mg/kg	10	NONE	-	-	-	-	-
TPH (C16 - C40) _{EH_CU_1D_TOTAL}	mg/kg	10	NONE	-	-	-	-	-



Analytical Report Number: 23-71305
Project / Site name: Victoria Point Manchester
Your Order No: C5515 4774 JM

Lab Sample Number				2891029	2891030	2891031	2891032	2891033
Sample Reference				WS03	SA02	WS01	SA01	WS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.30	0.40-1.40	0.80-1.00	0.30-1.00	0.28-0.58
Date Sampled				13/11/2023	15/11/2023	13/11/2023	15/11/2023	13/11/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
PCBs by GC-MS								
PCB Congener 28	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	-	-	-	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	-	-	-	-	-
Total PCBs by GC-MS								
Total PCBs	mg/kg	0.007	MCERTS	-	-	-	-	-

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



Analytical Report Number: 23-71305
Project / Site name: Victoria Point Manchester
Your Order No: C5515 4774 JM

Lab Sample Number				2891034	2891035
Sample Reference				WS06	SA03
Sample Number				None Supplied	None Supplied
Depth (m)				0.30-4.15	0.70-1.50
Date Sampled				13/11/2023	15/11/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	60
Moisture Content	%	0.01	NONE	16	11
Total mass of sample received	kg	0.001	NONE	0.8	0.8

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-
Asbestos Analyst ID	N/A	N/A	N/A	N/A	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-
Organic Matter (automated)	%	0.1	MCERTS	-	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	-	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	-	-
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Analytical Report Number: 23-71305
Project / Site name: Victoria Point Manchester
Your Order No: C5515 4774 JM

Lab Sample Number				2891034	2891035
Sample Reference				WS06	SA03
Sample Number				None Supplied	None Supplied
Depth (m)				0.30-4.15	0.70-1.50
Date Sampled				13/11/2023	15/11/2023
Time Taken				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	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-
Chromium (hexavalent)	mg/kg	1.2	NONE	-	-
Chromium (III)	mg/kg	1	NONE	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-

Monoaromatics & Oxygenates

Total BTEX & MTBE	mg/kg	0.007	NONE	-	-
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Monoaromatics & Oxygenates

Benzene	mg/kg	0.005	MCERTS	-	-
Toluene	mg/kg	0.005	MCERTS	-	-
Ethylbenzene	mg/kg	0.005	MCERTS	-	-
p & m-xylene	mg/kg	0.005	MCERTS	-	-
o-xylene	mg/kg	0.005	MCERTS	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.005	NONE	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 _{HS_1D_AL}	mg/kg	0.02	NONE	-	-
TPH-CWG - Aliphatic >EC6 - EC8 _{HS_1D_AL}	mg/kg	0.02	NONE	-	-
TPH-CWG - Aliphatic >EC8 - EC10 _{HS_1D_AL}	mg/kg	0.05	NONE	-	-
TPH-CWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL}	mg/kg	1	MCERTS	-	-
TPH-CWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL}	mg/kg	2	MCERTS	-	-
TPH-CWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	-	-
TPH-CWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	-	-
TPH-CWG - Aliphatic >EC16 - EC35 _{EH_CU_1D_AL}	mg/kg	10	MCERTS	-	-
TPH-CWG - Aliphatic >EC35 - EC40 _{EH_CU_1D_AL}	mg/kg	10	NONE	-	-
TPH-CWG - Aliphatic (EC5 - EC35) _{EH_CU+HS_1D_AL}	mg/kg	10	NONE	-	-

TPH-CWG - Aromatic >EC5 - EC7 _{HS_1D_AR}	mg/kg	0.01	NONE	-	-
TPH-CWG - Aromatic >EC7 - EC8 _{HS_1D_AR}	mg/kg	0.01	NONE	-	-
TPH-CWG - Aromatic >EC8 - EC10 _{HS_1D_AR}	mg/kg	0.05	NONE	-	-
TPH-CWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR}	mg/kg	1	MCERTS	-	-
TPH-CWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR}	mg/kg	2	MCERTS	-	-
TPH-CWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	-	-
TPH-CWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	-	-
TPH-CWG - Aromatic >EC35 - EC40 _{EH_CU_1D_AR}	mg/kg	10	NONE	-	-
TPH-CWG - Aromatic (EC5 - EC35) _{EH_CU+HS_1D_AR}	mg/kg	10	NONE	-	-
TPH Total C5 - C40 _{EH_CU+HS_1D_TOTAL}	mg/kg	10	NONE	-	-

TPH (C5 - C10) _{HS_1D_TOTAL}	mg/kg	1	NONE	-	-
TPH (C10 - C16) _{EH_CU_1D_TOTAL}	mg/kg	10	NONE	-	-
TPH (C16 - C40) _{EH_CU_1D_TOTAL}	mg/kg	10	NONE	-	-



Analytical Report Number: 23-71305
Project / Site name: Victoria Point Manchester
Your Order No: C5515 4774 JM

Lab Sample Number				2891034	2891035
Sample Reference				WS06	SA03
Sample Number				None Supplied	None Supplied
Depth (m)				0.30-4.15	0.70-1.50
Date Sampled				13/11/2023	15/11/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
PCBs by GC-MS					
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	< 0.001

Total PCBs by GC-MS

Total PCBs	mg/kg	0.007	MCERTS	< 0.007	< 0.007
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U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



Analytical Report Number: 23-71305
Project / Site name: Victoria Point Manchester
Your Order No: C5515 4774 JM

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
2891030	SA02	0.40-1.40	122	Loose Fibres & Loose Fibrous Debris	Chrysotile & Crocidolite	0.007	0.007

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



Analytical Report Number : 23-71305
Project / Site name: Victoria Point Manchester

* 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 *
2891024	WS01	None Supplied	0.58-0.80	Brown clay and sand with gravel and brick.
2891025	WS04	None Supplied	0.00-0.45	Brown clay and loam with gravel and vegetation.
2891026	WS04	None Supplied	0.45-1.00	Brown clay and sand with gravel and stones.
2891027	WS05	None Supplied	0.20-2.80	Brown clay and sand with gravel.
2891028	WS02	None Supplied	0.15-1.00	Brown sand with gravel and stones.
2891029	WS03	None Supplied	0.00-0.30	Brown clay and loam with gravel and vegetation.
2891030	SA02	None Supplied	0.40-1.40	Brown gravelly loam with stones.
2891031	WS01	None Supplied	0.80-1.00	Brown clay.
2891032	SA01	None Supplied	0.30-1.00	Brown sandy clay with gravel.
2891033	WS01	None Supplied	0.28-0.58	Brown sandy loam with gravel.
2891034	WS06	None Supplied	0.30-4.15	Brown clay and sand with gravel.
2891035	SA03	None Supplied	0.70-1.50	Brown clay and sand with gravel and stones.



Analytical Report Number : 23-71305
Project / Site name: Victoria Point Manchester

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
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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. Refer to CoA for analyte specific accreditation.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-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
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID. Refer to CoA for band specific accreditation.	In-house method with silica gel split/clean up.	L088/76-PL	D	MCERTS
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
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method by continuous flow analyser.	L080-PL	W	NONE
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. Refer to CoA for analyte specific accreditation	L073B-PL	W	MCERTS



Analytical Report Number : 23-71305
Project / Site name: Victoria Point Manchester

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	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

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 aravimetricallv usina 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

**Nicola Swallow**

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Analytical Report Number : 24-80669

Project / Site name:	Victoria Point, Manchester	Samples received on:	30/01/2024
Your job number:	C5515	Samples instructed on/ Analysis started on:	30/01/2024
Your order number:	NS-C5515-150	Analysis completed by:	06/02/2024
Report Issue Number:	1	Report issued on:	06/02/2024
Samples Analysed:	5 soil 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

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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: 24-80669
Project / Site name: Victoria Point, Manchester
Your Order No: NS-C5515-150

Lab Sample Number				2941566	2941567	2941568	2941569	2941701
Sample Reference				HP01	HP02	HP04	HP05	HP03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.35-0.70	0.30-0.60	0.30-0.70	0.30-0.40	0.30-0.50
Date Sampled				26/01/2024	26/01/2024	26/01/2024	26/01/2024	26/01/2024
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 Screen / Identification Name	Type	N/A	ISO 17025	-	-	Amosite	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	< 0.001	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	< 0.001	-	-
Asbestos Analyst ID	N/A	N/A	N/A	KWB	KWB	KWB	KWB	KWB

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



Analytical Report Number: 24-80669
Project / Site name: Victoria Point, Manchester
Your Order No: NS-C5515-150

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
2941568	HP04	0.30-0.70	159	Loose Fibres	Amosite	< 0.001	< 0.001

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



Analytical Report Number : 24-80669

Project / Site name: Victoria Point, Manchester

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
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
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE

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.

APPENDIX D

Geotechnical Testing Results

TEST REPORT

Client Brownfield Solutions Ltd

Address William Smith House
173-183 Witton Street
Northwich
Cheshire
CW9 5LP

Contract C5515 -
Victoria Point, Manchester

Job Number MRN 4573/23
Date of Issue 14 December 2023
Page 1 of 13

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



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Also at: London: 020 8523 1999

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

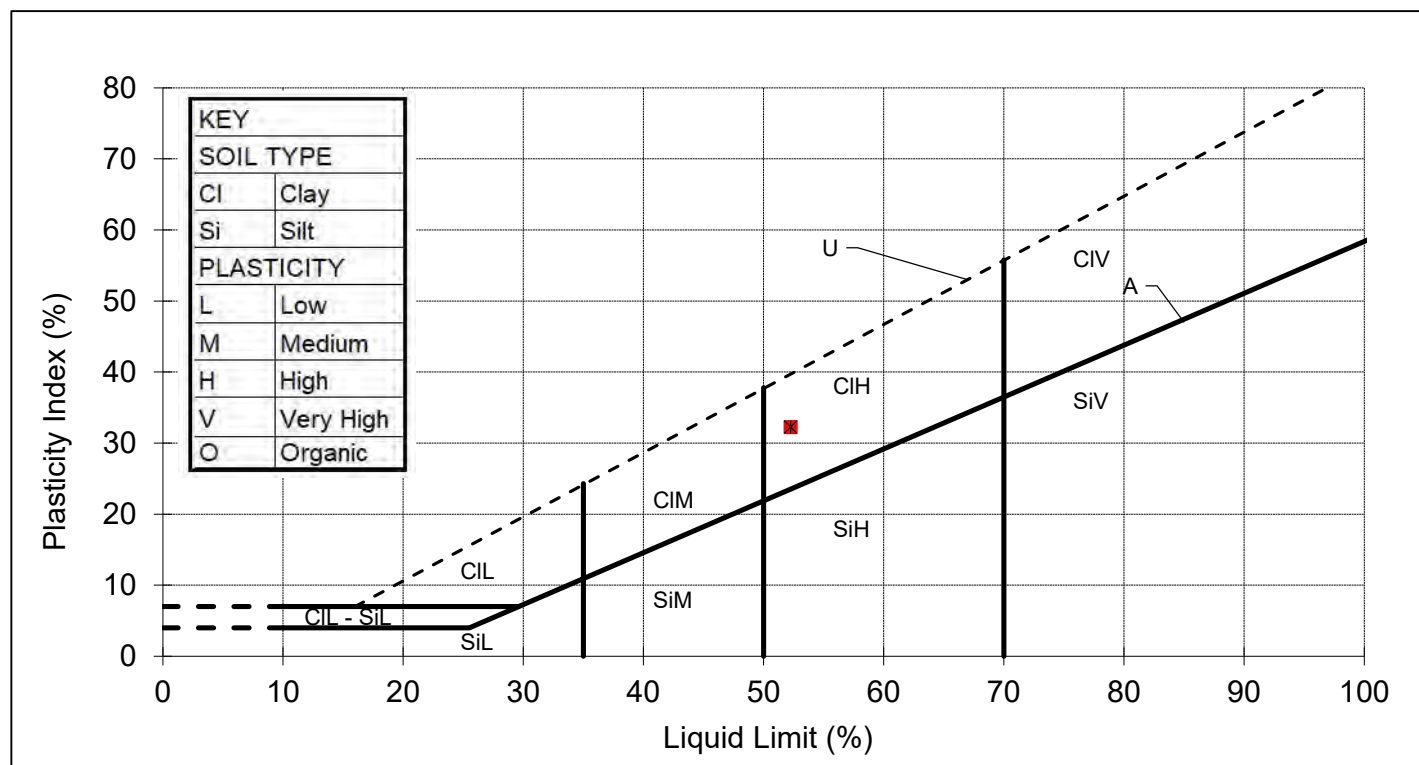
CLIENT	Brownfield Solutions Ltd
SITE	C5515 - Victoria Point, Manchester
JOB NUMBER	MRN 4573/23

