



**BROWNFIELD
SOLUTIONS LTD**

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

SHURGARD UK

Garman Road, Tottenham

Phase II Geo-Environmental Assessment Report

SRP/M4993/10981 REV A

May 2023

EXECUTIVE SUMMARY	
Location and Brief Site Description	The site is located off Garman Road, Tottenham, N17 0UR. It is situated approximately 12 km north-east of London City Centre, centred on National Grid Reference 535091, 191308. The site is occupied by a factory unit and small yard area.
Ground Conditions	Generalised ground conditions from the ground investigation comprise (top down): • Made ground generally comprising gravelly clay from ground level to between 0.90m and 1.20m bgl. • Natural superficial deposits comprising clay and gravel proven to depths between 2.00m and 3.60m bgl. • Groundwater recorded in WS04 at 2.60m bgl.
Human Health - Soils Contamination	• No exceedances of heavy metals, PAHs, TPHs, BTEX or MTBE compounds. • Chrysotile fibres (loose fibres) detected in one sample of made ground. • Risk to human health is considered to be low.
Controlled Waters – Surface and Groundwater Contamination	• Risk to controlled waters is considered to be low.
Ground Gas	This site is currently categorised as CS-1. Ground gas risks have been assessed in a separate Ground Gas Risk Assessment, reference AT/M4993/11821 dated February 2023.
Outline Remedial Strategy	No specific remedial measures are considered necessary at the site at this stage.
Foundations and Floor Slabs	For the anticipated point loads from an assumed steel frame, shallow pad foundations are considered to be the most suitable foundation solution, with a 1m² pad at a depth of 2.0m within the gravel strata providing a safe bearing capacity of 500kN/m², keeping total and differential settlement within acceptable limits. Strip foundations may be utilised to support external masonry placed within the natural gravel strata at a minimum depth of 2.00m bgl, for a 0.6m wide foundation an allowable bearing capacity not exceeding 500kN/m² should be assumed for the gravel. If the proposed loads are higher, or if the undercroft parking is proposed at basement level, piled foundation solutions may be more suitable. A generalised soil profile revealed for a 300mm pile diameter, there are allowable loads of 115192kN at 75.0m depth, and 395200kN at 11.0m bgl, increasing to 165kN or 280kN respectively for 400mm diameter piles Suspended floor slabs may be adopted however, ground bearing floor slabs may be considered more suitable.
Concrete Classification	DS-1 AC-1s conditions prevail in made ground and clay. DS-1 AC-2z conditions prevail in gravel. DS-4 AC3s conditions prevail in London Clay Formation.
Highways Design	Made Ground CBR – <2% Superficial Strata CBR – cohesive/fine soils– 2% Superficial Strata CBR – granular/coarse soils– 20-60% The above should be confirmed by in-situ testing at formation level by a specialist geotechnical engineer during construction.
Sustainable Drainage Systems (SUDS)	Drainage to soakaways is considered potentially suitable for this site. However, it is likely to require constructing within deeper more permeable strata or siting away from areas where the low permeability clays are present at shallow depth.
Further Work	The following further works will be required to progress to the construction phase: • If higher structural loads are anticipated than discussed in 7.3, or if basement excavation is considered, then deeper exploratory holes will be required to confirm foundation design. ○ Comprising: Cable Percussive boreholes to increase coverage, allow deeper piled foundation design and increase confidence of potential shallow design. • Demolition Asbestos survey. • Detailed foundation design by a structural engineer, including foundation zonation plan and depth schedule.

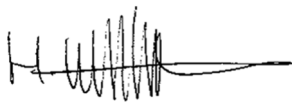
This executive summary should be read in conjunction with the full report, reference SRP/M4993/10981 REV A and not as a standalone document.

PROJECT QUALITY CONTROL DATA SHEET

Site Name:	Garman Road, Tottenham		
Document Name:	Phase II Geo-Environmental Assessment Report		
Reference:	SRP/M4993/10981 REV A		
Status:	-	18/05/2022	Final following completion of gas monitoring programme.
	A	02/05/2023	Revision following supplementary site investigation

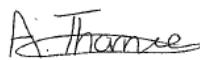
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DRAWINGS		
Drawing Number	Rev	Title
UK00- Tottenham Garman Road- UM Plan- SK02	-	Proposed Development Layout Plan
M4993/01	-	Site Location Plan
M4993/02	-	Site Features Plan
M4993/04	B	Exploratory Hole Location Plan

