Phase II Interpretative Ground Assessment

At

Grey Mare Lane
Manchester

Client: Great Places

Reference: 34338-SUT-ZZ-00-RP-G-7201

Date: January 2025

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Phase II Interpretative Ground Assessment

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Foreword (Geotechnical and Environmental Assessment)

This report has been prepared for the sole internal use and reliance of the Client named on page 1. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Sutcliffe Investigation; such authorisation not to be unreasonably withheld. If any unauthorised third party comes into possession of this report, they rely on it at their risk and the authors owe them no duty of care and skill.

The report presents observations and factual data obtained during our site investigation and provides an assessment of Geotechnical and environmental issues with respect to information provided by the Client regarding the proposed development. Further advice should be sought from Sutcliffe Investigation prior to significant revision of the development proposals. Primary aims of this exploratory phase of investigation were to identify salient geotechnical and environmental issues affecting the site to enable the client to obtain budget costs for the necessary site preparatory and remedial works.

The report should be read in its entirety, including all associated drawings and appendices. Sutcliffe Investigation cannot be held responsible for any misinterpretations arising from the use of extracts that are taken out of context.

The findings and opinions conveyed in this report (including review of any third-party reports) are based on information obtained from a variety of sources as detailed within this report, and which Sutcliffe Investigation believes are reliable. All reasonable care and skill have been applied in examining the information obtained. Nevertheless, Sutcliffe Investigation cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

The report represents the findings and opinions of experienced Geotechnical and environmental consultants. Sutcliffe Investigations does not provide legal advice and the advice of lawyers may also be required.

Intrusive investigation can only investigate shallow ground beneath a small proportion of the total site area. It is possible therefore that the intrusive investigation undertaken by Sutcliffe Investigation, whilst fully appropriate, may not have encountered all significant subsurface conditions. Any opinions expressed as to the possible configuration of strata between, or below exploratory holes are for guidance only and no responsibility is accepted as to its accuracy.

It should be borne in mind that the timescale over which the investigation was undertaken might not allow the establishment of equilibrium groundwater levels. Particularly relevant in this context is that groundwater levels are susceptible to seasonal and other variations and may be higher during the wetter periods than those encountered during this commission.

Where the report refers to the potential presence of invasive weeds such as Japanese Knotweed, or the presence of asbestos containing materials, it should be noted that the observations are for information only and should be verified by a suitably qualified expert.

This report assumes that ground levels will not change significantly from those existing at present. If this is not to be the case, then some modification to this report may be required.

It should be noted that the banning of the co-disposal of hazardous and non-hazardous waste was introduced in 2011, as a result of the implementation within the UK of the Landfill Directive. This will considerably affect the current practices and procedures for the handling and disposal of wastes, in particular hazardous wastes. In addition, it will be a requirement for all wastes to be pre-treated and to comply with certain waste acceptance procedures prior to sending wastes to landfill. The full potential effects of these important changes are not known at this stage, but it is perceived that disposal costs will rise, particularly for hazardous wastes, and waste pre-treatment may, in some cases, become an ‘additional’ redevelopment cost with regard to the remediation of contaminated sites.

Should this report recommend materials could be excavated and removed off-site for landfill disposal, then it should be noted that the costs, timescales and implications of the pending changes to waste management legislation could not be predicted at this stage. Sutcliffe Investigation will not be responsible for changing practices, etc that may affect the viability of necessary remedial actions or of the implications of potential alternative treatment techniques.

Sutcliffe Investigation reserves the right to amend their conclusions and recommendations in the light of further information that may become available. General notes and limitations relevant to all Sutcliffe Investigations are described in the Foreword and should be read in conjunction with this report.

Executive Summary

INTRODUCTION	Sutcliffe Investigations was instructed by Great Places (the "client") to undertake a Phase II ground assessment for the site at Grey Mare Lane, Manchester, M11 3FT. The site is centred on National Grid Reference (NGR) 386954, 398294 and is approximately 0.47ha in area. This report assesses the ground based geotechnical and environmental risks, constraints and liabilities associated with the proposed development of the site. This is required in support of the discharge of contaminated land planning conditions assigned to the site and to allow the design of economic foundation solutions.
SITE DESCRIPTION	The site is irregular in shape, 0.47ha and can be accessed via Grey Mare Lane along the south-eastern boundary of the site. The northern part of the site is currently covered with grass soft standing with a line of mature trees along the northern boundary. The southern portion of the site is currently unoccupied and covered with asphalt hardstanding. The central portion of the site used to contain the former public house however since its demolition, the area has been left as concrete hardstanding. An area of the central section is currently used as car parking for local residents with street lighting also noted. Curbs and street furniture are prevalent through this area along highway access to the former pub and car park.
DEVELOPMENT PROPOSAL	The proposed layout is for housing with associated soft landscaping areas and infrastructure.
PRELIMINARY CONCEPTUAL MODEL	The site was recorded as residential housing in the north and south with an additional large building in the centre noted as 'nurses' home'. In circa 1930 residential housing in the west of the site was redeveloped into a Picture Theatre continuing off-site. The Nurses Home was fully redeveloped pre-1977 to construct the club (recently demolished). All buildings were demolished circa 2019, and the site has remained vacant since then. Due to the historic developments noted across the site, there is a potential for areas of Made Ground across the site. Potential contaminants associated with Made Ground may comprise a wide range of metals, fuels, oils, acids, alkalis and asbestos. Contamination may be present on site in the form of Silver Chloride, Silver Bromide and Silver Iodide as a result of the site's historical use in the photographic processing industry. Chloring gas also pose a gassing issue, associated with the reduction of photographic chemicals during exposure to light. Volatile contamination may be present within the Made Ground deposits associated with previous on-site development.
PREVIOUS WORKS	e3p have completed a Phase I Geoenvironmental Site Assessment, June 2023 (Report Reference: 16-908-R1) and a Phase II Geoenvironmental Site Assessment, June 2024 (Report Reference: 16-908-R2-1). No other previous studies are known to have been undertaken to Sutcliffe's knowledge.
SITE INVESTIGATION	Field works were undertaken from the 9th – 13th December 2024 by ZORD Drilling, a specialist ground investigation contractor and comprised: • 3No. Cable Percussion Boreholes (BH101-BH103) • Contamination samples from various depth in the Made Ground largely for waste classification. • Geotechnical Samples
GROUND CONDITIONS	Made Ground: Made Ground was encountered in all the exploratory holes across the site and was noted to a maximum depth of 2.00m. Made Ground comprised concrete or asphalt over black ashy slightly sandy fine to coarse angular GRAVEL and COBBLES, a possible basement floor slab in BH103 and brown slightly gravelly CLAY. Gravel is fine to coarse angular and of brick and mixed lithology. Natural Ground: Natural ground was encountered in all boreholes and generally comprised very stiff brown silty sandy slightly gravelly CLAY, MUDSTONE occasionally laminated and weathered and SANDSTONE
GROUNDWATER	Groundwater was not encountered during the site investigation.
ASBESTOS	No Asbestos was detected in the samples obtained during the site works.

GEOTECHNICAL ASSESSMENT	General It is understood that consideration is being given to a residential development with associated soft landscaping areas and infrastructure. Based on the proposed development, it would be Sutcliffe's recommendation that a piled foundation solution is adopted. Final pile design will be undertaken by a specialist piling contractor. Ground Floor Construction Giving consideration to the proposed residential development, it is recommended that a ground bearing floor slab is utilised. Geotechnical Uncertainty The site has been subject to previous development and therefore, the potential for relic foundations and obstructions cannot be discounted.
WASTE CLASSIFICATION	If required for remediation purposes, material removed from site based on the Hazardous Waste Assessment Classification can be classified as inert waste. Notwithstanding, the final decision on waste classification is determined by the accepting landfill, and consultation with landfill operators be carried out during the development of the SMMP.
RECOMMENDATIONS	The following actions are recommended: - Design a Phase III Remediation & Validation Proposal for submission to planning department. - Design SMMP – management of material on and off site. - Good hygiene practices should be employed during construction work, in addition, the findings of this investigation should be included within the contractors H&S file and an assessment of risks associated with short term human health completed. No consumption of food or smoking should occur without prior hand washing. If dust is encountered, dust masks should be worn, and dust suppression employed.

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1 Introduction

1.1 Terms of Reference

Sutcliffe Investigations was instructed by Great Places (*the "client"*) to undertake a Phase II ground assessment for the site at Grey Mare Lane, Manchester, M11 3FT.

A plan detailing the sites existing site layout is presented as *Drawing Ref. CUB-SC-001A.*

This report assesses the ground based geotechnical and environmental risks, constraints and liabilities associated with the proposed development of the site. This is required to allow the design of economic foundation solutions and for the classification of waste materials on site.

1.2 Development Proposal & Legislative Context

Development Proposal

The proposed layout is shown in BowkerSadler *Drawing (Ref: 22-049-A-1005 F)*. This report has been prepared in support of a planning application to develop the site for housing with associated soft landscaping areas and infrastructure. Based on information received from the architect, it is anticipated that site levels will be retained to facilitate the proposed development option.

Legislative Context

The presence of contaminants which may pose a risk to human health, or the environment is a material planning consideration. For planning it should be considered whether the site is suitable for its new use, and the responsibility for securing a safe development (including cumulative effects of pollution on health, and the potential sensitivity of the proposed development to adverse effects from pollution,) rests with the developer and/or landowner. Planning is concerned with the site's proposed use not its current use, where the amount of contamination is expected to be low relative to the level of risk. This is the opposite to Part 2A which considers high levels (significant harm) and the current use of the site.

Section 57 of the Environment Act 1995 adds Part 2A (ss.78A-18YC) to the Environmental Protection Act 1990 and contains the legislative framework for identifying and dealing with contaminated land. Where development is undertaken on land which may be affected by contamination, the National Planning Policy Framework, paragraph 120 to 122 considers pollution and remediation. This links the contaminated land regime within the development process.

For there to be an environmental liability associated with the site there must be a perceived source (a contaminant), a receptor (humans, living organisms or property) and a pathway between them. The potential presence of all of these aspects would result in a complete contaminant linkage.

In accordance with environmental legislation and the associated guidelines, assuming the site is to be redeveloped as housing, it should be noted that any redevelopment of the site could actually create new pathways that could increase the liabilities associated with the

site. In addition, the basis of the intrusive ground assessment is to refine the preliminary conceptual model.

1.3 Site Location and Setting

The site is located at Grey Mare Lane, Beswick, Manchester, M11 3TF at National Grid Reference (NGR) 386954, 398294 within a predominantly residential area with local amenities also noted in the area.

A location plan and aerial photograph of the site are shown as *Figure 1 & 2*.

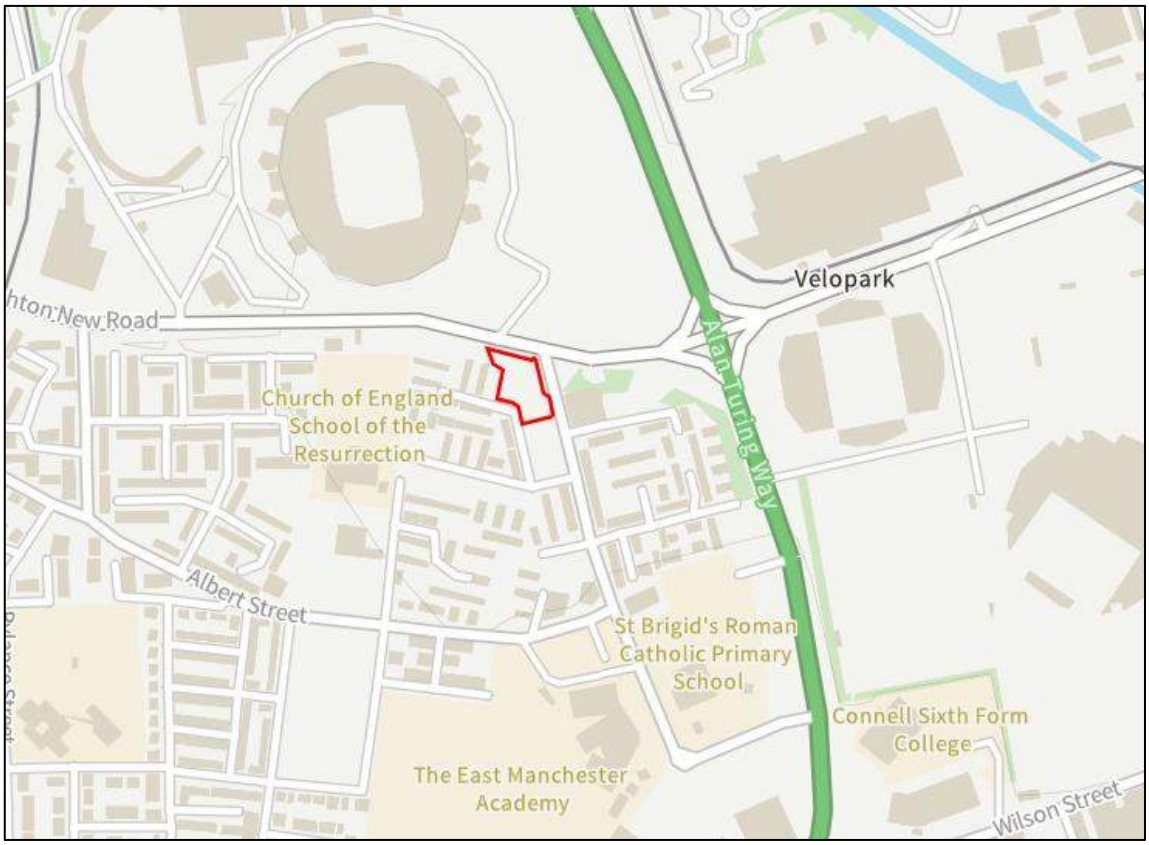


Figure 1: General Location of Site

1.4 Site Description and Layout

The site is irregular in shape, 0.47ha and can be accessed via Grey Mare Lane along the south-eastern boundary of the site. The northern part of the site is currently covered with grass soft standing with a line of mature trees along the northern boundary. The southern portion of the site is currently unoccupied and covered with asphalt hardstanding. The central portion of the site used to contain the former public house however since its demolition, the area has been left as concrete hardstanding. An area of the central section is currently used as car parking for local residents with street lighting also noted. Curbs and street furniture are prevalent through this area along highway access to the former pub and car park.

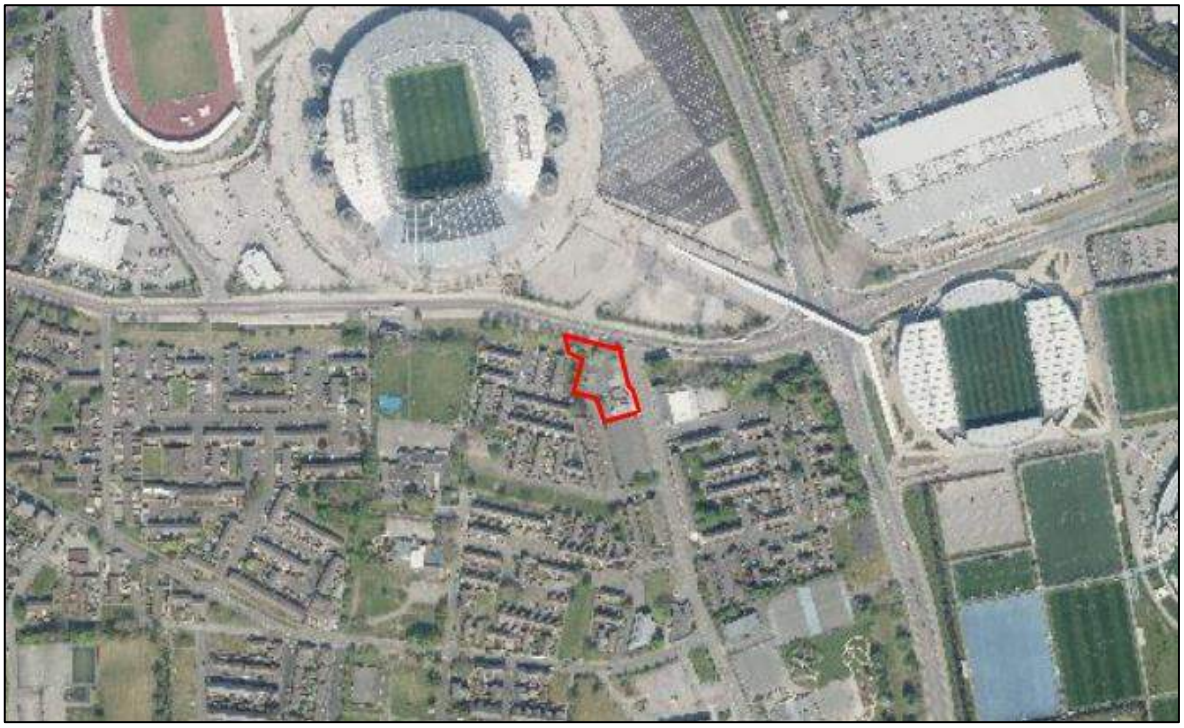


Figure 2: Aerial Photograph of the Site

1.5 Previous Studies

e3p have completed a Phase I Geoenvironmental Site Assessment, June 2023 (*Report Reference: 16-908-R1)* and a Phase II Geoenvironmental Site Assessment, June 2024 (*Report Reference: 16-908-R2-1)*. No other previous studies are known to have been undertaken to Sutcliffe's knowledge.

1.6 Objectives & Scope of Assessment

The aim of the intrusive ground investigation is to identify potential geotechnical & environmental liabilities and constraints, associated with the development of the site area in support of the following:

- To assess the likelihood of reuse of materials that are site won or disposal options for surplus material.
- The preliminary design of detailed and economic foundations options inclusive of all information and specifications relating to foundation types, the location of underlying rock, (if encountered), preparation of ground, concrete grades, reuse of materials for both the proposed building, and the existing foundations.

2 Preliminary Conceptual Risk Assessment

2.1 Introduction

The Phase I completed by e3p is summarised below. This report should be read in conjunction with Report Ref. 16-908-R1.

2.2 Site History

On-site

The site was recorded as residential housing in the north and south with an additional large building in the centre noted as 'nurses' home'. In circa 1930 residential housing in the west of the site was redeveloped into a Picture Theatre continuing off-site. The Nurses Home was fully redeveloped pre-1977 to construct the club (recently demolished). All buildings were demolished circa 2019, and the site has remained vacant since then.

Historical Contamination Potential

Due to the historic developments noted across the site, there is a potential for areas of Made Ground across the site. Potential contaminants associated with Made Ground may comprise a wide range of metals, fuels, oils, acids, alkalis and asbestos.

Contamination may be present on site in the form of Silver Chloride, Silver Bromide and Silver Iodide as a result of the site's historical use in the photographic processing industry. Chloring gas also pose a gassing issue, associated with the reduction of photographic chemicals during exposure to light.

Volatile contamination may be present within the Made Ground deposits associated with previous on-site development.

2.3 Geotechnical Constraints

Coal Mining

The site is located in a development high risk area. There are no mine entries located on site however one is situated 25m north east of the site. The mine entry is known to be in association with the Bradford Colliery which is situated approximately 20m north-east of the site. Known workings have been recorded 114m bgl under the site.

It is likely that the site may be influenced by worked seams at a shallow depth given the position of shafts and outcrops in the area, putting the site at high risk from coal mining related land instability.

Based on the above, a high risk of unrecorded coal mining at shallow depth has been identified within the site boundary. The Coal Authority, as a statutory consultee, will require a series of rotary open holes across the site to determine the presence of any coal on-site and to understand the nature of any coal workings.

Geology

A review of relevant records indicates that the site has not been subject to significant anthropogenic changes with the current site topography broadly representing natural landform. From the main highway at the north of the site, the grassed area generally falls in towards the site – the remainder has been largely regraded from development phases.

There is no evidence currently to suggest that the former club had basement features and so there is expected to be shallow Made Ground to facilitate construction in this area.

The nearest fault is located circa 650m east of the site recorded at rockhead between two geological stratum. Outcropping Coal seams are noted 44m north of the site and are noted as linear features.

Historical Land Use

Historical slabs and foundations are present in the centre of the site associated with the previous use as a public house. Furthermore, relic foundations are likely to be encountered in the north of the site, on the site of the old theatre. All existing underground foundations and obstructions beneath the proposed development will require grubbing out in their entirety, however it is considered that most of this hard material will be suitable for reuse in construction once excavated and processed.

3 Ground Investigation

3.1 Design Rationale

The aim and design of the ground assessment is to satisfy planning conditions assigned to the site by reference to the National Planning Policy Framework (NPPF). This will identify elevated concentrations of determinands with the aim of assessing long term human health risks to site users and groundwater resources. In addition, the works have been designed to allow the design of economic foundation solutions for the proposed new builds.

3.2 Fieldwork

Field works were undertaken from the 9th – 13th December 2024 by ZORD Drilling, a specialist ground investigation contractor and comprised:

- 3No. Cable Percussion Boreholes (BH101-BH103)
- Contamination samples from various depth in the Made Ground largely for waste classification.
- Geotechnical Samples

All works were supervised by a suitably qualified Sutcliffe engineer. The investigation was carried out in general accordance with the following standards:

- BS10175:2011+A2:2017 Investigation of Potentially Contaminated Sites – Code of Practice;
- R&D Technical Report P5-066/TR Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination, 2001 (Environment Agency).
- BS 5930:2015 Code of practice for site investigations; and,
- BS EN ISO 22475-1:2006 Geotechnical investigation and testing. Sampling methods and groundwater measurements. Technical principles for execution.

Site Investigation logs collated as part of the ground investigation completed by Sutcliffe are presented in *Appendix C.*

3.3 Sampling Strategy

A summary of exploratory hole detailing rationale is shown in *Table 3.1* below.

Table 3.1: Summary of Site Activities

Ref. No.	Location Rationale	Method	Completed Depth (mbgl)	Testing & Sampling details
BH101	General Site Coverage	Cable Percussion	21.00	SPTs / Small bulk samples
BH102	General Site Coverage	Cable Percussion	21.00	SPTs / Small bulk samples
BH103	General Site Coverage	Cable Percussion	21.00	SPTs / Small bulk samples

A plan detailing the position of sampling locations on an existing layout of the site is presented as *Drawing Ref. 34338-SUT-ZZ-XX-DR-G-7201.*

3.4 Chemical Laboratory Testing

Selected soil samples (Made Ground) were collected at various depths and horizons and submitted for chemical analysis, details of which are presented in *Table 3.2.*

Table 3.2: Summary of Soils Analysis (Total & Leachate Concentrations)

Suite Reference	Analysis Suite
Hazwaste Envriolab Minimal Requirements	Metals suite, speciated (16) polycyclic aromatic hydrocarbons (PAHs), TPH Total with ID + GC Trace (>C6-C40).
WAC E (Inert, SNRHW + Hazardous Landfills) 2 Stage	Antimony, Arsenic, Barium, Cadmium, Chloride, Chromium, Copper, DOC, Floride, Lead, Mercury, Molybdenum, Nickle, Phenol, Selenium, Sulphate, Total Dissolved Solids, Zinc.
Pipeline RA Suite	EPH CWG, VOCs, SVOCs, VPH CWG, Ph, Electrical Conductivity and Redox Potential
Asbestos	Asbestos in soil

All samples were analysed by MCERTS accredited soil analysis laboratory Envirolab under UKAS accredited methods. All samples have been taken in accordance with current British Standards.

Envirolab are appropriately accredited for the works required and are an approved supplier under the Sutcliffe's Quality Management System.

Analytical test certificates are presented in *Appendix D.*

TPH Speciated aromatic and aliphatic bands with BTEX analysis have been carried out in line with the TPHCWG. The toxicity and migration risk associated with a TPH is dependent on the specific aliphatic aromatic carbon banding.

Of particular concern are the low molecular weight compounds, which are highly mobile and show a greater level of toxicity that the higher molecular weight compounds. Therefore, a low TPH consisting of low molecular weight aliphatic and aromatic carbon banding compounds may present more of a risk than a high TPH consisting of heavy weight aliphatic and aromatic carbon banding compounds.

Based on the TPHCWG the aromatic band C5 – C7 is considered to consist only of Benzene and the aromatic band C7 – C8 of Toluene. Therefore, the more specific BTEX analysis has been used for risk assessment rather than the aromatic bands.

3.5 Drainage

It is recommended that the client / developer contact United Utilities with respect to capacity in existing foul and surface water sewers in the vicinity of the development area.

3.6 Water Supply

Please note the testing suite carried out for this site does not cover the suite of contaminants required by United Utilities for pipe selection and therefore further testing may be required.

3.7 Services

It is recommended that the client / developer contact the relevant service provided to ascertain the requirements for power reinforcement and / or relocation / diversion of existing services.

4 Ground Model

4.1 General

The following section describes the ground conditions encountered during the intrusive ground assessment completed by Sutcliffe.

4.2 Made Ground

A summary of the strata depths and thicknesses for Made Ground is detailed in Table 4.1 and Table 4.2 below.

Table 4.1: Ground Conditions Encountered (Made Ground)

Strata	Depths encountered (mbgl)		Thickness (m)		
	Min	Max	Min	Max	Average
MADE GROUND	0.00	2.00	1.70	2.00	1.83

Table 4.2: Ground Conditions Encountered (Made Ground – Detailed)

Strata	Depths encountered (mbgl)		Thickness (m)		
	Min	Max	Min	Max	Average
Concrete[1]	0.00	0.30	0.20	0.30	0.25
Asphalt [2]	0.10	0.10	0.10	0.10	0.10
MADE GROUND: Black ashy slightly sandy fine to coarse angular GRAVEL and COBBLES. Gravel is of brick.	0.10	1.70	1.10	1.50	1.30
MADE GROUND: Concrete – Possible basement floor slab [3]	1.60	1.80	0.20	0.20	0.20
MADE GROUND: Brown slightly gravelly CLAY. Gravel is fine to coarse angular and of brick and mixed lithology [4]	1.70	2.00	0.30	0.50	0.40

[1] Encountered in BH101 & BH103
[2] Only encountered in BH102
[3] Only encountered in BH103
[4] Only encountered in BH101 & BH102

4.3 Natural Ground

A summary of the strata depths and thicknesses for natural ground is detailed in *Table 4.3* and *4.4* below.

Table 4.3: Ground Conditions Encountered (Natural – General)

Strata	Depths encountered (mbgl)		Thickness (m)		
	Min	Max	Min	Max	Average
CLAY	1.70	14.50	11.50	12.70	12.17
MUDSTONE	13.50	21.00	0.32	7.42	3.15
SANDSTONE	15.80	21.00	0.08	4.88	1.75

Table 4.4: Ground Conditions Encountered (Natural – Detailed)

Strata	Depths encountered (mbgl)		Thickness (m)		
	Min	Max	Min	Max	Average
Very stiff brown silty sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular to angular and of mixed lithology.	1.70	14.50	11.50	12.70	12.17
Grey and brown highly weathered clayey, laminated MUDSTONE.	13.00	15.78	1.28	1.50	1.36
Bown / grey moderate to highly weathered MUDSTONE (with occasional sandstone inclusions BH102) recovered as gravelly clay. **	15.00	21.00	0.32	2.20	0.96
Grey highly weathered MUDSTONE with rare inclusions of sandstone, recovered as clayey gravel. [1**]	16.90	21.00	4.10	4.10	4.10
Grey MUDSTONE, fresh [2]	17.20	20.92	3.72	3.72	3.72
Grey occasionally brown slightly weathered fine to medium grained SANDSTONE with brown staining on fracture faces [3]	15.80	20.68	4.88	4.88	4.88
Brownish grey, moderately weathered, fine to medium grained SANDSTONE recovered as gravel. [1]	16.61	16.90	0.29	0.29	0.29
Grey fine-grained SANDSTONE, fresh [2**]	20.92	21.00	0.08	0.08	0.08

[1] Only encountered at one location – BH103
[2] Only encountered at one location – BH101
[3] Only encountered at one location – BH102
*** Final Depth of Strata not proven, average thickness on identified ground.*

4.4 Standard Penetration Tests (SPT)

The standard penetration test (SPT) is used to provide geotechnical engineering properties for foundation design purposes. The results can be used to determine the relative density, bearing capacity, and settlement of granular soil. The results can also be used to correlate the approximate strength of cohesive soil.

The SPT results are detailed in *Table 4.5* and *Figure 3* hereunder.

Table 4.5: SPT Results

Strata	No. of Tests	Range / Value	Average
MADE GROUND	3	7-25	15.7
CLAY	22	16-50	26.5
MUDSTONE	4	50	50

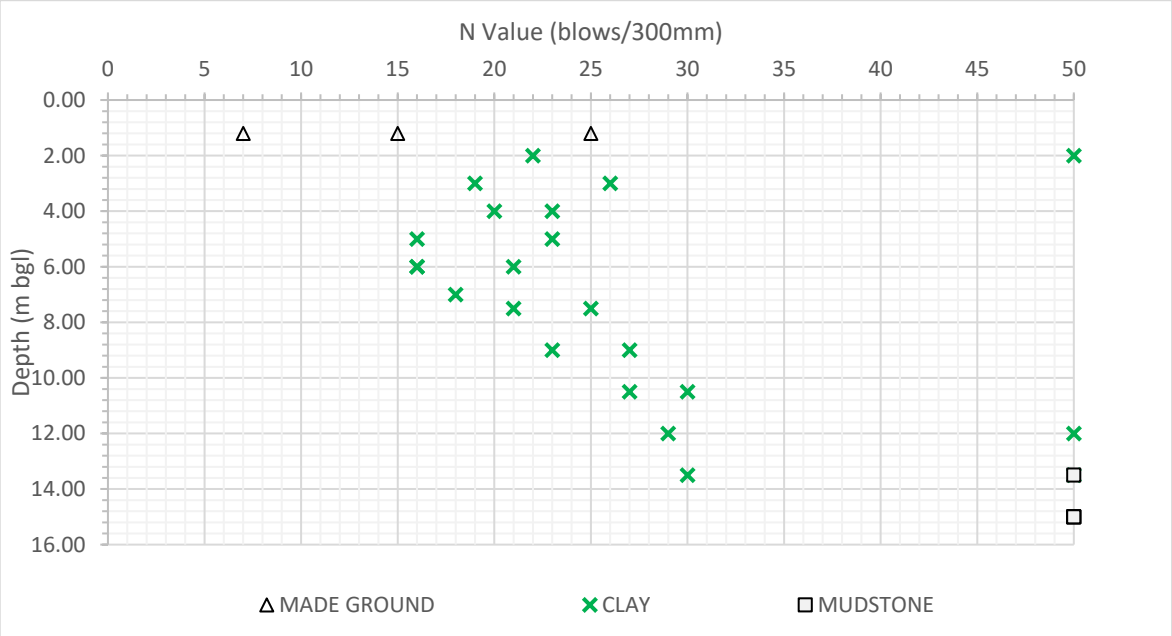


Figure 3: SPT Results

4.5 Field Evidence of Contaminated Soils

Made Ground was noted within every investigation location conducted. Within the Made Ground, additional contamination indicators were also noted:

Table 4.6: Field Evidence of Contaminated Soils

Ref. No.	Depth	Contamination Indicator
BH101	0.20 – 1.70	Ashy Material
BH102	0.10 – 1.20	Ashy Material
BH103	0.30 – 1.60	Ashy Material

Apart from the above instances, no other visual or olfactory contamination indicators were noted during the Site Investigation.