SAMPLE LABEL	WS02 1.000	DATE SAMPLED	13-Nov-23
SAMPLE No.	134323	DATE RECEIVED	24-Nov-23
DATE TESTED	29-Nov-23	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	15.6	49.1	1.073	
Determination 2 (avg)	15.4	48.3		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20.6	52	20	32	90



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

14-Dec-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

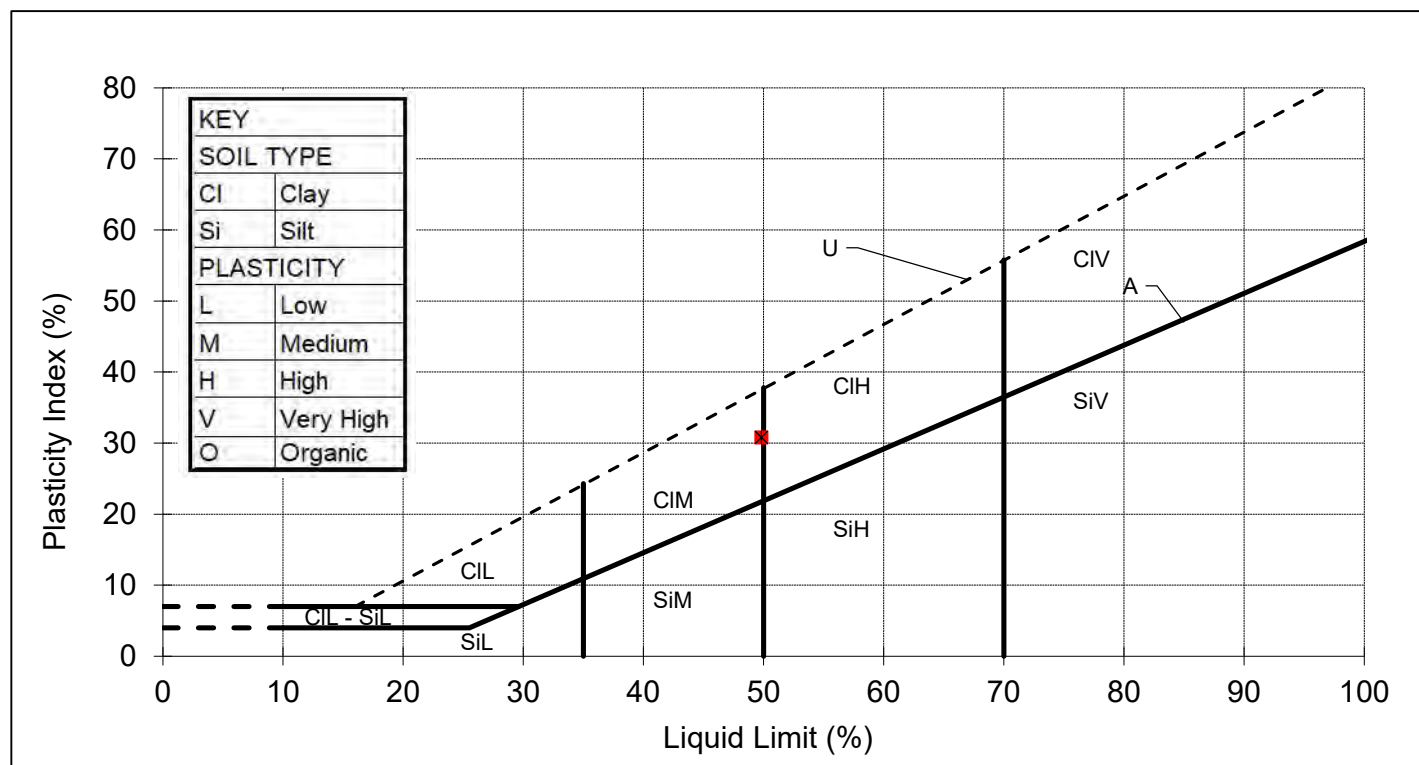
CLIENT	Brownfield Solutions Ltd
SITE	C5515 - Victoria Point, Manchester
JOB NUMBER	MRN 4573/23

SAMPLE LABEL	WS03 2.500	DATE SAMPLED	13-Nov-23
SAMPLE No.	134324	DATE RECEIVED	24-Nov-23
DATE TESTED	29-Nov-23	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	16.4	46.8	1.066	
Determination 2 (avg)	16.2	46.7		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
20.0	50	19	31	91



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

14-Dec-23

MURRAY RIX

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TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

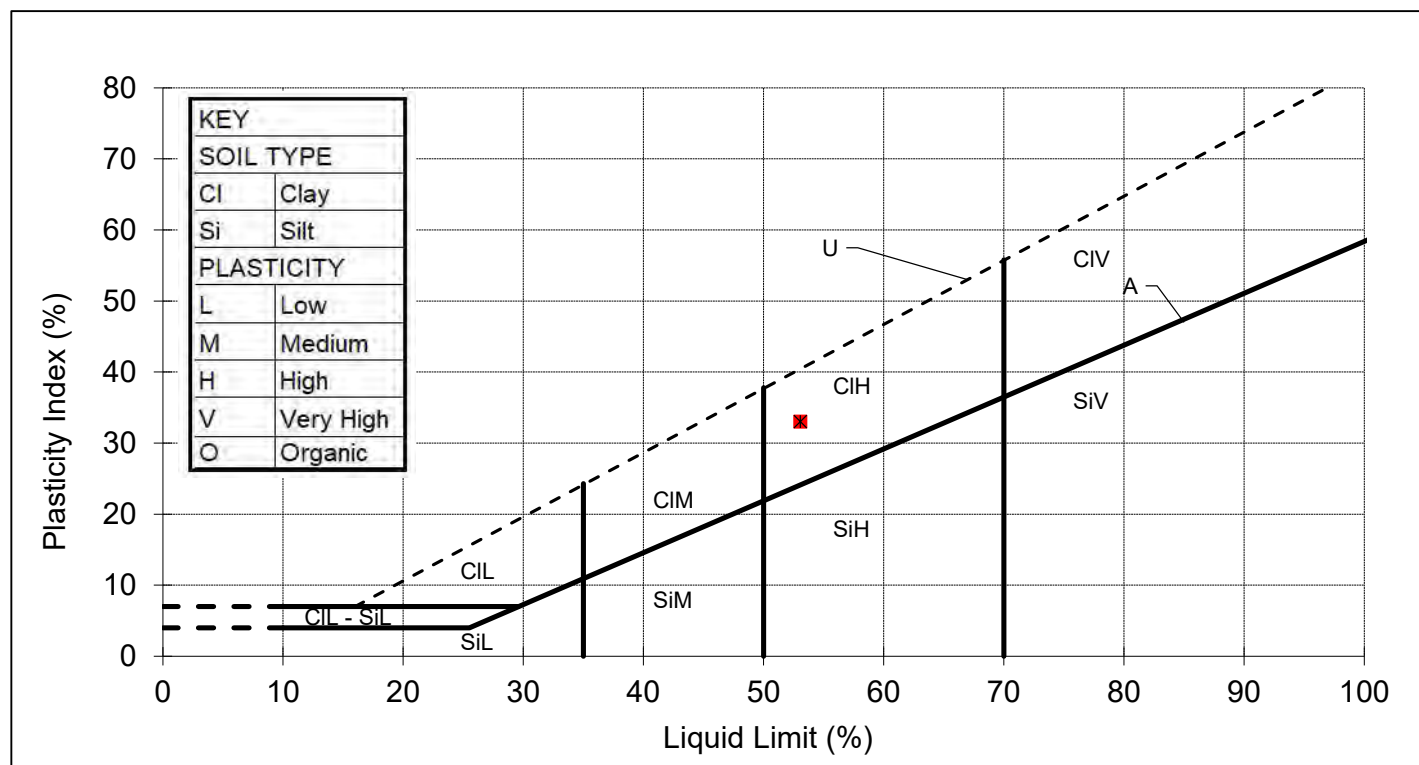
CLIENT	Brownfield Solutions Ltd
SITE	C5515 - Victoria Point, Manchester
JOB NUMBER	MRN 4573/23

SAMPLE LABEL	WS04 1.300	DATE SAMPLED	13-Nov-23
SAMPLE No.	134325	DATE RECEIVED	24-Nov-23
DATE TESTED	29-Nov-23	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	15.5	49.5	1.075	
Determination 2 (avg)	15.4	49.2		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
21.1	53	20	33	88



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

14-Dec-23

MURRAY RIX

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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

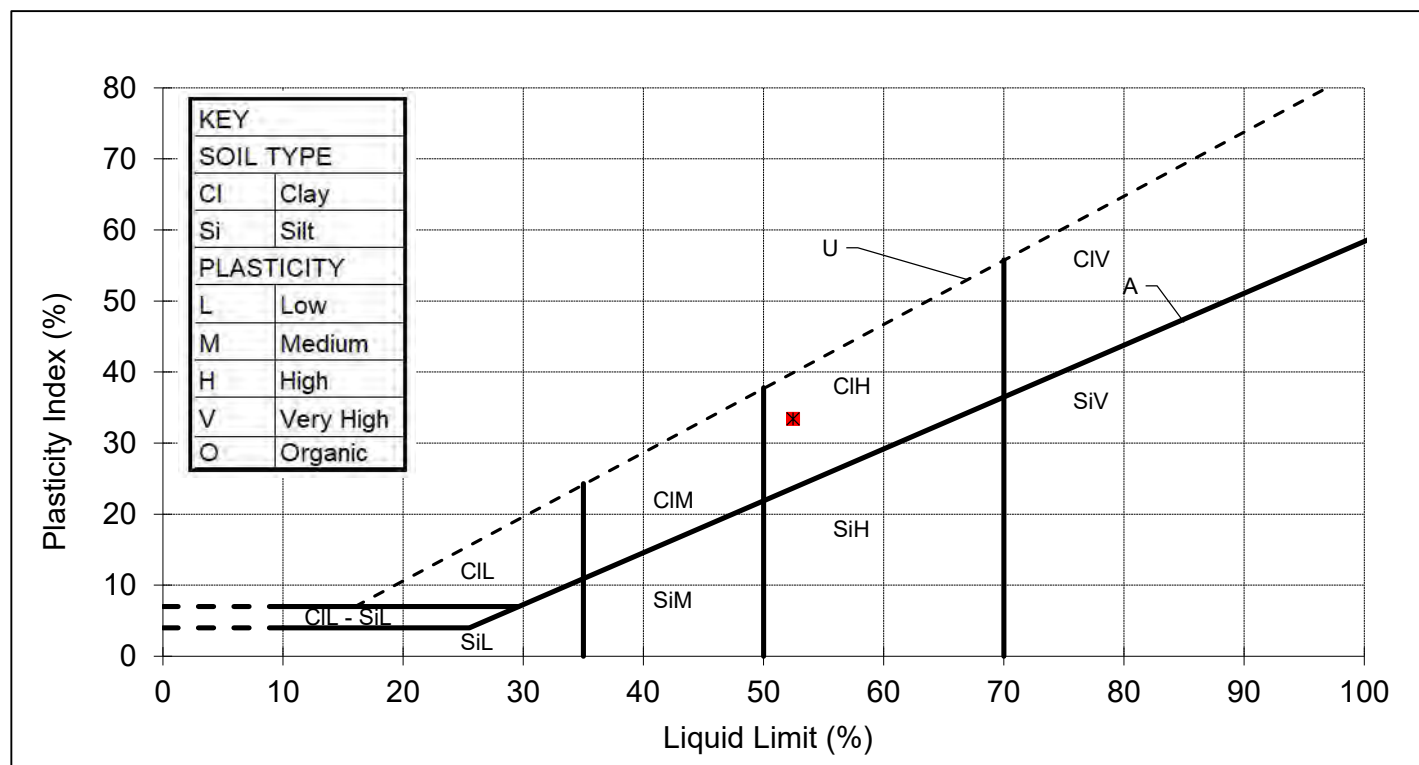
CLIENT	Brownfield Solutions Ltd
SITE	C5515 - Victoria Point, Manchester
JOB NUMBER	MRN 4573/23