APPENDICES	
Appendix	Title
Photographs	Site Works Photographs
Appendix A	BSL Methodology and Guidance
Appendix B	Exploratory Hole Logs
Appendix C	Chemical Testing Results
Appendix D	Geotechnical Testing Results
Appendix E	Monitoring Results

1.0 INTRODUCTION

1.1 Context

This report describes a Phase II Geo-Environmental Assessment carried out by Brownfield Solutions Limited (BSL) for Shurgard UK on a site off Garman Road, Tottenham and has been completed in general accordance with the following guidance:

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- Environment Agency guidance - Land Contamination: Risk Management (LCRM).
 - BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites.
 - BS5930: 2015+A1:2020 Code of Practice for Ground Investigations.
 - BS EN 1997-1 :2004+A1 :2013 Eurocode 7. Geotechnical design. General rules plus UK National Annex.
 - BS EN 1997-2 :2007 Eurocode 7 Geotechnical design. Ground investigation and testing plus UK National Annex.
-

Definitions of terms and acronyms used within this report is presented in Section 10.0.

1.2 Proposed Development

The proposed development is for a commercial end use comprising a six-storey steel framed storage unit building and associated internal/covered car park areas as shown on the proposed development plan, drawing 'UK00-Tottenham Garman road-UM Plan-SK02' provided to BSL by the client.

1.3 Previous Reports

This report should be read in conjunction with the Brownfield Solutions Ltd Phase I Desk Study Assessment Report (SRP/M4993/10841) issued in March 2022.

1.4 Objectives and Scope

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

This report has been produced in general accordance with the recommendations for a Tier 2 Generic Quantitative Risk Assessment as described in LCRM guidance. This assessment is also intended to fulfil the requirements of a Ground Investigation Report (GIR) as detailed in BS EN 1997-2:2007.

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

1.5 Limitations

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

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

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

This report has been prepared for the sole use and reliance of the Client, Shurgard UK. No other third parties may rely upon or reproduce the contents of this report without the written permission of Brownfield Solutions Ltd (BSL). If any unauthorised third party comes into possession of this report, they rely on it at their own risk and BSL do not owe them any Duty of Care.

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

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

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

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

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

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

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

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

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

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

2.0 THE SITE

2.1 Location

The site is located off Garman Road, Tottenham, N17 0UR. It is situated approximately 12 Km north-east of London City Centre, centred on National Grid Reference 535091, 191308 as shown on the Site Location Plan, Drawing No. M4993/01.

2.2 Site Description

The main site features and potential issues identified are detailed below and are shown on the Site Features Plan, Drawing No. M4993/02.

Feature	Description
Site Area	Approximately 0.3 hectares.
Site Access	Access to the site is gained off Garman Road to the west of the site.
Current Land Use and Site Features	The site comprises an existing commercial unit with a yard, comprising concrete hardstanding. The building occupies the majority of the site and borders another unit to the south of the site. Within the building, the flooring is concrete. There are multiple manhole covers recorded in the yard area. The toilets and welfare facilities are near the front of the building bordering the road and it appears that the services associated with these run in through the front of the building. The building is no longer used as a furniture works; however, the equipment is still present. The majority of the equipment comprises large pieces of machinery e.g., edge bander, panel saw and CNC machines.
Potential Sources of Gross Contamination	No evidence of gross contamination was observed on site.
Vegetation	There are semi-mature trees with mixed vegetation on the eastern boundary of the site. There is a mix of vegetation along the north boundary. This includes nettles and ivy.
Topography	The site is generally flat. An embankment is present off site to the east and Sedge Road is elevated above current site levels.
Site Boundaries	Chain link fence bounds the site to the north and east. The south of the site is bound by a party wall inside the factory. Garman Road bounds the site to the west. Where the chain link fence has been broken, temporary fencing has been placed behind. Some gaps in these fences do exist.
Surrounding Area	The site is set within a commercial area, bordered by a vehicle repair yard to the north, a large electricity transformer station to the east, an additional commercial unit adjoined to the south and an alcohol works and laundry to the west.