4.6 Groundwater

Groundwater was not encountered during the site investigation.

5 Geotechnical Laboratory Testing and Assessment

5.1 General

In total 6No. samples were recovered from site for the purpose of geotechnical laboratory testing. A breakdown of the testing scheduled is set out in *Table 5.1* below.

Table 5.1: Geotechnical Testing

Ref. No.	Depth (m)	Plasticity Index	Triaxial	Moisture Content	Point Load Tests
BH101	4.00-4.45	✓	✓	✓	
BH101	9.00-9.45	✓	✓	✓	
BH101	16.60-20.95				✓
BH102	5.00-5.45	✓	✓	✓	
BH102	12.00-12.45	✓	✓	✓	
BH102	15.85-20.20				✓
BH103	3.00-3.45	✓	✓	✓	
BH103	10.50-10.95	✓	✓	✓	
BH103	15.95-18.40				✓

5.2 Plasticity Index

A total of 6No. samples were tested to determine the plasticity index of the underlying CLAY strata. The plasticity results and the modified plasticity index are outlined in *Table 5.2* below.

Table 5.2: Plasticity Test Results

Ref. No.	Depth (m)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Modified Plasticity Index (%)	Soil Classification
BH101	4.00-4.45	40	19	21	91	19.11	CL
BH101	9.00-9.45	36	18	18	95	17.10	CL
BH102	5.00-5.45	37	17	20	88	17.60	CL
BH102	12.00-12.45	36	19	17	93	15.81	CL
BH103	3.00-3.45	39	20	19	89	16.91	CL
BH103	10.50-10.95	36	17	19	93	17.67	CL

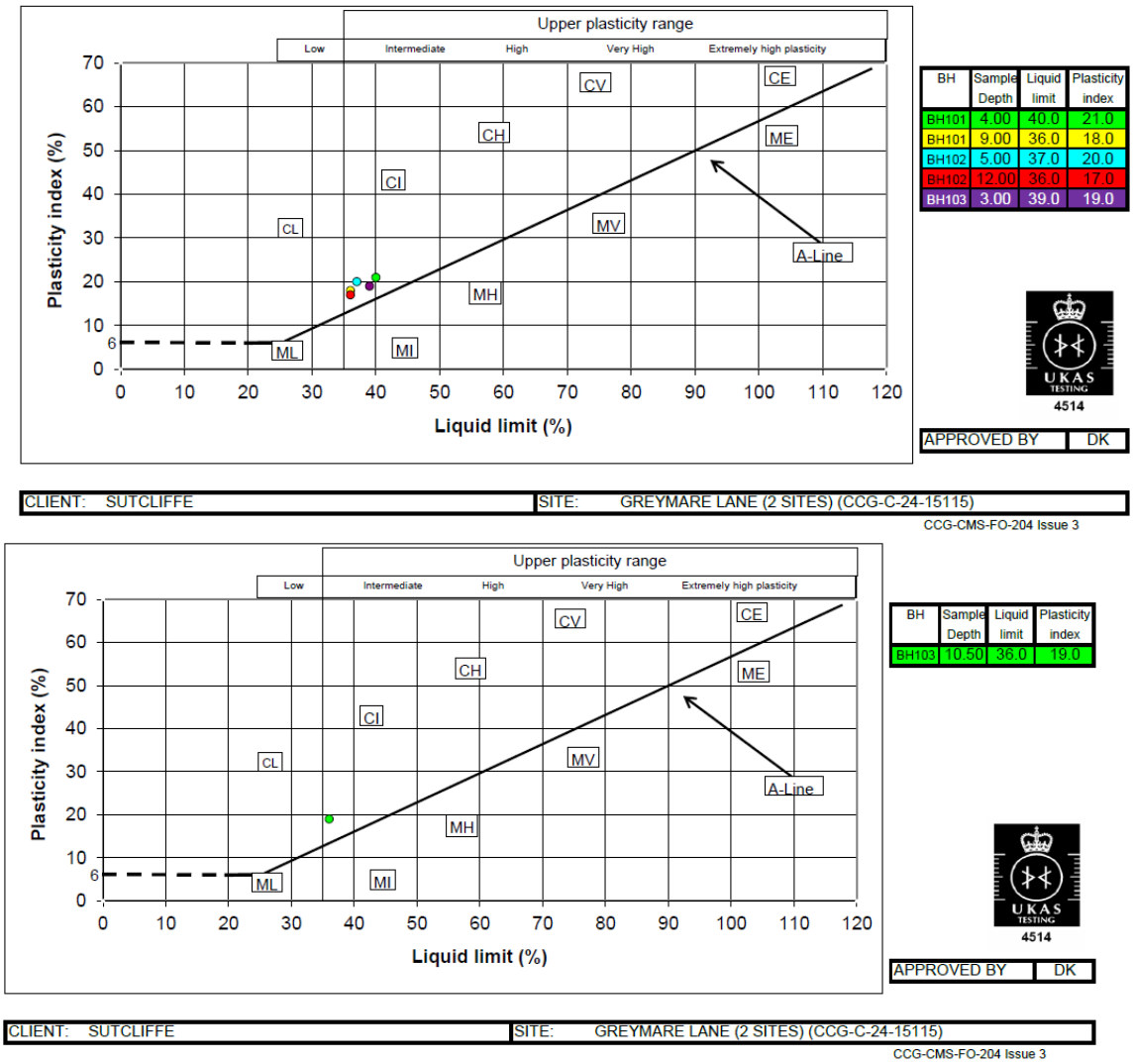


Figure 4: Plasticity Test Results

The results indicate that the underlying CLAY is low plasticity. Plasticity test results are included in *Appendix E*.

5.3 Shear Strength

Triaxial Testing

Triaxial testing was scheduled on 6No. samples recovered from site. The result of this testing is outlined below in *Table 5.3*.

Table 5.3: Triaxial Test Results

Ref. No.	Depth (m bgl)	Shear Strength (kPa)
BH101	4.00	96
BH101	9.00	115
BH102	5.00	48
BH102	12.00	128
BH103	3.00	264
BH103	10.50	112

Shear Strength Testing Summary

A summary of the Shear Strength Testing including Triaxial Testing is presented in *Figure 5.*

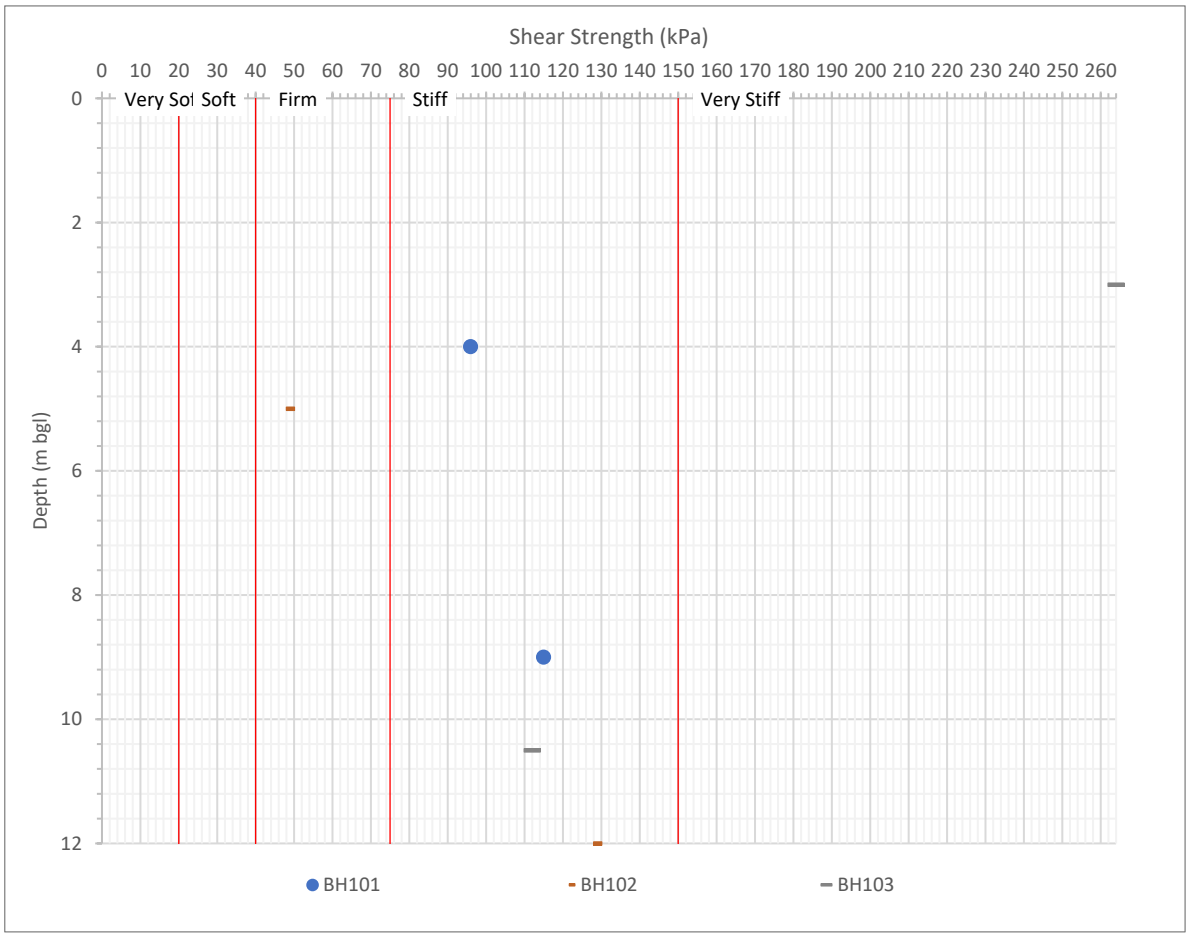


Figure 5: Shear Strength Test Results

The results of this testing indicate that the shear strength of the clay classifies as firm to very stiff, with the strength of the clay generally increasing with depth with the exception of material in BH103.

5.4 Point Load Tests

Point Load Testing was scheduled on 28No. samples recovered from site. The results of the testing is outlined in Table 5.4 below:

Table 5.4: Point Load Test Results

Ref No.	Depth (m bgl)	Test Type	Point Load Index (MPa)	Shear Strength (kPa)
BH101	16.60	Diametral	0.02	**600**
BH101	16.65	Axial	0.03	**800**
BH101	17.90	Axial	0.03	**800**
BH101	18.60	Diametral	0.46	**12000**
BH101	18.65	Axial	0.40	**10600**

Ref No.	Depth (m bgl)	Test Type	Point Load Index (MPa)	Shear Strength (kPa)
BH101	19.70	Axial	0.09	**2200**
BH101	20.20	Axial	0.05	**1400**
BH101	20.95	Axial	0.14	**3600**
BH102	15.85	Axial	0.03	**800**
BH102	16.20	Axial	0.05	**1400**
BH102	16.90	Axial	0.49	**11400**
BH102	17.50	Axial	0.64	**16400**
BH102	17.85	Axial	0.34	**8600**
BH102	18.15	Diametral	0.17	**4600**
BH102	18.20	Axial	0.32	**8200**
BH102	18.75	Axial	0.27	**7400**
BH102	19.00	Diametral	0.25	**6400**
BH102	19.05	Axial	0.28	**7400**
BH102	20.00	Diametral	0.31	**8000**
BH102	20.05	Axial	0.37	**10000**
BH102	20.20	Axial	0.34	**8800**
BH103	15.95	Axial	0.03	**800**
BH103	16.20	Axial	0.04	**1000**
BH103	16.65	Axial	0.46	**11400**
BH103	17.05	Axial	0.03	**800**
BH103	17.40	Axial	0.03	**800**
BH103	17.85	Axial	0.03	**800**
BH103	18.40	Axial	0.06	**1400**

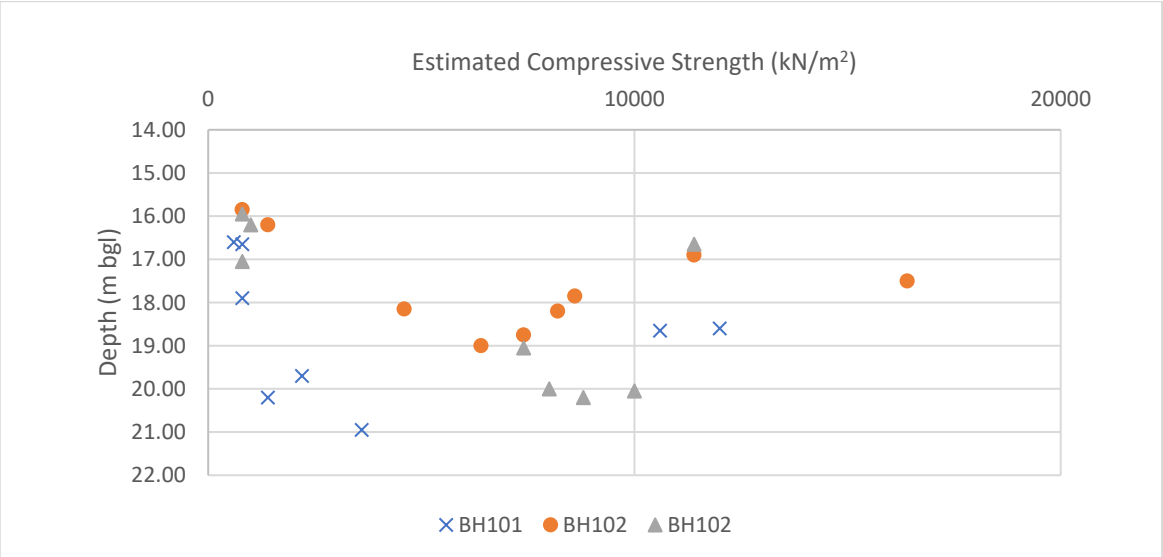


Figure 6: Point Load Results

Point Load Test Results are included within Appendix E.

5.5 Stability

No evidence of instability was noted in the exploratory holes that were undertaken on site; however, it is noted that these were only small diameter holes and that due to the amount of Made Ground noted on-site shoring would likely be required if any groundworks are to be left open during site works.

5.6 Foundation Recommendations

General

It is understood that consideration is being given to a residential development with associated soft landscaping areas and infrastructure.

Based on the proposed development, it would be Sutcliffe's recommendation that a piled foundation solution is adopted. Final pile design will be undertaken by a specialist piling contractor.

Ground Floor Construction

Giving consideration to the proposed residential development, it is recommended that a ground bearing floor slab is utilised.

5.7 Geotechnical Uncertainty

The site has been subject to previous development and therefore, the potential for relic foundations and obstructions cannot be discounted.

6 Waste Classification

6.1 Preliminary Waste Classification

A preliminary waste classification was carried out to determine the classification of soil contamination data using HazWasteOnline program, which creates the standard 'Hazardous / Non-Hazardous' classification of soils.

A summary of the preliminary waste classification is provided in *Table 6.1* below.

Table 6.1: Preliminary Waste Classification Summary

Ref. No.	Depth (m bgl)	Classification	Exceeded Contaminant	Value (mg/kg)
BH101	0.50 - 0.80	Non-Hazardous	-	-
BH102	0.40 - 0.80	Non-Hazardous	-	-
BH103	0.60 - 0.90	Non-Hazardous	-	-

The full Waste Classification Report is provided in Appendix G.

Notwithstanding, the final decision on waste classification is determined by the accepting landfill, and consultation with landfill operators be carried out during the development of the SMMP.

6.2 Asbestos

Asbestos containing material was not observed in all samples screened.

6.3 Waste Acceptance Criteria (WAC)

WAC analysis was carried out to determine if the preliminary waste classification results can be downgraded. Results of the WAC analysis are presented in Appendix D.

6.4 Discussion

WAC analysis indicates that 'Non-Hazardous' classifications can be downgraded to an 'Inert' classification.

Notwithstanding, the final decision on waste classification is determined by the accepting landfill, and consultation with landfill operators be carried out during the development of the SMMP.

6.5 Remediation Requirements

Waste Classification

If required for remediation purposes, material removed from site based on the Hazardous Waste Assessment Classification can be classified as inert waste.

Notwithstanding, the final decision on waste classification is determined by the accepting landfill, and consultation with landfill operators be carried out during the development of the SMMP.

7 Recommendations

7.1 Further works

The following actions are recommended:

- Design a Phase III Remediation & Validation Proposal for submission to planning department.
- Design SMMP – management of material on and off site.
- Good hygiene practices should be employed during construction work, in addition, the findings of this investigation should be included within the contractors H&S file and an assessment of risks associated with short term human health completed. No consumption of food or smoking should occur without prior hand washing. If dust is encountered, dust masks should be worn, and dust suppression employed.

8 References

- BRE Special Digest (1991) 'Sulphate and acidic resistance of concrete in the ground' 363
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- Environment Agency (2000) 'Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination. Research and Development. Technical Report. P5-066/TR', Bristol.
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- Environment Agency (2002) 'Department for Environment, Food and Rural Affairs and The Environment Agency. The Contaminated Land Exposure Assessment (CLEA) Model: Technical Basis and Algorithms', Environment Agency, Bristol. CLR report No. 1

Appendix A – General Notes

General Notes

2024

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1 Introduction

1.1 Current Guidance

In October 2020, the Environment Agency published the Land Contamination: Risk Management (LCRM) which replaces the now withdrawn Model Procedures for the Management of Contaminated Land (CLR 11).

The original CLR11 guidance was a technical framework for applying a risk management process in dealing with sites affected by contamination. In broad terms, it set out a model of identifying, making decisions on, and taking appropriate and measured action to deal the issue in a consistent way that is in line with current policies, standards and legislation.

Whilst the scope, purpose and framework of CLR11 remains largely the same, LCRM brings it up to date in a more accessible format.

The LCRM Stage 1 Risk Assessment is split into 3 Tiers:

- Tier 1: Preliminary Risk Assessment (PRA)
- Tier 2: General Quantitative Risk Assessment (GQRA)
- Tier 3: Detailed Quantitative Risk Assessment. (DQRA)

2 Tier 1: Preliminary Risk Assessment (PRA)

2.1 Introduction

Tier 1: Preliminary Risk Assessment (PRA) develops the initial conceptual site model to establish whether there are any potentially unacceptable risks and founded upon the use of the S-P-R (Source-Pathway-Receptor) principles in order to establish the presence or potential presence of a pollutant linkage. The PRA will:

- Interpret historical, archived and current information to establish the location of previous site activities.
- Understand the environmental setting of the site.
- Identify areas or zones that may contain distinct and different types of contamination.
- Identify potential contaminant linkages.
- Identify the types of contaminants likely to be present such as ground gases and vapours, solvents, metals.
- Identify any potential health and safety requirements such as immediate risks to human health from ground gases and vapours or unexploded ordnance that could cause asphyxiation or explosion.
- Develop an initial conceptual site model.
- Scope out the likelihood and requirements of a detailed investigation if you progress to the next tier.

This section outlines Sutcliffe Investigations process for the Tier 1 PRA.

2.2 Third Party Information

Third party information obtained from the British Geological Survey (BGS), the Coal Authority, the Local Authority, etc. is presented in the Appendix of the PRA.

2.3 Geology, Mining & Quarrying

In order to establish the geological setting of a site, Sutcliffe Investigations refer to BGS maps for the area and the relevant geological memoir.

A coal mining report is obtained from the Coal Authority. Further information is sourced from the Local Authority and by reference to current and historical OS plans.

2.4 Landfills

Sutcliffe Investigations obtain data from Envirocheck (Landmark Information Group), the Environment Agency and the Local Authority with respect to known areas of landfilling within 250m of the proposed development site. Reference is also made to historical OS plans, which are inspected for evidence of backfilled quarries, railway cuttings, colliery spoil tips, etc.

2.5 Radon

Radon is a colourless, odourless gas, which is radioactive. It is formed in strata that contain uranium and radium (most notably granite) and can move through fissures eventually

discharging to atmosphere, or the spaces under and within buildings. Where radon occurs in high concentrations, it can pose a risk to health.

In order to assess potential risks associated with radon gas, Sutcliffe Investigations refer to BRE Report BR211, 2015:

“Radon: guidance on protective measures for new dwellings.”

BR211 provides a preliminary indication of the measures required for a particular site, but it is also often necessary to request a Stage 2 Protective Measures Site Report from the BGS.

The level of protection needed is site-specific and is determined by reference to the radon potential map for the area followed by a geological assessment of the site. This information is contained in the Annexes of BR211.

Annex A – derived from statistical analysis of radon measurements in existing houses carried out by the NRPB and grouped on 5km grid.

Annex B – based on an assessment of the same radon measurements grouped by geological units. The maps show the 5km grid squares underlain completely or in part, by geological units which potentially exceed the action levels for radon protective measures. The grid squares are coded according to highest potential within the square. In many cases the actual geological radon potential varies considerably within a grid square.

Sutcliffe Investigations adopt the following procedure when assessing risk associated with radon.

Firstly, Annex A maps are reviewed to see whether the site requires full, basic or no measures. If the site is in a dark brown square, full radon protection measures are required. If the site is in a light brown square, reference should be made to Annex B.

Secondly, Annex B maps are reviewed to see whether a further geological assessment is required which may result in upgrading the result from Annex A. If a site lies within a shaded square, it may require radon protection and Sutcliffe Investigations request a Stage 2 Protective Measures Site Report from the BGS.

If the site is in a square that is not coloured or shaded in either set of maps, then no radon protection is needed and therefore a BGS Report is not normally necessary.

The BGS geological assessment involves checking whether the site is on or close to a geological unit that has statistically been found to have elevated radon potential. The geological assessment is based on either 1:50,000 or the 1:250,000 scale data. The search area specified as part of the request is increased by 50m in areas where 1:50,000 data is available and by 500m in areas with 1:250,000 scale data to allow for potential inaccuracies in the position of boundaries. The BGS report indicates the highest level of protection required within the search area and its buffer zone.

When requesting a BGS report, Sutcliffe Projects select the search radius carefully, since too large a search radius may result in the inclusion of areas underlain by geological units

of a higher radon potential, thereby giving rise to recommending too high a level of protection.

The report also includes (where available), a list of the geological units included in the assessment. Sutcliffe Investigations check that these actually underlie the site, rather than the buffer zone only.

On the basis of radon measurements in dwellings and on their geological interpretation, the BGS report stipulates the level of protective measures required for the proposed development site, and this could be:

- no measures.
- basic measures; or
- full measures.

Details of these measures are provided in the Hazardous Gas section of this Geo-environmental Report.

2.6 Hydrogeology

Sutcliffe Investigations obtain information from the Environment Agency (EA) and Envirocheck with respect to:

- groundwater quality.
- recorded pollution incidents.
- licensed groundwater abstractions.

Reference is also made to the EA Guidance “Protect groundwater and prevent groundwater pollution” (2024) and Defra Magic Map.

Groundwater protection policy uses aquifer designations that are consistent with the Water Framework Directive.

These designations reflect the importance of aquifers not only in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems.

Types of aquifer designations are presented hereunder:

Table 2.1: Aquifer Designations

Designation	Description
Principal Aquifer	Layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.
Secondary Aquifer	Secondary aquifers are split into 2 groups: - Secondary A aquifers comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers. - Secondary B aquifers are mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers.

Designation	Description
Secondary Undifferentiated Aquifer	Secondary undifferentiated are aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value.
Unproductive Aquifer	Unproductive strata are largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.

Groundwater vulnerability is determined by 4 variables:

1. The presence and nature of overlying soil (the weathered zone affected by living organisms; soil in the UK can extend up to 2m in depth). Physical properties of the soil affect the downward passage of water and its ability to attenuate pollutants. The EA refer to a three-fold classification of soil types:

Table 2.2: Leaching Potential Types

Leaching Potential	Definition
Low	Soils in which the pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.
Intermediate	Soils which have a moderate ability to attenuate diffuse source pollutants or in which it is possible that some non-absorbed diffuse source pollutants and liquid discharges could penetrate the soil layer.
High	Soils with little ability to attenuate diffuse source pollutants and in which non-absorbed diffuse source pollutants and liquid discharges have the potential to move rapidly to underlying strata or to shallow groundwater.

In urban areas and restored mineral workings the soil information is based on fewer observations than elsewhere. A worst-case vulnerability (H) is therefore assumed for these areas and for current mineral workings by the EA. All are given a designation of HU unless proved otherwise.

2. The presence and nature of Drift, which often overlies bedrock. Where Drift is of substantial thickness and low permeability, it can provide an effective barrier to surface pollutant migration. Permeability Drift is classified as an unproductive aquifer, except where it is in probable hydraulic continuity with a Principal Aquifer, where it is regarded as part of the Principal Aquifer unless proven otherwise by site investigation.

3. The nature of the geological strata (bedrock). Rocks that contain groundwater in exploitable quantities are called aquifers.

4. The depth of the unsaturated zone i.e., that part of the aquifer which lies above the water table.

The EA have also designated Source Protection Zones, which are based on proximity to a groundwater source (springs, wells and abstraction boreholes). The size of a Source Protection Zone may vary from tens to several thousand hectares.

2.7 Hydrology

Sutcliffe obtain information from the Environment Agency and Envirocheck with respect to:

- Surface water quality
- Recorded pollution incidents.
- Licensed abstractions (groundwater & surface waters)
- Licensed discharge consents
- Site susceptibility to flooding.

The EA have set water quality targets for all rivers. These targets are known as River Quality Objectives (RQOs). The water quality scheme used to set RQO planning targets is known as the River Ecosystem scheme. The scheme comprises five classes (RE1 to RE5) which reflect the chemical quality requirements of communities of plants and animals occurring in our rivers.

General Quality Assessment (GQA) grades reflect actual water quality. They are based on the most recent analytical testing undertaken by the EA. There are six GQA grades (denoted A to F) defined by the concentrations of biochemical oxygen demand, total ammonia and dissolved oxygen.

The susceptibility of a site to flooding is assessed by reference to a Flood Map on the Environment Agency's website. These maps provided show natural floodplains – areas potentially at risk of flooding it a river rises above its banks or high tides and stormy seas cause flooding in coastal areas.

There are different kinds of area shown on the Flood Map:

- Dark blue areas could be flooded by the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year, or by a river by a flood that has a 1% (1 in 200) or greater chance of happening each year.
- Light blue areas show the additional extend of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with up to a 0.1% (1 in 1000) chance or occurring each year.

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manufactured structures and channel improvements.

The maps also show all flood defences built in the last five years to protect against river floods with a 1% (1 in 100) chance of happening each year, or floods from the sea with a 0.5% (1 in 200) chance of happening each year, together with some, but not all, older defences and defences which protect against smaller floods. The Agency's assessment of the likelihood of flooding from rivers and the sea at any location is based on the presence and effect of all flood defences, predicted flood levels and ground levels.

It should also be noted that as the floodplain shown is the 1 in 100-year (or 1 in 200-year as appropriate) areas outside this may be flooded by more extreme floods (e.g., the 1 in 1000-year flood). Also, parts of the areas shown at risk of flooding will be flooded by lesser floods (e.g., the 1 in 5-year flood). In some places due to the shape of the river valley the smaller floods will flood a very similar extent to larger floods but to a lesser depth.

If a site falls within a floodplain, it is recommended that a flood survey be undertaken by a specialist consultant who can advise on appropriate mitigating measures i.e., raising slab levels, provision of storage, etc.

2.8 COMAH & Explosive Sites

Sutcliffe Investigations obtain information from Envirocheck with respect to COMAH or explosive sites within 1km of the proposed development site. Sutcliffe Investigations' report refers to any that are present and recommends that the Client seeks further advice from the HSE.

Areas around COMAH sites (chemical plants, etc.) are zoned with respect to the implementation of emergency plans. The HSE are a statutory consultee to the local planning authority for all COMAH sites. The COMAH site may have to revise its emergency action plan if development occurs. This might be quite straightforward or could entail significant expenditure. Consequently, the COMAH site may object to a proposed development (although, it is the Local Authority who have final say and they are likely to place more weight on advice from the HSE).

2.9 Preliminary Conceptual Ground Model

The site's environmental setting (and proposed end use) is used by Sutcliffe Investigations to assess the significance of any contamination encountered during the subsequent ground investigation.

A conceptual model is an essential element of any site-specific environmental risk assessment. In this context, they are often simple representations of the hypothesised relationships between sources, pathways and receptors.

A basic conceptual model is developed based on the principles of LCRM and interpretation of information gathered during the Tier 1 review. Thus, this allows the identification of potential contaminant linkages and whether these linkages have the potential to comprise significant harm and/or pollution of controlled waters in relation to the site.

Based on this interpretation, the implications for potential liability associated with soil or water contamination at the site can be evaluated.

- **SOURCES** – the identification of contaminants within the soils and groundwater that represent potential pollution sources.
- **PATHWAYS** – the identification of the potential exposure mechanisms and migration pathways from the potential sources; and
- **RECEPTORS** – the identification of the potential receptors that could be sensitive to harm if exposed to these pollution sources.

3 Tier 2: General Quantitative Risk Assessment (GQRA)

3.1 Introduction

Following the Tier 1 PRA, if one or more potential contaminant linkages have been identified and further assessment is necessary, a GQRA is required to assess the risks potentially impacting the site.

The GQRA will:

- define the objectives for this tier of risk assessment.
- establish if General assessment criteria and a standard set of General assumptions to assess the risks.
- do an intrusive site investigation.
- confirm which linkages are to be assess.
- decide if General assessment criteria are suitable to use.
- assess the risks and update the conceptual site model.
- decide what further action is needed.
- produce a report.

This section outlines the processes that Sutcliffe Investigations utilise during the GQRA.