SAMPLE LABEL	WS05 3.500	DATE SAMPLED	13-Nov-23
SAMPLE No.	134326	DATE RECEIVED	24-Nov-23
DATE TESTED	29-Nov-23	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	18.6	51.1	1.025	
Determination 2 (avg)	18.6	51.2		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18.7	52	19	33	82



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

14-Dec-23

MURRAY RIX

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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

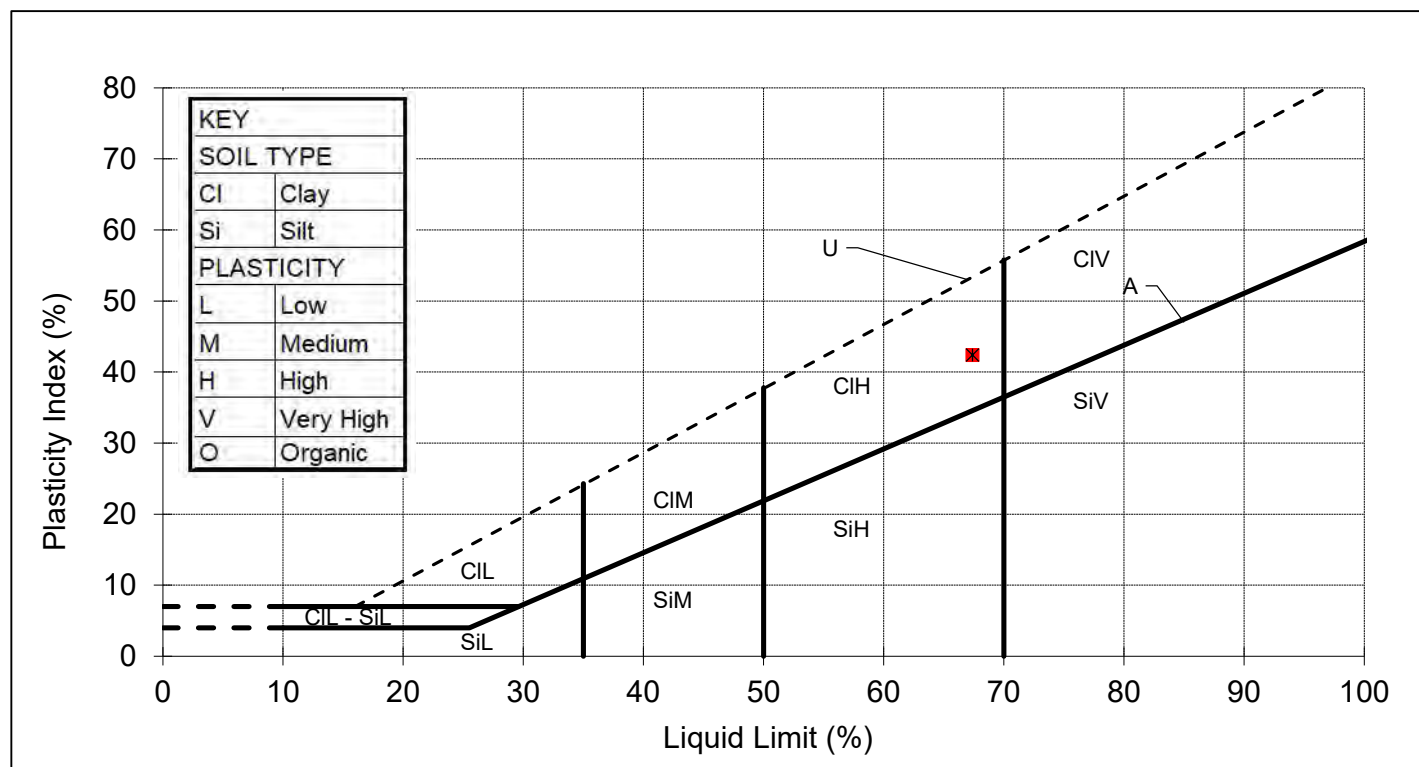
CLIENT	Brownfield Solutions Ltd
SITE	C5515 - Victoria Point, Manchester
JOB NUMBER	MRN 4573/23

SAMPLE LABEL	SA02 1.4-1.7	DATE SAMPLED	15-Nov-23
SAMPLE No.	134327	DATE RECEIVED	24-Nov-23
DATE TESTED	29-Nov-23	SAMPLED BY	Client

MATERIAL	Grey brown silty slightly sandy slightly gravelly organic CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	18.3	65.4	1.030	
Determination 2 (avg)	18.4	65.5		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
32.0	67	25	42	53



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

14-Dec-23

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DUKINFIELD, CHESHIRE SK16 4QX
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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

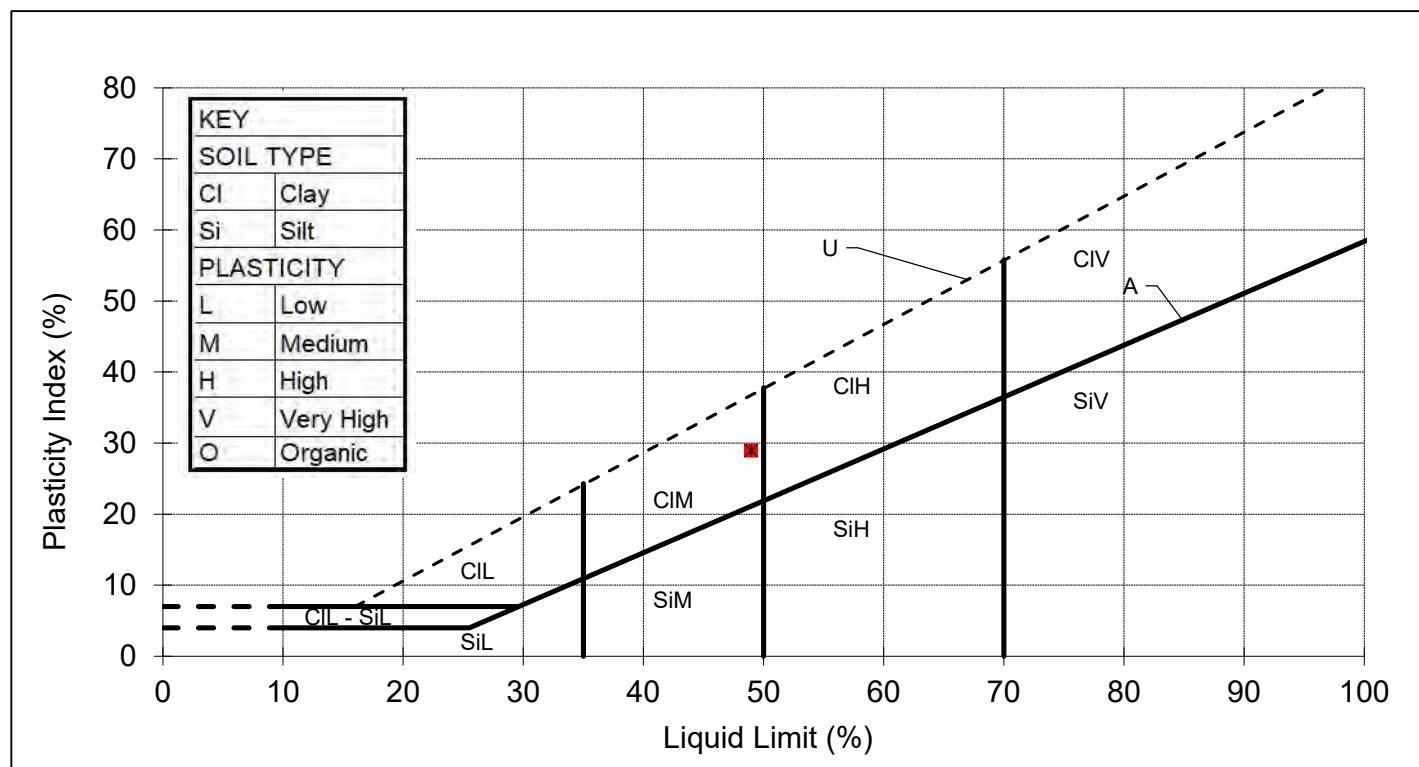
CLIENT	Brownfield Solutions Ltd
SITE	C5515 - Victoria Point, Manchester
JOB NUMBER	MRN 4573/23

SAMPLE LABEL	WS01 1.000	DATE SAMPLED	13-Nov-23
SAMPLE No.	134328	DATE RECEIVED	24-Nov-23
DATE TESTED	29-Nov-23	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.2	48.2	1.018	
Determination 2 (avg)	19.0	48.0		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
22.0	49	20	29	86



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

14-Dec-23

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

DETERMINATION OF POINT LOAD STRENGTH INDEX OF ROCK METHOD IN ACCORDANCE WITH ASTM STANDARD D 5731

[illegible]

Page 8 of 13

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF THE COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS

ASTM D7012 - 14 Method C

CLIENT	Brownfield Solutions Ltd
SITE	C5515 - Victoria Point, Manchester
JOB NUMBER	MRN 4573/23

DATE RECEIVED	24-Nov-23	DATE SAMPLED	Not advised
DATE TESTED	01-Dec-23	SAMPLED BY	Client
MATERIAL TESTED	Rock Core		

Sample Number	Sample Reference	Tested By	Diameter (mm)	Length* (mm)	L/D Ratio	Method of Preparation	Load at Failure (kN)	Compressive Strength (N/mm ²)	Description after Test
134338	BH01 20.0-20.30	M.R.	85	170	2.00	Saw / Grinding	32.4	5.7	Split vertically top to bottom with no visible end defects
134339	BH01 21.90-22.13	M.R.	85	170	2.00	Saw / Grinding	133.9	23.6	Split vertically top to bottom with no visible end defects

Comments / Deviation from standard method / Abnormalities noted during visual inspection.

*Length after sample preparation

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

SIGNED



DATE 14-Dec-23

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

DETERMINATION OF POINT LOAD STRENGTH INDEX OF ROCK METHOD IN ACCORDANCE WITH ASTM STANDARD D 5731

[illegible]

Page 10 of 13

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF THE COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS

ASTM D7012 - 14 Method C

CLIENT	Brownfield Solutions Ltd
SITE	C5515 - Victoria Point, Manchester
JOB NUMBER	MRN 4573/23

DATE RECEIVED	24-Nov-23	DATE SAMPLED	Not advised
DATE TESTED	01-Dec-23	SAMPLED BY	Client
MATERIAL TESTED	Rock Core		

Sample Number	Sample Reference	Tested By	Diameter (mm)	Length* (mm)	L/D Ratio	Method of Preparation	Load at Failure (kN)	Compressive Strength (N/mm ²)	Description after Test
134340	BH02 19.20-19.50	M.R.	85	170	2.00	Saw / Grinding	7.1	1.3	Split vertically top to bottom with no visible end defects
134341	BH02 21.80-22.05	M.R.	85	170	2.00	Saw / Grinding	20.4	3.6	Split vertically top to bottom with no visible end defects

Comments / Deviation from standard method / Abnormalities noted during visual inspection.

*Length after sample preparation

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

SIGNED



DATE 14-Dec-23

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

DETERMINATION OF POINT LOAD STRENGTH INDEX OF ROCK METHOD IN ACCORDANCE WITH ASTM STANDARD D 5731

MATERIAL	Rock Core
ADVISED SOURCE	Site Investigation Sample

[illegible]

SIGNED

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 14-Dec-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

DETERMINATION OF THE COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS

ASTM D7012 - 14 Method C

CLIENT	Brownfield Solutions Ltd
SITE	C5515 - Victoria Point, Manchester
JOB NUMBER	MRN 4573/23

DATE RECEIVED	24-Nov-23	DATE SAMPLED	Not advised
DATE TESTED	01-Dec-23	SAMPLED BY	Client
MATERIAL TESTED	Rock Core		

Sample Number	Sample Reference	Tested By	Diameter (mm)	Length* (mm)	L/D Ratio	Method of Preparation	Load at Failure (kN)	Compressive Strength (N/mm ²)	Description after Test
134342	BH03 18.60-18.85	M.R.	85	170	2.00	Saw / Grinding	165.6	29.2	Split vertically top to bottom with no visible end defects
134343	BH03 22.80-23.00	M.R.	85	170	2.00	Saw / Grinding	28.1	5.0	Split vertically top to bottom with no visible end defects

Comments / Deviation from standard method / Abnormalities noted during visual inspection.