3.0 SUMMARY OF PREVIOUS REPORTS

3.1 BSL Desk Study

A summary of the relevant points from the Desk Study completed by Brownfield Solutions Ltd (reference SRP/M4993/10841) is presented below:

- The site has had previous uses including a paper works and cardboard works.
- The site has been set within a wider industrial area over time. Nearby off-site sources include an alcohol works and laundry.
- Geology comprises superficial Enfield Silt Member (Unproductive) over London Clay (Unproductive). However, nearby deposits of alluvium recorded on BGS mapping may be present beneath the Enfield Silt Member, which are associated with the Secondary (A) Aquifer located 30m to the east of the site.
- No faults are present within an influencing distance of the site.
- The nearest watercourse is the Pymme's Brook circa 230m to the east of the site.
- The site is located in a Zone 2 floodplain.
- The site is indicated to lie within a Source Protection Zone, Zone II, Outer Catchment.
- The risk to human health is considered to be low to moderate. Due to the proposed development, there are not considered to be any pathways for direct contact or ingestion, and therefore only human health risks associated with gases and vapours were assessed.
- The risk from ground gas is considered to be moderate due to potential made ground on-site and the presence of alluvium in close proximity to the site. The site is not located in an area requiring radon protection measures.
- The risk to controlled waters is low.
- The site is located in the UXO high risk zone according to UXO screening mapping provided by Zetica. However, a detailed UXO assessment summarised below for the site concluded that the site is low risk.
- Recommendations were for an appropriate Phase II ground investigation to be carried out to confirm the identified risks and obtain information for preliminary design.

3.2 EOD Detailed UXO Desk Study

A summary of the relevant points from the detailed UXO Desk Study completed by EOD (reference EOD/22/22061/DTS) is presented below:

- The nearest recorded bomb strike is over 300m from the site.
- No bomb damage was recorded.
- No reconstruction was noted.
- No military usage was noted.
- The overall risk is low.
- Site Specific Unexploded Ordnance Awareness Briefings to all personnel conducting intrusive works was recommended.

4.0 METHOD OF INVESTIGATION

4.1 Objectives

To confirm the risks to the identified receptors and confirm the ground conditions in respect to the identified geotechnical and geo-environmental risks, an appropriate intrusive investigation was undertaken as per the recommendations of the Phase I Desk Study Assessment.

The aim of the fieldwork was to:

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

4.2 Site Works

Original

The following site works have been undertaken as part of the initial intrusive investigation on 21st and 22nd March 2022.

Method	No.	Range Depths (m bgl)	Purpose
Window sample boreholes – Modular Tracked WS rig	5	2.00 – 3.60	Establish general ground conditions on site. Allow Standard Penetration Tests (SPTs) to be carried out and obtain samples for contamination testing. Installation of ground gas monitoring wells.
Hand Excavated Pit	1	1.00	Obtain samples for contamination and geotechnical testing.

The hand dug pit was due to be drilled by window sampling but could not be progressed due to an obstruction of the inspection pit at 1.00m bgl. Samples were obtained from the arisings and the pit was backfilled.

Supplementary

The following site works were undertaken as part of a supplementary intrusive investigation between 27th and 31st March 2023.

Method	No.	Range Depths (m bgl)	Purpose
Cable Percussive boreholes	3	20m	Establish the deeper ground conditions to enable foundation design, Allow Standard Penetration Tests (SPTs) to be carried out and obtain samples for contamination testing. Installation of ground gas monitoring wells.

General

The approximate locations of the exploratory holes are indicated on the Exploratory Hole Location Plan, Drawing No. M4993/04, which is enclosed. The exploratory holes were positioned to gain the best coverage possible by the BSL engineer on site. Note that the slow concrete coring limited the positions of exploratory holes.

The exploratory hole logs are presented in Appendix B.

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

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

4.3 Sampling

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

The type of sample was dependent upon the stratum and the purpose of analysis in accordance with current environmental guidance.

The distribution of samples taken across the site is recorded on the exploratory logs and a summary of the samples taken is presented in the table below:

Type	Number
Environmental (ES)	28
Disturbed (D)	26
Bulk (B)	5
U100 (U)	6

4.4 Laboratory Testing

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

Potential contamination was found on site in the form of made ground and hydrocarbon odours therefore the following suite of determinands were chosen to screen for potential site impacts at a UKAS approved laboratory:

Determinand	No of Samples
BSL Default Soil Suite: Arsenic, Cadmium, Chromium (III), Chromium (VI), Copper, Nickel, Mercury, Lead, Zinc, Selenium, speciated polycyclic hydrocarbons (PAH 16), water soluble sulphate (2:1 Extract), soil organic matter (SOM) and pH.	8
Petroleum Hydrocarbons (TPH CWG) up to C44 inc BTEX and MTBE.	6
Asbestos Screen.	8
Volatile Organic Compounds (VOCs) by GC-MS.	3
Speciated PAH (16) including Benzo(a)pyrene by GC-MS	2

The Chemical Laboratory Testing Results are presented in Appendix C.