3.2 Intrusive Site Investigation

General

Sutcliffe Ground Investigations are undertaken in accordance with current UK guidance including:

- BS10175:2011+A2:2017 Investigation of Potentially Contaminated Sites – Code of Practice.
- R&D Technical Report P5-066/TR Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination, 2001 (Environment Agency).
- BS 5930:2015 (+A1:2020) Code of practice for site investigations; and,
- BS EN ISO 22475-1:2021 Geotechnical investigation and testing — Sampling methods and groundwater measurements — Part 1: Technical principles for the sampling of soil, rock and groundwater.

Exploratory hole logs are presented in the Appendices to this Ground Assessment Report. These logs include details of the:

- Investigation technique adopted.
- Samples taken.
- Descriptions of the solid strata and any groundwater encountered.
- Results of any in situ testing.
- Any gas/groundwater monitoring well installed.

Exploratory Hole Locations

Exploratory hole locations are selected by Sutcliffe Investigations, prior to commencement of fieldwork, to provide a representative view of the strata beneath the site and to target potential contaminant sources identified during the preliminary investigation (Phase I PRA).

Additional exploratory locations are often determined by the site engineer in light of the ground conditions actually encountered; this enables better delineation of the depth and lateral extent of organic contamination, poor ground, relict structures, etc.

Investigation Techniques

Ground conditions can be investigated by a number of techniques; the procedures used are in general accordance with BS5930:2015 (+A1:2020), BS1377: 2022 and BS EN ISO 22475-1:2021.

Techniques most commonly used by Sutcliffe Investigations include:

- Machine excavated trial pits, usually equipped with a backacter and a 0.6m wide bucket.
- Cable percussive (Shell & Auger) boreholes, typically using 150mm diameter tools and casing.
- Window or windowless sampling boreholes. Constraints associated with existing buildings, operations and underground service runs can render some sites partly or wholly inaccessible to a mechanical excavator. In such circumstances, window sampling is often the most appropriate technique. A window sampling drilling rig can be manoeuvred in areas of restricted access and results in minimal disturbance of the ground (a 150mm diameter bituminous/cementitious core can be lifted and put to one side). However, it should be noted that window sampling allows only a limited inspection of the ground (in particular, made ground with a significant proportion of coarse material).
- Rotary percussive open-hole probe holes are typically drilled using a tricone rock roller bit with air as the flushing medium. Probe holes are generally lined through made ground with temporary steel casing to prevent hole collapse.

Where installed, gas/groundwater monitoring wells typically comprise a lower slotted section, surrounded by a filter pack of 10mm non-calcareous gravel and an upper plain section surrounded in part by a bentonite seal and in part by gravel or arisings. The top of the plain pipe is cut off below ground level and the monitoring well protected by a square, stopcock type manhole cover set in concrete, or the plain pipe is cut off just above ground level and the well protected by 100mm diameter steel borehole helmet set in concrete.

Monitoring well details, including the location of the response zone and bentonite seal are presented on the relevant exploratory hole logs.

In situ Testing

Where relative densities of granular materials given on the trial pit and window sample logs are based on visual inspection only, they do not relate to any specific bearing capacities. However, wherever possible, Sutcliffe Investigations employ a mackintosh probe to assess relative density. Mackintosh probe results can be related to approximate allowable bearing capacities.

The relative densities of granular materials encountered in cable percussive boreholes are based on Standard Penetration Test (SPT) results. SPTs are carried out boreholes, in accordance with BS 1377 2022.

Where full penetration (600mm) is not possible, “N” values are calculated by linear extrapolation and are shown on the logs as:

“N* = x.”

The strength of cohesive deposits is determined using a hand shear vane.

Shear strength test results reported on trial pit logs are considered to be more reliable than those reported on window sample logs. Significant sample disturbance occurs during window sampling and consequently shear strength results on disturbed window samples are generally lower than results obtained during trial pitting, in-situ or in large, excavated blocks.

Sampling

Representative soil/fill samples are taken at regular intervals from the exploratory holes to assist in description of the ground and to allow selected laboratory testing to be performed. The type of sample taken is dependent on the nature of the stratum and the purpose of the analysis.

Where the soils encountered contain a significant proportion of coarse-grained material, truly representative samples are not typically obtained – only the finer fraction is placed in sample containers. However, a visual estimate of the amount of coarse material is made on site.

NB: Coarse constituents not sampled are defined as: coarse gravel, cobble and boulder (i.e., any ‘particles’ with an average diameter greater than 20mm).

Occasionally, unrepresentative ‘spot’ samples are also taken from some exploratory locations for contaminant analysis, typically where unusual, localised pockets of materials are encountered.

Samples of soil for chemical testing are placed into 1 litre plastic tubs prior to delivery to the selected laboratory. Samples of water are taken in one litre brown glass bottles and stored in cool boxes, at a temperature of approximately 4°C, until delivery to the selected laboratory. Soil/fill samples for organic analysis are also stored in cool boxes.

Groundwater

Where encountered during fieldwork, groundwater is recorded on exploratory hole logs. If monitoring wells are installed, groundwater levels are also recorded on one or more occasions after completion of the fieldwork.

It should be borne in mind that the rapid excavation rates used during a ground investigation may not allow the establishment of equilibrium water levels. Water levels are likely to

fluctuate with season/rainfall and could be substantially higher at wetter times of the year than those found during this investigation.

Long term monitoring of standpipes of piezometers is always recommended if water levels are likely to have a significant effect on earthworks or foundation design.

3.3 Description of Strata

The soils encountered during a ground investigation are described (logged) in general accordance with BS5930:2015 (+A1:2020). The descriptions and depth of strata encountered are presented on the exploratory hole logs and summarised in the Ground Conditions section within the main body of text.

The materials encountered in the trial pits are logged, samples taken, and tests performed on the in-situ materials in the excavation faces, to depths of up to 1.2m; below this depth these operations are conducted at the surface on disturbed samples recovered from the excavation.

3.4 Health and Safety

All work was carried out in accordance with the procedures detailed in the Construction (Design and Management) Regulations 2015, Control of Asbestos Regulations 2012 and Manual Handling Operations Regulations 1992.

3.5 Geotechnical Laboratory Tests

General

Soil Samples are delivered to the laboratory for testing along with a schedule of testing drawn up by Sutcliffe Investigations. All tests are carried out in accordance with **BS 1377-2:2022.**

The test results are presented as received in an Appendix to this Geo-environmental Report. The following laboratory testing are routinely carried out on a selection of samples:

- Atterberg limits & moisture contents
- Particle Size Density (PSD)
- Soluble sulphate & pH

The additional tests are typically only scheduled where significant earthworks regrade is anticipated:

- Grading
- Compaction tests

Atterberg Limits & Moisture Content

The Liquid and Plastic Limits of samples of natural in-situ clay are determined using the cone penetrometer method and the rolling thread test. These tests enable determination of

an average Plasticity Index (PI) for each “type” of clay, although judgement is applied where variable results are reported.

PI can be related to shrinkability (low, medium or high) and then to minimum founding depth. Sutcliffe Investigations typically only consider a soil to be shrinkable if the proportion finer than 63µm is > 35%.

PI results are compared against guidance given in the NHBC Standards, Chapter 4.2 which advocates the use of modified Plasticity Index (I’p) defined as:

I’p = PI x (% <425µm/100)

i.e., if PI is 30%, but the soil contains 80% < 425µm, then I’p = 30 x 80/100 = 24%

It should be noted that in accordance with the requirements of BS 1377, the % passing the 425µm sieve is routinely reported by testing labs.

Sutcliffe Investigations apply engineering judgement where PI results are spread over a range of classifications. Consideration is given to:

- The average values for each particular soil type (i.e., differentiate between residual soil and alluvium)
- The number of results in each class and
- The actual values

Unless the judgement strongly indicates otherwise, Sutcliffe Investigations typically adopt a conservative approach and recommend assumption of the higher classification.

Soluble Sulphate and pH

Sulphates in soil and groundwater are the chemical agents most likely to attack sub-surface concrete, resulting in expansion and softening of the concrete to a mush. Another common cause of concrete deterioration is groundwater acidity.

The rate of chemical attack depends on the concentration of aggressive ions and their replenishment at the reaction surface. The rate of replenishment is related to the presence and mobility of groundwater.

Sutcliffe Investigations refer to **BRE Special Digest 1 (SD1) 3rd Edition (+A1:2017) “Concrete in aggressive ground”**.

SD1 provides definitions of:

- The nature of the site (Greenfield or Brownfield)
- The groundwater regime (static or mobile)
- The Design Sulphate Class (DC Class) and
- The Aggressive Chemical Environment for Concrete (ACEC Class)

Sutcliffe reports clearly state each of the above for the site being considered.

The concentrations of sulphate in aqueous soil/fill extracts are determined in the laboratory using the gravimetric method. The results are expressed in terms of SO_4 for direct comparison with BS 8500-1:2015+A2:2019. The pH value of each sample was determined by the electrometric method.

SD1 also discusses determination of "representative" sulphate concentration from a number of tests. Essentially if <10 samples of a given soil-type have been tested, the highest measured sulphate concentration should be taken. If >10 samples have been tested, the mean of the highest 20% of the sulphate test can be taken. With respect to groundwater, the highest sulphate concentration should always be taken.

With respect to pH (soil & groundwater) the value used is the lowest value if <10 samples have been tested and the mean of the lowest 20% if >10 samples have been tested.

3.6 Contamination Laboratory Analysis & Interpretation (including WAC)

General

An assessment of potential contaminants associated with the former usages of the site is undertaken with reference to:

- Environment Agency Guidance Land Contamination Risk Assessment (LCRM)(2020).
- SCI SC050021/SR3 (2009).
- DEFRA Contaminated Land Statutory Guidance (2012).
- CL:AIRE Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration (2020).
- DEPARTMENT OF THE ENVIRONMENT (DoE) Industry Profile(s).

Common Inorganic Contaminants

These include:

- Metals, most notably cadmium, copper, chromium, mercury, lead, nickel and zinc
- Semi-metals, most notably arsenic, selenium and (water soluble) boron
- Non-metals, most notably sulphur
- Inorganic anions, most notably cyanides (free & complex), sulphates, sulphides and nitrates

With respect to the terminology used by most analytical laboratories:

- Total cyanide = Free cyanide + Complex cyanide
- Total cyanide (CN) is determined by acid extraction, whereas free cyanide is the water-soluble fraction.
- Complex cyanide is "bound" in compounds and is hard to breakdown. Laboratory determination of complex CN involves subjecting the sample to UV digestion for determination of both free and total CN.
- Thiocyanate (SCN) is a different species combined with sulphur.
- Elemental sulphur (S) and free sulphur are the same. Total sulphur is all forms, including that present in sulphates (SO4) sulphates, etc.

- There are 2 forms of chromium (Cr), chromium VI and chromium III. Chromium VI is the more toxic of these. In soils, total chromium is determined by a strong aqua regia acid digestion. Chromium VI is an empirical method based on a water extract test.

Common Organic Contaminants

Petroleum hydrocarbons are a mixture of hydrocarbons produced from the distillation of crude oil. They include Aliphatics (alkanes, alkenes and cycloalkanes), aromatics (single or multi benzene ringed compounds) and hydrocarbon-like compounds containing minor amounts of oxygen, sulphur or nitrogen.

Petroleum hydrocarbons can be grouped based on the carbon number range:-

- **GRO** – Gasoline Range Organics (typically C6 to C10). Also referred to as PRO – Petroleum Range Organics
- **DRO** – Diesel Range Organics (typically C10 to C28)
- **LRO** – Lubricating Oil Range Organics (typically C28 to C40)
- **MRO** – Mineral Oil Range Organics (typically C18 to C44)

Total Petroleum Hydrocarbons (TPH) is also a poorly defined term; some testing laboratories regard TPH as hydrocarbons ranging from C5 – C40, whereas other define TPH as C10 – C30. The composition of a TPH plume migrating through the ground can vary significantly; this is primarily dictated by the nature of the source (e.g., petrol, diesel, engine oil, etc.). Furthermore, different hydrocarbons are affected differently by weathering processes, and this can result in further variation in the chemical composition of the TPH.

Gasoline contains light aliphatic hydrocarbons rapidly (especially within the C4 to C5 range) that will evaporate. The aromatic hydrocarbons in gasoline are primarily benzene, toluene, ethylbenzene and xylenes, referred to as BTEX. Small amounts of polyaromatic hydrocarbons (PAHs) such as benzo(a)pyrene may also be present.

Diesel and light fuel oils have higher molecular weights than gasoline. Consequently, they are less volatile and less water soluble. About 25 to 35% is composed of aromatic hydrocarbons. BTEX concentrations are generally low.

Heavy Fuel Oils are typically dark in colour and considerably more viscous than water. They contain 15 to 40% aromatic hydrocarbons. Polar NSO compounds are also present.

Lubricating Oils are relatively viscous and insoluble in groundwater. They may contain 10 to 30% aromatics, including the heavier PAHs. NSO compounds are also common.

Polycyclic Aromatic Hydrocarbons (PAHs) have more than two fused benzene rings as a structural characteristic. PAH compounds are present in both petrol and diesel, although insignificantly lower concentrations than in coal tars. Certain PAH compounds are carcinogenic (Benzo(a)pyrene) and/or mobile in the environment (naphthalene).

Polychlorinated Biphenyls (PCBs)

Volatile Organic Compounds (VOCs) The volatile organic compound (VOC) headspace concentration of all soil samples was made with a photoionization detector (PID) fitted with

a 10.2 eV lamp. This gives a semi-quantitative VOC concentration record as parts per million (ppm) (Vol/Vol). Prior to the VOC headspace reading, the background levels of VOCs were recorded. The PID was recalibrated with standard isobutylene in zero air after every 10 headspace readings.

Semi-Volatile Organic Compounds (sVOCs) Phenols

Solvents, pesticides, herbicides

Dioxins & furans

Methods of Analysis (Organic Compounds)

Toluene Extractable Matter (TEM) results provide a screening test for organic contamination. The sample is air dried a 30°C and ground prior to addition of the solvent (toluene). The solvent extraction is aggressive and most organic compounds (fuels, oils, tars, humic material, animal fats and vegetable oil) are dissolved, as are some other inorganic contaminants such as sulphur. However, the volatiles (lighter fuel fraction, etc.) are lost during evaporation of the solvent.

Total Petroleum Hydrocarbon (TPH) by IR (also known as mineral oil by some testing laboratories) is undertaken on “as received” samples. Tetrachloroethylene is the solvent, and fluoroscil is used to removed humic material, animal fats and vegetable oil. Consequently, this analysis detects a wide range of “mineral” organics from volatiles (BTEX and gasoline) through diesel and oils to tars (including the very heavy, stable tars such as asphalt and bitumen).

TPH by GC-FID is more refined analytical technique which only detects hydrocarbons (aliphatic and aromatic) in the range C10 to C40 (volatiles, heavy tars, humic material and sulphur are not detected). The laboratory can provide a breakdown of the TPH results into diesel range organics (DRO) and heavier lubricating oil range organics (LRO).

GRO (PRO) by GC-FID analysis detects the more volatile C6 – C9 hydrocarbons (aliphatic and aromatic) including those organic compounds present in petrol.

Speciated VOC (by GC-MS) analysis quantifies the concentrations of 30 USA-EPA priority compounds. These include chlorinated alkanes and alkenes (in the molecular weight range chloroethane to tetrachloroethane); trimethlybenzenes; and the 4 BTEX compounds (benzene, ethylbenzene, toluene & xylene).

Speciated sVOC by (GC-MS) analysis quantifies the concentration of a variety of organic compounds, including the 16 USA-EPA priority PAHs, phenols, 7 USA EPA priority PCB congeners, herbicides & pesticides.

Note: PAHs are hydrocarbons and consequently (where present) will be picked up when scheduling TPH by GC-FID. Naphthalene (the lightest PAH) is also one of the 58 US EPA VOCs.

Speciated TPH by GC-FID provides a “banded ”TPH”, initially split into aromatic and aliphatic fractions and then further divided into fraction specific carbon bandings based upon behavioural characteristics.

Note: Risk assessment models require physiochemical properties (solubilities, toxicitities, etc.) of compounds in order to model their behaviour in the environment. These physiochemical properties cannot be derived from a single "TPH", "GRO" or "DRO" value.

However, the carbon banded fractions can be used in risk assessment models. If the relative proportion of each carbon banding within the "TPH" impact at a site is known, the risks posed by each individual fraction can be assessed and a simple back calculation applied to calculate an overall

"TPH" screening value based upon the percentage weight fraction of each banding present in the "TPH". Specialised analytical techniques and data interpretation skills are required to identify each carbon banding.

Analysis Interpretation

General Quantitative Risk Assessment for human health is in accordance with LCRM and SR (SC050021 series) (DEFRA) guidance as well as CL:AIRE Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration (2020) and comprises the following:

- Selection of appropriate General screening values for human health assessment.
- Creation of relevant datasets from which to undertake the assessment.
- Assessment of contamination distribution and comparison of site data to screening values using relevant statistical tests (in accordance with CIEH guidance).
- Assessment of risks to receptors.
- Determination of requirements for further investigation or remediation.

The purpose of human health risk assessment for planning is to decide whether the land is suitable for the proposed end use and does not pose a risk to human health.

The LQM/CIEH 'Suitable 4 Use Levels' (S4ULs) follow on from the previous LQM/CIEH General Assessment Criteria. The assessment criteria have been updated in line with developments in UK human health risk assessment since 2009, in particular the additional land uses and exposure assumptions presented in Defra's recent C4SL guidance. However, the S4ULs are all based on Health Criteria that represent minimal or tolerable levels of risks to health as described in the Environment Agency's SR2 guidance, ensuring that the resulting assessment criteria are 'suitable for use' under planning.

For each substance, S4ULs have been derived for six General land uses (including the two Public Open Space land uses defined in C4SL guidance) and a range of Soil Organic Matter contents (organic contaminants only).

Note: There is no S4UL provided for Lead contaminant, hence Category 4 Screening Levels (C4SL) are used for the Long-Term Human Health assessment.

Statistical analysis is in accordance with CL:AIRE publication Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration (2020).

Utilising the 2-way confidence interval method, the likelihood of whether the true mean is less than the critical concentration can be calculated and aid with decision making in terms of further investigation or remediation.

This assessment will be using an 85% confidence interval to state that:

There is an 85% chance that the true mean concentration level of the contaminant in this sampling zone lies between x and y mg/kg.

A 99% confidence interval will be used to state that:

There is a 99% chance that the true mean concentration level of the contaminant in this sampling zone will not lie outside x and y mg/kg.

The potential risk to building materials is considered through reference to relevant BRE Digests, with particular emphasis on BRE Special Digest 1 (SD1) 3rd Edition (+A1:2017) “Concrete in aggressive ground (2005)”.

With respect to the interpretation of the calorific values, at present there are no accepted methods to assess whether a sample is combustible and under what circumstances it might smoulder.

Tier 1 Groundwater Risk Assessments are undertaken by comparing leachate concentrations with the appropriate water quality standard.

Based on the Preliminary Risk Assessment and Ground Model for this site, a Level 1 Screening Assessment has been undertaken in general accordance with Environment Agency guidance Environment Agency Remedial Targets Methodology, Hydrogeological Risk Assessment for Land Contamination, 2006.

The methodology comprises:

- Identification of potential contaminant linkages.
  - Selection of appropriate General screening values for controlled waters.
  - Screening measured concentrations of leachate against the General screening values available for UK Drinking Water Standards (UK DWS) and Environmental Quality Standards (EQS).
- Assessment of contaminant distribution and risk to receptors.
  - Identification of contaminants of concern and relevant contaminant linkages.
  - Identification of potential contaminants and contaminant linkages which are no longer of concern.

Depending upon the specific characteristics and environmental setting of the site the appropriate standard is likely to be one of the following:

- SI 2019/526 Environment, Food and Rural Affairs (Miscellaneous Amendments, etc.) Regulations 2019
- Environmental Quality Standards (for Freshwater)
- The Surface Waters (Abstraction for Drinking Water) Regulations

The Tier 1 risk assessment of landfill gas is undertaken through reference to the following documents:

- Approved Document C, Building Regulations 2010
- CIRIA Report 149, “Protecting Development from Methane”, 1995

Should any Tier 1 criteria be exceeded, then three potential courses of action are available. (The first is only applicable in terms of human health, but the second and third could also be applied to groundwater or landfill gas).

- Undertake further statistical following the approach set out in CL:AIRE publication Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration (2020)in order to determine whether contaminant concentrations of inorganic contaminants within soil/fill actually present a risk (only applicable to assessing the risk to human health).
- Based on a qualitative risk assessment, advocate an appropriate level of remediation to "break" the pollutant linkage – for example, the removal of the contaminated materials or the provision of a clean cover.
- Carry out a more detailed quantitative risk assessment in order to determine whether contamination risks actually exist.

3.7 Waste Classification & WAC

In accordance with the Landfill Regulations (2005) and Waste Framework Directive (WFD) (2008/98/EC), it is a statutory requirement that waste is characterised and also meets specific Waste Acceptance Criteria (WAC) prior to disposal at a landfill site. The waste producer has a Duty of Care to ensure that the waste is characterised, and the landfill operator must also be satisfied that a Preliminary Waste Classification, is properly completed before the waste is accepted.

If arisings from constructions works or other waste materials are intended for disposal then there is a requirement to determine prior to disposal whether these would classify as:

- Hazardous
- Non hazardous

The Environment Agency's technical guidance 'Waste Classification (WM3, 1st edition 2015)' which came into force on 1st July 2015, sets out the requirement for the classification. It also provides the basis for the methodology to employ in order to ensure compliance with the regulations.

The classification assesses the composition of the material and determines the concentrations of the hazardous substances in the material. The assessment of contaminated soil (excavated soil) to determine whether it is hazardous waste is dependent on the presence of "hazardous substances" exceeding particular thresholds.

The basic characterisation requires solids testing for potential contaminants, derived from the knowledge of the site history (in the case of contaminated soil) or product safety data sheet (in the case of other waste products).

The characterisation also determines the most appropriate List of Waste (LoW) code(s) for the waste. The List of Wastes (England) Regulations 2005 shows those wastes that are absolute entries (hazardous waste regardless of their concentration) and mirror entries (hazardous waste only if dangerous substances are present above threshold concentrations).

The Waste Acceptance Criteria (WAC) became mandatory in 2005 following the introduction of the Landfill Regulations.

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.

The WAC testing includes solids and leachate testing to assess which class of landfill the waste can be accepted at.

Currently there are only acceptance criteria for inert, stable-non-reactive hazardous and hazardous landfills. This means that WAC testing is only required for wastes destined for Inert, SNRH and Hazardous landfills.

If material is classified as non-hazardous, there is a choice of sending the material to a non-hazardous or an inert landfill (subject to meeting inert waste acceptance levels). Where the material is classified as hazardous, WAC analysis will be required to demonstrate that it meets the acceptance levels for hazardous landfill or stable non-reactive hazardous (SNRH) landfill.

3.8 Hazardous Gas

General

A ground gas risk assessment is undertaken in general accordance with the British Standard BS8485:2015+A1:2019, “Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings”.

The guidance is written specifically for use by designers of gas protection measures relating to the development of a site. Reference is also made to the CIRIA document C665:2007: “Assessing Risks Posed by Hazardous Ground Gases to Buildings” and to the Health and Safety Executive document EH40/2005 “Workplace Exposure Limits”.

Our assessment comprises the following:

- Review of results.
- Calculation of Hazardous Gas Flow Rate for Methane (CH_4) and Carbon Dioxide (CO_2)
- Assessment of risks from ground gas.
- Development options.

Hazardous gas is considered to be any mixture of potentially explosive, toxic or asphyxiating gases, most notably methane, carbon dioxide and oxygen (deficiency).

In addition, radon, a naturally occurring radioactive gas is also considered.

Assessment of potential risks associated with hazardous gas are based on a review of data obtained from Envirocheck, the Environment Agency and the Local Authority and the British Geological Survey.

Reference is also made to historical OS plans, which are inspected for evidence of backfilled quarries, railway cuttings, colliery spoil tips, etc.

Sources

Potential sources of hazardous gas are:

- Landfill sites.
- Made ground, especially where significant depths are present.
- Shallow mineworks associated with coal extraction.
- Geological strata, including peat, organic silts, coal-bearing strata and limestone (reaction with acidic waters), granite (radon)
- Groundwater can sometimes act as a “carrier” for hazardous gas.
- Leakages from pipelines or storage tanks
- Sewers, septic tanks and cess pits

Generation

Wherever biodegradable material is deposited, landfill gas (principally a mixture of methane and carbon dioxide) is likely to be generated by microbial activity. Carbon dioxide is an asphyxiant and toxic; methane is flammable and a mixture containing between 5% and 15%

methane by volume in air is explosive. Landfill gas in the ground is unlikely in itself to pose a significant risk, though it may damage vegetation. However, infiltration of landfill gas into confined spaces (e.g., cellars, services, etc.) may give rise to considerable risk.

There is no typical figure for the length of time that landfill gas will be evolved, but at many sites significant gas generation continues for at least 15 years after the last deposit of waste.

Migration

Gas migration from a landfill site may occur in several ways. It may migrate through adjacent strata; the distance of migration being dependent on the pressure gradients, volume of gas and permeability of the strata. Where there are faults, cavities and fissures within the strata, gas may move considerable distances. Other migration pathways for gas include manufactured features such as mine shafts, roadways and underground services.

Gas migration is influenced by a number of climatic factors, such as atmospheric pressure variations, water table level variations and the influence of a covering of snow or ice over the surface of the site and surrounding area.

Gas Monitoring Procedure

Sutcliffe Investigations adopt a standard gas monitoring procedure, in accordance with CIRIA guidance. This procedure involves the measurement, in the following order of:

- Atmospheric temperature, pressure and ambient oxygen concentration on site immediately prior to and on completion of monitoring.
- Gas emission rate.
- Methane, oxygen and carbon dioxide concentrations using and infra-red gas analyser.
- Standing water level using a Dipmeter.

In addition, ground conditions at each sampling location are recorded together with prevailing weather conditions and any other observations such as any vandalism.

Where samples of gas are required for laboratory analysis, Gresham Tubes are used. Gas concentrations in the well are typically recorded immediately before and after retrieval of a sample.

Appendix B – CIRIA Guidance Document C552 2001

Risk Assessment Methodology

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1 Risk Assessment Methodology

1.1 General

The purpose of this appendix is to describe in detail the concepts underlying the risk-based approach to assessing potentially contaminated land, introduce the roles of key legislation and describe the qualitative methodology adopted for evaluating and characterising risk.

Current best practice in the UK promotes a risk-based approach to dealing with both soil and groundwater contamination. The principal aim of the approach is to ensure protection of human health and the environment in a thorough, transparent and cost-effective manner.

Fundamental to the risk-based approach is the concept that for 'Contaminated Land' to be designated, as a consequence of historic activities, a pathway for contamination must be shown to exist between a source of contamination and a receptor. The combined presence of a source, pathway and a receptor is described as a 'pollutant linkage'.

The concepts associated with a contaminant source, pathway and receptor are defined in DETR Circular 02/2000 'Contaminated Land Environmental Protection Act 1990: Part II A'. A source of contamination may be considered as a 'substance, which is in, on or under land that has the potential to cause harm or to cause pollution of controlled waters'. A receptor can be considered as either 'a living organism, a group of living organisms, an ecological system or a piece of property which is being, or could be harmed, by a contaminant or controlled waters which are being, or could be, polluted by a contaminant'.

A pathway may be considered as one or more routes by, or through, which a receptor is being, or could be, exposed to or affected, by a contaminant. Typical pathways may include migration in groundwater, surface water run-off or infiltration, inhalation, dermal contact and ingestion.

The risks posed by an identified pollutant linkage can often be mitigated by removing the source of contamination, treating the source of contamination, blocking the relevant pathway(s) or by protecting the receptor.

1.2 Principles of Risk Evaluation

The risk evaluation methodology presented below is qualitative in nature and is therefore a subjective method. It is based upon guidance presented in CIRIA publication referenced C552, 'Contaminated land risk assessment - A guide to good practice', 2001 and involves the classification of the following.

- The magnitude of the potential consequence (severity) of risks occurring (Table 1.1).
- The magnitude of the probability (likelihood) of the risk occurring (Table 1.2).
- These are then considered in conjunction to give a risk matrix (Table 1.3).

Table 1.1: Classification of Consequence

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environmental Protection Act 1990, Part IIA. Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem (note the definitions of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health ("significant harm" as defined in DETR, 2000). Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem. (Note: the definitions of ecological systems within Draft Circular on Contaminated Land, DETR, 2000).	Concentrations of a contaminant from site exceed the generic or site-specific assessment criteria. Leaching of contaminants from a site to a major or minor aquifer. Death of a 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 the Draft Circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/structures/ services or the environment.	Pollution of non-classified groundwater. Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discolouration of concrete.

Table 1.2: Classification of Probability

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

Table 1.3: Risk Assessment Matrix

Consequence					
Severe	Medium	Mild	Minor		
Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk	High Likelihood	Probability
High Risk	Moderate Risk	Moderate / Low Risk	Low Risk	Likely	
Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk	Low Likelihood	
Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk	Unlikely	
Low Risk	Very Low Risk	Very Low Risk	Very Low Risk	Negligible Likelihood	

1.3 Risk Classification and Action Requirements

This table categorises the risk of pollution events based on the presence and conditions of pollution linkages. It outlines five levels, ranging from imminent or almost inevitable events with evidence of harm, to scenarios where an event is extremely unlikely even over an extended period. This structured assessment aids in evaluating environmental risks and prioritising mitigation measures accordingly.

Table 1.4: Description of the classified risks and likely action required

Very High Risk	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 to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High Risk	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 (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate Risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild.

	Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low Risk	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 Risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

2 Risk Assessment for the Water Environment

2.1 General

The risk assessment has been developed to provide a greater level of standardisation. It includes relevant elements from TAG (Transport Analysis Guidance) Table 1 relating to the features described as river, floodplain, groundwater and stillwaters, including their attributes/services and selected/modified indicators of quality and possible measures. Two additional columns have been added for 'grading' and 'importance level'.

These columns expand on the limited number of examples provided in TAG Table 2.

2.2 Principles of Risk Evaluation

Table 2.1 has been developed with reference to TAG, Highways Agency's 'New Approach to Appraisal' (NATA), the Water Framework Directive and other sources as referenced in the table.

Table 2.1 here relies on easily available data to avoid unnecessary data collection. Should inadequate data be available a 'worst case' should be assumed. The table is designed to act as a guide to determining importance and to raise the level of compatibility in predicting the significance of impacts on the water environment.