*Length after sample preparation

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

SIGNED



DATE 14-Dec-23



Jack Mather
Brownfield Solutions Ltd
William Smith House
173 - 183 Witton Street
Northwich
Cheshire
CW9 5LP

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: j.mather@brownfield-solutions.co.uk

Analytical Report Number : 23-71299

Project / Site name:	Victoria Point Manchester	Samples received on:	24/11/2023
Your job number:	C5515	Samples instructed on/ Analysis started on:	24/11/2023
Your order number:	C5515-4773-JM	Analysis completed by:	01/12/2023
Report Issue Number:	1	Report issued on:	01/12/2023
Samples Analysed:	8 soil samples		

Signed: *A. Czerwińska*
Agnieszka Czerwińska
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: 23-71299
Project / Site name: Victoria Point Manchester
Your Order No: C5515-4773-JM

Lab Sample Number				2890992	2890993	2890994	2890995	2890996
Sample Reference				WS01	WS02	WS03	WS06	BH02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	4.50	1.50	3.50	20.00
Date Sampled				13/11/2023	13/11/2023	13/11/2023	13/11/2023	14/11/2023
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	11	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	9.9	14	16	18	7.9
Total mass of sample received	kg	0.001	NONE	0.5	0.6	0.6	0.6	0.4

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.1	8.6	9.2	8.2	8.9
Total Sulphate as SO ₄	%	0.005	MCERTS	-	-	-	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.027	0.0328	0.273	0.0243	0.0175
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	-	-	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	-	-	-
Total Sulphur	%	0.005	MCERTS	-	-	-	-	-
Ammoniacal Nitrogen as NH ₄	mg/kg	0.5	MCERTS	-	-	-	-	-
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-	-	-	-	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	-	-	-

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	-	-	-	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	-	-	-

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

Analytical Report Number: 23-71299
 Project / Site name: Victoria Point Manchester
 Your Order No: C5515-4773-JM

Lab Sample Number				2890997	2890998	2890999
Sample Reference				BH03	WS05	BH01
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				22.00	3.00	12.00
Date Sampled				16/11/2023	13/11/2023	15/11/2023
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	7.4	12	14
Total mass of sample received	kg	0.001	NONE	1.4	0.6	0.5

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.9	8.5	9
Total Sulphate as SO ₄	%	0.005	MCERTS	-	0.017	0.01
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0072	0.0267	0.0153
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	26.7	15.3
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	2.3	2.2
Total Sulphur	%	0.005	MCERTS	-	0.01	0.012
Ammoniacal Nitrogen as NH ₄	mg/kg	0.5	MCERTS	-	< 0.5	< 0.5
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-	< 0.05	< 0.05
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	-	19	11
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	9.6	5.4

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

Analytical Report Number : 23-71299

Project / Site name: Victoria Point Manchester

* 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 *
2890992	WS01	None Supplied	1.5	Brown clay and sand with gravel.
2890993	WS02	None Supplied	4.5	Brown clay.
2890994	WS03	None Supplied	1.5	Brown clay and sand with gravel and stones.
2890995	WS06	None Supplied	3.5	Brown clay.
2890996	BH02	None Supplied	20	Brown clay and sand.
2890997	BH03	None Supplied	22	Brown clay and sand.
2890998	WS05	None Supplied	3	Brown clay.
2890999	BH01	None Supplied	12	Brown sand.

Analytical Report Number : 23-71299

Project / Site name: Victoria Point Manchester

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
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	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
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	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

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.

APPENDIX E

Monitoring Results

Ground Gas Monitoring Results



CLIENT:	Date	Operator	Analysar	Weather Observations			Temp (°C)	Pressure Trend	Min Barometric Pressure (mb)	Notes
EMPIRIC (MANCHESTER VICTORIA POINT) LTD	01/12/2023	SJ	GA5000	Sunny	No wind	Cold	0	Rising	1010	
JOB NO.	14/12/2023	SJ	GFM436	Light rain	Light breeze	Cold	6	Rising	1006	
C5515	02/01/2024	SJ	GFM436	Light rain	Light breeze	Cold	7	Falling	977	
SITE:	24/01/2024	OS	GA5000	Overcast	Windy	Cool	10	Rising	994	
VICTORIA POINT, MANCHESTER	09/02/2024	SJ	GFM436	Light rain	No wind	Cool	10	Rising	974	
	23/02/2024	SJ	GFM436	Light rain	Light breeze	Cold	4	Rising	982	

Notes: mb = milibars; CH₄ = methane; LEL = lower explosive limit = 5%v/v; CO₂ = carbon dioxide; O₂ = oxygen; CO=carbon monoxide; H₂S = hydrogen sulphide; TVOC= Total volatile organic compounds; PPM = parts per million. Where the flow is less than the limit of detection of the instrument, the detection limit is reported (Highlighted in green). Gas Screening Values (GSVs) are rounded to 3 decimal places. Calibration Records for analysers used available on request.

Date	Time	Location	Response zone (m)	Pressures (mb)		Gas flows (l/hr)		CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases (PPM)			Depth to Water (m)	Well Base (m)	Gas Screening Value (CH ₄) (l/hr)	Gas Screening Value (CO ₂) (l/hr)	Notes	
				Atmospheric Pressure	Relative Well Pressure	Initial	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	CO	H ₂ S	TVOC (PID)						
				Summary Statistics																				
Max. values:				1013	1273.0	63.8	0.4	3.1	2.0	62.0	40.0	2.5	2.2	21.5	20.3	0.0	0.0	0.0	3.4	5.0	0.006	0.005	Highlight Box - Methane >1.0% v/v	
Min. values:				972	-133.0	-1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	6.5	0.0	0.0	0.0	1.1	2.0	0.000	0.000	Highlight Box - Carbon Dioxide >5.0% v/v		
Top Bottom				Worst-case GSVs based on maximum recorded steady flow and maximum individual peak concentrations:																		0.012	0.010	Highlight Box - Water above Response Zone
01/12/2023	AM	Ambient Start		1005				0.1		2.0		0.1		20.7										
		WS01	1.00	5.00	0.0	-0.6	0.1	0.1	0.1	2.0	2.0	0.1	0.1	6.9	15.2		0.0		2.90	5.00	0.000	0.000		
		WS02			-0.2	8.5	0.2	0.1	0.1	2.0	2.0	2.5	1.5	14.5	17.2		0.0		3.20	5.00	0.000	0.005		
		WS03	1.00	2.00	0.0	0.4	0.2	3.1	2.0	62.0	40.0	1.3	0.6	0.4	9.1		0.0		NGW	2.02	0.006	0.003		
		WS05	1.00	2.00	0.0	0.0	0.0	0.1	0.1	2.0	2.0	2.3	0.3	12.1	20.3		0.0		NGW	2.05	0.000	0.000		
		WS06	4.00	5.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.5	11.1	16.4		0.0		1.50	4.05	0.000	0.000		
		Ambient End		1005				0.0		0.0		0.1		21.4										
14/12/2023	AM	Ambient Start		1013				0.0		0.0		0.0		20.0										
		WS01	1.00	5.00	5.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	12.9	0.0	0.0		2.70	5.00	0.000	0.000		
		WS02			-133.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.6	11.1	18.9	0.0	0.0		3.41	5.00	0.000	0.000		
		WS03	1.00	2.00	1.0	0.1	0.0	2.8	2.0	56.0	40.0	1.2	0.6	0.1	6.9	0.0	0.0		NGW	2.04	0.000	0.000		
		WS05	1.00	2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.8	11.3	16.6	0.0	0.0		NGW	3.05	0.000	0.000		
		WS06	4.00	5.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.4	5.3	13.9	0.0	0.0		1.37	4.04	0.000	0.000		
		Ambient End		1010				0.0		0.0		0.0		20.0										
02/01/2024		Ambient Start		977				0.0		0.0		0.0		20.1										
		WS01	1.00	5.00	1273.0	63.8	0.0	0.0	0.0	0.0	0.0	0.6	0.0	13.0	18.5	0.0	0.0		1.25	4.95	0.000	0.000		
		WS02			33.9	25.8	0.0	0.0	0.0	0.0	0.0	1.3	0.5	12.4	17.6	0.0	0.0		1.35	4.90	0.000	0.000		
		WS03	1.00	2.00	3.0	0.4	0.0	2.5	1.8	50.0	36.0	1.0	0.0	0.1	6.7	0.0	0.0		2.00	2.04	0.000	0.000		
		WS05	1.00	2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.6	17.6	17.9	0.0	0.0		NGW	2.04	0.000	0.000		
		WS06	4.00	5.00	34.0	11.8	0.0	0.0	0.0	0.0	0.0	0.7	0.4	0.3	11.2	0.0	0.0		1.10	4.05	0.000	0.000		
		Ambient End		974				0.0		0.0		0.0		20.0										
24/01/2024		Ambient Start		1001				0.1		2.0		0.1		21.5										
		WS01	1.00	5.00	0.0	0.0	0.0	0.1	0.1	2.0	2.0	1.0	0.2	9.2	16.7	0.0	0.0		1.38	5.00	0.000	0.000		
		WS02			45.2	10.1	0.2	0.1	0.0	2.0	0.0	1.9	0.2	17.2	19.5	0.0	0.0		1.44	4.78	0.000	0.004		
		WS03	1.00	2.00	0.0	0.0	0.0	1.9	0.0	38.0	0.0	1.8	0.1	4.8	17.6	0.0	0.0		NGW	2.06	0.000	0.000		
		WS05	1.00	2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	2.2	16.5	17.7	0.0	0.0		2.00	2.06	0.000	0.000		
		WS06	4.00	5.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.1	19.2	17.0	0.0	0.0		1.42	4.06	0.000	0.000		
		Ambient End		994				0.1		2.0		0.1		20.2										
09/02/2024	PM	Ambient Start		972				0.0		0.0		0.0		20.3										
		WS01	1.00	5.00	1168.0	58.6	0.4	0.0	0.0	0.0	0.0	0.7	0.3	15.3	18.6	0.0	0.0		1.42	4.95	0.000	0.003		
		WS02			35.0	4.3	0.0	0.0	0.0	0.0	0.0	0.9	0.5	14.3	18.2	0.0	0.0		1.40	4.93	0.000	0.000		
		WS03	1.00	2.00	-28.0	-1.3	0.0	2.1	1.4	42.0	28.0	0.6	0.0	0.1	6.5	0.0	0.0		NGW	2.04	0.000	0.000		
		WS05	1.00	2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.9	19.0	17.3	0.0	0.0		2.00	2.05	0.000	0.000		
		WS06	4.00	5.00	-5.0	-1.0	0.0	0.0	0.0	0.0	0.0	1.1	0.5	7.4	15.4	0.0	0.0		1.24	4.03	0.000	0.000		
		Ambient End		970.0				0.0		0.0		0.0		20.2										

Ground Gas Monitoring Results



Date	Time	Location	Response zone (m)		Pressures (mb)		Gas flows (l/hr)		CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases (PPM)			Depth to Water (m)	Well Base (m)	Gas Screening Value (CH ₄) (l/hr)	Gas Screening Value (CO ₂) (l/hr)	Notes
					Atmospheric Pressure	Relative Well Pressure	Initial	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	CO	H ₂ S	TVOC (PID)					
23/02/2024	AM	Ambient Start			978				0.0		0.0		0.0		20.8									
		WS01	1.00	5.00		0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	13.6	18.2	0.0	0.0		1.48	4.95	0.000	0.000	
		WS02				0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.7	1.9	17.3	0.0	0.0		1.40	4.92	0.000	0.000	
		WS03	1.00	2.00		7.0	1.5	0.0	1.8	1.1	36.0	22.0	0.0	0.0	0.4	6.8	0.0	0.0		2.00	2.06	0.000	0.000	
		WS05	1.00	2.00		0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.3	17.9	17.3	0.0	0.0		2.00	2.04	0.000	0.000	
		WS06	4.00	5.00		0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.6	10.5	17.2	0.0	0.0		1.26	4.03	0.000	0.000	
		Ambient End			975				0.0		0.0		0.0		20.6									

TEST DATE AND CONDITIONS	
Date	23/01/23
Atmospheric pressure	1023 mb
Ambient Temp	20.1 °C
EnviroNics Serial No.	2518

GAS DATA LTD
Unit 4 Fairfield court
Seven Stars Estate
Coventry
CV3 4LJ, UK
+44 (0) 24 7630 3311



GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS					
SO Number	Instrument Banner	Instrument Serial Number + SW Version	Job Number(s)		
333016	GFM 436	13233 V27.10	24706	—	—

Calibration Technician [Signature]

DATE 19/11/23

Inspection Technician [Signature]

DATE 23/01/23

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable(NA)	INSTRUMENT PACKING LIST		Tick if included
Function Tests	Dust Caps Fitted	P	Instrument		✓
	Keyboard Test (All keys)	P	Leather Case		✓
	Backlight Test	P	Instrument Strap		✓
	Clock Set / Running	P	AC Battery Charger (UK)		✓
	Comms Test	P	AC Battery Charger (EURO)		X
	Pump Flow Test (In & Out)	P	AC Battery Charger (US)		X
	Overall Leak Test (30mb)	N/A	AC Battery Charger (AUS)		X
	Battery Charge Test	P	Gas Sample Pipe		X
	Service Date set to?	19/01/24	Hard Carry Case		✓
Channel Tests	Data Logging Enabled?	P	Spares Pot		X
	Verify CH4/LEL/Hexane/PID	P	Allen Key		X
	Verify CO2	P	Flow Sample Pipe		X
	Verify O2	P	Temperature Probe		X
	Verify H2S	P	Vane Anemometer		X
	Verify CO	P	USB Cable		✓
	Verify LEL	P	USB Memory Stick		✓
	Verify 1st Option gas	N/A	SM V5 Software	Ver 6.05	✓
	Verify atmospheric pressure	P	Internal Filter Pack	Qty	X
	Verify differential pressure	P	External Filter Pack	Qty	X
	Verify flow	P	Field Guide		X
	Verify temperature probe input	P	EX Safety Flier		X
	Verify vane anemometer input	P	Extra Items: SERVICE SPARES CUSTOMER: FILTER & PART SAMPLE PIPE		
DataBase Checks	Jobcard(s) completed and signed	P			
	Jobcard(s) booked off database	P			
	Calibration certificate completed	P			
	Complete & print QI record	N/A			
Label Checks	No. of Calibration label fitted	12216	Comments		
	MCERTS label not displayed	P			
	Warranty label fitted	P			
H2S Range	H2S Range from SO	5000 ppm			
	H2S Range from cal cert	5000 ppm			
	Over-range value correct?	P			

TEST DATE AND CONDITIONS	
Date	18/1/23
Atmospheric pressure	985mb
Ambient Temp	22.2°C
EnviroNics Serial No.	2633

GAS DATA LTD
Unit 4 Fairfield court
Seven Stars Estate
Coventry
CV3 4LJ, UK
+44 (0) 24 7630 3311



GFM436-1 FINAL INSPECTION & CALIBRATION CHECK CERTIFICATE

INSTRUMENT DETAILS	
Serial No	Customer
13233	Brownfield Solutions Ltd

INSTRUMENT CHECKS			
Keyboard	✓	Pump Flow	500cc/min
Display Contrast	✓	Pump Flow @ -200mB	350cc/min
Clock Set / Running	✓	S/W Version	G436-00.0027/0010
Labels Fitted	✓	Recalibration Date	19/1/24

GAS CHECKS							
Calibration Gas		Instrument Gas Channels Read					
Gas Type	Applied Conc.	CH4 (%)	tol. (% vol.)	CO2 (%)	tol. (% vol.)	O2 (%)	tol. (% vol.)
N2	100%	0.0	0.0	0.0	0.0	0.0	+/-0.1
CH4	5%	5.0	+/-0.3	0.0	0.0	0.0	+/-0.1
	60%	60.3	+/-3.0	0.0	0.0	0.0	+/-0.1
CO2	5%	0.0	0.0	4.9	+/-0.3	0.0	+/-0.1
	40%	0.0	0.0	39.9	+/-3.0	0.0	+/-0.1
O2	20.9%	0.0	0.0	0.0	+0.1	20.9	+/-0.5

OPTIONAL GAS CHECKS								
Calibration Gas		Instrument Gas Channels Read						
Gas Type	Applied Conc.	Label	H2S	CO			Hexane	tol. (% vol.)
		Range	5000ppm	2000ppm			2.00%	
N2	100%		0	0			0.000	0.0
H2S	1500ppm		1510	0				+/- 5.0
CO	1000ppm		60	1000				+/- 5.0
Hexane	2.00%						1.935	+/- 10.0

PRESSURE CHECKS							
Calibration Pressure		Instrument Pressure Channels Read					
Pressure @	Applied Pressure	Atmospheric [Ap] (mB)	tol. (mB)				
All Ports	Current Atmospheric	986	+/-2.0				
Ap Port (Internal)	+800mB(a)	799	+/-5.0				
	+1200mB(a)	1198	+/-5.0				

TEST DATE AND CONDITIONS	
Date	18/1/23
Atmospheric pressure	985mb
Ambient Temp	22.2°C
Enviroics Serial No.	2633

GAS DATA LTD	 GAS DATA LISTEN · ANALYSE · INFORM
Unit 4 Fairfield court	
Seven Stars Estate	
Coventry	
CV3 4LJ, UK	
+44 (0) 24 7630 3311	

GFM436-1 FINAL INSPECTION & CALIBRATION CHECK CERTIFICATE

FLOW CHECKS					
Calibration Flow		Instrument Flow Channels Read			
Applied Flow (l/hour)	Applied Pressure (Pa)	Flow [Flow] (l/hour)	tol. (l/hour)	Differential Pressure [Dp] (Pa)	tol. (Pa)
-30.0	-405	30.0	+/-3.0	-406	+/-50
-3.0	-17	-3.0	+/-1.0	-18	+/-6
0.0	0	0.0	0.0	0	0.0
+3.0	15	3.1	+/-0.5	16	+/-3
+30.0	321	30.1	+/-3.0	320	+/-50
+60.0	961	60.0	+/-6.0	960	+/-130
+90.0	1906	90.7	+/-9.0	1949	+/-250

TEMPERATURE CHECK		
Calibration Temperature	Instrument Temperature Channel Read	
Applied Equivalent Temperature (°C)	Temperature [Temp] (°C)	tol. (°C)
-10.0	-10.0	+/- 2.0
0.0	0.0	+/- 1.0
30.0	29.5	+/- 1.0
60.0	59.5	+/- 1.0
100.0	99.0	+/- 1.0

Notes:

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015, BS EN ISO 14001:2015 and BS EN ISO 45001:2018 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

Gas Data Ltd is certified to: BS EN ISO 9001:2015
 BS EN ISO 14001:2015
 BS EN ISO 45001:2018

TEST DATE AND CONDITIONS			
Date	30/01/2024		
Atmospheric Pressure	1010	mB	
Ambient Temperature	21.7	°C	
EnviroNics Serial No.	5089		

**GFM436 Final Inspection & Calibration
Check Certificate**

GAS DATA LTD

Unit D

Earlplace Business Park

Fletchamstead Highway

Coventry

CV4 9XL

Tel 02476303311

Fax 02476307711



GAS DATA
LISTEN • ANALYSE • INFORM

Customer	Brownfield Solutions
Certificate Number	124907
Order Number	336968

Serial Number	13233
Software Version	G436-00.0027/0010

Recalibration DUE Date
30/01/25

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	550	Accept > 200 cc/min	Pump Flow @ -200mB	350	Accept > 200 cc/min
Clock Set / Running	✓		Labels Fitted	✓	

Gas Checks						
Sensor	CH ₄		CO ₂		O ₂	
	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %
	Readings %		Readings %		Readings %	
	59.6	60	39.7	40	20.9	20.9
	Accept ±3.0		Accept ±3.0		Accept ±0.5	
	5.0	5	4.9	5	6.0	6
	Accept ±0.3		Accept ±0.3		Accept ±0.3	
Zero Reading 100% N2	0.0	0	0.0	0	0.0	0
	Accept ±0.0		Accept ±0.0		Accept ±0.1	

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings (ppm)			
Gas Type	Range (ppm)		Zero Reading		Instrument Gas Reading	
H2S	5000	1500	0	Accept ±0.0	1500	Accept ±5.0%
CO	2000	1000	0	Accept ±0.0	997	Accept ±5.0%
Hexane	2.0%	2.0%	0	Accept ±0.0	1.99	Accept ±10.0%

Cross Gas Effects									
Applied Gas (ppm)		Instrument Readings (ppm)							
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:	HEX		
H2S	1500	1500		0		0			
CO	1000	90		997		0			
Hexane	2.0%	0		0		1.99			

Pressure Checks			
Atmospheric Pressure [AP] (mB)			
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports		1010	Accept ± 2.0
AP Port (Internal)	+800 mB	800	Accept ± 5.0
	+1200mb	1200	Accept ± 5.0

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading (l/h)	Instrument Reading (l/h)		Applied Pressure (Pa)	Instrument Reading (Pa)	
-30	-30.3	Accept ± 3.0	-386	-393	Accept ± 50
-3	-3.0	Accept ± 1.0	-18	-18	Accept ± 6.0
0	0.0	Accept ± 0.0	0	0	Accept ± 0.5
3	3.0	Accept ± 0.5	15	15	Accept ± 3.0
30	30.4	Accept ± 3.0	315	321	Accept ± 50
60	60.4	Accept ± 6.0	941	952	Accept ± 130
90	91.9	Accept ± 9.0	1844	1911	Accept ± 250

Temperature Checks		
Calibration Temperature	Instrument Temperature Reading $^{\circ}\text{C}$	
Applied Temperature $^{\circ}\text{C}$		
-10	-10.0	Accept ± 2.0
0	0.0	Accept ± 1.0
30	30.0	Accept ± 1.0
60	60.0	Accept ± 1.0
100	100.0	Accept ± 1.0

Technician:
<i>Jack Rutland</i>

Date Tested:
<i>30/01/2024</i>

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

TEST DATE AND CONDITIONS			
Date	30.1.24		
Atmospheric Pressure	1010	mB	
Ambient Temperature	21.7	°C	
EnviroNics Serial No.	5089		

GAS DATA LTD Unit D Earlplace Business Park Fletchamstead Highway Coventry CV4 9XL UK +44 (0) 24 7630 3311	
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GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS			
SO Number	Instrument Type	Instrument Serial Number + SW Version	Job Number(s)
336968	GFM436	13233 9436-27/10	124907

Calibration Technician *[Signature]*

Date ...30.1.24...

Inspection Technician *[Signature]*

Date ...31-1-24...

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable (NA)		INSTRUMENT PACKING LIST		Tick if included
Function Tests	Dust Caps Fitted	P		Instrument		✓
	Keyboard Test (All Keys)	P		Leather Case		✓
	Backlight	P		Instrument Strap		✓
	Clock Set / Running	P		AC Battery Charger (UK)		✓
	Comms Test	P		AC Battery Charger (EURO)		X
	Pump Flow Test (In & Out)	D		AC Battery Charger (US)		X
	Overall Leak Test (30mB)	n/a		AC Battery Charger (AUS)		X
	Battery Charge Test	P		Gas Sample Pipe - (new issue)		✓
	Service Date set to?	30/01/25		Flow Sample Pipe - (new issue)		✓
Channel Tests	Data Logging Enabled?	P		Hard Carry Case		✓
	Verify CH4/LEL/Hexane/PID	P		Spares Pot		X
	Verify CO2	P		Allen Key		X
	Verify O2	P		Temperature Probe		X
	Verify H2S	P		Vane Anemometer		X
	Verify CO	P		USB Cable		✓
	Verify LEL	P		USB Memory stick		✓
	Verify 1 st Option Gas	N/A		SM V5 Software	Ver 6.05	✓
	Verify Atmospheric pressure	P		Internal Filter Pack	Qty	X
	Verify differential pressure	P		External Filter Pack	Qty	X
	Verify flow	P		Field Guide		X
	Verify temperature probe input	P		Extra Items: USED SAMPLE/FLOW TUBES. PIECE OF PAPER		
	Verify vane anemometer input	P				
DataBase Checks	Jobcard(s) completed and signed	P		Comments:		
	Jobcard(s) booked off database	P				
	Calibration certificate completed	P				
	Complete & print QI record	n/a				
Label Checks	No. of Calibration label fitted	GDC	13229			
	MCERTS label displayed	P				
	Warranty label fitted	P				
H2S Range	H2S Range from Sales Order	5000	ppm			
	H2S Range from Cal Cert	5000	ppm			
	Over-range value correct?	P				

CERTIFICATION OF CALIBRATION



Date Of Calibration: 17-Aug-2023

Certificate Number: G502031_2/33401

Issued by: QED Environmental Systems Ltd.