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

The following tests were scheduled for geotechnical purposes:

Description	No of Samples
Natural Water Content	9
Plasticity Index Analysis	9
SD1 BRE Full Suite.	8
Quick Undrained Triaxial - Single Stage	3
1D Consolidation	3
pH Value	4
Water Soluble Sulphate Contents	4

The Geotechnical Laboratory Testing Results are presented in Appendix D.

4.5 Monitoring

Ground gas and ground water monitoring standpipes were installed in five boreholes and subsequently three monitoring visits have been undertaken, in line with the recommendations of CIRIA C665. All gas monitoring was undertaken using GA 5000 infrared gas meter with integral electronic flow analyser and a Photo Ionisation Detector (PID). The Desk Study completed by Brownfield Solutions Ltd (reference SRP/M4993/10841) suggested six monitoring visits were to be carried out in accordance with CIRIA C665 guidance however monitoring may be concluded early if the dataset shows consistent data including across periods of falling pressure.

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

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

Location	Internal Diameter Pipe	Response Zone (m bgl)	Targeted Strata	Purpose
WS01	35mm PVC	1.00 – 3.00	MADE GROUND, CLAY, and GRAVEL	Ground Gas
WS02	35mm PVC	0.75 – 2.00	MADE GROUND and GRAVEL	Ground Gas
WS03	35mm PVC	0.75 – 2.00	MADE GROUND, CLAY, and GRAVEL	Ground Gas
WS04	35mm PVC	0.60 – 3.00	MADE GROUND, CLAY, and GRAVEL	Ground Gas
WS05	35mm PVC	0.60 – 3.00	MADE GROUND, CLAY, and GRAVEL	Ground Gas
BH01	50mm HDPE	1.50 – 5.00	CLAY and GRAVEL	Ground Gas
BH02	50mm HDPE	0.50 – 1.00	MADE GROUND	Ground Gas
BH03	50mm HDPE	0.50 – 1.00	MADE GROUND	Ground Gas

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

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

5.0 GROUND CONDITIONS

5.1 Summary

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

Stratum	Range Depths - Top (m bgl)	Range Depths - Base (m bgl)	Range Thickness' (m)	Brief Description
Made Ground	GL	0.90 – 1.60	0.90 – 1.60	CONCRETE, MADE GROUND: Dark brown gravelly clay.
Natural Superficial Strata - Cohesive	0.90 – 1.60	1.70 – 3.30	0.60 – 1.70	Slightly gravelly CLAY.
Natural Superficial Strata - Granular	1.10 – 3.30	5.40 – 5.60	3.60 – 4.30	Sandy / clayey GRAVEL.
Natural Bedrock Strata - London Clay	5.40 – 5.60	20.00	14.40 – 14.60	Bluish grey slightly sandy CLAY (LONDON CLAY)

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

5.2 Made Ground

A concrete layer was present across the site. This concrete was cored inside the building and was observed from ground level to between 0.14m and 0.21m bgl. Small round single pieces of metal reinforcement were observed throughout the concrete cores. Concrete was also observed in the yard and was encountered from ground level to between 0.12m and 0.15m bgl in this area.

Made Ground – General

Made ground was encountered within all the exploratory holes across the site and was observed from ground level to depths between 0.90m and 1.60m bgl. The base of the made ground was not observed in HP01 as the hole was terminated due to a possible service.

The composition of the made ground was fairly consistent across the site. The majority comprised dark brown gravelly and sandy clay. The gravel generally consisted of brick, chert, chalk, concrete, pottery with occasional coal and rare slate.

In WS03, made ground of light brown and grey sandy gravel with medium cobble content was encountered between 0.12m and 0.32m bgl between the concrete and clay made ground.

5.3 Natural Superficial Strata

Two layers of natural superficial strata were encountered beneath the made ground. The first layer encountered was generally a firm clay with varying amounts of sand and gravel minor constituents. This layer was not encountered in WS02, and no natural strata was encountered in HP01.

Beneath the made ground and natural clay, where present, gravel was encountered from between 1.10m and 3.30m bgl to depths between 5.40m and 5.60m bgl. The gravel had varying amounts of clay and sand within it. At the base of WS01 between 3.50m and 3.60m bgl was a band of black slightly clayey gravel with a slight hydrocarbon odour. In all three cable boreholes, a layer of black gravel with an organic odour was encountered from 3.50m and the odour and colour increased in intensity until the London Clay was encountered between 5.40m and 5.60m bgl. The gravel was generally fine to coarse of mudstone, sandstone, and chert.