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Table 2.1: Water features, their attributes, indicators of quality, grading and importance

Feature	Attribute / Service	Indicator of Quality	Measure	Grading	Importance Level
River	Water Supply	Chemical water quality	Environment Agency's Chemical General Quality Assessment (GQA)	A	Very High
				B	High
				C-D	Medium
				E-F	Low
		Industrial / agricultural abstractions	Location and volume of abstraction	All abstractions within 2km downstream:	
				>1000m^3/day	Very High
				500-1000m^3/day	High
				50-499m^3/day	Medium
				<50m^3/day	Low
		Drinking water supply	Classification defined within The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996. No 3001[2]	Classification:	
				DW1 or DW2 within critical travel time for pollution downstream	Very High
				DW3 within critical time downstream	High
				Not designated	Medium - Low
	Biodiversity[3]	Biological Water Quality	Environment Agency's Biological GQA[1]	A	Very High
				B	High
				C-D	Medium
				E-F	Low
		Fisheries Quality	Fisheries status as defined within the Freshwater Fish Directive 78/659/EEC	Designated salmonid fishery	Very High
				Designated cyprinid fishery	High
				Undesignated fishery	Medium
				Not a fishery	Low
	Transport and dilution of waste product	Surface Water / effluent discharges	Type of discharges with reference to the EC Dangerous Substances Directive (76/464/EEC and Daughter Directives)	All discharges within 2km up or downstream:	
				List I	Very High - High
				List II	Medium
				Other discharge / no discharge	Medium - Low
	Recreation	Riverside access	Presence / absence of route and importance	National trail / cycleway	Very High
				Regional trail	High
				Definitive footpath / bridleway	Medium
				No route	Low
		Presence of clubs / recreation use	Presence / absence	Club recreation use present	Very High - High - Medium
				No club / recreation use	Low
	Conveyance of flow and material	Presence of water courses	Size of watercourses[5]	Main River > 10m wide	Very High
				Main River < 10m wide	High
				Ordinary watercourse >5m wide	Medium
				Other	Low
Floodplain	Flood defence	Importance in relation to flood defence	Status of flood plain area	Designated washland	Very High
				Active floodplain	High
				Existing defended area	Medium
				Does not flood	Low
			Return period	> (i.e. more frequent then) 1 in 25 years	Very High
				< 1 in 25 years	High
				<1 in 100 years (urban)	Medium
				<1 in 50 years	Medium
				<1 in 200 years	Low

Feature	Attribute / Service	Indicator of Quality	Measure	Grading	Importance Level
Groundwater	Water supply	Industrial / agricultural abstractions	Location and volume of abstraction	All abstraction points within zone of influence of development:	
				>1000m^3/day	Very High
				>500-1000m^3/day	High
				>50-499m^3/day	Medium
				<50m^3/day	Low
		Drinking water supply	Presence of potable public supply or private water supply within zone of influence of development	Public supply	Very High
				Private water supply >10m3/day or serves >50 people6	High
				Other private water supply	Medium
				No supply	Low
		Groundwater vulnerability	Source protection status	Within zone 1,2 or 3 of a source protection zone	Very High-High-Medium
				Not within a source protection zone	Low
			Classification of aquifer vulnerability	Major aquifer with H soils or I soils or U soils.	Very High
				Minor aquifer with H soils or U soils	High
				Major aquifer with L soils.	Medium
				Minor aquifer with L soils or non aquifer.	Low
	Conveyance of flood flows	Acceptance potential of flood flows	Soil type / groundwater table levels8	Gravels with low water table (>1m below infiltration point)	Very High
				Sands with low water table	High
				All soil types with high water table	Medium
				Clay	Low
Stillwaters (lakes and ponds)	Biodiversity[3]	Biological water quality	Classification system to be developed under the Water Framework Directive for ecological status / potential		
		Fisheries quality	Fisheries status as defined within the Freshwater Fish Directive 78/659/EEC	Designated salmonid fishery	Very High-High
				Designated cyprinid fishery	High - Medium
				Undesignated fishery	Medium - Low
				Not a fishery	Low
	Water supply	Use for abstraction	Presence / absence	Abstraction	Very High - High – Medium[9]
				No abstraction	Low
	Recreation	Presence of clubs / recreation use	Presence / absence	Club recreation use present	Very High - High - Medium[4]
				No club / recreation use	Low

1. *If the river is unclassified and hence has no GQA grade, the quality can be measured, or assumptions can be made based on the grade of the nearest classified stretch.*
2. *An importance level of high or very high must also be awarded if the water feature provides more than 10m^3/day of drinking water, or serves more than 50 people, which is the definition used in the Water Framework Directive to define drinking water protected areas.*
3. *Conservation value is not included, as this should be included within an ecology/nature conservation assessment.*
4. *This required judgement on a case-by-case basis because the importance of use by people is being assessed, and they are sensitive to being categorised as unimportant. Careful assessment is thus required, using as much data as possible e.g. on the facilities, their scale and frequency of use, membership levels and economic value.*
5. *An importance level of 'Medium' or greater must also be awarded if a river has a catchment greater than 10km^2, as this means that it will be classified as a water body under the Water Framework Directive. Other measures are available for describing the ability of watercourses to convey flow and material (such as the carrying capacity of the channel for flood flows) and could if necessary be substituted.*
6. *Based on criteria given within the Water Framework Directive for features to be designated as drinking water protected areas.*
7. *Adapted from NRA Policy and Practice for the Protection of Groundwater, Groundwater Vulnerability Sheets, NRA 1994. Because soil information in urban areas is less reliable and based on fewer observations than in rural areas, the worst case is assumed, and such land is classified as being high of leaching potential. H = high, I = Intermediate, L = Low and U = Unclassified leaching potential.*
8. *This uses a coarse basis of permeability together with the ability of the existing ground conditions to accept additional flows. For example, gravels in a river floodplain are unlikely to have a high acceptance potential because of raised water table due to river flows. Sands above a relatively dry substrata would have a high potential; however, caution is required in areas such as chalk with highly fluctuating groundwater levels.*
9. *Depends on use of water, volume abstracted etc. An importance level of 'High' or 'Very high' must be awarded if the water feature provides more than 10m3/day of drinking water, or serves more than 50 people, which is the definition used in the Water Framework Directive to define drinking water protected areas.*

2.3 Risk Classification and Action Requirements

Once Table 2.1 has been used to determine the importance of the environmental attributes that may be affected by a particular development project, Tables 3 and 4 of TAG Unit 3.3.11 can be used to estimate the significance of potential impacts. These tables are reproduced here as Tables 2.2 and 2.3 respectively. Table 2.2 provides a methodology for determining impact magnitude. Table 2.3 is a matrix that allows the significance of the impact to be calculated based on the impact magnitude and the importance of the attribute. The significance of impacts can range from 'insignificant' to 'very significant'

Table 2.2: Criteria for determining impact magnitude

Magnitude	Criteria	Example
Major	Results in loss of attribute	• Loss of EC designated Salmonid fishery • Compromise employment source • Pollution of potable source of abstraction • Change in GQA grade of river reach • Loss of flood storage / increased flood risk
Moderate	Results in impact on integrity of attribute or loss of art of attribute	• Loss in productivity of a fishery • Contribution of a significant proportion of the effluent in the receiving river, but insufficient to change its GQA grade • Reduction in the economic value of the feature
Minor	Results in minor impact on attribute	• Measurable change in attribute, but of limited • size and/or proportion
Negligible	Results in an impact on attribute but of insufficient magnitude to affect the use / integrity	• Discharges to watercourse but no significant loss in quality, fishery productivity or biodiversity • No significant impact on the economic value of the feature • No increase in flood risk

Table 2.3: Significance Criteria of Potential Impacts

Magnitude of Potential impact	Importance of Attribute			
	Very High	High	Medium	Low
Major	Very Significant	Very Significant	Significant	Low Significant
Moderate	Very Significant	Significant	Low Significant	Insignificant
Minor	Significant	Low Significant	Insignificant	Insignificant
Negligible	Low Significant	Insignificant	Insignificant	Insignificant

Table 2.4: Significance Criteria of Potential Impacts

Feature	Attribute / Service	Importance Level	Magnitude of Impact	Significance of Impact
River	Water Supply	Very High	Minor	Significant

References

1-The Highways Agency et al, Design Manual for Roads and Bridges, Vol 11. Environmental Assessment, 1993.
2-DETR 'Guidance on the New Approach to Appraisal, 1998.
3-Department for Transport, Transport Analysis Guidance (TAG) 2003

Appendix C – Site Investigation Logs

Sutcliffe

Site	Borehole Number
Grey Mare Lane (2 sites), Manchester	BH101

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush :			Great Places	34338LG
Core Dia : mm	Location	Dates 11/12/2024	Engineer	Sheet
Method : Rotary Cored			Michael Wiggins	1/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(0.20) 0.20	MADE GROUND: Concrete		
0.50-0.80					ES1			MADE GROUND: black ashy slightly sandy fine to coarse angular GRAVEL and COBBLES. Gravel is of brick		
							(1.50)			
1.20-1.65					1,1/2,1,2,2 SPT N=7					
							1.70			
							(0.30)	MADE GROUND: brown slightly gravelly CLAY. Gravel is fine to coarse angular and of brick and mixed lithology.		
2.00-2.45					3,4/4,5,5,8 SPT N=22		2.00			
								Very stiff brown silty sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular to angular and of mixed lithology		
3.00-3.45					3,3/4,4,5,6 SPT N=19					
4.00-4.45					U1 120 blows					
5.00-5.45					2,3/3,4,4,5 SPT N=16					
6.00-6.45					3,3/3,4,4,5 SPT N=16					
							(9.00)			
7.00-7.45					3,3/3,4,5,6 SPT N=18					
9.00-9.45					U2 120 blows					

Remarks
Borehole dry
Rotary Core follow on from 15.00m (bgl)

Scale (approx)	Logged By
1:50	MW

Figure No. 34338LG.BH101

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Sutcliffe			Site: Grey Mare Lane (2 sites), Manchester	Borehole Number: BH101
Machine : Flush : Core Dia : mm Method : Rotary Cored	Casing Diameter	Ground Level (mOD)	Client: Great Places	Job Number: 34338LG
	Location	Dates: 11/12/2024	Engineer: Michael Wiggins	Sheet: 2/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
								... as previous cont...Stiff brown silty sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular to angular and of mixed lithology		
10.50-10.95					4,4/5,7,7,8 SPT N=27					
							11.00	Very stiff brown sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular to angular and of mixed lithology		
12.00-12.23					15,10/35,15 SPT 25*/125 50/100		(2.50)			
13.50-13.70					25/30,20 SPT 25*/75 50/125		13.50	Grey and brown, highly weathered, clayey, laminated MUDSTONE.		
							(1.00)			
							14.50	Grey, highly weathered, clayey, laminated MUDSTONE.		
							(0.50)			
15.00							15.00			
15.00-15.10				NR	25/50 SPT 25*/50 50/45			Grey, highly weathered MUDSTONE. Recovered as gravelly clay.		
15.60	59	0	0	NI			(1.50)			
16.50				NR			16.50			
16.51				7			(0.70)	Grey becoming dark grey, moderately weathered MUDSTONE. Recovered locally as gravelly clay. Discontinuites are very close to medium spaced, horizontal, clean, smooth and tight. 16.50-16.52m: No recovery		
17.20	99	57	35	NI			17.20	Grey MUDSTONE. Fresh. 17.20-17.75m: Not intact, Recovered as clayey GRAVEL.		
17.80				9						
18.00				NR				18.00-18.01m: No recovery.		
18.01				NI				18.01-18.50m: Not intact, recovered as gravelly clay.		
18.60	95	95	32	4						
19.00				NI			(3.72)	19.00-19.50m: Not intact, recovered as gravelly clay.		
19.50				NR				19.50-19.60m: No recovery.		
19.51										

Remarks
Borehole dry
Rotary Core follow on from 15.00m (bgl)

Scale (approx)	Logged By
1:50	MW

Figure No. 34338LG.BH101

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Sutcliffe

Site	Borehole Number
Grey Mare Lane (2 sites), Manchester	BH101

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush :			Great Places	34338LG
Core Dia : mm	Location	Dates 11/12/2024	Engineer	Sheet
Method : Rotary Cored			Michael Wiggins	3/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				1				... as previous cont...Grey MUDSTONE. Fresh.		
21.00							20.92 21.00	Grey fine grained SANDSTONE. Fresh. Complete at 21.00m		

Remarks
Borehole dry
Rotary Core follow on from 15.00m (bgl)

Scale (approx)	Logged By
1:50	MW

Figure No. 34338LG.BH101

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Sutcliffe

Site	Borehole Number
Grey Mare Lane (2 sites), Manchester	BH102

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush :			Great Places	34338LG
Core Dia : mm	Location	Dates 09/12/2024	Engineer	Sheet
Method : Rotary Cored			Michael Wiggins	1/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							0.10	MADE GROUND: Asphalt.		
0.40-0.80					ES1		(1.10)	MADE GROUND: black fine to coarse angular GRAVEL and COBBLES of brick and ash.		
1.20-1.65					2,2/3,3,4,5 SPT N=15		1.20 (0.50)	MADE GROUND: brown slightly gravelly, CLAY. Gravel is angular fine to coarse of brick and mixed lithology.		
2.00-2.45					U1 125 blows		1.70	Very stiff brown silty sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular to angular and of mixed lithology		
3.00-3.45					3,4/4,6,7,9 SPT N=26					
4.00-4.45					2,3/4,5,7,7 SPT N=23					
5.00-5.45					U2 100 blows					
6.00-6.45					3,3/4,5,6,6 SPT N=21					
7.50-7.95					3,4/5,6,7,7 SPT N=25		(10.80)			
9.00-9.45					4,4/5,7,7,8 SPT N=27					

Remarks
Borehole dry
Rotary core follow on from 15.00m (bgl)

Scale (approx)	Logged By
1:50	MW

Figure No. 34338LG.BH102

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Sutcliffe

Site	Borehole Number
Grey Mare Lane (2 sites), Manchester	BH102

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush :			Great Places	34338LG
Core Dia : mm	Location	Dates 09/12/2024	Engineer	Sheet
Method : Rotary Cored			Michael Wiggins	2/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
								... as previous cont...Stiff brown silty sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular to angular and of mixed lithology		
10.50-10.95					5,6/7,7,8,8 SPT N=30					
12.00-12.45					U3 130 blows		12.50	Very stiff brown sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular to angular and of mixed lithology		
13.50-13.95					6,8/10,11,13,16 SPT N=50		(1.50)			
							14.00	Grey and brown highly weathered clayey laminated MUDSTONE.		
							(1.31)			
15.00					20,5/40,10 SPT 50/195			15.00-15.31m: No recovery.		
15.00-15.35				NR						
15.31				NI			15.31	Brown highly weathered MUDSTONE with inclusions of sandstone. Highly weathered. Recovered as gravel and clay.		
15.50				NI			(0.49)	15.31-15.50m: Not intact, recovered as gravel.		
15.80	79	45	41	6			15.80	15.50-15.80m: Not intact, recovered as gravelly clay.		
16.50				NR				Grey occasionally brown slightly weathered fine to medium grained, SANDSTONE with brown staining on fracture faces. Discontinuities are extremely close to medium spaced, horizontal, clean, rough and tight.		
16.51				NI				16.5-16.52m: No recovery		
16.53				35				16.52-16.60m: Not intact, recovered as gravel.		
16.90	99	89	52	8						
18.00				NR				18.00-18.02m: No recovery		
18.01				NI			(4.88)	18.02-18.08m: Not intact, recovered as gravel.		
18.02	99	95	62	12						
19.50				NR				19.5-19.51: No recovery		
19.51										

Remarks
Borehole dry
Rotary core follow on from 15.00m (bgl)

Scale (approx)	Logged By
1:50	MW

Figure No. 34338LG.BH102

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Sutcliffe

Site	Borehole Number
Grey Mare Lane (2 sites), Manchester	BH102

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush :			Great Places	34338LG
Core Dia : mm	Location	Dates 09/12/2024	Engineer	Sheet
Method : Rotary Cored			Michael Wiggins	3/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	99	77	29	15				... as previous		
20.68				NI			20.68			
20.90				13			(0.32)	Grey highly weathered MUDSTONE. Recovered as gravel and clay.		
21.00							21.00	20.68-20.9: Not intact, recovered as gravelly.		
								Complete at 21.00m		

Remarks
Borehole dry
Rotary core follow on from 15.00m (bgl)

Scale (approx)	Logged By
1:50	MW

Figure No. 34338LG.BH102

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Sutcliffe

Site	Borehole Number
Grey Mare Lane (2 sites), Manchester	BH103

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush :			Great Places	34338LG
Core Dia : mm	Location	Dates 10/12/2024	Engineer	Sheet
Method : Rotary Cored			Michael Wiggins	1/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(0.30) 0.30	MADE GROUND: Concrete		
0.60-0.90					ES1			MADE GROUND: black ashy slightly sandy fine to coarse angular GRAVEL and COBBLES. Gravel is of brick		
							(1.30)			
1.20-1.65					2,3/1,4,5,15 SPT 25/0					
							1.60 (0.20) 1.80	MADE GROUND: Concrete - possible basement floor slab.		
2.00-2.13					25/50 SPT 25*/60 50/70			Very stiff brown silty sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular to angular and of mixed lithology		
							(1.20)			
							3.00			
3.00-3.45					U1 130 blows			Very stiff brown sandy gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular to angular and of mixed lithology		
4.00-4.45					3,4/4,4,6,6 SPT N=20					
							(3.00)			
5.00-5.45					3,4/5,5,6,7 SPT N=23					
6.00-6.45					3,3/3,4,5,4 SPT N=16		6.00	Very stiff brown silty sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular to angular and of mixed lithology		
7.50-7.95					3,3/4,5,6,6 SPT N=21					
9.00-9.45					3,3/4,5,7,7 SPT N=23					

Remarks
Borehole dry
Rotary core follow on from 15.00m (bgl)

Scale (approx)	Logged By
1:50	MW

Figure No. 34338LG.BH103

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Sutcliffe			Site: Grey Mare Lane (2 sites), Manchester	Borehole Number: BH103
Machine : Flush : Core Dia : mm Method : Rotary Cored	Casing Diameter Location	Ground Level (mOD) Dates: 10/12/2024	Client: Great Places Engineer: Michael Wiggins	Job Number: 34338LG Sheet: 2/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(8.50)	... as previous cont...Very stiff brown silty sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular to angular and of mixed lithology		
10.50-10.95					U2 120 blows					
12.00-12.45					4,5/6,7,8,8 SPT N=29					
13.50-13.95					5,6/6,7,8,9 SPT N=30					
							14.50	Heavily weathered, grey, clayey MUDSTONE.		
15.00 15.00-15.12				NR	25/50 SPT 25*/65 50/55		(1.28)	15.00-15.78: No recovery.		
15.78	48	41	41	3			15.78	Brownish grey, moderately weathered MUDSTONE. Recovered as clay and gravel. Discontinuities are medium spaced, horizontal, clean, smooth and tight.		
16.40 16.50 16.60 16.61 16.70 16.75 16.85	100	88	74	NI NI NI 14 3			(0.83) 16.61 (0.29) 16.90	16.40-16.50: Not intact, recovered as gravel. 16.50-16.61: Not intact, recovered as clay. Brownish grey, moderately weathered, fine to medium grained SANDSTONE recovered locally as gravel. Discontinuities are closely spaced, horizontal, clean, rough. 16.69-16.75: Not intact, recovered as gravel. Grey becoming dark, highly weathered MUDSTONE with rare inclusions of sandstone recovered as clayey gravel. Discontinuities are close to widely spaced, horizontal, clean, smooth and tight.		
18.00 18.20 18.35 18.50 18.55 18.75 18.80 18.90 19.30 19.50	87	36	25	NR NI 6 NI 5 NI 12 NI NI NI			(2.14) 19.04	18.00-18.20: No recovery. 18.20-18.35: Not intact, recovered as gravel. 18.50-18.56: Not intact, recovered as clayey gravel. 18.72-18.78: Not intact, recovered as clayey gravel. Grey becoming dark grey, highly weathered MUDSTONE with rare inclusions of sandstone. Highly weathered recovered as clayey gravel. 18.96-19.04: Not intact, recovered as clayey gravel. 19.30-19.50: Not intact, recovered as clay. 19.50-20.00: No recovery.		

Remarks
Borehole dry
Rotary core follow on from 15.00m (bgl)

Scale (approx)	Logged By
1:50	MW

Figure No. 34338LG.BH103

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Sutcliffe

Site	Borehole Number
Grey Mare Lane (2 sites), Manchester	BH103

Machine :	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush :			Great Places	34338LG
Core Dia : mm	Location	Dates 10/12/2024	Engineer	Sheet
Method : Rotary Cored			Michael Wiggins	3/3

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
20.30	48	0	0	NI			(1.96)	... as previous 20.30-21.00: Not intact: recovery as clayey gravel.		
21.00							21.00	Complete at 21.00m		

Remarks
Borehole dry
Rotary core follow on from 15.00m (bgl)

Scale (approx)	Logged By
1:50	MW

Figure No. 34338LG.BH103

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Appendix D – Analytical Certificates

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 25/00047
Issue Number: 1 **Date:** 14 January, 2025

Client: Sutcliffe
18-20 Harrington Street
Liverpool
L2 9QA

Project Manager: (use) D Evans; D Bowen; A Tosh; W Baldwin/(use)Sar
Project Name: Grey Mare Lane (2 Sites)
Project Ref: 34338LG
Order No: 10673
Date Samples Received: 13/12/24
Date Instructions Received: 06/01/25
Date Analysis Completed: 14/01/25

Approved by:

[redacted]

Richard Wong
Client Manager

Envirolab Job Number: 25/00047

Client Project Name: Grey Mare Lane (2 Sites)

Client Project Ref: 34338LG

Lab Sample ID	25/00047/1	25/00047/2	25/00047/3					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH101	BH102	BH103							
Depth to Top	0.50	0.40	0.60							
Depth To Bottom	0.80	0.80	0.90							
Date Sampled	12-Dec-24	12-Dec-24	12-Dec-24							
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES							
Sample Matrix Code	3AE	3A	4AED							
% Moisture at <40C$_A$	14.9	16.1	11.0					% w/w	0.1	A-T-044
% Stones >10mm$_A$	<0.1	<0.1	<0.1					% w/w	0.1	A-T-044
pH$_D^{M\#}$	8.65	8.84	11.29					pH	0.01	A-T-031s
Arsenic$_D^{M\#}$	2	3	5					mg/kg	1	A-T-024s
Cadmium$_D^{M\#}$	<0.5	<0.5	0.8					mg/kg	0.5	A-T-024s
Copper$_D^{M\#}$	20	23	25					mg/kg	1	A-T-024s
Chromium$_D^{M\#}$	24	27	16					mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	<1					mg/kg	1	A-T-040s
Lead$_D^{M\#}$	11	16	56					mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	<0.17					mg/kg	0.17	A-T-024s
Nickel$_D^{M\#}$	26	29	13					mg/kg	1	A-T-024s
Selenium$_D^{M\#}$	<1	<1	<1					mg/kg	1	A-T-024s
Zinc$_D^{M\#}$	54	56	111					mg/kg	5	A-T-024s

Envirolab Job Number: 25/00047

Client Project Name: Grey Mare Lane (2 Sites)

Client Project Ref: 34338LG

Lab Sample ID	25/00047/1	25/00047/2	25/00047/3					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH101	BH102	BH103							
Depth to Top	0.50	0.40	0.60							
Depth To Bottom	0.80	0.80	0.90							
Date Sampled	12-Dec-24	12-Dec-24	12-Dec-24							
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES							
Sample Matrix Code	3AE	3A	4AED							
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD							A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-							A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-							A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A							A-T-045

Envirolab Job Number: 25/00047

Client Project Name: Grey Mare Lane (2 Sites)

Client Project Ref: 34338LG

Lab Sample ID	25/00047/1	25/00047/2	25/00047/3					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH101	BH102	BH103							
Depth to Top	0.50	0.40	0.60							
Depth To Bottom	0.80	0.80	0.90							
Date Sampled	12-Dec-24	12-Dec-24	12-Dec-24							
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES							
Sample Matrix Code	3AE	3A	4AED							
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01	0.05	<0.10					mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	<0.10					mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	<0.02	0.06	<0.20					mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04	0.13	<0.40					mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04	0.10	<0.40					mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05	0.10	<0.50					mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05	<0.05	<0.50					mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	<0.07	<0.70					mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	<0.06	0.17	<0.60					mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04	<0.40					mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08	0.37	<0.80					mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01	0.02	<0.10					mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03	0.06	<0.30					mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	<0.03	<0.30					mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	<0.03	0.32	<0.30					mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	<0.07	0.33	<0.70					mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	<0.08	1.71	<0.80					mg/kg	0.01	A-T-019s
TPH Total with ID + GC Trace										
TPH total (>C6-C40)$_A^{M\#}$	16	703	397					mg/kg	10	A-T-007s
TPH FID Chromatogram$_A$	Appended	Appended	Appended							A-T-007s
TPH ID Interpretation$_A$	C12-C44 hydrocarbons with unknown profile	C6-C44 with PAHs plus other unknown hydrocarbons	C16-C44 hydrocarbons with unknown profile							A-T-007s

Report Notes

General

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

Key

Superscript "#"	Accredited to ISO 17025
Superscript "M"	Accredited to MCertS
Superscript "U"	Individual result not accredited
None of the above symbols	Analysis unaccredited
Subscript "A"	Analysis performed on as-received Sample
Subscript "D"	Analysis performed on the dried sample, crushed to pass 2mm sieve.
Subscript "D" on Asbestos	Analysis performed on a dried aliquot of sample provided.
Subscript "^"	Analysis has dependant options against results. Details appear in the comments of your Sample receipt
IS	Insufficient Sample for analysis
US	Unsuitable Sample for analysis
NDP	No Determination Possible
NAD	No Asbestos Detected
Trace	Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh.
N/A	Not applicable

Asbestos

Identification: Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
Quantification: Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.

Assigned Matrix Codes

1	SAND	6	CLAY/LOAM	A	Contains Stones
2	LOAM	7	OTHER	B	Contains Construction Rubble
3	CLAY	8	Asbestos Bulk (Only Asbestos ID accredited)	C	Contains visible hydrocarbons
4	LOAM/SAND	9	Incinerator Ash (some Metals accredited)	D	Contains glass / metal
5	SAND/CLAY			E	Contains roots / twigs
Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.					