Customer: Brownfield Solutions Ltd
William Smith House 173-183 Witton Street Northwich
Cheshire CW9 5LP UNITED KINGDOM

Description: Gas Analyser

Model: GA5000

Serial Number: G502031

UKAS Accredited results:

Results after adjustment :

Methane (CH ₄)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
5.0	5.0	0.072
15.0	15.0	0.13
60.0	59.6	0.42

Carbon Dioxide (CO ₂)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
5.0	4.8	0.074
15.0	14.6	0.13
40.0	39.9	0.29

Oxygen (O ₂)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
20.2	20.3	0.25

The inwards assessment was carried out 10-Aug-2023.

The maximum adjustment is larger than the specification limit.

Inwards assessment data is available if requested.

All concentrations are molar.

CH₄, CO₂ readings recorded at : 33.2 °C ± 2.5 °C

O₂ readings recorded at : 23.0 °C ± 2.5 °C

Barometric Pressure : 1011 mbar ± 4 mbar

Method of Test : The analyser is calibrated in a temperature controlled chamber using a series of reference gases, in compliance with procedure LP004.

Instrument has passed calibration as the measurement result is within the specification limit. The specification limit takes into account the measurement uncertainty.

The results relate only to the item calibrated

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance:117 IGC Instance:117

Page 1 of 2 | LP015GIUKAS-2.5

www.qedenv.com +44 (0) 333 800 0088 sales@qedenv.co.uk

QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

CERTIFICATION OF CALIBRATION



Date Of Calibration: 17-Aug-2023

Certificate Number: G502031_2/33401

Issued by: QED Environmental Systems Ltd.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Calibrations marked 'Non-UKAS Accredited results' on this certificate have been included for completeness.

Non-UKAS accredited results after adjustment:

Barometer (mbar)	
Reference	Instrument Reading
1011	1012

Additional Gas Cells		
Gas	Certified Gas (ppm)	Instrument Reading (ppm)
H ₂ S	273.5	274

Internal Flow	
Applied (l/hr)	Instrument Reading (l/hr)
5.0	5.2
10.0	10.3

Date of Issue : 21-Aug-2023

Approved by Signatory

Fani Zolota

Laboratory Inspection

End of Certificate

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance:117 IGC Instance:117

Page 2 of 2 | LP015GIUKAS-2.5

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QED Environmental Systems Ltd. Cyan Park- Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

Instrument Service Report

Unit Type: GA5000	Part Number: GA5K00C0-311	Date: 21-Aug-2023	Next Service Due: 17-Feb-2024	Customer Name: Brownfield Solutions Ltd
Serial Number: G502031				
Actions/Investigation Description		Result	Comments	
Serial Number Check		Yes		
Battery Requires Replacing		Yes	Battery replaced	
Internal Flow Calibrated		Yes		
Full Automatic Calibration		Pass		
Serial Comms Test (USB)		Pass		
Service history of instrument reviewed		Yes		
Inwards gas check data reviewed		Yes		
Instrument turns on		Pass		
Backlight operates correctly		Yes		
External visual inspection performed		Pass		
Internal visual inspection performed		Pass		
All screws tightened to correct torque		Yes		
All connectors are secure		Pass		
Check diagnostic channels		Pass		
Case compression test		Pass		
Impact and stability test		Pass		
Pressure transducer test(s) as per user operation		Pass		

Instrument Service Report

Unit Type: GA5000	Part Number: GA5K00C0-311	Date: 21-Aug-2023	Next Service Due: 17-Feb-2024	Customer Name: Brownfield Solutions Ltd
Serial Number: G502031				
Actions/Investigation Description		Result	Comments	
Final visual inspection on instrument		Pass		
Case assembly closed and screws tightened to correct torque		Yes		
PTFE filters replaced		Yes	Filters replaced	
Pump flow greater than 550 ml/min		Pass		
Automated instrument pressure system test (leak test)		Pass		
Pump vacuum greater than -400 mb and flow fails		Pass		
GPS function test		Pass		
Temperature probe tested		Pass		
Anemometer tested		Pass		
Chemical gas sensors calibrated – refer to Calibration Certificate		Retest Passed		
Check main PCB and sensor PCB have the latest software		Yes		
Transducers calibrated		Pass		
As Received Chemical Cell Gas Assessment Performed (CAL16)		Yes		
As Received Gas Assessment Performed (CAL01 or CAL02)		Yes		
Chemical sensor(s) replacement over 2yrs UK and 21mths overseas.		Yes	H2S cell replaced	
O2 sensor replacement over 3yrs UK, 33mths overseas		NA		

Instrument Service Report

Unit Type: GA5000	Part Number: GA5K00C0-311	Date: 21-Aug-2023	Next Service Due: 17-Feb-2024	Customer Name: Brownfield Solutions Ltd
Serial Number: G502031				
Actions/Investigation Description		Result	Comments	
Verification of Instrument		Pass		
Customer Comments				
Overdue calibration				
Accessory Test		Result	Comments	
Charger		Pass	5K Charger Voltage test box indicates charger voltage and current output are in spec.	

General Comments/Feedback

Thank you for returning your gas analyser to the QED Service Centre for full service and calibration. We are pleased to inform you that the analyser was received and fully assessed by one of our experienced Service Engineers and no significant faults or issues were observed during the assessment. Our extensive service was carried out, and any necessary components replaced. The analyser has successfully passed all of our rigorous testing and quality checks and has been calibrated using our bespoke, state of the art calibration facility. For further information about how to get the best use from your instrument please visit our YouTube channel <http://www.youtube.com/GeotechTV> and on our Website <https://qedenv.com>

The H2S electrochemical sensor has been replaced due to it being over 2 years old in accordance with the manufacturer's recommendations, and also as a proactive measure based on our experience of the typical lifetime of this type of sensor.

If you require any further assistance with your instrument please email our Technical Support Team at technical@qedenv.co.uk or call us on +44 (0) 333 800 0088 (Monday to Thursday 08.30 - 17.00 & Friday 08.30 - 15.30) UK time zone.

Service Details: Service Scheme	☒	Service Engineer: Michael Price	Calibration Engineer: Suk Bailey	Approved By: FZolota	Signature:
Standard Service	☐				

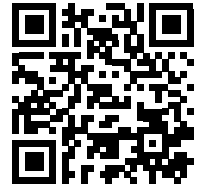
APPENDIX F

Waste Assessment Report

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)



GQPNO-X0ID5-FE5I6

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

Job name

C5515 Victoria Point

Description/Comments

Project

C5515

Site

Victoria Point

Classified by

Name:

Jack Mather

Date:

04 Jan 2024 14:44 GMT

Telephone:

01606334844

Company:

Brownfield Solutions Limited**173-183 Witton Street****Northwich****CW9 5LP**

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:**CERTIFIED****Course****Hazardous Waste Classification****Date****09 Feb 2023**

Next 3 year Refresher due by Feb 2026

Purpose of classification

2 - Material Characterisation

Address of the waste

Hathersage Road, Manchester

Post Code M13 0FT

SIC for the process giving rise to the waste

Description of industry/producer giving rise to the waste

The redevelopment of existing residential blocks.

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

Waste created during the excavations of soils.

Description of the waste

Made ground comprising of light brown sandy gravelly clay with fragments of brick, coal and sandstone.



Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	WS01	0.58-0.80	Non Hazardous		3
2	WS04	0.00-0.45	Non Hazardous		5
3	WS04[2]	0.45-1.00	Non Hazardous		7
4	WS05	0.20-2.80	Non Hazardous		9
5	WS02	0.15-1.00	Non Hazardous		11
6	WS03	0.00-0.30	Non Hazardous		13
7	SA02	0.40-1.40	Non Hazardous		15
8	WS01[2]	0.80-1.00	Non Hazardous		17
9	SA01	0.30-1.00	Non Hazardous		19
10	WS01[3]	0.28-0.58	Non Hazardous		21
11	WS06	0.30-4.15	Unknown. Chemistry data not provided.		23
12	SA03	0.70-1.50	Unknown. Chemistry data not provided.		24

Related documents

#	Name	Description
1	BSL Suite	waste stream template used to create this Job

Report

Created by: Jack Mather

Created date: 04 Jan 2024 14:44 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	26

Classification of sample: WS01

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

Sample details

Sample name:	LoW Code:	
WS01	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)
0.58-0.80 m		
Moisture content:		
13%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 13% Wet Weight 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	pH				8.7 pH		8.7	pH	8.7 pH		
2	arsenic { arsenic trioxide }				12 mg/kg	1.32	13.784	mg/kg	0.00138 %	✓	
	033-003-00-0	215-481-4	1327-53-3								
3	cadmium { cadmium sulfide }			1	0.8 mg/kg	1.285	0.895	mg/kg	0.0000696 %	✓	
	048-010-00-4	215-147-8	1306-23-6								
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				15 mg/kg	1.462	19.073	mg/kg	0.00191 %	✓	
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				50 mg/kg	1.126	48.976	mg/kg	0.0049 %	✓	
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	140 mg/kg		121.8	mg/kg	0.0122 %	✓	
	082-001-00-6										
8	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								
9	nickel { nickel dihydroxide }				15 mg/kg	1.579	20.612	mg/kg	0.00206 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
10	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8										
11	zinc { zinc sulphate }				110 mg/kg	2.469	236.312	mg/kg	0.0236 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
12	naphthalene				1.8 mg/kg		1.566	mg/kg	0.000157 %	✓	
	601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				4.1 mg/kg		3.567	mg/kg	0.000357 %	✓	
		205-917-1	208-96-8								
14	acenaphthene				5.7 mg/kg		4.959	mg/kg	0.000496 %	✓	
		201-469-6	83-32-9								

#		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							
15	fluorene	201-695-5	86-73-7		7.2 mg/kg		6.264 mg/kg	0.000626 %	✓		
16	phenanthrene	201-581-5	85-01-8		64 mg/kg		55.68 mg/kg	0.00557 %	✓		
17	anthracene	204-371-1	120-12-7		16 mg/kg		13.92 mg/kg	0.00139 %	✓		
18	fluoranthene	205-912-4	206-44-0		100 mg/kg		87 mg/kg	0.0087 %	✓		
19	pyrene	204-927-3	129-00-0		98 mg/kg		85.26 mg/kg	0.00853 %	✓		
20	benzo[a]anthracene	601-033-00-9	200-280-6		48 mg/kg		41.76 mg/kg	0.00418 %	✓		
21	chrysene	601-048-00-0	205-923-4		51 mg/kg		44.37 mg/kg	0.00444 %	✓		
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		46 mg/kg		40.02 mg/kg	0.004 %	✓		
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		21 mg/kg		18.27 mg/kg	0.00183 %	✓		
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		39 mg/kg		33.93 mg/kg	0.00339 %	✓		
25	indeno[123-cd]pyrene	205-893-2	193-39-5		17 mg/kg		14.79 mg/kg	0.00148 %	✓		
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		5.3 mg/kg		4.611 mg/kg	0.000461 %	✓		
27	benzo[ghi]perylene	205-883-8	191-24-2		19 mg/kg		16.53 mg/kg	0.00165 %	✓		
28	TPH (C6 to C40) petroleum group		TPH		555 mg/kg		482.85 mg/kg	0.0483 %	✓		
29	benzene	601-020-00-8	200-753-7		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD	
30	toluene	601-021-00-3	203-625-9		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD	
31	ethylbenzene	601-023-00-4	202-849-4		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD	
32	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD	
Total:									0.142 %		

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 Concentration too low to be considered flammable. Low concentrations of short chain hydrocarbons. Discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0483%)