5.4 Natural Bedrock Strata

The solid geology of the London Clay was encountered during the supplementary site investigation works conducted in March 2023. It was encountered from 5.40m bgl, increasing in strength with depth.

5.5 Groundwater

The depths to groundwater and locations present are shown in the table below:

Location	Depth During Site Works (m)	Depth During Monitoring Period (range) (m)
WS01	-	2.09-2.30
WS02	-	NGW-1.97
WS03	-	NGW-1.91
WS04	2.60 - Small seepage	2.10-2.31
WS05	-	2.21-2.37
BH01	4.50 and 18.00	-
BH02	2.00 and 16.80	-
BH03	3.50 and 18.80	-

5.6 Observations

Contamination

During the works undertaken by BSL, observations for both visual and olfactory evidence of contamination were undertaken.

In WS01 a slight hydrocarbon odour was noted from 3.50m to the base of the hole at 3.60m.

In BH01 and BH03 a band of black gravel with a moderate organic odour was encountered from 3.60m to the top of the London Clay (5.60m). In BH02, the moderate organic odour remained into the London Clay to 7.00m bgl, and arisings exhibited a rainbow sheen.

Stability of Boreholes

The window sampling borehole sidewalls were generally stable and window sampling progressed without the need to install casing. However, a collapse occurred from 3.60m bgl up to 3.00m bgl in WS01. Cable percussive boreholes were progressed in 8" casing to 6.00m, and sealed with a bentonite seal before progressing in 6" casing to a depth of 10.50m.

6.0 TEST RESULTS

6.1 Geotechnical Laboratory Test Results

Plasticity Index Analysis

Plasticity index results ranged between 30% and 67% indicating the cohesive soils to be of low plasticity. Associated water contents ranged between 23.5% and 46.2%.

After modification of particle size in accordance with BRE 240 the modified plasticity indices are in the range 30% to 67% indicating the cohesive soils to be of medium to very high-volume change potential.

Undrained Shear Strength

The results of the tests are shown in the table below:

Location	Depth (m)	Shear Strength (kPa)	Undrained Shear Strength to EC7
BH01	9.00	88	High
BH02	7.50	92	High
BH03	15.00	227	Very High

One Dimensional Consolidation Properties

The one-dimensional consolidation properties were as follows:

Location	Depth (m)	Mv Range (m ² /MN)	Cv Range (m ² /yr)	Compressibility at Approx Over-Burden Pressure
BH01	9.00	0.037 - 0.15	0.4 - 23	Very Low to medium
BH02	7.50	0.079 - 0.87	0.44 - 1.9	Low to High
BH03	15.00	0.025 - 0.19	0.51 - 2.2	Very Low to Medium

6.2 Aggressive Ground Conditions – Geotechnical Chemical Testing

The test results for the assessment of aggressive ground conditions are presented in Appendix C. The results are summarised and assessed within Section 8.0 of this report.

6.3 In Situ Geotechnical Testing

In Situ Standard Penetration Tests

Standard Penetration Tests (SPTs) were carried out within the window sampling at regular 1.0m intervals. In the case of the cable holes, SPTs were conducted every 1.0m until 5.00m, and subsequently every 1.50m thereafter. The results of the individual blows and the N-values are recorded on the Exploratory Hole Logs in Appendix B.

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

6.4 Geo-Environmental Testing

Chemical Laboratory Testing

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

Photo-Ionisation Detection (PID) Monitoring - Soils

PID head space monitoring was undertaken on all environmental soil samples taken during the ground investigation at the site, the results are recorded on the exploratory hole logs.

All of the samples tested recorded PID results of between 0.0ppm and 0.1ppm, indicating that no significant volatile vapour contamination was present within the soils sampled.

Ground Gas Monitoring

Ground gas monitoring installations of window sample holes have been monitored on 3 occasions between 7th April and 17th May 2022.

7.0 GEOTECHNICAL ASSESSMENT

7.1 Ground Model Summary

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

-
- Made ground generally comprising concrete surfacing over gravelly clay from ground level to between 0.90m and 1.60m bgl.
 - Natural superficial deposits comprising clay below the made ground proven to depths between 1.70m and 3.30m bgl, with the exception of HP01 and WS02, where no clay was recorded.
 - Natural superficial deposits comprising gravel from between 1.10m and 3.30m bgl proven to depths between 5.40m and 5.60m bgl.
 - Groundwater levels were between 2.00m and 4.50m bgl and between 16.80m and 18.80m bgl during site works.
 - Post site works monitoring levels ranging between 1.91m and 2.37m bgl..
-

Made ground was encountered to depths of between 0.90m to 1.60m bgl and comprised predominantly gravelly clay with brick, concrete, occasional pottery. The natural geology at the site was considered likely to comprise the Enfield Silt Member, which according to information on the BGS website varies from a silt to a clay and is commonly yellow brown.