Soil Chemical Analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH by method A-T-007:
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

EPH CWG (method A-T-055) from TPH CWG:
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

Electrical Conductivity of water by method A-T-037:
Results greater than 12900µS/cm @ 25^0C / 11550µS/cm @ 20^0C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Sutcliffe, 18-20 Harrington Street, Liverpool, L2 9QA

Project: Grey Mare Lane (2 Sites)

Clients Project No: 34338LG

Project No: 25/00047

Date Received: 06/01/2025 (am)

Cool Box Temperatures (°C): 13.1

Lab Sample ID	25/00047/1	25/00047/2	25/00047/3
Client Sample No			
Client Sample ID/Depth	BH101 0.50-0.80m	BH102 0.40-0.80m	BH103 0.60-0.90m
Date Sampled	12/12/24	12/12/24	12/12/24
Deviation Code			
F	✓	✓	✓

Key
F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	25/00047/1	25/00047/2	25/00047/3
Client Sample No			
Client Sample ID/Depth	BH101 0.50-0.80m	BH102 0.40-0.80m	BH103 0.60-0.90m
Date Sampled	12/12/24	12/12/24	12/12/24
PAH-16MS	✓	✓	✓
TPH Total with ID + GC Trace	✓	✓	✓
PAH (total 17)	✓	✓	✓
BTEX (total)	✓	✓	✓

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

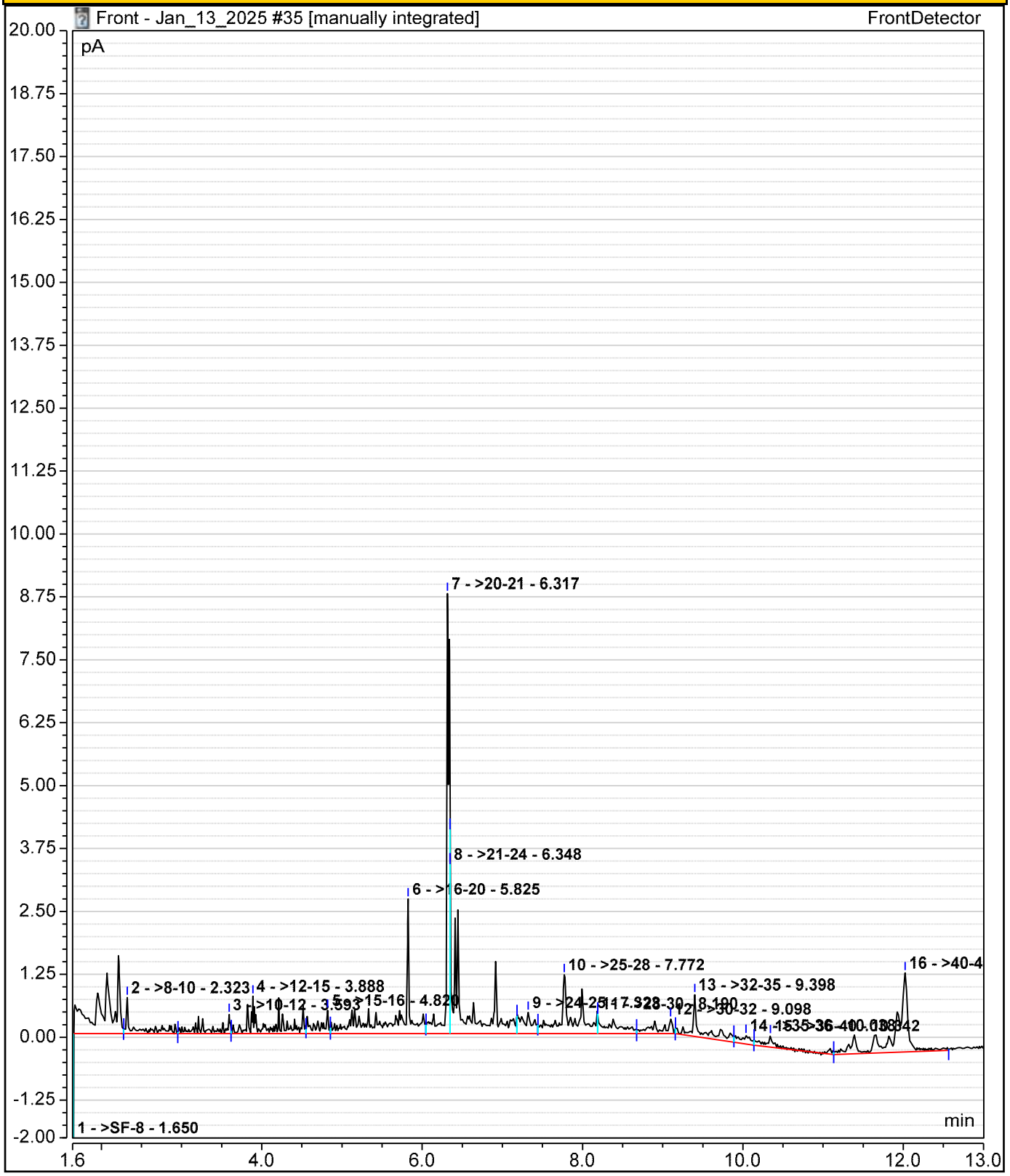
Envirolab Analysis Dates

Lab Sample ID	25/00047/1	25/00047/2	25/00047/3
Client Sample No			
Client Sample ID/Depth	BH101 0.50-0.80m	BH102 0.40-0.80m	BH103 0.60-0.90m
Date Sampled	12/12/24	12/12/24	12/12/24
A-T-004s	08/01/2025	08/01/2025	08/01/2025
A-T-007s	14/01/2025	14/01/2025	14/01/2025
A-T-019s	08/01/2025	08/01/2025	08/01/2025
A-T-022s	08/01/2025	08/01/2025	08/01/2025
A-T-024s	08/01/2025	08/01/2025	08/01/2025
A-T-025w	09/01/2025	09/01/2025	09/01/2025
A-T-026w	09/01/2025	09/01/2025	09/01/2025
A-T-026w (F)	09/01/2025	09/01/2025	09/01/2025
A-T-030s	08/01/2025	08/01/2025	08/01/2025
A-T-031s	08/01/2025	08/01/2025	08/01/2025
A-T-031w	09/01/2025	09/01/2025	09/01/2025
A-T-032s	09/01/2025	09/01/2025	09/01/2025
A-T-032w	09/01/2025	09/01/2025	09/01/2025
A-T-037w	09/01/2025	09/01/2025	09/01/2025
A-T-040s	08/01/2025	08/01/2025	08/01/2025
A-T-044	08/01/2025	08/01/2025	08/01/2025
A-T-045	07/01/2025	07/01/2025	07/01/2025
A-T-050w	09/01/2025	09/01/2025	09/01/2025
A-T-ANCs	08/01/2025	08/01/2025	08/01/2025
Calc	08/01/2025	08/01/2025	08/01/2025
Calc-no stones	09/01/2025	09/01/2025	09/01/2025
Probe (w)	09/01/2025	09/01/2025	09/01/2025

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

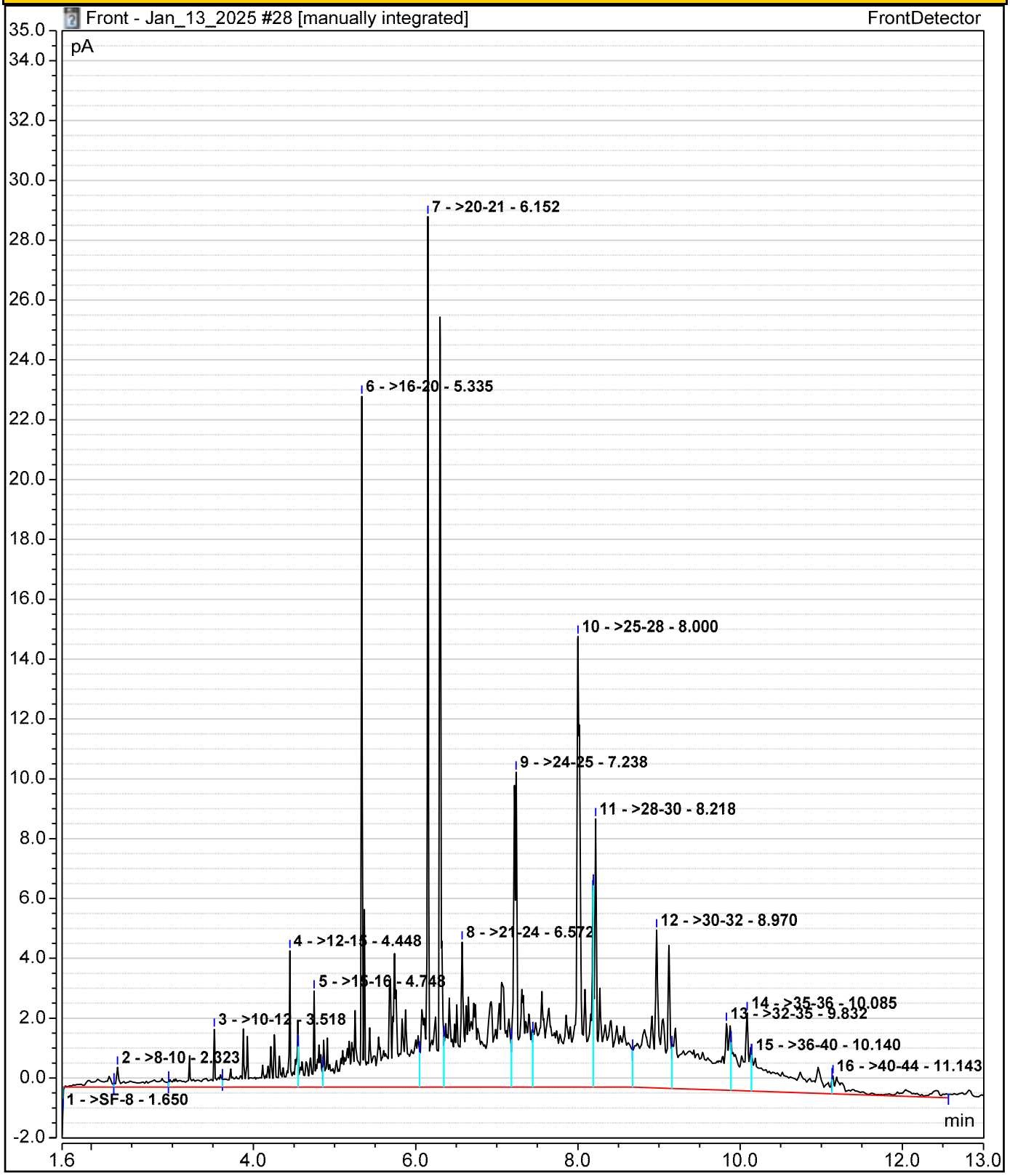
End of Report

Chromatogram



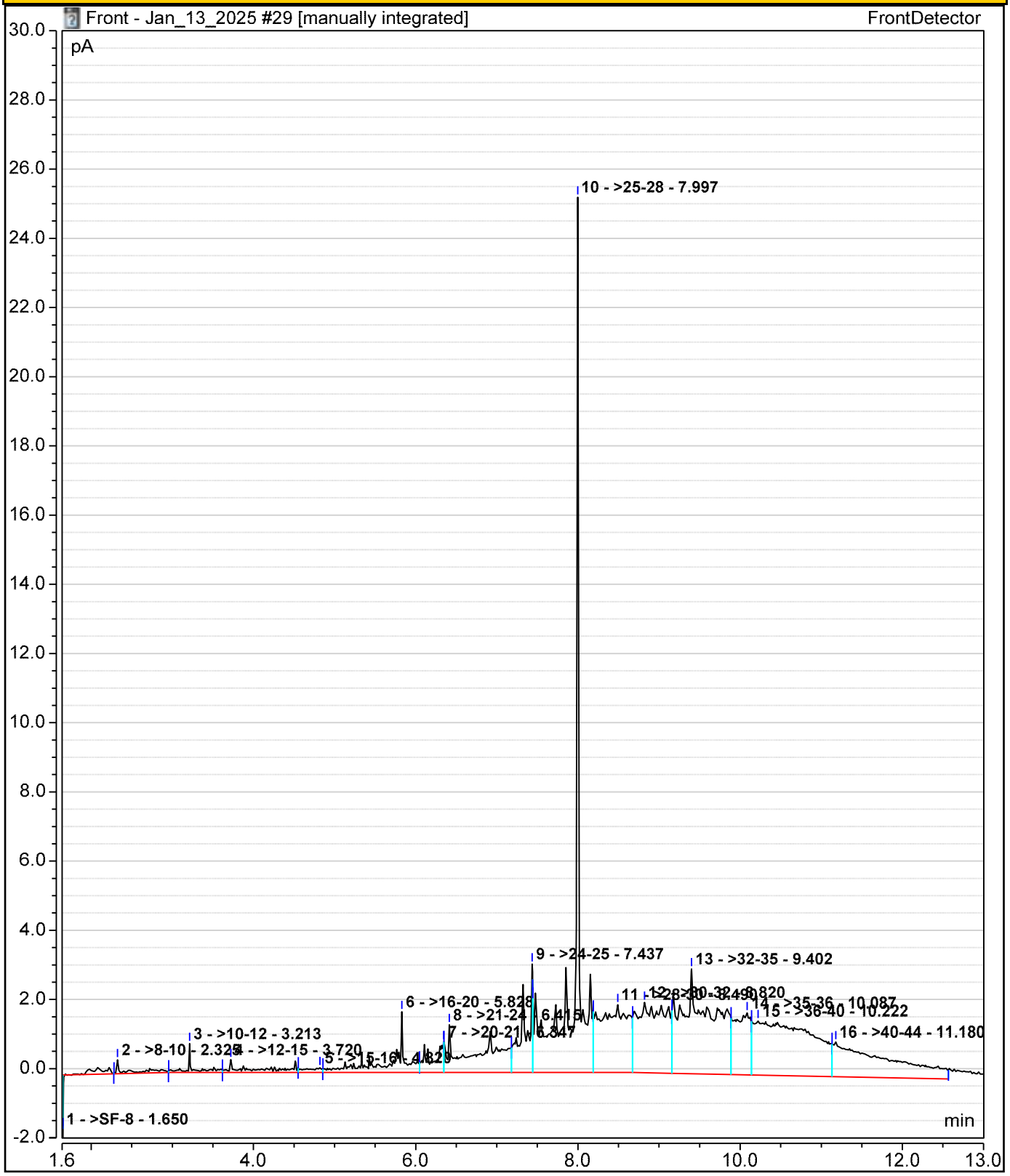
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envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

Final Test Report

Envirolab Job Number:	25/00047
Issue Number:	1
Date:	14-Jan-25
Client:	Sutcliffe 18-20 Harrington Street Liverpool L2 9QA WF10 1NJ
Project Manager:	(use) D Evans; D Bowen; A Tosh; W Baldwin/(use)Sar
Project Name:	Grey Mare Lane (2 Sites)
Project Ref:	34338LG
Order No:	10673
Date Samples Received:	13-Dec-24
Date Instructions Received:	6-Jan-25
Date Analysis Completed:	14-Jan-25

Notes - Soil analysis

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General

This report shall not be reproduced, except in full, without written approval from Envirolab.

Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.

All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.

All analysis is performed on the sample as received for soil samples from outside the European Union and this supercedes any "D" subscripts

For complex, multi-compound analysis, quality control results do not always fall within chart limits for every compound and we have criteria for reporting in these situations.

If results are in italic font they are associated with such quality control failures and may be unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid

Predominant Matrix Codes: 1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample

Secondary Matrix Codes: A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient sample for analysis, NDP indicates No Determination Possible and NAD indicates No Asbestos Detected.

Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

HWOL TPH Code: EH_CU_1D_AL: Extractable hydrocarbons - i.e. everything extracted by the solvent(s), Clean-up - e.g. by florisil, silica gel, GC - Single coil gas chromatography, Aliphatics only

Approved by:

[redacted]

Richard Wong
Client Manager

Landfill WAC analysis must not be used for hazardous waste classification purposes. This analysis is only applicable for landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Sample Details								Landfill Waste Acceptance Criteria Limits		
Lab Sample ID	Method	ISO17025	MCERTS	25/00047/1						
Client Sample Number								Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Client Sample ID				BH101						
Depth to Top				0.5						
Depth to Bottom				0.80						
Date Sampled				12/12/2024						
Sample Type				Soil - ES						
Sample Matrix Code				3AE						
Solid Waste Analysis										
pH (pH Units)$_D$	A-T-031	N	N	**8.65**				-	>6	-
ANC to pH 4 (mol/kg)$_D$	A-T-ANC	N	N	**0.38**				-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg)$_D$	A-T-ANC	N	N	**0.11**				-	to be evaluated	to be evaluated
Loss on Ignition (%)$_D$	A-T-030	N	N	**3.8**				-	-	10
Total Organic Carbon (%)$_D$	A-T-032	N	N	**0.98**				3	5	6
PAH Sum of 17 (mg/kg) $_A$	A-T-019	N	N	**<0.08**				100	-	-
Mineral Oil (mg/kg)$_{A\ EH_CU_1D_AL}$	A-T-007	N	N	**<10**				500	-	-
Sum of 7 PCBs (mg/kg)$_A$	A-T-004	N	N	**<0.007**				1	-	-
Sum of BTEX (mg/kg)$_A$	A-T-022	N	N	**<0.01**				6	-	-
Eluate Analysis				**2:1**	**8:1**	**2:1**	**Cumulative 10:1**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
				mg/l		**mg/kg**				
Arsenic	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.5	2	25
Barium	A-T-025	N	N	0.034	0.028	0.085	**0.300**	20	100	300
Cadmium	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.04	1	5
Chromium	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.5	10	70
Copper	A-T-025	N	N	<0.004	<0.004	<0.008	**<0.04**	2	50	100
Mercury	A-T-025	N	N	<0.0005	<0.0005	<0.001	**<0.005**	0.01	0.2	2
Molybdenum	A-T-025	N	N	0.007	0.003	0.017	**0.040**	0.5	10	30
Nickel	A-T-025	N	N	<0.002	<0.002	<0.004	**<0.02**	0.4	10	40
Lead	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.5	10	50
Antimony	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.06	0.7	5
Selenium	A-T-025	N	N	0.003	0.001	0.007	**0.010**	0.1	0.5	7
Zinc	A-T-025	N	N	0.010	0.009	0.025	**0.100**	4	50	200
Chloride	A-T-026	N	N	2	<1.00	5	**<10**	800	15000	25000
Fluoride	A-T-026	N	N	0.3	0.3	0.8	**3.0**	10	150	500
Sulphate as SO_4	A-T-026	N	N	46	8	116	**128**	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	134	45	335	**574**	4000	60000	100000
Phenol Index	A-T-050	N	N	0.01	<0.01	0.02	**<0.1**	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<20.0	<20.0	<40	**<200**	500	800	1000
Leach Test Information										
pH (pH Units)	A-T-031	N	N	7.9	7.9					
Conductivity (µS/cm)	A-T-037	N	N	268	90					
Mass Sample (kg)				0.262						
Dry Matter (%)	A-T-044	N	N	66.8						
Stage 1										
Volume Leachant, L_2 (l)	A-T-046			0.350						
Filtered Eluate Volume, VE_1 (l)	A-T-046			0.200						
Stage 2										
Volume Leachant, L_8 (l)	A-T-046			1.400						

Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation

envirolab

Landfill WAC analysis must not be used for hazardous waste classification purposes. This analysis is only applicable for landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Sample Details								Landfill Waste Acceptance Criteria Limits		
Lab Sample ID	Method	ISO17025	MCERTS	25/00047/2						
Client Sample Number										
Client Sample ID				BH102						
Depth to Top				0.4						
Depth to Bottom				0.80				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Date Sampled				12/12/2024						
Sample Type				Soil - ES						
Sample Matrix Code				3A						
Solid Waste Analysis										
pH (pH Units)$_D$	A-T-031	N	N	**8.84**				-	>6	-
ANC to pH 4 (mol/kg)$_D$	A-T-ANC	N	N	**0.48**				-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg)$_D$	A-T-ANC	N	N	**0.17**				-	to be evaluated	to be evaluated
Loss on Ignition (%)$_D$	A-T-030	N	N	**4.5**				-	-	10
Total Organic Carbon (%)$_D$	A-T-032	N	N	**1.32**				3	5	6
PAH Sum of 17 (mg/kg) $_A$	A-T-019	N	N	**1.73**				100	-	-
Mineral Oil (mg/kg)$_{A\ EH_CU_1D_AL}$	A-T-007	N	N	**<10**				500	-	-
Sum of 7 PCBs (mg/kg)$_A$	A-T-004	N	N	**<0.007**				1	-	-
Sum of BTEX (mg/kg)$_A$	A-T-022	N	N	**<0.01**				6	-	-
Eluate Analysis				**2:1**	**8:1**	**2:1**	**Cumulative 10:1**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
				mg/l		**mg/kg**				
Arsenic	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.5	2	25
Barium	A-T-025	N	N	0.017	0.014	0.042	**0.150**	20	100	300
Cadmium	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.04	1	5
Chromium	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.5	10	70
Copper	A-T-025	N	N	<0.004	<0.004	<0.008	**<0.04**	2	50	100
Mercury	A-T-025	N	N	<0.0005	<0.0005	<0.001	**<0.005**	0.01	0.2	2
Molybdenum	A-T-025	N	N	0.002	0.003	0.005	**0.030**	0.5	10	30
Nickel	A-T-025	N	N	<0.002	<0.002	<0.004	**<0.02**	0.4	10	40
Lead	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.5	10	50
Antimony	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.06	0.7	5
Selenium	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.1	0.5	7
Zinc	A-T-025	N	N	0.013	0.006	0.032	**0.070**	4	50	200
Chloride	A-T-026	N	N	16	1	39	**31**	800	15000	25000
Fluoride	A-T-026	N	N	0.7	0.2	1.8	**3.0**	10	150	500
Sulphate as SO_4	A-T-026	N	N	37	5	92	**85**	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	139	44	342	**569**	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	<0.01	<0.02	**<0.1**	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<20.0	<20.0	<40	**<200**	500	800	1000
Leach Test Information										
pH (pH Units)	A-T-031	N	N	7.9	8.1					
Conductivity (µS/cm)	A-T-037	N	N	277	89					
Mass Sample (kg)				0.255						
Dry Matter (%)	A-T-044	N	N	68.6						
Stage 1										
Volume Leachant, L_2 (l)	A-T-046			0.350						
Filtered Eluate Volume, VE_1 (l)	A-T-046			0.200						
Stage 2										
Volume Leachant, L_8 (l)	A-T-046			1.400						

Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation

Landfill WAC analysis must not be used for hazardous waste classification purposes. This analysis is only applicable for landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Sample Details								Landfill Waste Acceptance Criteria Limits		
Lab Sample ID	Method	ISO17025	MCERTS	25/00047/3						
Client Sample Number										
Client Sample ID				BH103						
Depth to Top				0.6						
Depth to Bottom				0.90				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Date Sampled				12/12/2024						
Sample Type				Soil - ES						
Sample Matrix Code				4AED						
Solid Waste Analysis										
pH (pH Units)$_D$	A-T-031	N	N	**11.29**				-	>6	-
ANC to pH 4 (mol/kg)$_D$	A-T-ANC	N	N	**1.5**				-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg)$_D$	A-T-ANC	N	N	**0.44**				-	to be evaluated	to be evaluated
Loss on Ignition (%)$_D$	A-T-030	N	N	**5.3**				-	-	10
Total Organic Carbon (%)$_D$	A-T-032	N	N	**2.62**				3	5	6
PAH Sum of 17 (mg/kg) $_A$	A-T-019	N	N	**<0.80**				100	-	-
Mineral Oil (mg/kg)$_{A\ EH_CU_1D_AL}$	A-T-007	N	N	**121**				500	-	-
Sum of 7 PCBs (mg/kg)$_A$	A-T-004	N	N	**<0.007**				1	-	-
Sum of BTEX (mg/kg)$_A$	A-T-022	N	N	**<0.01**				6	-	-
Eluate Analysis				**2:1**	**8:1**	**2:1**	**Cumulative 10:1**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
				mg/l		**mg/kg**				
Arsenic	A-T-025	N	N	0.012	0.006	0.028	**0.070**	0.5	2	25
Barium	A-T-025	N	N	0.039	0.016	0.091	**0.190**	20	100	300
Cadmium	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.04	1	5
Chromium	A-T-025	N	N	0.002	<0.001	0.005	**<0.01**	0.5	10	70
Copper	A-T-025	N	N	0.006	<0.004	0.014	**<0.04**	2	50	100
Mercury	A-T-025	N	N	<0.0005	<0.0005	<0.001	**<0.005**	0.01	0.2	2
Molybdenum	A-T-025	N	N	0.004	<0.001	0.009	**<0.01**	0.5	10	30
Nickel	A-T-025	N	N	<0.002	<0.002	<0.004	**<0.02**	0.4	10	40
Lead	A-T-025	N	N	0.014	0.029	0.033	**0.280**	0.5	10	50
Antimony	A-T-025	N	N	0.001	<0.001	0.002	**<0.01**	0.06	0.7	5
Selenium	A-T-025	N	N	<0.001	<0.001	<0.002	**<0.01**	0.1	0.5	7
Zinc	A-T-025	N	N	0.023	0.015	0.054	**0.160**	4	50	200
Chloride	A-T-026	N	N	3	<1.00	7	**<10**	800	15000	25000
Fluoride	A-T-026	N	N	0.2	0.1	0.5	**1.0**	10	150	500
Sulphate as SO_4	A-T-026	N	N	27	4	63	**68**	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	147	51	343	**637**	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	<0.01	<0.02	**<0.1**	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<20.0	<20.0	<40	**<200**	500	800	1000
Leach Test Information										
pH (pH Units)	A-T-031	N	N	7.9	8.1					
Conductivity (µS/cm)	A-T-037	N	N	294	101					
Mass Sample (kg)				0.233						
Dry Matter (%)	A-T-044	N	N	75						
Stage 1										
Volume Leachant, L_2 (l)	A-T-046			0.350						
Filtered Eluate Volume, VE_1 (l)	A-T-046			0.200						
Stage 2										
Volume Leachant, L_8 (l)	A-T-046			1.400						

Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation

Appendix E – Geotechnical Laboratory Certificates

Units 1 & 2
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CC GEOTECHNICAL LTD
Consulting Geoenvironmental and Geotechnical Engineers

LABORATORY REPORT

CONTRACT NUMBER: CCG-C-24-15115

CONTRACT TITLE: GREYMARE LANE (2 SITES)

CLIENT: SUTCLIFFE
18-20 Harrington Street, Liverpool L2 9QA

DATE RECEIVED: 17/12/24
DATE COMMENCED: 18/12/24
DATE COMPLETED: 07/01/25
REPORT DATE: 07/01/25

Test Description	Qty
Point Load Test ISRM 1985: Suggested Method (a)	30
Uniaxial Compressive Strength ISRM Vol 16 No 2, pp 135-140 (1979) (#)	1
Determination of Moisture Content BS 1377-2:1990 (a)	6
Determination of Liquid & Plastic Limits BS 1377-2:1990 (a)	6
Unconsolidated Undrained Triaxial Compression BS1377-7:1990 (a)	6

Notes: Observations and interpretations are not accredited by UKAS
All testing undertaken at laboratory permanent facilities
# denotes non-accredited test
a denotes UKAS accredited test
s denotes test undertaken by approved subcontractor
Test results only relate to the samples tested
Sample and sample information supplied by client

This report is issued in accordance with the requirements of the United kingdom Accreditation Services and EN ISO/IEC 17025:2017. The results reported herein relate only to the material supplied to the laboratory. This report shall not be reproduced except in full, without the prior written approval of the laboratory.
Approved Signatories: Chris Bolan (Managing Director) – Daniel Kerfoot (Laboratory Manager)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
BH101	U	4.00	4.45	21	2.21	1.84	96	40	19	21	91	CI	Y	Dark brown slightly sandy slightly gravelly silty CLAY of high undrained shear strength. (BS1377Pt2:3.2,4.4,5,Pt7:8)
BH101	U	9.00	9.45	16	2.19	1.89	115	36	18	18	95	CI	Y	Dark brown slightly sandy slightly gravelly silty CLAY of high undrained shear strength. (BS1377Pt2:3.2,4.4,5,Pt7:8)
BH102	U	5.00	5.45	19	2.25	1.89	48	37	17	20	88	CI	Y	Dark brown slightly sandy slightly gravelly silty CLAY of medium undrained shear strength. (BS1377Pt2:3.2,4.4,5,Pt7:8)
BH102	U	12.00	12.45	17	2.25	1.93	128	36	19	17	93	CI	Y	Dark brown slightly sandy slightly gravelly silty CLAY of high undrained shear strength. (BS1377Pt2:3.2,4.4,5,Pt7:8)
BH103	U	3.00	3.45	17	2.27	1.93	264	39	20	19	89	CI	Y	Dark brown slightly sandy slightly gravelly silty CLAY of very high undrained shear strength. (BS1377Pt2:3.2,4.4,5,Pt7:8)
BH103	U	10.50	10.95	17	2.28	1.94	112	36	17	19	93	CI	Y	Dark brown slightly sandy slightly gravelly silty CLAY of high undrained shear strength. (BS1377Pt2:3.2,4.4,5,Pt7:8)

SITE: GREYMARE LANE (2 SITES) (CCG-C-24-15115) DATE: 07.01.25

CLIENT: SUTCLIFFE

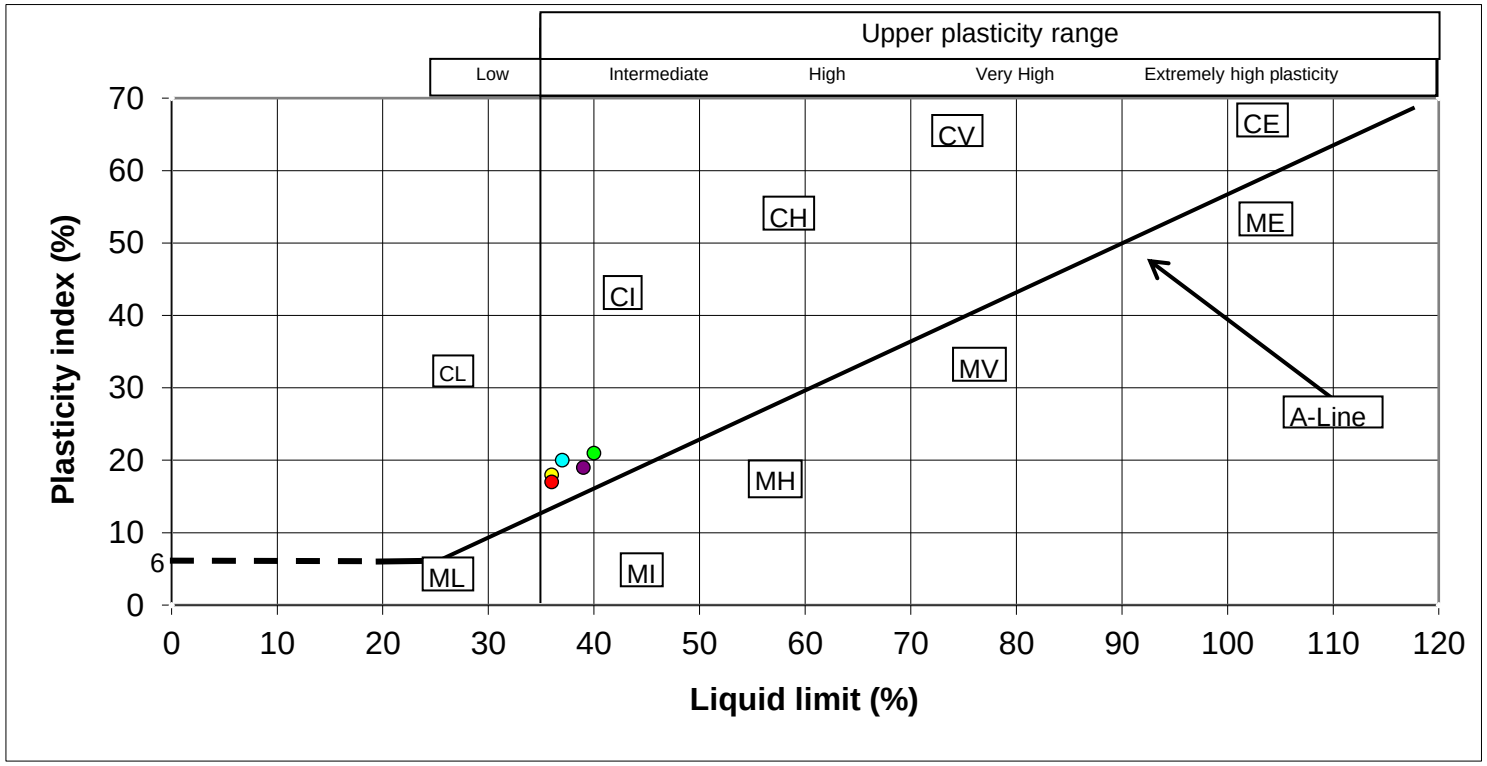
UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET

BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
BH101	4.00	40.0	21.0
BH101	9.00	36.0	18.0
BH102	5.00	37.0	20.0
BH102	12.00	36.0	17.0
BH103	3.00	39.0	19.0