Classification of sample: WS04

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

Sample details

Sample name:	LoW Code:	
WS04	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)
0.00-0.45 m		
Moisture content:		
19%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 19% Wet Weight 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	pH				8.2 pH		8.2	pH	8.2 pH		
2	arsenic { arsenic trioxide }				14 mg/kg	1.32	14.972	mg/kg	0.0015 %	✓	
	033-003-00-0	215-481-4	1327-53-3								
3	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								
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				17 mg/kg	1.462	20.126	mg/kg	0.00201 %	✓	
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				45 mg/kg	1.126	41.039	mg/kg	0.0041 %	✓	
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	100 mg/kg		81	mg/kg	0.0081 %	✓	
	082-001-00-6										
8	mercury { mercury dichloride }				0.3 mg/kg	1.353	0.329	mg/kg	0.0000329 %	✓	
	080-010-00-X	231-299-8	7487-94-7								
9	nickel { nickel dihydroxide }				16 mg/kg	1.579	20.47	mg/kg	0.00205 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
10	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8										
11	zinc { zinc sulphate }				85 mg/kg	2.469	170.011	mg/kg	0.017 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
12	naphthalene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				0.06 mg/kg		0.0486	mg/kg	0.00000486 %	✓	
		205-917-1	208-96-8								
14	acenaphthene				0.14 mg/kg		0.113	mg/kg	0.0000113 %	✓	
		201-469-6	83-32-9								

#	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							
15	fluorene	201-695-5	86-73-7		0.09 mg/kg		0.0729 mg/kg	0.00000729 %	✓	
16	phenanthrene	201-581-5	85-01-8		0.93 mg/kg		0.753 mg/kg	0.0000753 %	✓	
17	anthracene	204-371-1	120-12-7		0.23 mg/kg		0.186 mg/kg	0.0000186 %	✓	
18	fluoranthene	205-912-4	206-44-0		1.9 mg/kg		1.539 mg/kg	0.000154 %	✓	
19	pyrene	204-927-3	129-00-0		1.8 mg/kg		1.458 mg/kg	0.000146 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	0.94 mg/kg		0.761 mg/kg	0.0000761 %	✓	
21	chrysene	601-048-00-0	205-923-4	218-01-9	1 mg/kg		0.81 mg/kg	0.000081 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	1.2 mg/kg		0.972 mg/kg	0.0000972 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	0.42 mg/kg		0.34 mg/kg	0.000034 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	0.92 mg/kg		0.745 mg/kg	0.0000745 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		0.52 mg/kg		0.421 mg/kg	0.0000421 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	0.15 mg/kg		0.122 mg/kg	0.0000121 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		0.58 mg/kg		0.47 mg/kg	0.000047 %	✓	
28	benzene	601-020-00-8	200-753-7	71-43-2	<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
29	toluene	601-021-00-3	203-625-9	108-88-3	<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
30	ethylbenzene	601-023-00-4	202-849-4	100-41-4	<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
31	xylene	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]	<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
Total:								0.0361 %		

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: WS04[2]

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

Sample details

Sample name:	LoW Code:
WS04[2]	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.45-1.00 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
9.1%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 9.1% Wet Weight 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	pH				8.7 pH		8.7	pH	8.7 pH		
2	arsenic { arsenic trioxide }				7.1 mg/kg	1.32	8.521	mg/kg	0.000852 %	✓	
	033-003-00-0	215-481-4	1327-53-3								
3	cadmium { cadmium sulfide }			1	0.4 mg/kg	1.285	0.467	mg/kg	0.0000364 %	✓	
	048-010-00-4	215-147-8	1306-23-6								
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				15 mg/kg	1.462	19.928	mg/kg	0.00199 %	✓	
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				20 mg/kg	1.126	20.469	mg/kg	0.00205 %	✓	
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	32 mg/kg		29.088	mg/kg	0.00291 %	✓	
	082-001-00-6										
8	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								
9	nickel { nickel dihydroxide }				17 mg/kg	1.579	24.408	mg/kg	0.00244 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
10	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8										
11	zinc { zinc sulphate }				48 mg/kg	2.469	107.74	mg/kg	0.0108 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
12	naphthalene				0.83 mg/kg		0.754	mg/kg	0.0000754 %	✓	
	601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				0.12 mg/kg		0.109	mg/kg	0.0000109 %	✓	
		205-917-1	208-96-8								
14	acenaphthene				0.15 mg/kg		0.136	mg/kg	0.0000136 %	✓	
		201-469-6	83-32-9								

#	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							
15	fluorene	201-695-5	86-73-7		0.14 mg/kg		0.127 mg/kg	0.0000127 %	✓	
16	phenanthrene	201-581-5	85-01-8		1.1 mg/kg		1.0 mg/kg	0.0001 %	✓	
17	anthracene	204-371-1	120-12-7		0.3 mg/kg		0.273 mg/kg	0.0000273 %	✓	
18	fluoranthene	205-912-4	206-44-0		2.3 mg/kg		2.091 mg/kg	0.000209 %	✓	
19	pyrene	204-927-3	129-00-0		2.3 mg/kg		2.091 mg/kg	0.000209 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		1.1 mg/kg		1.0 mg/kg	0.0001 %	✓	
21	chrysene	601-048-00-0	205-923-4		1.2 mg/kg		1.091 mg/kg	0.000109 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		1.3 mg/kg		1.182 mg/kg	0.000118 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.57 mg/kg		0.518 mg/kg	0.0000518 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		1.1 mg/kg		1.0 mg/kg	0.0001 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		0.63 mg/kg		0.573 mg/kg	0.0000573 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.14 mg/kg		0.127 mg/kg	0.0000127 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		0.63 mg/kg		0.573 mg/kg	0.0000573 %	✓	
28	TPH (C6 to C40) petroleum group		TPH		21 mg/kg		19.089 mg/kg	0.00191 %	✓	
29	benzene	601-020-00-8	200-753-7		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
30	toluene	601-021-00-3	203-625-9		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
31	ethylbenzene	601-023-00-4	202-849-4		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
32	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
Total:								0.0246 %		

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 Concentration too low to be considered flammable. Low concentrations of short chain hydrocarbons. Discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00191%)

Classification of sample: WS05

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

Sample details

Sample name:	LoW Code:	
WS05	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)
0.20-2.80 m		
Moisture content:		
16%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 16% Wet Weight 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	pH				8.8 pH		8.8	pH	8.8 pH		
2	arsenic { arsenic trioxide }				9.1 mg/kg	1.32	10.093	mg/kg	0.00101 %	✓	
	033-003-00-0	215-481-4	1327-53-3								
3	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								
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				29 mg/kg	1.462	35.603	mg/kg	0.00356 %	✓	
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				25 mg/kg	1.126	23.644	mg/kg	0.00236 %	✓	
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	20 mg/kg		16.8	mg/kg	0.00168 %	✓	
	082-001-00-6										
8	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								
9	nickel { nickel dihydroxide }				39 mg/kg	1.579	51.744	mg/kg	0.00517 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
10	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8										
11	zinc { zinc sulphate }				60 mg/kg	2.469	124.453	mg/kg	0.0124 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
12	naphthalene				0.98 mg/kg		0.823	mg/kg	0.0000823 %	✓	
	601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				0.06 mg/kg		0.0504	mg/kg	0.00000504 %	✓	
		205-917-1	208-96-8								
14	acenaphthene				0.09 mg/kg		0.0756	mg/kg	0.00000756 %	✓	
		201-469-6	83-32-9								

#	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							
15	fluorene	201-695-5	86-73-7		0.09 mg/kg		0.0756 mg/kg	0.00000756 %	✓	
16	phenanthrene	201-581-5	85-01-8		0.51 mg/kg		0.428 mg/kg	0.0000428 %	✓	
17	anthracene	204-371-1	120-12-7		0.13 mg/kg		0.109 mg/kg	0.0000109 %	✓	
18	fluoranthene	205-912-4	206-44-0		0.81 mg/kg		0.68 mg/kg	0.000068 %	✓	
19	pyrene	204-927-3	129-00-0		0.79 mg/kg		0.664 mg/kg	0.0000664 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		0.4 mg/kg		0.336 mg/kg	0.0000336 %	✓	
21	chrysene	601-048-00-0	205-923-4		0.41 mg/kg		0.344 mg/kg	0.0000344 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.43 mg/kg		0.361 mg/kg	0.0000361 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.21 mg/kg		0.176 mg/kg	0.0000176 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.36 mg/kg		0.302 mg/kg	0.0000302 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		0.19 mg/kg		0.16 mg/kg	0.000016 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
27	benzo[ghi]perylene	205-883-8	191-24-2		0.23 mg/kg		0.193 mg/kg	0.0000193 %	✓	
Total:								0.0271 %		

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: WS02

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

Sample details

Sample name:	LoW Code:	
WS02	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)
0.15-1.00 m		
Moisture content:		
2%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 2% Wet Weight 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	pH				11.1 pH		11.1	pH	11.1 pH		
2	arsenic { arsenic trioxide }				1.4 mg/kg	1.32	1.811	mg/kg	0.000181 %	✓	
	033-003-00-0	215-481-4	1327-53-3								
3	cadmium { cadmium sulfide }			1	0.6 mg/kg	1.285	0.756	mg/kg	0.0000588 %	✓	
	048-010-00-4	215-147-8	1306-23-6								
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				5.7 mg/kg	1.462	8.164	mg/kg	0.000816 %	✓	
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				3.8 mg/kg	1.126	4.193	mg/kg	0.000419 %	✓	
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	12 mg/kg		11.76	mg/kg	0.00118 %	✓	
	082-001-00-6										
8	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								
9	nickel { nickel dihydroxide }				4 mg/kg	1.579	6.192	mg/kg	0.000619 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
10	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8										
11	zinc { zinc sulphate }				16 mg/kg	2.469	38.719	mg/kg	0.00387 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
12	naphthalene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8								
14	acenaphthene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9								

#	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							
15	fluorene	201-695-5	86-73-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
16	phenanthrene	201-581-5	85-01-8		0.16 mg/kg		0.157 mg/kg	0.0000157 %	✓	
17	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
18	fluoranthene	205-912-4	206-44-0		0.23 mg/kg		0.225 mg/kg	0.0000225 %	✓	
19	pyrene	204-927-3	129-00-0		0.28 mg/kg		0.274 mg/kg	0.0000274 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		0.17 mg/kg		0.167 mg/kg	0.0000167 %	✓	
21	chrysene	601-048-00-0	205-923-4		0.36 mg/kg		0.353 mg/kg	0.0000353 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.2 mg/kg		0.196 mg/kg	0.0000196 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.11 mg/kg		0.108 mg/kg	0.0000108 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.15 mg/kg		0.147 mg/kg	0.0000147 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
27	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
Total:								0.00776 %		

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: WS03

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

Sample details

Sample name:	LoW Code:	
WS03	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)
0.00-0.30 m		
Moisture content:		
21%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 21% Wet Weight 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	pH				8.5 pH		8.5	pH	8.5 pH		
2	arsenic { arsenic trioxide }				16 mg/kg	1.32	16.689	mg/kg	0.00167 %	✓	
	033-003-00-0	215-481-4	1327-53-3								
3	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								
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				17 mg/kg	1.462	19.629	mg/kg	0.00196 %	✓	
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				50 mg/kg	1.126	44.473	mg/kg	0.00445 %	✓	
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	110 mg/kg		86.9	mg/kg	0.00869 %	✓	
	082-001-00-6										
8	mercury { mercury dichloride }				0.4 mg/kg	1.353	0.428	mg/kg	0.0000428 %	✓	
	080-010-00-X	231-299-8	7487-94-7								
9	nickel { nickel dihydroxide }				17 mg/kg	1.579	21.213	mg/kg	0.00212 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
10	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8										
11	zinc { zinc sulphate }				92 mg/kg	2.469	179.468	mg/kg	0.0179 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
12	naphthalene				0.48 mg/kg		0.379	mg/kg	0.0000379 %	✓	
	601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				0.07 mg/kg		0.0553	mg/kg	0.00000553 %	✓	
		205-917-1	208-96-8								
14	acenaphthene				0.18 mg/kg		0.142	mg/kg	0.0000142 %	✓	
		201-469-6	83-32-9								

#	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							
15	fluorene	201-695-5	86-73-7		0.12 mg/kg		0.0948 mg/kg	0.00000948 %	✓	
16	phenanthrene	201-581-5	85-01-8		1.2 mg/kg		0.948 mg/kg	0.0000948 %	✓	
17	anthracene	204-371-1	120-12-7		0.27 mg/kg		0.213 mg/kg	0.0000213 %	✓	
18	fluoranthene	205-912-4	206-44-0		2.3 mg/kg		1.817 mg/kg	0.000182 %	✓	
19	pyrene	204-927-3	129-00-0		2.3 mg/kg		1.817 mg/kg	0.000182 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		1.2 mg/kg		0.948 mg/kg	0.0000948 %	✓	
21	chrysene	601-048-00-0	205-923-4		1.2 mg/kg		0.948 mg/kg	0.0000948 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		1.4 mg/kg		1.106 mg/kg	0.000111 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.56 mg/kg		0.442 mg/kg	0.0000442 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		1.2 mg/kg		0.948 mg/kg	0.0000948 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		0.58 mg/kg		0.458 mg/kg	0.0000458 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.17 mg/kg		0.134 mg/kg	0.0000134 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		0.72 mg/kg		0.569 mg/kg	0.0000569 %	✓	
Total:								0.0384 %		