Deposits consistent with the Enfield Silt Member comprising firm clay were encountered to depths of between 1.70m and 3.30m bgl within all locations with the exception of WS02 where it was absent.

Gravels interpreted as the Kempton Park Gravel were encountered underlying the clay, with the exception of WS02 where the gravels were directly underlying the made ground, to depths of between 5.40m and 5.60m bgl. The gravels comprised an orange to brown sandy to clayey gravel.

The site appears to have been cut to form a level development at some point, as there is an embankment 2-3m above the current site levels on the eastern boundary of the site along Watermead Way. Levels also increase northwards as Sedge Road is elevated above current site level.

The absence of the deposits interpreted as the Enfield Silt Member within WS02 could potentially be due to the levelling of the site as discussed above or due to historic development on the site e.g., the construction of the buildings.

According to the Environment Agency the site is situated on unproductive deposits (Enfield Silt Member) however the Kempton Park Gravel formation outcrops 30m east of the site is also considered to be present beneath the site and is classified as a Secondary (A) Aquifer.

The encountered ground conditions indicate that there is a thin layer of low permeability deposits present beneath the made ground which is likely to offer some degree of protection to the possible water bearing deposits underlying the site.

London Clay has been encountered in subsequent site investigation boreholes at around 5.40m bgl to depths of 20.00m bgl..

The site lies within a Zone 2 floodplain. Specialist flood risk advice should be sought, and this will require consideration when setting the finished levels for the site.

7.2 Design Soil Parameters

The relevant test results from the prior section have been evaluated to derive geotechnical soil parameters for the site in the following section.

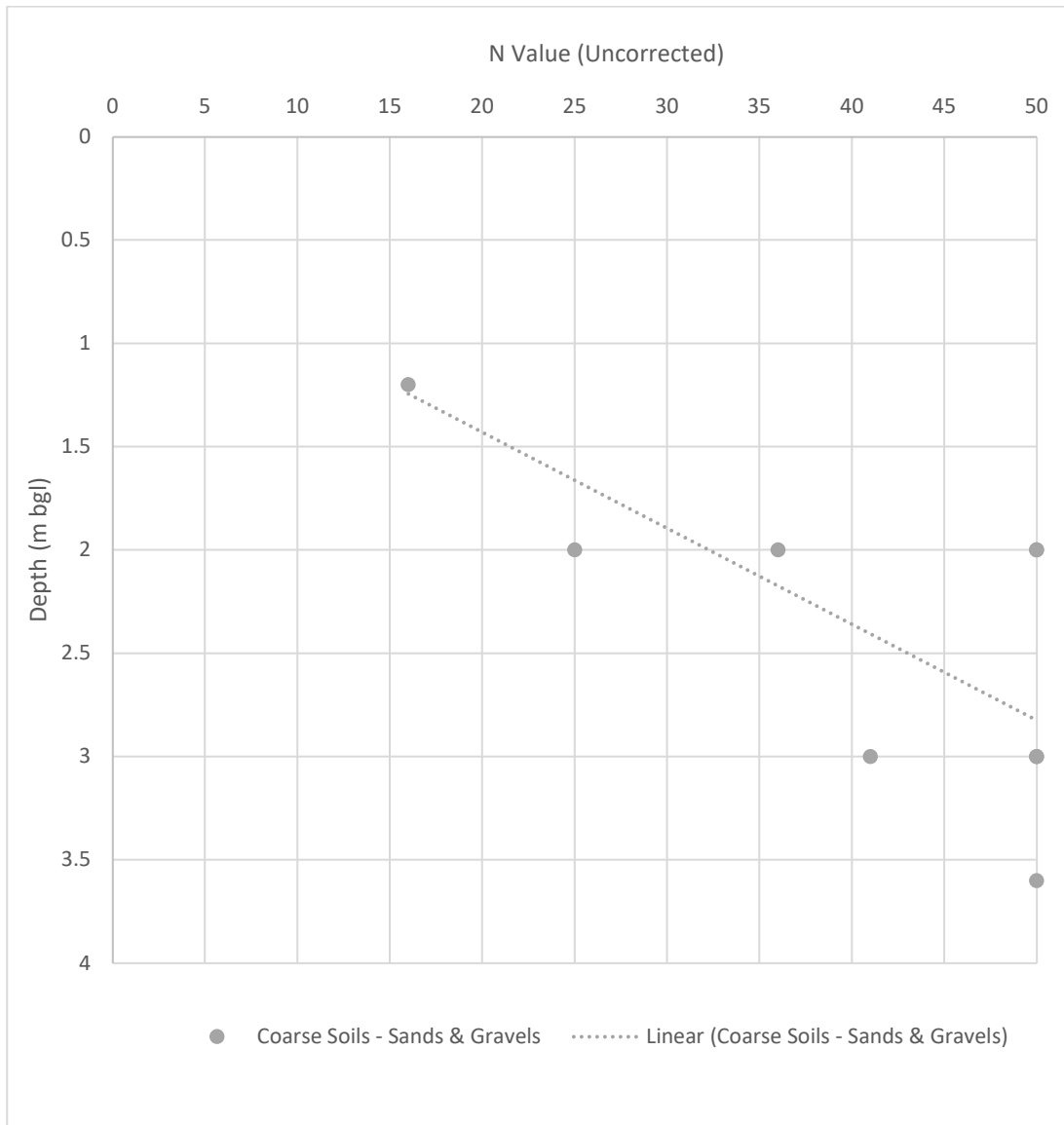
For cohesive (fine) soils, the equivalent approximate undrained shear strengths (C_u) and equivalent approximate coefficients of volume compressibility (m_v) have been calculated from the recorded SPT N values, adopting f_1 and f_2 values respectively, based on the correlation of Stroud (1975) and the 'average' plasticity.