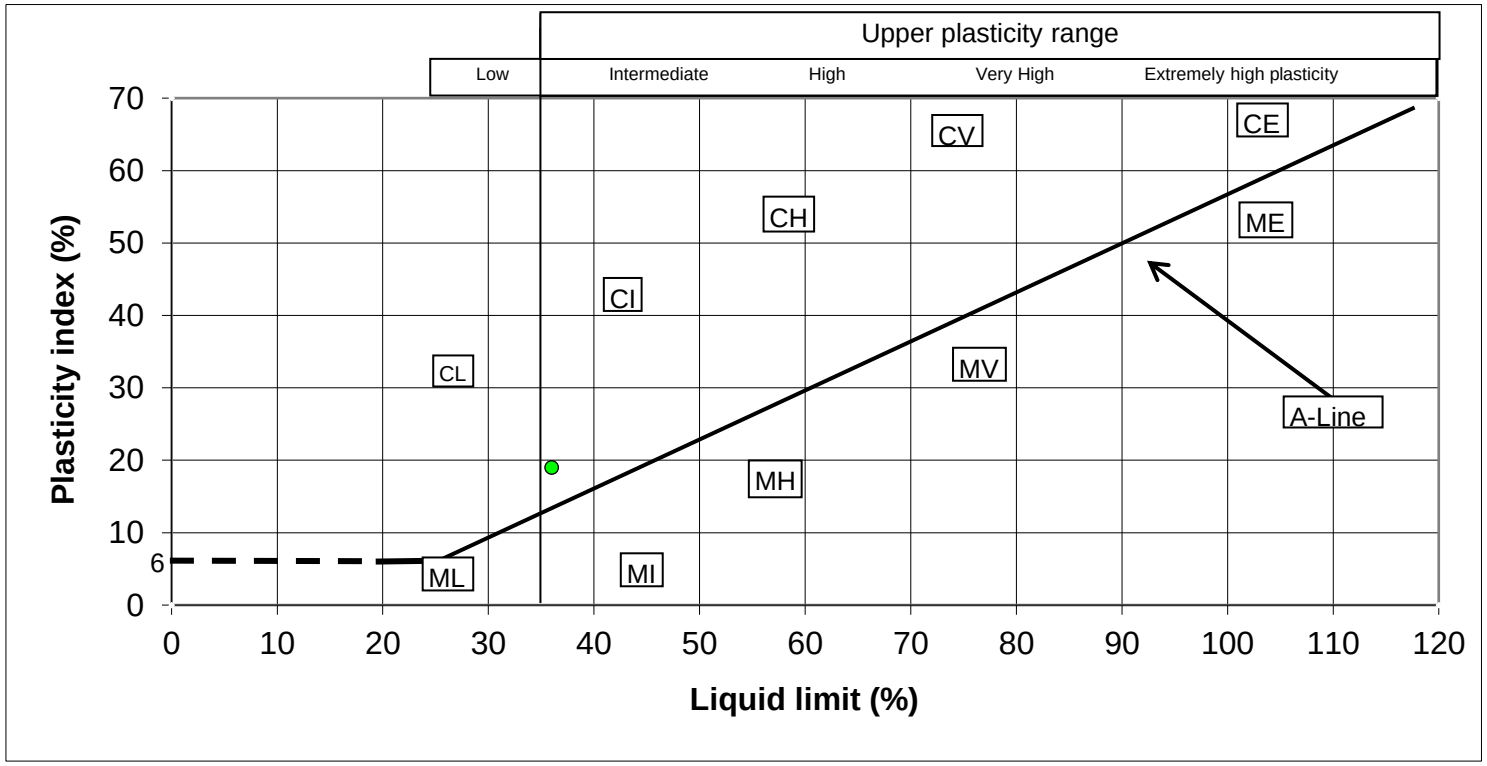
UKAS TESTING 4514

APPROVED BY	DK

CLIENT: SUTCLIFFE	SITE: GREYMARE LANE (2 SITES) (CCG-C-24-15115)

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
BH103	10.50	36.0	19.0

UKAS TESTING 4514

APPROVED BY	DK

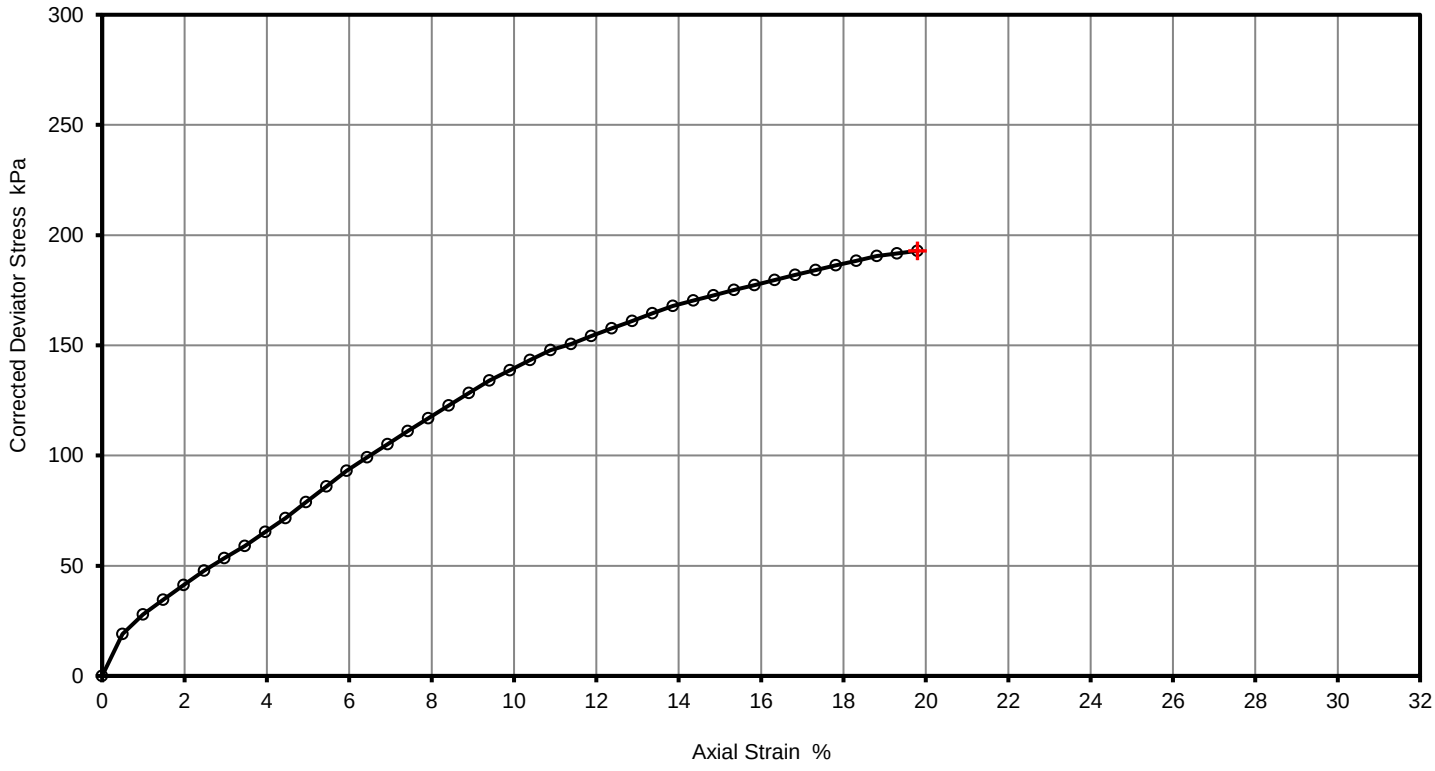
CLIENT: SUTCLIFFE	SITE: GREYMARE LANE (2 SITES) (CCG-C-24-15115)

CC Geotechnical Ltd Tel: 0151 545 2750 e: lab@ccgeotechnical.com	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	CCG-C-24-15115
				Borehole/Pit No.	BH101
Site Name	GREYMARE LANE (2 SITES)			Sample No.	1
Soil Description				Depth	4.00
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Dark brown slightly sandy slightly gravelly silty CLAY			Date of test	03/01/2025
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				

UKAS TESTING 4514

Test Number		1	
Length		202.1	mm
Diameter		101.4	mm
Bulk Density		2.21	Mg/m3
Moisture Content		20.6	%
Dry Density		1.84	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		80	kPa
At failure	Axial Strain	19.8	%
	Deviator Stress, (σ1 - σ3)f	193	kPa
	Undrained Shear Strength, cu	96	kPa ½(σ1 - σ3)f
	Mode of Failure	Plastic	

Deviator Stress v Axial Strain



Remarks

0.5mm membrane, correction factor = 1.88

Approved: DanielKerfoot

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Fig. No. 1

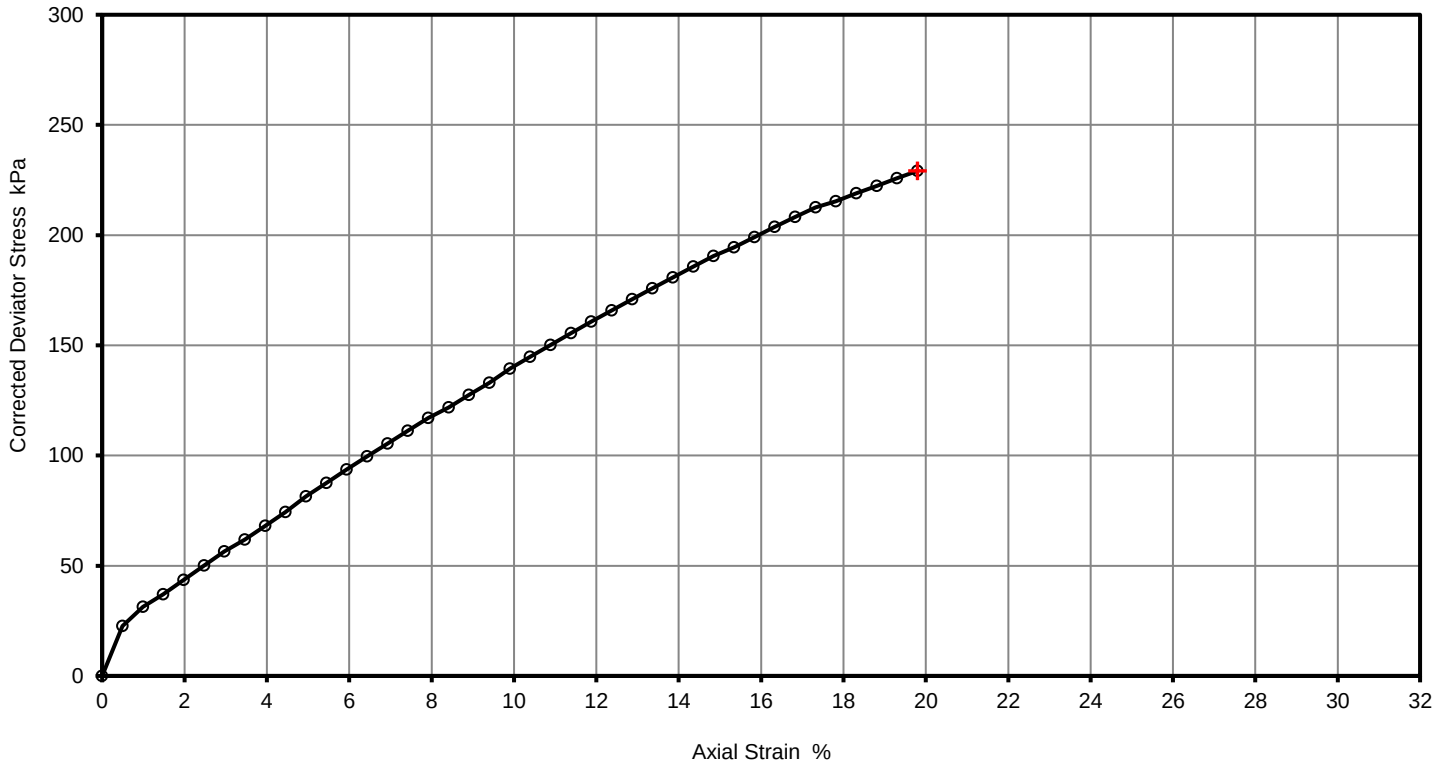
Sheet 2

CC Geotechnical Ltd Tel: 0151 545 2750 e: lab@ccgeotechnical.com	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	CCG-C-24-15115
				Borehole/Pit No.	BH101
Site Name	GREYMARE LANE (2 SITES)			Sample No.	1
Soil Description				Depth	9.00
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Dark brown slightly sandy slightly gravelly silty CLAY			Date of test	03/01/2025
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				

UKAS TESTING 4514

Test Number		1	
Length		202.1	mm
Diameter		102.2	mm
Bulk Density		2.19	Mg/m3
Moisture Content		16.1	%
Dry Density		1.89	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		180	kPa
At failure	Axial Strain	19.8	%
	Deviator Stress, (σ1 - σ3)f	229	kPa
	Undrained Shear Strength, cu	115	kPa ½(σ1 - σ3)f
	Mode of Failure	Plastic	

Deviator Stress v Axial Strain



Remarks

0.5mm membrane, correction factor = 1.87

Approved: DanielKerfoot

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Fig. No. 1

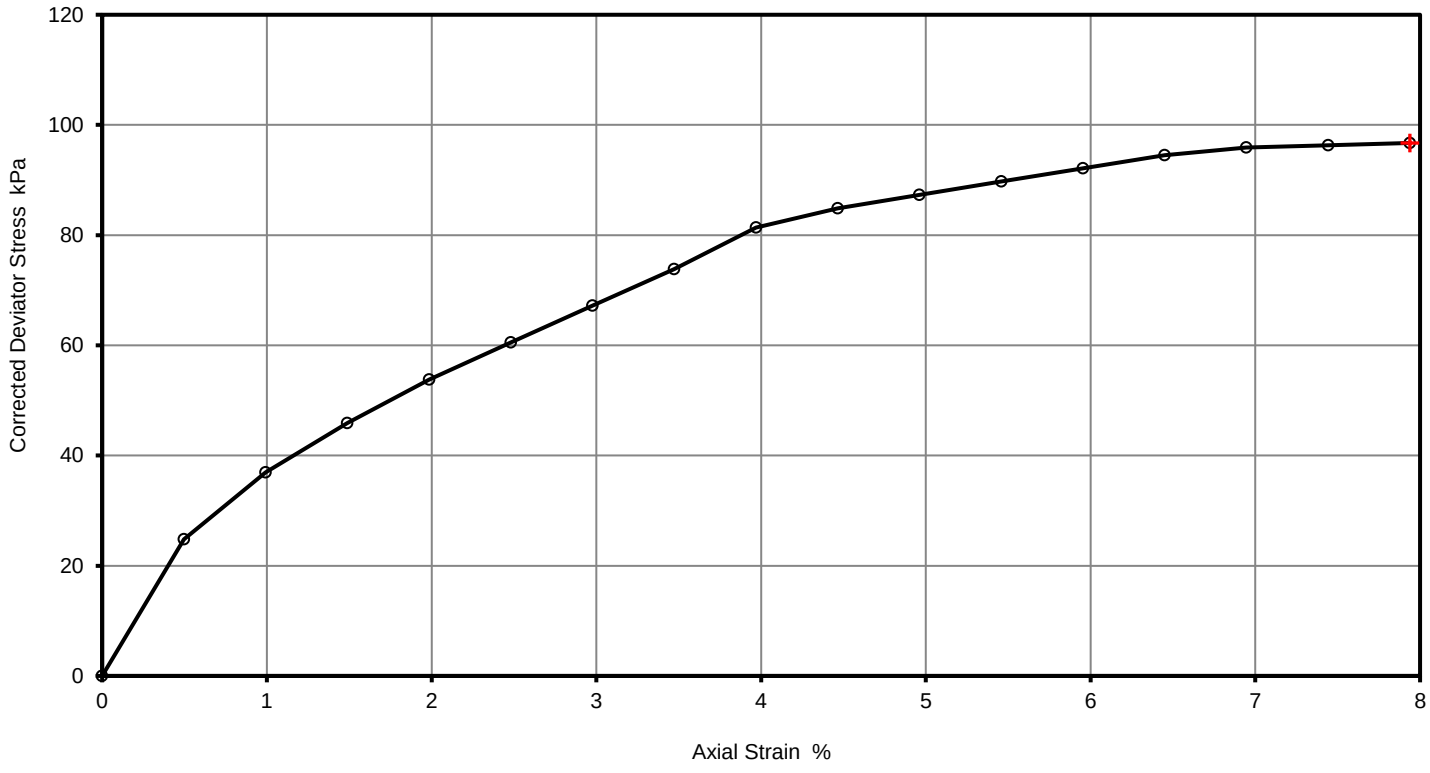
Sheet 4

CC Geotechnical Ltd Tel: 0151 545 2750 e: lab@ccgeotechnical.com	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	CCG-C-24-15115
				Borehole/Pit No.	BH102
Site Name	GREYMARE LANE (2 SITES)			Sample No.	1
Soil Description				Depth	5.00
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Dark brown slightly sandy slightly gravelly silty CLAY			Date of test	03/01/2025
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				

UKAS TESTING 4514

Test Number		1	
Length		201.6	mm
Diameter		99.8	mm
Bulk Density		2.25	Mg/m3
Moisture Content		19.1	%
Dry Density		1.89	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		100	kPa
At failure	Axial Strain	7.9	%
	Deviator Stress, (σ1 - σ3)f	97	kPa
	Undrained Shear Strength, cu	48	kPa ½(σ1 - σ3)f
	Mode of Failure	Plastic	

Deviator Stress v Axial Strain



Remarks

0.5mm membrane, correction factor = 0.95

Approved: DanielKerfoot

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Fig. No. 1

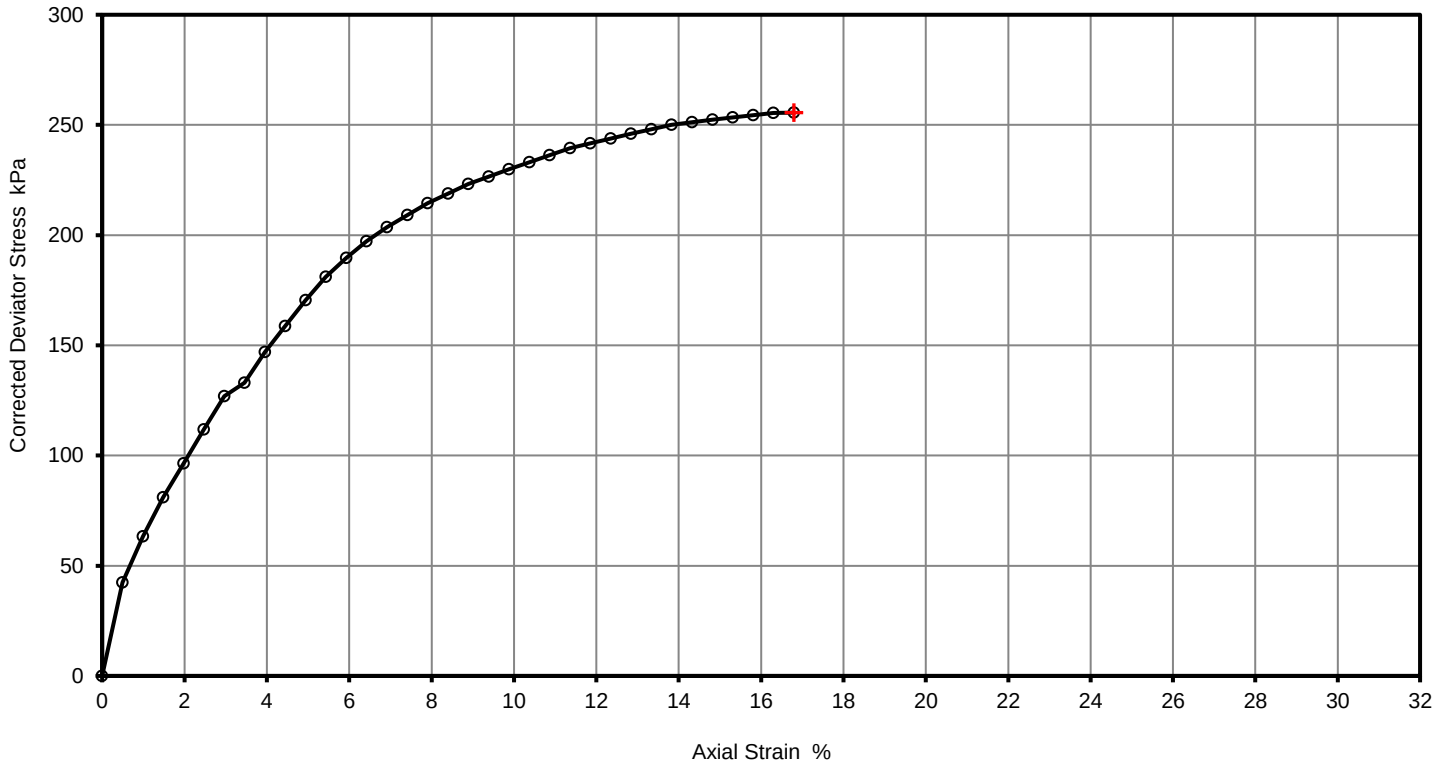
Sheet 3

CC Geotechnical Ltd Tel: 0151 545 2750 e: lab@ccgeotechnical.com	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	CCG-C-24-15115
				Borehole/Pit No.	BH102
Site Name	GREYMARE LANE (2 SITES)			Sample No.	1
Soil Description				Depth	12.00
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Dark brown slightly sandy slightly gravelly silty CLAY			Date of test	06/01/2025
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				

UKAS TESTING 4514

Test Number		1	
Length		202.5	mm
Diameter		101.0	mm
Bulk Density		2.25	Mg/m3
Moisture Content		16.8	%
Dry Density		1.93	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		240	kPa
At failure	Axial Strain	16.8	%
	Deviator Stress, (σ1 - σ3)f	256	kPa
	Undrained Shear Strength, cu	128	kPa ½(σ1 - σ3)f
	Mode of Failure	Plastic	

Deviator Stress v Axial Strain



Remarks

0.5mm membrane, correction factor = 1.65

Approved: DanielKerfoot

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Fig. No. 1

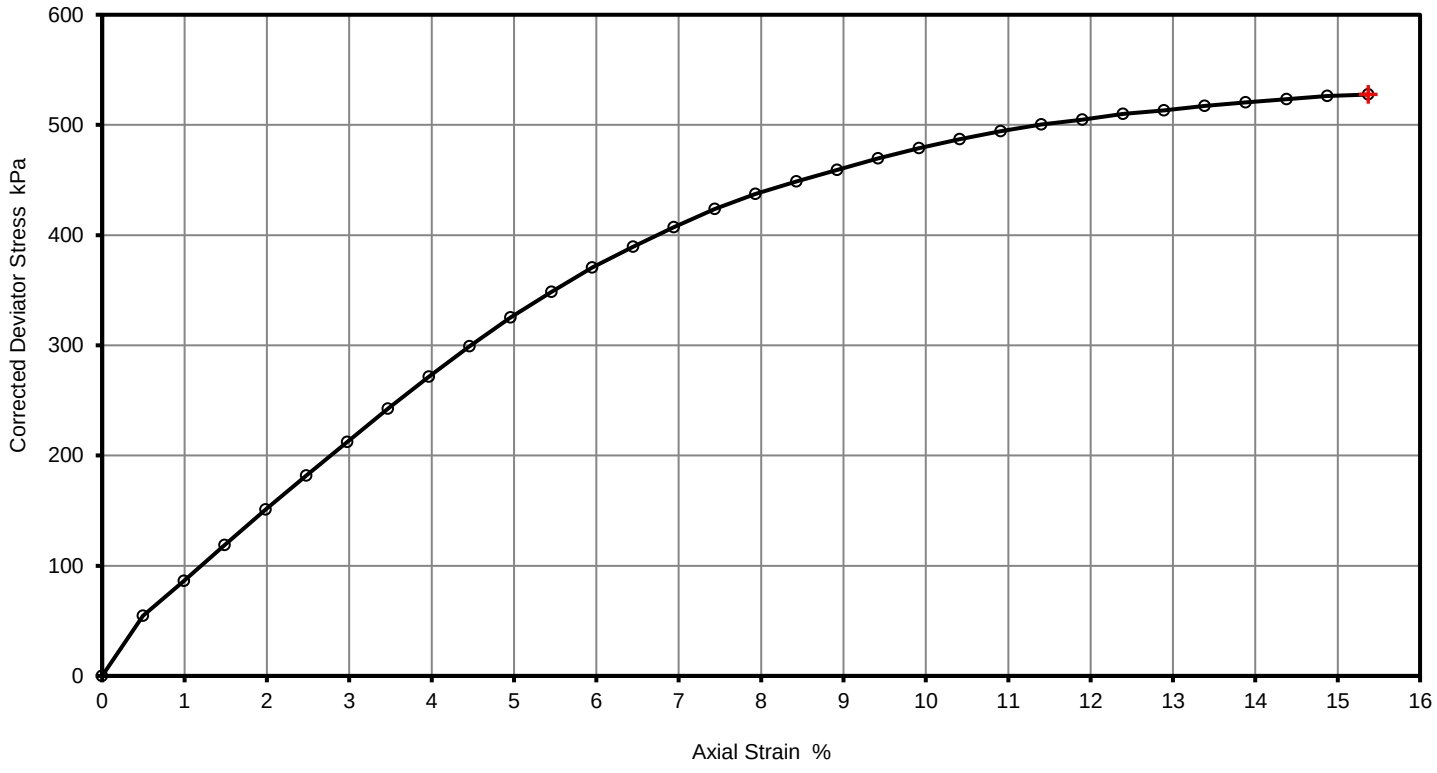
Sheet 6

CC Geotechnical Ltd Tel: 0151 545 2750 e: lab@ccgeotechnical.com	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	CCG-C-24-15115
				Borehole/Pit No.	BH103
Site Name	GREYMARE LANE (2 SITES)			Sample No.	1
Soil Description				Depth	3.00
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Dark brown slightly sandy slightly gravelly silty CLAY			Date of test	06/01/2025
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				

UKAS TESTING 4514

Test Number		1	
Length		201.7	mm
Diameter		101.1	mm
Bulk Density		2.27	Mg/m3
Moisture Content		17.2	%
Dry Density		1.93	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		60	kPa
At failure	Axial Strain	15.4	%
	Deviator Stress, (σ1 - σ3)f	528	kPa
	Undrained Shear Strength, cu	264	kPa ½(σ1 - σ3)f
	Mode of Failure	Plastic	

Deviator Stress v Axial Strain



Remarks

0.5mm membrane, correction factor = 1.53

Approved: DanielKerfoot

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Fig. No. 1

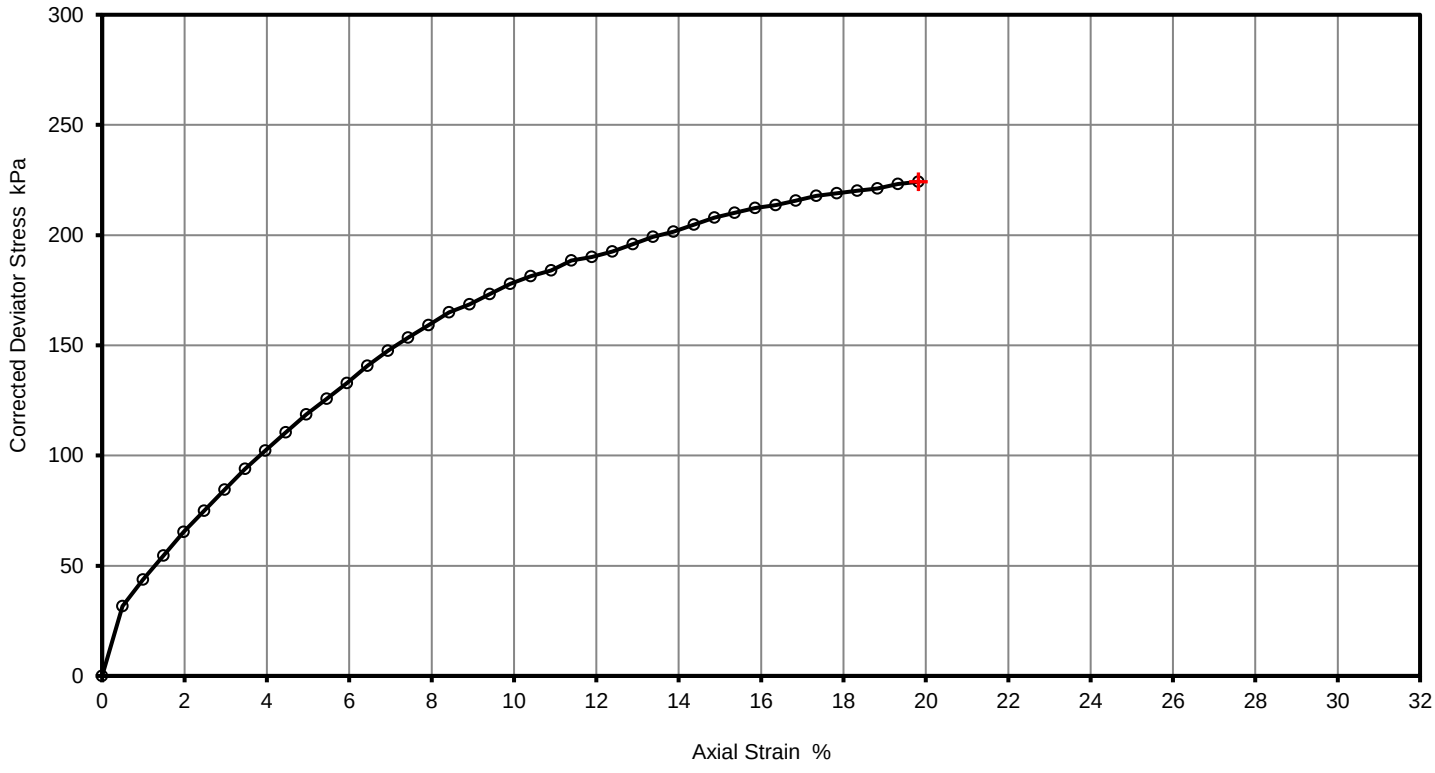
Sheet 1

CC Geotechnical Ltd Tel: 0151 545 2750 e: lab@ccgeotechnical.com	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	CCG-C-24-15115
				Borehole/Pit No.	BH103
Site Name	GREYMARE LANE (2 SITES)			Sample No.	1
Soil Description				Depth	10.50
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Dark brown slightly sandy slightly gravelly silty CLAY			Date of test	06/01/2025
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen				

UKAS TESTING 4514

Test Number		1	
Length		201.8	mm
Diameter		100.4	mm
Bulk Density		2.28	Mg/m3
Moisture Content		17.0	%
Dry Density		1.94	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		210	kPa
At failure	Axial Strain	19.8	%
	Deviator Stress, (σ1 - σ3)f	224	kPa
	Undrained Shear Strength, cu	112	kPa ½(σ1 - σ3)f
	Mode of Failure	Plastic	

Deviator Stress v Axial Strain



Remarks

0.5mm membrane, correction factor = 1.90

Approved: DanielKerfoot

Printed: 07/01/2025 14:50

Fig. No. 1

Sheet 5

POINT LOAD TEST RESULTS

ISRM 1985: Suggested Method

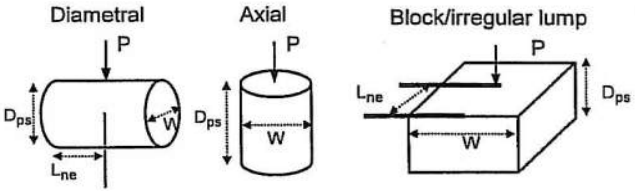
PROJECT No.:- CCG-C-24-15115 SITE:- GREYMARE LANE (2 SITES) DATE: 19.12.24