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: SA02


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

Sample details

Sample name:	LoW Code:	
SA02	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)
0.40-1.40 m		
Moisture content:		
16%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 16% Wet Weight 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	pH				10.1	pH		10.1	pH	10.1 pH		
2	arsenic { arsenic trioxide }				26	mg/kg	1.32	28.836	mg/kg	0.00288 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
3	cadmium { cadmium sulfide }			1	1	mg/kg	1.285	1.08	mg/kg	0.000084 %	✓	
	048-010-00-4	215-147-8	1306-23-6									
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				20	mg/kg	1.462	24.554	mg/kg	0.00246 %	✓	
		215-160-9	1308-38-9									
6	copper { dicopper oxide; copper (I) oxide }				130	mg/kg	1.126	122.947	mg/kg	0.0123 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	310	mg/kg		260.4	mg/kg	0.026 %	✓	
	082-001-00-6											
8	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									
9	nickel { nickel dihydroxide }				37	mg/kg	1.579	49.091	mg/kg	0.00491 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
10	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8											
11	zinc { zinc sulphate }				160	mg/kg	2.469	331.873	mg/kg	0.0332 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
12	naphthalene				1.4	mg/kg		1.176	mg/kg	0.000118 %	✓	
	601-052-00-2	202-049-5	91-20-3									
13	acenaphthylene				0.3	mg/kg		0.252	mg/kg	0.0000252 %	✓	
		205-917-1	208-96-8									
14	acenaphthene				2.3	mg/kg		1.932	mg/kg	0.000193 %	✓	
		201-469-6	83-32-9									

#	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							
15	fluorene	201-695-5	86-73-7		1.8 mg/kg		1.512 mg/kg	0.000151 %	✓	
16	phenanthrene	201-581-5	85-01-8		17 mg/kg		14.28 mg/kg	0.00143 %	✓	
17	anthracene	204-371-1	120-12-7		5.4 mg/kg		4.536 mg/kg	0.000454 %	✓	
18	fluoranthene	205-912-4	206-44-0		29 mg/kg		24.36 mg/kg	0.00244 %	✓	
19	pyrene	204-927-3	129-00-0		31 mg/kg		26.04 mg/kg	0.0026 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		15 mg/kg		12.6 mg/kg	0.00126 %	✓	
21	chrysene	601-048-00-0	205-923-4		16 mg/kg		13.44 mg/kg	0.00134 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		17 mg/kg		14.28 mg/kg	0.00143 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		7.3 mg/kg		6.132 mg/kg	0.000613 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		16 mg/kg		13.44 mg/kg	0.00134 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		6.5 mg/kg		5.46 mg/kg	0.000546 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		1.5 mg/kg		1.26 mg/kg	0.000126 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		7.5 mg/kg		6.3 mg/kg	0.00063 %	✓	
28	asbestos	650-013-00-6	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		70 mg/kg		58.8 mg/kg	0.00588 %	✓	
Total:								0.103 %		

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: WS01[2]

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

Sample details

Sample name:	LoW Code:	
WS01[2]	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)
0.80-1.00 m		
Moisture content:		
13%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 13% Wet Weight 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	pH				8.8 pH		8.8	pH	8.8 pH		
2	arsenic { arsenic trioxide }				9.1 mg/kg	1.32	10.453	mg/kg	0.00105 %	✓	
	033-003-00-0	215-481-4	1327-53-3								
3	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								
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				30 mg/kg	1.462	38.147	mg/kg	0.00381 %	✓	
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				24 mg/kg	1.126	23.509	mg/kg	0.00235 %	✓	
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	13 mg/kg		11.31	mg/kg	0.00113 %	✓	
	082-001-00-6										
8	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								
9	nickel { nickel dihydroxide }				36 mg/kg	1.579	49.47	mg/kg	0.00495 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
10	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8										
11	zinc { zinc sulphate }				60 mg/kg	2.469	128.897	mg/kg	0.0129 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
12	naphthalene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8								
14	acenaphthene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9								

#	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							
15	fluorene	201-695-5	86-73-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
16	phenanthrene	201-581-5	85-01-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
17	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
18	fluoranthene	205-912-4	206-44-0		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
19	pyrene	204-927-3	129-00-0		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
20	benzo[a]anthracene	601-033-00-9	200-280-6		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
21	chrysene	601-048-00-0	205-923-4		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
25	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
27	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
Total:								0.0267 %		

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: SA01


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

Sample details

Sample name:	LoW Code:
SA01	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.30-1.00 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
10%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 10% Wet Weight 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	pH				9.4	pH		9.4	pH	9.4 pH		
2	arsenic { arsenic trioxide }				6.8	mg/kg	1.32	8.08	mg/kg	0.000808 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
3	cadmium { cadmium sulfide }			1	0.4	mg/kg	1.285	0.463	mg/kg	0.000036 %	✓	
	048-010-00-4	215-147-8	1306-23-6									
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				9.9	mg/kg	1.462	13.022	mg/kg	0.0013 %	✓	
		215-160-9	1308-38-9									
6	copper { dicopper oxide; copper (I) oxide }				18	mg/kg	1.126	18.239	mg/kg	0.00182 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	45	mg/kg		40.5	mg/kg	0.00405 %	✓	
	082-001-00-6											
8	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									
9	nickel { nickel dihydroxide }				11	mg/kg	1.579	15.637	mg/kg	0.00156 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
10	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8											
11	zinc { zinc sulphate }				51	mg/kg	2.469	113.341	mg/kg	0.0113 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
12	naphthalene				0.98	mg/kg		0.882	mg/kg	0.0000882 %	✓	
	601-052-00-2	202-049-5	91-20-3									
13	acenaphthylene				0.14	mg/kg		0.126	mg/kg	0.0000126 %	✓	
		205-917-1	208-96-8									
14	acenaphthene				0.31	mg/kg		0.279	mg/kg	0.0000279 %	✓	
		201-469-6	83-32-9									

#	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							
15	fluorene	201-695-5	86-73-7		0.36 mg/kg		0.324 mg/kg	0.0000324 %	✓	
16	phenanthrene	201-581-5	85-01-8		2.8 mg/kg		2.52 mg/kg	0.000252 %	✓	
17	anthracene	204-371-1	120-12-7		0.74 mg/kg		0.666 mg/kg	0.0000666 %	✓	
18	fluoranthene	205-912-4	206-44-0		3.9 mg/kg		3.51 mg/kg	0.000351 %	✓	
19	pyrene	204-927-3	129-00-0		4 mg/kg		3.6 mg/kg	0.00036 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		1.9 mg/kg		1.71 mg/kg	0.000171 %	✓	
21	chrysene	601-048-00-0	205-923-4		2.3 mg/kg		2.07 mg/kg	0.000207 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		2.2 mg/kg		1.98 mg/kg	0.000198 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.94 mg/kg		0.846 mg/kg	0.0000846 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		1.9 mg/kg		1.71 mg/kg	0.000171 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		0.72 mg/kg		0.648 mg/kg	0.0000648 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.24 mg/kg		0.216 mg/kg	0.0000216 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		0.89 mg/kg		0.801 mg/kg	0.0000801 %	✓	
Total:								0.0235 %		

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: WS01[3]

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

Sample details

Sample name:	LoW Code:
WS01[3]	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.28-0.58 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
3.2%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 3.2% Wet Weight 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	pH				9.4 pH		9.4	pH	9.4 pH		
2	arsenic { arsenic trioxide }				2.5 mg/kg	1.32	3.195	mg/kg	0.00032 %	✓	
	033-003-00-0	215-481-4	1327-53-3								
3	cadmium { cadmium sulfide }			1	0.8 mg/kg	1.285	0.995	mg/kg	0.0000774 %	✓	
	048-010-00-4	215-147-8	1306-23-6								
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				7.5 mg/kg	1.462	10.611	mg/kg	0.00106 %	✓	
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				8.6 mg/kg	1.126	9.373	mg/kg	0.000937 %	✓	
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	18 mg/kg		17.424	mg/kg	0.00174 %	✓	
	082-001-00-6										
8	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								
9	nickel { nickel dihydroxide }				9.3 mg/kg	1.579	14.219	mg/kg	0.00142 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
10	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8										
11	zinc { zinc sulphate }				26 mg/kg	2.469	62.147	mg/kg	0.00621 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
12	naphthalene				0.32 mg/kg		0.31	mg/kg	0.000031 %	✓	
	601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				0.05 mg/kg		0.0484	mg/kg	0.00000484 %	✓	
		205-917-1	208-96-8								
14	acenaphthene				0.3 mg/kg		0.29	mg/kg	0.000029 %	✓	
		201-469-6	83-32-9								

#	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							
15	fluorene	201-695-5	86-73-7		0.22 mg/kg		0.213 mg/kg	0.0000213 %	✓	
16	phenanthrene	201-581-5	85-01-8		1.3 mg/kg		1.258 mg/kg	0.000126 %	✓	
17	anthracene	204-371-1	120-12-7		0.45 mg/kg		0.436 mg/kg	0.0000436 %	✓	
18	fluoranthene	205-912-4	206-44-0		3.1 mg/kg		3.001 mg/kg	0.0003 %	✓	
19	pyrene	204-927-3	129-00-0		3 mg/kg		2.904 mg/kg	0.00029 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		1.5 mg/kg		1.452 mg/kg	0.000145 %	✓	
21	chrysene	601-048-00-0	205-923-4		2.3 mg/kg		2.226 mg/kg	0.000223 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		2 mg/kg		1.936 mg/kg	0.000194 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.68 mg/kg		0.658 mg/kg	0.0000658 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		1.5 mg/kg		1.452 mg/kg	0.000145 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		0.62 mg/kg		0.6 mg/kg	0.00006 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
27	benzo[ghi]perylene	205-883-8	191-24-2		0.83 mg/kg		0.803 mg/kg	0.0000803 %	✓	
Total:								0.014 %		

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: WS06

Unknown. Chemistry data not provided.

 Classified as **17 05 04** or **17 05 03 ***
 in the List of Waste

Sample details

Sample name:	LoW Code:	
WS06	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)
0.30-4.15 m		
Moisture content:		
16%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 16% Wet Weight 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							
Total:								0%			

Key

User supplied data

Classification of sample: SA03

Unknown. Chemistry data not provided.

 Classified as **17 05 04** or **17 05 03 ***
 in the List of Waste

Sample details

Sample name:	LoW Code:	
SA03	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)
0.70-1.50 m		
Moisture content:		
11%		
(wet weight correction)		

Hazard properties

None identified

Determinands

Moisture content: 11% Wet Weight 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							
Total:							0%			

Key

User supplied data

Appendix A: Classifier defined and non GB MCL determinands

• pH (CAS Number: PH)

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

• 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

GB MCL index number: 082-001-00-6
Description/Comments: Least-worst case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following MCL protocols, considers many simple lead compounds to be Carcinogenic category 2
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 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html. Review date 29/09/2015

• 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

• 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

• 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

• 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

• 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

• 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

• 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

■ **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

■ **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

■ **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

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case species based on hazard statements

cadmium {cadmium sulfide}

Worst case species based on hazard statements

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case species based on hazard statements

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

Worst case species based on hazard statements

copper {dicopper oxide; copper (I) oxide}

Most likely common species

lead {lead compounds with the exception of those specified elsewhere in this Annex}

Absence of hexavalent chromium indicates it unlikely that lead chromate is present within the site soils.

mercury {mercury dichloride}

Worst case species based on hazard statements

nickel {nickel dihydroxide}

Worst case species based on hazard statements

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

Worst case species based on hazard statements

zinc {zinc sulphate}

Absence of hexavalent chromium indicates it unlikely that zinc chromate is present within the site soils.

Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.2.GB - Oct 2021**
HazWasteOnline Classification Engine Version: 2023.356.5870.10868 (22 Dec 2023)
HazWasteOnline Database: 2023.356.5870.10868 (22 Dec 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

GB MCL List v2.0 - version 2.0 of 20th October 2023

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