The f_1 and f_2 values of 4.3 and 0.45 respectively have been selected to provide a conservative assessment of the ground bearing capacity for the shallow soils. f_1 and f_2 values of 4.2 and 0.42 respectively for the London Clay Formation.

For granular (coarse) soils, the angle of shearing resistance (ϕ') has been derived from the uncorrected SPT N value data and the correlation of Peck (1967).

A depth (m bgl) vs derived shear strength (C_u) relationship has been calculated. There is limited data for the cohesive deposits as they were only observed in a thin layer and were not observed across the whole site, therefore a graph has not been produced. The SPT data for the cohesive deposits shows an undrained shear strength of 20kPa is achieved at 1.20m bgl.

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



The above graph shows a general increase in soil density as depth increases.

Characteristic Values

Characterisation of the geotechnical parameters above has been undertaken to obtain characteristic values, which are a cautious estimate of the values affecting the occurrence of the limit state.

The characteristic value for undrained shear strength (C_u) in cohesive deposits at 1.20mbgl is interpreted to be 20kN/m^2 , however this is not recommended as a founding stratum due to its inconsistent presence.

The characteristic SPT N value in the granular deposits at 2.00m bgl is interpreted to be 30. Therefore, the characteristic ϕ' value at 2.00m bgl is interpreted to be 36° for Ultimate Limit State conditions. The characteristic SPT N value in the granular deposits at 3.00m bgl is interpreted to be 41, which is the lowest recorded N value, with the other two locations refusing at this depth (N value 50+). Therefore, the characteristic ϕ' value at 3.00m bgl is interpreted to be 38° for Ultimate Limit State conditions.

7.3 Foundations

The development will comprise a commercial end use comprising a six-storey steel framed storage unit building and associated internal/covered car park areas and is considered to be classed as Geotechnical Category 2 in accordance with Eurocode 7.

Preliminary design by calculation has been undertaken to determine the design resistance of the bearing strata in the following section. No proposed structural loads were available at the time of writing; therefore, the following recommendations are provisional and should be reviewed at the detailed design stage. However, for the purpose of this assessment a typical load of 50kN has been assumed per storey.

Shallow Foundations – Pad

No details of the foundation design have been provided, however assuming a steel frame it is assumed the majority of the load will be put through these point loads, making a pad type foundation applicable. As a guide the allowable bearing capacity for a Pad foundation with an area of 1m² has been calculated. This is assumed to have been placed within the natural gravel strata at a minimum depth of 2.00m bgl.

At this depth, an allowable bearing capacity not exceeding 500kN/m² should be assumed for the gravel. This adopts a factor of safety of 3 and limits settlements to within acceptable limits (<25mm).

If the pad foundation is placed at 3.00m bgl an allowable bearing capacity not exceeding 1000kN/m² should be assumed for the gravel. This adopts a factor of safety of 3 and limits settlements to within acceptable limits (<25mm).