Borehole Number	Depth (m)	Type of Test* a	d	i	Width (W) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MPa)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MPa)	Estimated Uniaxial Compressive Strength (MPa)	Water Content (NAT/SAT)	Orientation to plane of weakness
BH101	16.60		d		90	95	0.20	-	0.02	1.33	0.03	0.59	NAT	l
BH101	16.65	a			62	90	0.20	84	0.03	1.26	0.04	0.71	NAT	p
BH101	17.90	a			90	59	0.20	82	0.03	1.25	0.04	0.74	NAT	p
BH101	18.60		d		76	90	3.70	-	0.46	1.30	0.60	11.90	NAT	l
BH101	18.65	a			90	74	3.40	92	0.40	1.32	0.53	10.56	NAT	p
BH101	19.70	a			90	50	0.50	76	0.09	1.21	0.11	2.10	NAT	p
BH101	20.20	a			90	64	0.40	86	0.05	1.27	0.07	1.39	NAT	p
BH101	20.95	a			90	70	1.10	90	0.14	1.30	0.18	3.57	NAT	p

*NOTE- a = axial ; d = diametral ; i = irregular lump or block (see diagrams, right, for details)
p = perpendicular; l = parallel, u = unkown

DIA. KEY- P = load ; Dps = platen seperation ;
W = width of shortest dimension perpendicular to load ;
Lne = length from platens to nearest free end

UKAS TESTING 4514



TESTED BY: DK APPROVED BY: DK

POINT LOAD TEST RESULTS

ISRM 1985: Suggested Method

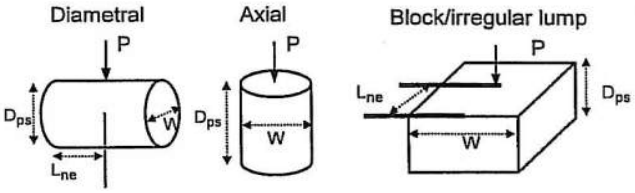
PROJECT No.:- CCG-C-24-15115 SITE:- GREYMARE LANE (2 SITES) DATE: 03.01.25

Borehole Number	Depth (m)	Type of Test* a	d	i	Width (W) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MPa)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MPa)	Estimated Uniaxial Compressive Strength (MPa)	Water Content (NAT/SAT)	Orientation to plane of weakness
BH102	15.85	a			90	51	0.20	76	0.03	1.21	0.04	0.83	NAT	p
BH102	16.20	a			90	48	0.30	74	0.05	1.19	0.07	1.30	NAT	p
BH102	16.90	a			80	46	2.30	68	0.49	1.15	0.57	11.31	NAT	p
BH102	17.50	a			90	64	4.70	86	0.64	1.27	0.82	16.33	NAT	p
BH102	17.85	a			90	61	2.40	84	0.34	1.26	0.43	8.65	NAT	p
BH102	18.15		d		69	90	1.40	-	0.17	1.30	0.23	4.50	NAT	l
BH102	18.20	a			90	66	2.40	87	0.32	1.28	0.41	8.14	NAT	p
BH102	18.75	a			90	84	2.60	98	0.27	1.35	0.37	7.32	NAT	p
BH102	19.00		d		81	90	2.00	-	0.25	1.30	0.32	6.43	NAT	l
BH102	19.05	a			90	79	2.50	95	0.28	1.34	0.37	7.38	NAT	p
BH102	20.00		d		83	90	2.50	-	0.31	1.30	0.40	8.04	NAT	l
BH102	20.05	a			90	77	3.30	94	0.37	1.33	0.50	9.93	NAT	p
BH102	20.20	a			90	72	2.80	91	0.34	1.31	0.44	8.88	NAT	p

*NOTE- a = axial ; d = diametral ; i = irregular lump or block (see diagrams, right, for details)
p = perpendicular; l = parallel, u = unkown

DIA. KEY- P = load ; Dps = platen seperation ;
W = width of shortest dimension perpendicular to load ;
Lne = length from platens to nearest free end

UKAS TESTING 4514



TESTED BY: DK APPROVED BY: DK

POINT LOAD TEST RESULTS

ISRM 1985: Suggested Method

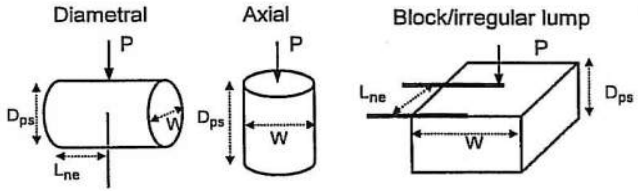
PROJECT No.:- CCG-C-24-15115 SITE:- GREYMARE LANE (2 SITES) DATE: 02.01.25

Borehole Number	Depth (m)	Type of Test* a	d	i	Width (W) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D_e) (mm)	Point Load (I_s) (MPa)	Size Factor (F)	Point Load Index ($I_{s(50)}$) (MPa)	Estimated Uniaxial Compressive Strength (MPa)	Water Content (NAT/SAT)	Orientation to plane of weakness
BH103	15.95	a			90	59	0.20	82	0.03	1.25	0.04	0.74	NAT	p
BH103	16.20	a			90	62	0.30	84	0.04	1.26	0.05	1.07	NAT	p
BH103	16.65	a			80	64	3.00	81	0.46	1.24	0.57	11.42	NAT	p
BH103	17.05	a			90	57	0.20	81	0.03	1.24	0.04	0.76	NAT	p
BH103	17.40	a			90	50	0.20	76	0.03	1.21	0.04	0.84	NAT	p
BH103	17.85	a			90	52	0.20	77	0.03	1.22	0.04	0.82	NAT	p
BH103	18.40	a			90	62	0.40	84	0.06	1.26	0.07	1.42	NAT	p

*NOTE- a = axial ; d = diametral ; i = irregular lump or block (see diagrams, right, for details)
p = perpendicular; l = parallel, u = unkown

DIA. KEY- P = load ; Dps = platen seperation ;
W = width of shortest dimension perpendicular to load ;
Lne = length from platens to nearest free end

UKAS TESTING 4514



TESTED BY: DK APPROVED BY: DK

TEST REPORT

UNIAXIAL COMPRESSIVE STRENGTH

In accordance with ISRM Vol 16 No 2, pp 135-140 (1979)

PROJECT:	**GREYMARE LANE (2 SITES)**
CLIENT:	**SUTCLIFFE**
CCG REF:	**CCG-C-24-15115**
Sample ref:	BH102 17.10mbgl
Date of coring:	Unknown
Sampled by:	Client
Sample description:	SANDSTONE

TEST DATA

Specimen Height (mm):	180
Specimen Diameter (mm):	90
L/D ratio:	2:1
Mode of failure:	Axial
Test duration:	1m 33s
Maximum load at failure (kN):	99.7
Compressive strength (N/mm2):	**15.7**
Test date:	03/01/2025
Tested by:	**DK**
Report prepared by:	**DK**
Report approved by:	**DK**

	Contract Name: Greymare Lane		Client: Sutcliffe		Borehole ID: **BH101**
	Contract Number: CCG-C-24-15115	Date Started:	Loggged By: DK	Checked By: CB	Status: FINAL — Sheet 1 of 3
Rotary Core Drilling Log	Easting:	Northing:	Ground Level:	Plant Used:	Rig Crew: — Scale: 1:50
Weather:		Termination:			

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
							(15.00)				

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information				
Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

CCG	Contract Name: Greymare Lane		Client: Sutcliffe		Borehole ID: **BH101**
	Contract Number: CCG-C-24-15115	Date Started:	Loggged By: DK	Checked By: CB	Status: FINAL
Rotary Core Drilling Log	Easting:	Northing:	Ground Level:	Plant Used:	Rig Crew:
Weather:		Termination:			Sheet 2 of 3 / Scale: 1:50

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
15.00 - 16.50	59	0	0	NR NI			15.00 (1.50)		Grey MUDSTONE. Highly weathered. Recovered as gravelly clay. *No Recovery* *Not Intact recovered as gravelly clay*		
16.50 - 18.00	99	57	35	~~NR~~ 7 NI 9			16.50 (3.00)		Grey becoming dark grey MUDSTONE. Moderately weathered. Recovered locally as gravelly clay. Discontinuities are very close to medium spaced, horizontal, clean, smooth and tight. *No Recovery* *Not Intact recovered as clayey gravel*		
18.00 - 19.50	95	95	32	~~NR~~ NI 4 NI			19.50		*No Recovery* *Not Intact recovered as gravelly clay* *Not Intact recovered as gravelly clay*		
				~~NR~~					Grey MUDSTONE. Fresh. *No Recovery*		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information				
Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

CCG	Contract Name: Greymare Lane		Client: Sutcliffe		Borehole ID: **BH101**
	Contract Number: CCG-C-24-15115	Date Started:	Loggged By: DK	Checked By: CB	Status: FINAL — Sheet 3 of 3
Rotary Core Drilling Log	Easting:	Northing:	Ground Level:	Plant Used:	Rig Crew: — Scale: 1:50
Weather:		Termination:			

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
				1			(1.42)		Grey MUDSTONE. Fresh.		
							20.92 21.00		Grey fine grained SANDSTONE. Fresh.		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information				
Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

CCG	Contract Name: Greymare Lane		Client: Sutcliffe		Borehole ID: **BH102**
	Contract Number: CCG-C-24-15115	Date Started:	Loggged By: DK	Checked By: CB	Status: FINAL — Sheet 1 of 3
Rotary Core Drilling Log	Easting:	Northing:	Ground Level:	Plant Used:	Rig Crew: — Scale: 1:50
Weather:		Termination:			

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
							(15.31)				

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information				
Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

CCG	Contract Name: Greymare Lane		Client: Sutcliffe		Borehole ID: **BH102**
	Contract Number: CCG-C-24-15115	Date Started:	Loggged By: DK	Checked By: CB	Status: FINAL
Rotary Core Drilling Log	Easting:	Northing:	Ground Level:	Plant Used:	Rig Crew:
Weather:		Termination:			Sheet 2 of 3 / Scale: 1:50

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
									No Recovery		
				NR			15.31				
				NI			(0.49)		Brown MUDSTONE with inclusions od sandstone. Highly weathered. Recovered as gravel and clay.		
15.00 - 16.50	79	45	41	NI					*Not Intact recovered as gravel*		
				6			15.80		*Not Intact recovered as gravelly clay*		
				NR					Grey occasionally brown fine to medium grained SANDSTONE. Slightly weathered with brown staining on fracture faces. Discontinuities are extremely close to medium spaced, horizontal, clean, rough and tight.		
				NI					*No Recovery*		
				35					*Not Intact recovered as gravel*		
16.50 - 18.00	99	89	52	8			(4.88)				
				NR					*No Recovery*		
				NI					*Not Intact recovered as gravel*		
18.00 - 19.50	99	95	62	12							
				NR					*No Recovery*		

11 12 13 14 15 16 17 18 19 20

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	

Flush Information				
Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

CCG	Contract Name: Greymare Lane		Client: Sutcliffe		Borehole ID: **BH102**
	Contract Number: CCG-C-24-15115	Date Started:	Loggged By: DK	Checked By: CB	Status: FINAL
Rotary Core Drilling Log	Easting:	Northing:	Ground Level:	Plant Used:	Rig Crew:
Weather:		Termination:			Sheet 3 of 3 / Scale: 1:50

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
19.50 - 21.00	99	77	29	15			20.68 (0.32) 21.00		Grey occasionally brown fine to medium grained SANDSTONE. Slightly weathered with brown staining on fracture faces. Discontinuities are extremely close to medium spaced, horizontal, clean, rough and tight.		
				NI 13					Grey MUDSTONE. Highly weathered. Recovered as gravel and clay. *Not Intact recovered as gravelly clay*		

21 22 23 24 25 26 27 28 29 30

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information				
Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

	Contract Name: Greymare Lane		Client: Sutcliffe		Borehole ID: **BH103**
	Contract Number: CCG-C-24-15115	Date Started:	Loggged By: DK	Checked By: CB	Status: FINAL
Rotary Core Drilling Log	Easting:	Northing:	Ground Level:	Plant Used:	Rig Crew:
Weather:		Termination:			Scale: 1:50

Sheet 1 of 3

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
							(15.78)				

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Flush Information				
Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

Contract Name: Greymare Lane		Client: Sutcliffe		Borehole ID: **BH103**
Contract Number: CCG-C-24-15115	Date Started:	Loggged By: DK	Checked By: CB	Status: FINAL — Sheet 2 of 3
Rotary Core Drilling Log	Easting:	Northing:	Ground Level:	Plant Used: / Rig Crew: / Scale: 1:50
Weather:	Termination:			

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
15.00 - 16.50	48	41	41	NR					No Recovery		
				3			15.78 (0.83)		Brownish grey MUDSTONE. Moderately weathered recovered as clay and gravel. Discontinuities are medium spaced, horizontal, clean, smooth and tight.		
				NI					Not Intact recovered as gravel		
				NI					Not Intact recovered as clay		
16.50 - 18.00	100	88	74	13			16.61		Brownish grey fine to medium grained SANDSTONE. Moderately weathered recovered locally as gravel. Discontinuities are closely spaced, horizontal, clean, rough and wide.		
				NI			16.90		Not Intact recovered as gravel		
				14					Grey becoming dark grey MUDSTONE with rare inclusions of sandstone. Highly weathered recovered as clayey gravel. Discontinuities are close to widely spaced, horizontal, clean, smooth and tight.		
				3			(2.14)				
18.00 - 19.50	87	36	25	NR					No Recovery		
				NI					Not Intact recovered as gravel		
				6							
				NI					Not Intact recovered as clayey gravel		
				5							
				NI					Not Intact recovered as clayey gravel		
				12							
				NI			19.04		Not Intact recovered as clayey gravel		
				NI					Grey becoming dark grey MUDSTONE with rare inclusions of sandstone. Highly weathered recovered as clayey gravel.		
				NI					Not Intact recovered as clay		
				NR					No Recovery		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	

Flush Information				
Top (m)	Base (m)	Flush Type	Return	Flush Colour

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

Contract Name: Greymare Lane		Client: Sutcliffe		Borehole ID: **BH103**
Contract Number: CCG-C-24-15115	Date Started:	Loggged By: DK	Checked By: CB	Status: FINAL — Sheet 3 of 3
Rotary Core Drilling Log	Easting:	Northing:	Ground Level:	Plant Used: / Rig Crew: / Scale: 1:50
Weather:	Termination:			

Samples & In Situ Testing						Strata Details				Groundwater	
Depth	TCR	SCR	RQD	FI	Water Added	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
19.50 - 21.00	48	0	0	NI			(1.96) 21.00		Grey becoming dark grey MUDSTONE with rare inclusions of sandstone. Highly weathered recovered as clayey gravel. *Not Intact recovered as clayey gravel*		

21 22 23 24 25 26 27 28 29 30

Start & End of Shift Observations				
Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter	
Depth (m)	Dia (mm)

Casing Diameter	
Depth (m)	Dia (mm)

Flush Information				
Top (m)	Base (m)	Flush Type	Return	Flush Colour

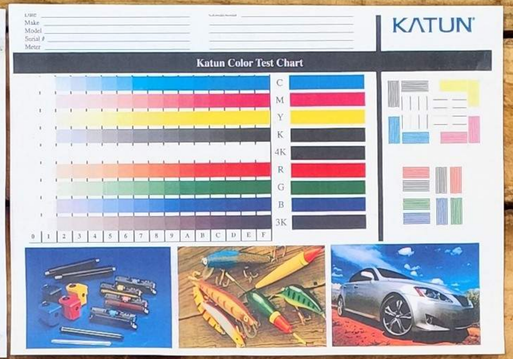
Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Fracture spacing reported in mm as min, Average and Max values. TCR, SCR and RQD reported in %

REF: CCG-C-24-15115
SITE: GREYMARE LANE
(2 SITES)
CLIENT: SUTCLIFFE
BH101 15.0-18.0mbgl



15.0

16.5

16.5

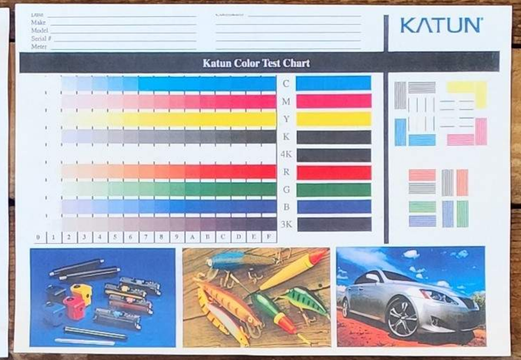
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REF: CCG-C-24-15115

SITE: GREYMARE LANE
(2 SITES)

CLIENT: SUTCLIFFE

BH101 18.0-21.0mbgl

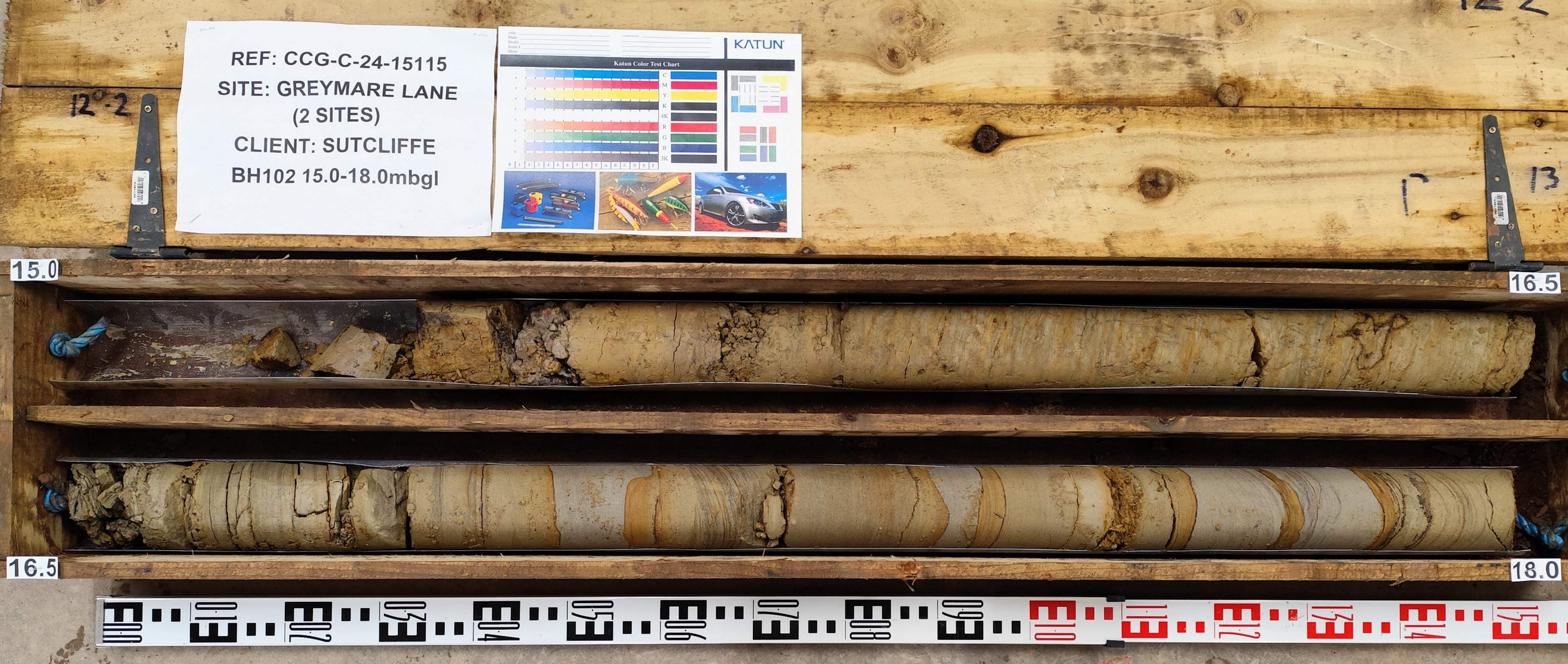


18.0

19.5

19.5

21.0


REF: CCG-C-24-15115
SITE: GREYMARE LANE
(2 SITES)
CLIENT: SUTCLIFFE
BH102 15.0-18.0mbgl
KATUN
Katun Color Test Chart
12.2
13
15.0
16.5
16.5
18.0


REF: CCG-C-24-15115
SITE: GREYMARE LANE
(2 SITES)
CLIENT: SUTCLIFFE
BH102 18.0-21.0mbgl
KATUN
Katun Color Test Chart
18.0
19.5
19.5
21.0


REF: CCG-C-24-15115
SITE: GREYMARE LANE
(2 SITES)
CLIENT: SUTCLIFFE
BH103 15.0-18.0mbgl
KATUN
Katun Color Test Chart
15.0
16.5
16.5
18.0


REF: CCG-C-24-15115
SITE: GREYMARE LANE
(2 SITES)
CLIENT: SUTCLIFFE
BH103 18.0-21.0mbgl
KATUN
Katun Color Test Chart
18.0
19.5
19.5
21.0

`Notes on Limitations
For
Geoenvironmental and Geotechnical Consultancy Services

General

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Phase I Environmental Audits / Desk Studies

The work undertaken to provide the basis of a Phase 1 Desk Study report comprises a study of available documented information from a variety of sources (including the client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in a Desk Study report have been dictated by finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in the report, CC GEOTECHNICAL LTD reserves the right to review such information and to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Factual Ground Investigations

The investigation of the site has been carried out in accordance with the scope and specification instructed by the Client. No interpretations of the data generated by the investigation have been provided or implied. The exploratory holes undertaken in this commission, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of site conditions. Conditions may exist on the site which have not been detected by the works undertaken. Furthermore, the number of sampling points and the methods of sampling and testing do not preclude the existence of localised “hotspots” or more widespread contamination where concentrations may be significantly higher than those actually encountered.

Interpretative Phase II Environmental Audits

The investigation of the site has been carried out with the intention of providing sufficient information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated to potential human targets, building materials, the environment (including adjacent land), and surface and groundwater.

The amount of exploratory work and chemical testing undertaken may have been restricted by factors including inter alia the Clients budget, the available timescale, access to all parts of the site, the existence of buried services etc., and where this is the case, a more comprehensive investigation may be required if the site is to be redeveloped, since a number of important engineering and environmental issues may need further assessment.

For those reasons, if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

It must be borne in mind, that the exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be ground conditions present on the site which have not been disclosed by this investigation, and which have therefore not been taken into account in this report. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised “hotspots” or more widespread contamination where concentrations may be significantly higher than those actually encountered. The findings of the investigation are valid for the time of investigation and the passage of time may result in changes to the contamination status of the site, and a reassessment of the site may be required where significant time has elapsed.

Geoenvironmental Ground Investigations

The investigation of the site has been carried out within the constraints of Client budget, available timeframe, access to all parts of the site, the existence of buried services and a more comprehensive investigation may be required to provide sufficient information regarding the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions, to formulate a reasonable assessment of the environmental risks together with engineering and development implications.

If costs have been included in relation to the site remediation, these must be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of the site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be ground conditions present on the site which have not been disclosed by this investigation, and which have therefore not been taken into account in this report. The findings of the investigation are valid for the time of investigation and the passage of time may result in changes to the contamination status of the site, and a reassessment of the site may be required where significant time has elapsed.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal, weather, or other effects.

The risk assessment and opinions provided, inter alia, take into consideration currently available guidance relating to acceptable contamination concentrations and no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

Appendix F – Soil Screening Tables

Sutcliffe	**SUTCLIFFE INVESTIGATIONS** TEL: 0151 227 3155 FAX: 0151 227 3156		**Long Term Human Health Risk Assessment**				
	Job Name:	0	**Job No.:**	0			
	Proposed Land Use:	Residential With Plant Uptake	**S.O.M. (%):**	1.0			
	Legend		**Sample Details**				
	Above Threshold:		**Lab Sample Ref.:**		25/00047/1	25/00047/2	25/00047/3
	Below Limit of Detection:	<0.01	**Depth Top (m bgl):**		0.50	0.40	0.60
	Not Tested:	n/t	**Depth Base (m bgl):**		0.80	0.80	0.90
	No Asbestos Detected:	NAD	**Date Sampled:**		12-Dec-24	12-Dec-24	12-Dec-24
	Contaminant	**Units**	**Threshold Source**	**Threshold Value**	**BH101**	**BH102**	**BH103**
Metals / Non-Metals / Other Suite	Arsenic (Total)	mg/kg	LQM S4UL	37	2	3	5
	Boron (Soluble)	mg/kg	LQM S4UL	290	n/t	n/t	n/t
	Cadmium (Total)	mg/kg	LQM S4UL	11	<0.5	<0.5	0.8
	Chromium III	mg/kg	LQM S4UL	910	n/t	n/t	n/t
	Chromium VI	mg/kg	LQM S4UL	6	<1	<1	<1
	Copper (Total)	mg/kg	LQM S4UL	2400	20	23	25
	Lead (Total)	mg/kg	C4SL	200	11	16	56
	Mercury (Total)	mg/kg	LQM S4UL	40	<0.17	<0.17	<0.17
	Nickel (Total)	mg/kg	LQM S4UL	130	26	29	13
	Selenium (Total)	mg/kg	LQM S4UL	250	<1	<1	<1
	Zinc (Total)	mg/kg	LQM S4UL	3700	54	56	111
	Cyanide (Total)	mg/kg	ATKINS	34	n/t	n/t	n/t
	Phenols (Total)	mg/kg	LQM S4UL	120	n/t	n/t	n/t
	Organic matter	%	LQM S4UL	N/a	n/t	n/t	n/t
	Sulphate (Acid Soluble)	mg/kg	LQM S4UL	N/a	n/t	n/t	n/t
	Sulphate as Water Soluble	g/l	LQM S4UL	N/a	n/t	n/t	n/t
	Sulphide	mg/kg	LQM S4UL	N/a	n/t	n/t	n/t
	pH	pH units	LQM S4UL	N/a	8.65	8.84	11.29
	Sulphur (Elemental)	mg/kg	LQM S4UL	N/a	n/t	n/t	n/t
Asbestos Suite	Asbestos in soil	N/a	-	N/a	NAD	NAD	NAD
	Asbestos Matrix (visual)	N/a	-	N/a	n/t	n/t	n/t
	Asbestos Matrix (microscope)	N/a	-	N/a	n/t	n/t	n/t
	Suitable for Water Absorption Test?	N/a	-	N/a	n/t	n/t	n/t
	Asbestos Quantification	% w/w	-	0.001	n/t	n/t	n/t
TPH Suite	C5 to C6 aliphatic	mg/kg	LQM S4UL	42	n/t	n/t	n/t
	C6 to C8 aliphatic	mg/kg	LQM S4UL	100	n/t	n/t	n/t
	C8 to C10 aliphatic	mg/kg	LQM S4UL	27	n/t	n/t	n/t
	C10 to C12 aliphatic	mg/kg	LQM S4UL	130	n/t	n/t	n/t
	C12 to C16 aliphatic	mg/kg	LQM S4UL	1100	n/t	n/t	n/t
	C16 to C21 aliphatic	mg/kg	-	N/a	n/t	n/t	n/t
	C21 to C35 aliphatic	mg/kg	-	N/a	n/t	n/t	n/t
	C16 to C35 aliphatic (as Calc.)	mg/kg	LQM S4UL	65000	n/t	n/t	n/t
	C35 to C44 aliphatic	mg/kg	LQM S4UL	65000	n/t	n/t	n/t
	Total Aliphatic	mg/kg	-	N/a	n/t	n/t	n/t
	C5 to C7 aromatic (Benzene)	mg/kg	LQM S4UL	70	n/t	n/t	n/t
	C7 to C8 aromatic (Toluene)	mg/kg	LQM S4UL	130	n/t	n/t	n/t
	C8 to C10 aromatic	mg/kg	LQM S4UL	34	n/t	n/t	n/t
	C10 to C12 aromatic	mg/kg	LQM S4UL	74	n/t	n/t	n/t
	C12 to C16 aromatic	mg/kg	LQM S4UL	140	n/t	n/t	n/t
	C16 to C21 aromatic	mg/kg	LQM S4UL	260	n/t	n/t	n/t
	C21 to C35 aromatic	mg/kg	LQM S4UL	1100	n/t	n/t	n/t
	C35 to C44 aromatic	mg/kg	LQM S4UL	1100	n/t	n/t	n/t
	Total Aromatic	mg/kg	-	N/a	n/t	n/t	n/t
	TPH (Total)	mg/kg	-	N/a	16	703	397
BTEX Suite	benzene	mg/kg	LQM S4UL	0.87	n/t	n/t	n/t
	toluene	mg/kg	LQM S4UL	130	n/t	n/t	n/t
	ethylbenzene	mg/kg	LQM S4UL	47	n/t	n/t	n/t
	M&P Xylene	mg/kg	LQM S4UL	56	n/t	n/t	n/t
	O-Xylene	mg/kg	LQM S4UL	60	n/t	n/t	n/t
PAH Suite	naphthalene	mg/kg	LQM S4UL	2.3	<0.03	<0.03	<0.30
	acenaphthylene	mg/kg	LQM S4UL	170	<0.01	<0.01	<0.10
	acenaphthene	mg/kg	LQM S4UL	210	<0.01	0.05	<0.10
	fluorene	mg/kg	LQM S4UL	170	<0.01	0.02	<0.10
	phenanthrene	mg/kg	LQM S4UL	95	<0.03	0.32	<0.30
	anthracene	mg/kg	LQM S4UL	2400	<0.02	0.06	<0.20
	fluoranthene	mg/kg	LQM S4UL	280	<0.08	0.37	<0.80
	pyrene	mg/kg	LQM S4UL	620	<0.07	0.33	<0.70
	benzo(a)anthracene	mg/kg	LQM S4UL	7.2	<0.04	0.13	<0.40
	chrysene	mg/kg	LQM S4UL	15	<0.06	0.17	<0.60
	benzo(b)fluoranthene	mg/kg	LQM S4UL	2.6	<0.05	0.1	<0.50
	benzo(k)fluoranthene	mg/kg	LQM S4UL	77	<0.07	<0.07	<0.70
	benzo(a)pyrene	mg/kg	LQM S4UL	2.2	<0.04	0.1	<0.40
	dibenzo(ah)anthracene	mg/kg	LQM S4UL	0.24	<0.04	<0.04	<0.40
	benzo(ghi)perylene	mg/kg	LQM S4UL	320	<0.05	<0.05	<0.50
	indeno(123cd)pyrene	mg/kg	LQM S4UL	27	<0.03	0.06	<0.30

Waste Stream name:	Sutcliffe Hazwaste Minimum Requirements Suite 2025				
Determinand	**Unit**	**BH101**	**BH102**	**BH103**	
Depth	m	0.50-0.80	0.40-0.80	0.60-0.90	
moisture	%	14.9	16.1	11	
pH	pH	8.65	8.84	11.29	
arsenic	mg/kg	2	3	5	
cadmium	mg/kg	<0.5	<0.5	0.8	
copper	mg/kg	20	23	25	
chromium	mg/kg	24	27	16	
chromium in chromium(VI) compounds	mg/kg	<1	<1	<1	
lead	mg/kg	11	16	56	
mercury	mg/kg	<0.17	<0.17	<0.17	
nickel	mg/kg	26	29	13	
selenium	mg/kg	<1	<1	<1	
zinc	mg/kg	54	56	111	
acenaphthene	mg/kg	<0.01	0.05	<0.10	
acenaphthylene	mg/kg	<0.01	<0.01	<0.10	
anthracene	mg/kg	<0.02	0.06	<0.20	
benz[a]anthracene	mg/kg	<0.04	0.13	<0.40	
benzo[a]pyrene; benzo[def]chrysene	mg/kg	<0.04	0.1	<0.40	
benzo[b]fluoranthene	mg/kg	<0.05	0.1	<0.50	
benzo[ghi]perylene	mg/kg	<0.05	<0.05	<0.50	
benzo[k]fluoranthene	mg/kg	<0.07	<0.07	<0.70	
chrysene	mg/kg	<0.06	0.17	<0.60	
dibenz[a,h]anthracene	mg/kg	<0.04	<0.04	<0.40	
fluoranthene	mg/kg	<0.08	0.37	<0.80	
fluorene	mg/kg	<0.01	0.02	<0.10	
indeno[123-cd]pyrene	mg/kg	<0.03	0.06	<0.30	
naphthalene	mg/kg	<0.03	<0.03	<0.30	
phenanthrene	mg/kg	<0.03	0.32	<0.30	
pyrene	mg/kg	<0.07	0.33	<0.70	
TPH (C6 to C40) petroleum group	mg/kg	16	703	397	

Appendix G – Waste Classification 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:

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

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

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Report is invalid if pages are removed.

Job name

Grey Mare Lane (2 Sites)

Description/Comments

Project

34338LG

Site

Grey Mare Lane (2 Sites)

Classified by

Name:
Daniel Evans
Date:
20 Jan 2025 16:32 GMT
Telephone:
0151 227 3155

Company:
Sutcliffe Projects Ltd
18-20 Harrington St
Liverpool
L2 9QA

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

HazWasteOnline™ Certification: -

Course	Date
Hazardous Waste Classification	-

Purpose of classification

2 - Material Characterisation

Address of the waste

Grey Mare Lane (2 Sites) **Post Code** M11 3FT

SIC for the process giving rise to the waste

Description of industry/producer giving rise to the waste

Redevelopment

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

Excavation of foundations for new build

Description of the waste

Made Ground

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	BH101	0.50-0.80	Non Hazardous		3
2	BH102	0.40-0.80	Non Hazardous		5
3	BH103	0.60-0.90	Non Hazardous		7

Related documents

#	Name	Description
1	Sutcliffe Hazwaste Minimum Requirements Suite 2025	waste stream template used to create this Job

Report

Created by: Daniel Evans

Created date: 20 Jan 2025 16:32 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	9
Appendix B: Rationale for selection of metal species	10
Appendix C: Version	10

Classification of sample: BH101

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

Sample details

Sample name:
BH101
Sample Depth:
0.50-0.80 m
Moisture content:
14.9%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 14.9% No Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	pH			PH		8.65	pH		8.65	pH	8.65 pH		
2	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				2	mg/kg	1.895	3.789	mg/kg	0.000379 %		
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		<0.5	mg/kg	1.855	<0.927	mg/kg	<0.0000927 %		<**LOD**
4	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		20	mg/kg	3.929	78.581	mg/kg	0.00786 %		
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		24	mg/kg	1.462	35.077	mg/kg	0.00351 %		
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1	mg/kg	2.27	<2.27	mg/kg	<0.000227 %		<**LOD**
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	11	mg/kg	1.56	17.158	mg/kg	0.0011 %		
8	mercury { mercury difulminate }	080-005-00-2	211-057-8	628-86-4		<0.17	mg/kg	1.419	<0.241	mg/kg	<0.0000241 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		26	mg/kg	5.358	139.316	mg/kg	0.0139 %		
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		54	mg/kg	2.774	149.804	mg/kg	0.015 %		
12	acenaphthene		201-469-6	83-32-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
13	acenaphthylene		205-917-1	208-96-8		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
14	anthracene		204-371-1	120-12-7		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<**LOD**
15	benz[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<**LOD**

#		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									
16		benzo[a]pyrene; benzo[def]chrysene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
17		benzo[b]fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
18	●	benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-883-8	191-24-2									
19		benzo[k]fluoranthene				<0.07	mg/kg		<0.07	mg/kg	<0.000007 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
20		chrysene				<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
21		dibenz[a,h]anthracene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
22	●	fluoranthene				<0.08	mg/kg		<0.08	mg/kg	<0.000008 %		<**LOD**
			205-912-4	206-44-0									
23	●	fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
			201-695-5	86-73-7									
24	●	indeno[123-cd]pyrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			205-893-2	193-39-5									
25		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
26	●	phenanthrene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
			201-581-5	85-01-8									
27	●	pyrene				<0.07	mg/kg		<0.07	mg/kg	<0.000007 %		<**LOD**
			204-927-3	129-00-0									
28	●	TPH (C6 to C40) petroleum group				16	mg/kg		16	mg/kg	0.0016 %		
				TPH									
										Total:	0.044 %		

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 Deteminand - 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 for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: Concentrations are too low to be considered a flammable risk

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.0016%)

Classification of sample: BH102

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

Sample details

Sample name:
BH102
Sample Depth:
0.40-0.80 m
Moisture content:
16.1%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 16.1% No Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	pH			PH		8.84 pH		8.84 pH	8.84 pH		
2	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				3 mg/kg	1.895	5.684 mg/kg	0.000568 %		
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		<0.5 mg/kg	1.855	<0.927 mg/kg	<0.0000927 %		<**LOD**
4	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		23 mg/kg	3.929	90.368 mg/kg	0.00904 %		
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		27 mg/kg	1.462	39.462 mg/kg	0.00395 %		
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	16 mg/kg	1.56	24.957 mg/kg	0.0016 %		
8	mercury { mercury difulminate }	080-005-00-2	211-057-8	628-86-4		<0.17 mg/kg	1.419	<0.241 mg/kg	<0.0000241 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		29 mg/kg	5.358	155.391 mg/kg	0.0155 %		
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		56 mg/kg	2.774	155.352 mg/kg	0.0155 %		
12	acenaphthene		201-469-6	83-32-9		0.05 mg/kg		0.05 mg/kg	0.000005 %		
13	acenaphthylene		205-917-1	208-96-8		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<**LOD**
14	anthracene		204-371-1	120-12-7		0.06 mg/kg		0.06 mg/kg	0.000006 %		
15	benz[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.13 mg/kg		0.13 mg/kg	0.000013 %		

#		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									
16		benzo[a]pyrene; benzo[def]chrysene				0.1	mg/kg		0.1	mg/kg	0.00001 %		
		601-032-00-3	200-028-5	50-32-8									
17		benzo[b]fluoranthene				0.1	mg/kg		0.1	mg/kg	0.00001 %		
		601-034-00-4	205-911-9	205-99-2									
18	●	benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
			205-883-8	191-24-2									
19		benzo[k]fluoranthene				<0.07	mg/kg		<0.07	mg/kg	<0.000007 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
20		chrysene				0.17	mg/kg		0.17	mg/kg	0.000017 %		
		601-048-00-0	205-923-4	218-01-9									
21		dibenz[a,h]anthracene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
22	●	fluoranthene				0.37	mg/kg		0.37	mg/kg	0.000037 %		
			205-912-4	206-44-0									
23	●	fluorene				0.02	mg/kg		0.02	mg/kg	0.000002 %		
			201-695-5	86-73-7									
24	●	indeno[123-cd]pyrene				0.06	mg/kg		0.06	mg/kg	0.000006 %		
			205-893-2	193-39-5									
25		naphthalene				<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
26	●	phenanthrene				0.32	mg/kg		0.32	mg/kg	0.000032 %		
			201-581-5	85-01-8									
27	●	pyrene				0.33	mg/kg		0.33	mg/kg	0.000033 %		
			204-927-3	129-00-0									
28	●	TPH (C6 to C40) petroleum group				703	mg/kg		703	mg/kg	0.0703 %		
				TPH									
										Total:	0.117 %		

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 Deteminand - 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 for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: Concentrations are too low to be considered a flammable risk

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.0703%)

Classification of sample: BH103

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

Sample details

Sample name:
BH103
Sample Depth:
0.60-0.90 m
Moisture content:
11%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	pH			PH		11.29 pH		11.29 pH	11.29 pH		
2	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				5 mg/kg	1.895	9.473 mg/kg	0.000947 %		
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.8 mg/kg	1.855	1.484 mg/kg	0.000148 %		
4	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		25 mg/kg	3.929	98.226 mg/kg	0.00982 %		
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16 mg/kg	1.462	23.385 mg/kg	0.00234 %		
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<LOD
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	56 mg/kg	1.56	87.35 mg/kg	0.0056 %		
8	mercury { mercury difulminate }	080-005-00-2	211-057-8	628-86-4		<0.17 mg/kg	1.419	<0.241 mg/kg	<0.0000241 %		<LOD
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		13 mg/kg	5.358	69.658 mg/kg	0.00697 %		
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		111 mg/kg	2.774	307.93 mg/kg	0.0308 %		
12	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
13	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
14	anthracene		204-371-1	120-12-7		<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
15	benz[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.4 mg/kg		<0.4 mg/kg	<0.00004 %		<LOD

#		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									
16		benzo[a]pyrene; benzo[def]chrysene				<0.4	mg/kg		<0.4	mg/kg	<0.00004 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
17		benzo[b]fluoranthene				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
18	●	benzo[ghi]perylene				<0.5	mg/kg		<0.5	mg/kg	<0.00005 %		<**LOD**
			205-883-8	191-24-2									
19		benzo[k]fluoranthene				<0.7	mg/kg		<0.7	mg/kg	<0.00007 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
20		chrysene				<0.6	mg/kg		<0.6	mg/kg	<0.00006 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
21		dibenz[a,h]anthracene				<0.4	mg/kg		<0.4	mg/kg	<0.00004 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
22	●	fluoranthene				<0.8	mg/kg		<0.8	mg/kg	<0.00008 %		<**LOD**
			205-912-4	206-44-0									
23	●	fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
24	●	indeno[123-cd]pyrene				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
			205-893-2	193-39-5									
25		naphthalene				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
26	●	phenanthrene				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
			201-581-5	85-01-8									
27	●	pyrene				<0.7	mg/kg		<0.7	mg/kg	<0.00007 %		<**LOD**
			204-927-3	129-00-0									
28	●	TPH (C6 to C40) petroleum group				397	mg/kg		397	mg/kg	0.0397 %		
				TPH									
										Total:	0.0975 %		

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 Deteminand - 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 for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: Concentrations are too low to be considered a flammable risk

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.0397%)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- **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

Appendix B: Rationale for selection of metal species

arsenic {arsenic acid and its salts with the exception of those specified elsewhere in this Annex}

Worst case species (edit as required)

cadmium {cadmium sulfate}

Worst case species (edit as required)

copper {copper sulphate pentahydrate}

Worst case species (edit as required)

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

Worst case species (edit as required)

chromium in chromium(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case species (edit as required)

lead {lead chromate}

Worst case species (edit as required)

mercury {mercury difulminate}

Worst case species (edit as required)

nickel {nickel dibromate}

Worst case species (edit as required)

selenium {nickel selenate}

Worst case species (edit as required)

zinc {zinc chromate}

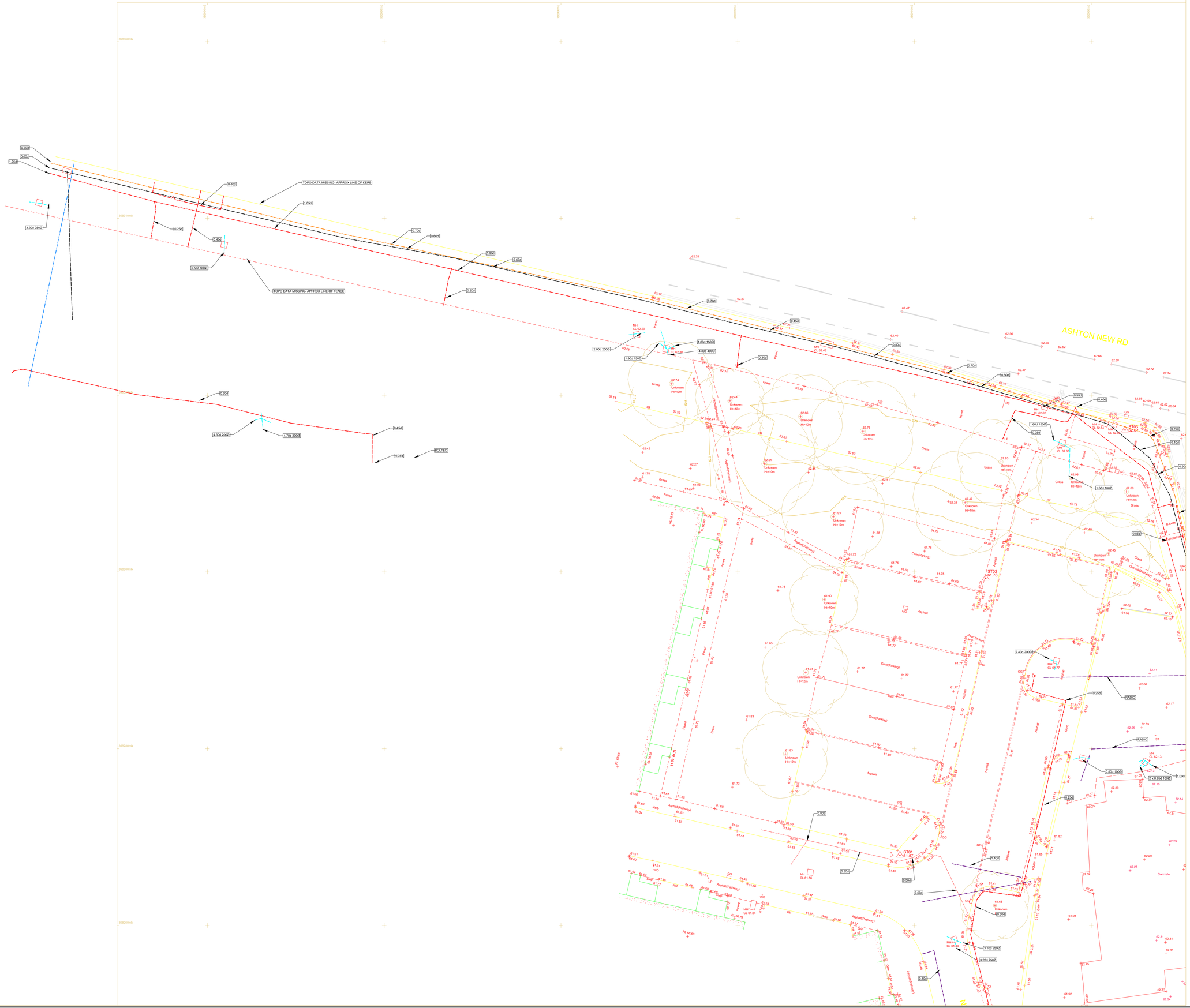
Worst case species (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2025.7.6439.11737 (07 Jan 2025)
HazWasteOnline Database: 2025.7.6439.11737 (07 Jan 2025)

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
GB MCL List v3.0 - version 3.0 of 11th January 2024
GB MCL List v4.0 - version 4.0 of 2nd March 2024
GB MCL List v5.0 - version 5.0 of 26th June 2024

Drawing Ref. – *CUB-SC-001A* (Existing Layout)



cube surveys
NON GROUND BREAKING TECHNOLOGY

TEL. 0870 7550093
EMAIL. SALES@CUBESURVEYS.CO.UK

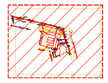
CONTROL SCHEDULE

STATION	EASTING	NORTHING	LEVEL

GENERAL NOTES

PLEASE STATE WHERE THE SURVEY CONTROL CAME FROM

SITE MAP



LEGEND

ELECTRIC	ELEC
ELECTRIC FROM RECORDS	ELEC (R)
WATER	WTR
WATER FROM RECORDS	WTR (R)
GAS	GAS
GAS FROM RECORDS	GAS (R)
BT	BT
BT FROM RECORDS	BT (R)
COMMS	COMMS
COMMS FROM RECORDS	COMMS (R)
STREET LIGHTING	SL
STREET LIGHTING FROM RECORDS	SL (R)
CCTV	CCTV
CCTV FROM RECORDS	CCTV (R)
TRAFFIC MANAGEMENT	TM
TRAFFIC MANAGEMENT FROM RECORDS	TM (R)
OIL PIPELINE	OIL
OIL PIPELINE FROM RECORDS	OIL (R)
UNKNOWN	UKN
MISCELLANEOUS	MISC
DRAINAGE	DRA
DRAINAGE FROM RECORDS	DRA (R)
OVERHEAD BT	BT (O)
OVERHEAD ELECTRIC	ELEC (O)
EXTRA HIGH VOLTAGE ELECTRIC	ELEC (EHV)
HIGH VOLTAGE ELECTRIC	ELEC (HV)
LOW VOLTAGE ELECTRIC	ELEC (LV)
HIGH PRESSURE GAS	GAS (HP)
LOW PRESSURE GAS	GAS (LP)
INTERMEDIATE PRESSURE GAS	GAS (IP)
ASSUMED DRAINAGE	ADR
SURVEY AREA	
TEXT BOX	000mm
EOT	END OF TRACE
ND	NO DEPTH RECORDS
d	DEPTH OF UTILITY
Ø	DIAMETER OF PIPE
GPR	GROUND PENETRATING RADAR

Always Exercise Caution When Excavating

A range of detection methods are used to obtain the underground information produced in this drawing. Variations in ground conditions can affect the quality of the data and therefore an absolute affirmation cannot be guaranteed.

IF IN ANY DOUBT ASK

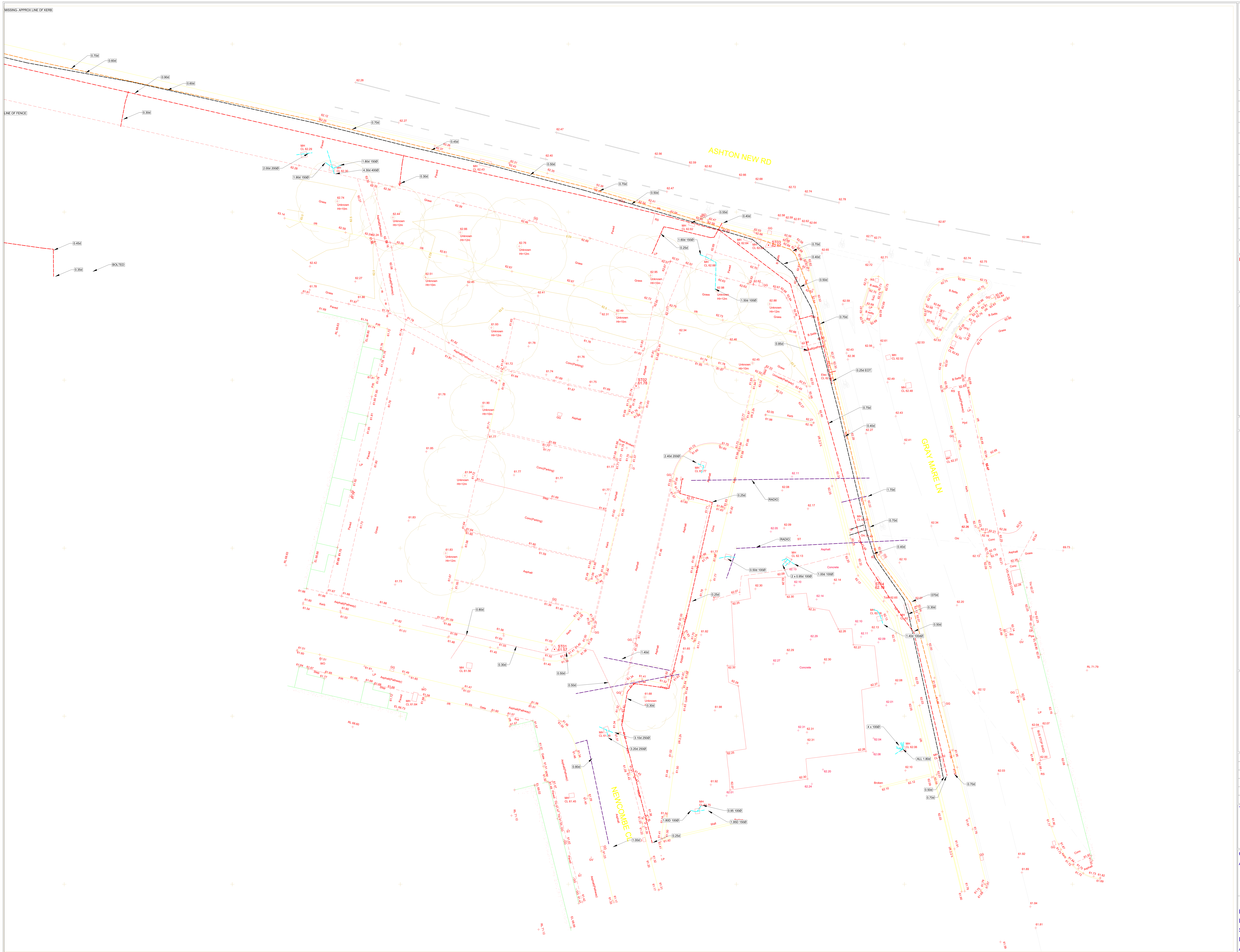
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-	00/00/00	Add Description	XXX

TITLE:

Utility Survey
PAS 128 B
GREY MARE LANE

CLIENT:	SHAPE CONSULTING
ADDRESS:	Shape Consulting Engineers Ltd Amber House | Green Lane | Liverpool | L13 7GD

PROJECT NAME:	Utility Survey
DRAWING NAME:	Grey Mare Lane
SURVEYED BY:	DT 24/04/24
DRAWN BY:	NS 24/04/24
APPROVED BY:	DT 24/04/24
DRAWING NUMBER:	CUB-SC-001A
SHEET NUMBER:	1 OF 2
SCALE @ A1:	1:200 DRAWING IN METRES



cube surveys
NON GROUND BREAKING TECHNOLOGY

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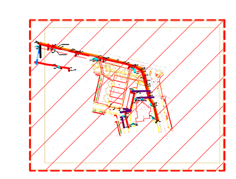
CONTROL SCHEDULE

STATION	EASTING	NORTHING	LEVEL

GENERAL NOTES

PLEASE STATE WHERE THE SURVEY CONTROL CAME FROM

SITE MAP



LEGEND

ELECTRIC	ELEC
ELECTRIC FROM RECORDS	ELEC (R)
WATER	WTR
WATER FROM RECORDS	WTR (R)
GAS	GAS
GAS FROM RECORDS	GAS (R)
BT	BT
BT FROM RECORDS	BT (R)
COMMS	COMMS
COMMS FROM RECORDS	COMMS (R)
STREET LIGHTING	SL
STREET LIGHTING FROM RECORDS	SL (R)
CCTV	CCTV
CCTV FROM RECORDS	CCTV (R)
TRAFFIC MANAGEMENT	TM
TRAFFIC MANAGEMENT FROM RECORDS	TM (R)
OIL PIPELINE	OIL
OIL PIPELINE FROM RECORDS	OIL (R)
UNKNOWN	UKN
MISCELLANEOUS	MISC
DRAINAGE	DRA
DRAINAGE FROM RECORDS	DRA (R)
OVERHEAD BT	BT (O)
OVERHEAD ELECTRIC	ELEC (O)
EXTRA HIGH VOLTAGE ELECTRIC	ELEC (EHV)
HIGH VOLTAGE ELECTRIC	ELEC (HV)
LOW VOLTAGE ELECTRIC	ELEC (LV)
HIGH PRESSURE GAS	GAS (HP)
LOW PRESSURE GAS	GAS (LP)
INTERMEDIATE PRESSURE GAS	GAS (IP)
ASSUMED DRAINAGE	ADR
SURVEY AREA	
TEXT BOX	300mm
EOT	END OF TRACE
ND	NO DEPTH RECORDS
d	DEPTH OF UTILITY
Ø	DIAMETER OF PIPE
GPR	GROUND PENETRATING RADAR

Always Exercise Caution When Excavating

A range of detection methods are used to obtain the underground information produced in this drawing. Variations in ground conditions can affect the quality of the data and therefore an absolute affirmation cannot be guaranteed.

IF IN ANY DOUBT ASK

REV	DATE	DESCRIPTION	INITIALS
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-	00/00/00	Add Description	XXX
-	00/00/00	Add Description	XXX
-	00/00/00	Add Description	XXX
-	00/00/00	Add Description	XXX

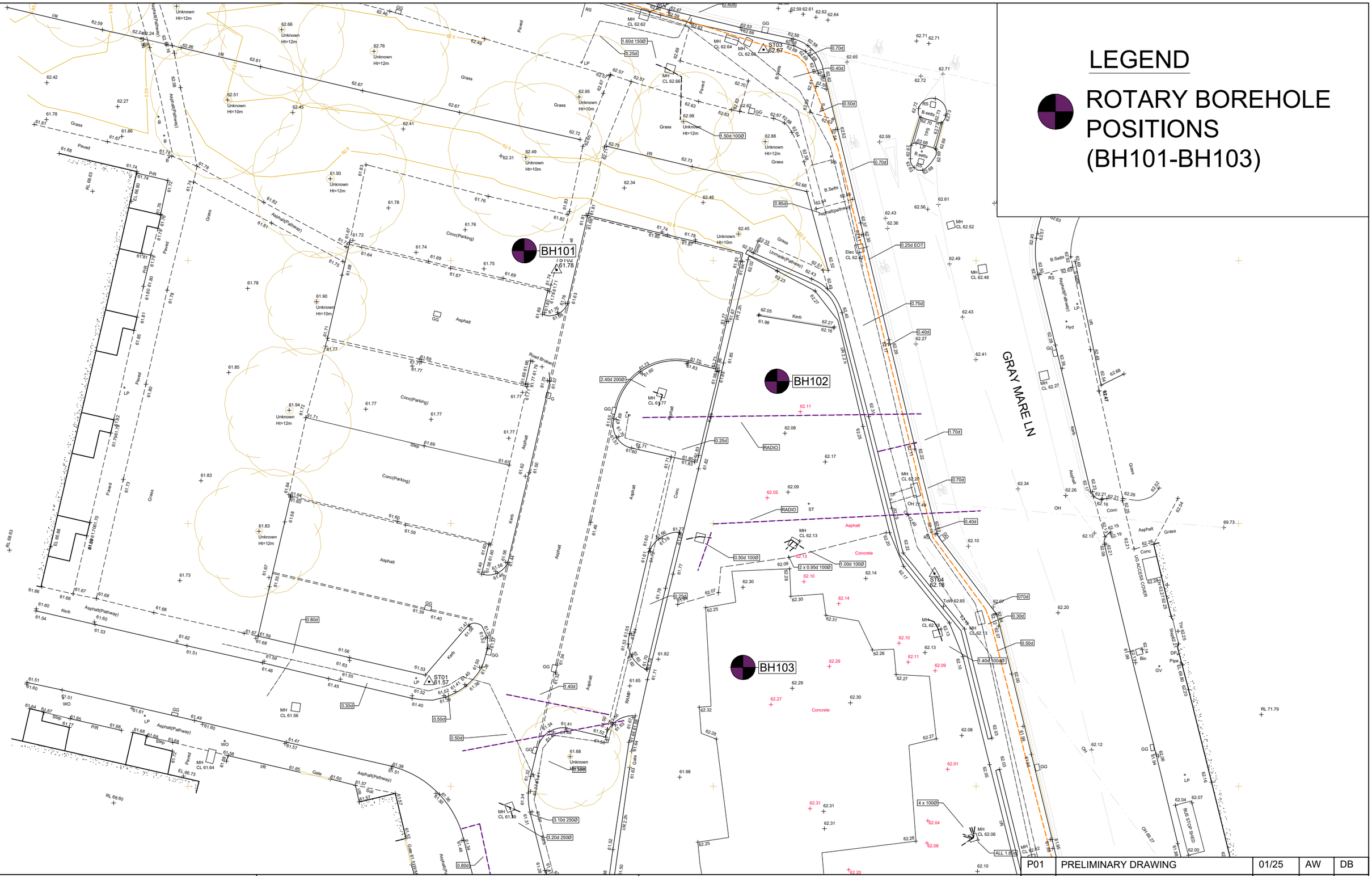
TITLE:

Utility Survey
PAS 128 B
GREY MARE LANE

CLIENT:	SHAPE CONSULTING
ADDRESS:	Shape Consulting Engineers Ltd Amber House | Green Lane | Liverpool | L13 7GD

PROJECT NAME:	Utility Survey
DRAWING NAME:	Grey Mare Lane
SURVEYED BY:	DT 24/04/24
DRAWN BY:	NS 24/04/24
APPROVED BY:	DT 24/04/24
DRAWING NUMBER:	CUB-SC-001A
SHEET NUMBER:	2 OF 2
SCALE @ A1:	1:200 DRAWING IN METRES

Drawing Ref. – 34338-SUT-ZZ-XX-DR-G-7251 (Site Investigation on Proposed Layout)



LEGEND

ROTARY BOREHOLE POSITIONS (BH101-BH103)

P01	PRELIMINARY DRAWING	01/25	AW	DB
Rev	Description	Date	By	Chkd

Sutcliffe
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Drawing Status: FOR INFORMATION ONLY

Client: GREAT PLACES

Project: GREY MARE LANE MANCHESTER

Drawing Title: ROTARY BOREHOLE POSITIONS FOR COAL RISK INVESTIGATION

Date: JAN 2025	Drawn By: A WOODS	Checked By: D BOWEN
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