The limiting factor for the safe bearing capacity is keeping settlement within 25mm. For foundations bearing within the gravels, the depth to the underlying London Clay is estimated to be circa 5m bgl based on BGS boreholes, and presence of shallow groundwater is a controlling factor. The current investigation has not encountered the London Clay; therefore, it is recommended for initial design purposes pending additional investigation to investigate the depth to the London Clay that a maximum bearing capacity of 500kN/m² for strip foundations is used.

Shallow Foundations – Strip

No details of the foundation design have been provided. However, it is envisaged that structural masonry skin of the building may be supported upon a strip foundation, as a guide the allowable bearing capacity for a shallow strip foundation, 0.6m wide has been calculated, founding within the natural gravel strata at a minimum depth of 2.00m bgl.

At this depth, an allowable bearing capacity not exceeding 500kN/m² should be assumed for the gravel. This adopts a factor of safety of 3 and limits settlements to within acceptable limits (<25mm).

If the strip foundation is placed at 3.00m bgl, an allowable bearing capacity of 1000kN/m² should be assumed. This adopts a factor of safety of 3 and limits settlements to within acceptable limits (<25mm).

The limiting factor for the safe bearing capacity is keeping settlement within 25mm. For foundations bearing within the gravels, the depth to the underlying London Clay is estimated to be circa 5m bgl based on BGS boreholes, and presence of shallow groundwater is a controlling factor. The current investigation has not encountered the London Clay; therefore, it is recommended for initial design purposes pending additional investigation to investigate the depth to the London Clay that a maximum bearing capacity of 500kN/m² for strip foundations is used.

Piles

According to the drawing provided by the client provides indicative drawings of the proposed development, the development will consist of a 6-story building. The indicative drawings also show under-

croft parking, therefore there is likely to be a requirement for columns to support the building above the carparking area.

The under-croft parking will comprise nearly 50% of the ground floor footprint and will need to be considered when designing foundations. These columns would provide a point load to any foundations and therefore the development may require piled foundations.

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

Displacement piles such as driven pre-cast concrete or tubular steel piles, or replacement techniques such as bored piles with the use of casing or continuous flight auger (CFA) piles are all considered potentially suitable piling solutions for this site, with either pre-cast or cast in situ ground beams spanning between piles to support masonry walls.

The choice of piling system and the detailed design of piles are beyond the scope of this report and should be undertaken by a piling specialist. However, as a guide, preliminary calculations were undertaken for a single circular pile, taking into account shaft resistance, end bearing resistance and the effects of negative skin friction. The preliminary allowable loads for various pile diameters and lengths are shown in the table below.

Profile	Pile Diameter (mm)	Pile Length (m)	Allowable Load (kN)
Generalised Soil Profile	300	7.00	115
		11.00	200
	400	7.00	165
		11.00	280

The above does not take into consideration the effects of pile groups or the self-weight of the pile.

Information gained from this ground investigation should be assessed by an experienced piling contractor such that appropriate piles are selected and designed given the site conditions that have been encountered.

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

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

7.4 Building Near Trees

Presently, a number of semi-mature trees are located along the eastern site boundary, however the proposed development indicates that these trees will be removed alongside all other vegetation, with no new planting undertaken. The volume change potential for the clay soils is medium to very high. Where foundation excavations (or piles if adopted) encounter cohesive strata in the vicinity of existing, proposed or recently removed trees, foundations should be adjusted in full accordance with BRE 298. All foundations should be deepened below roots of greater than 5mm diameter during excavations for footings.

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

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

This section of the report will be updated with further recommendations once laboratory data has been received.

7.5 Floor Slabs

A suspended floor slab could be adopted at the site supported by a suitable foundation solution. Given the presence of cohesive (shrinkable) strata, the required void size for beneath floor slabs on this site is 300mm based on the medium to very high volume change potential clays.

For buildings where suspended construction is structurally inappropriate, a hardcore thickness in excess of 600 mm may be employed below a ground bearing slab providing it is designed and supervised by an appropriately qualified engineer.

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

- Any other compressible or unsuitable materials are excavated and either improved or removed and replaced with suitable materials.
- It is demonstrated that desiccation in cohesive soils is not present.
- Any fill beneath the slab is suitable, well-compacted granular material placed in an appropriate thickness in accordance with a suitable specification (e.g., SHW Series 600) designed and supervised by an appropriately qualified engineer, with the end performance validated.
- The slab is adequately reinforced.
- Regular construction joints and ties are provided to allow for differential settlement.

The final floor slab design should be of sufficient thickness and sufficiently reinforced to accept the envisaged applied loads, without unacceptable total or differential movement.

Vertical elements within the structure, such as columns and walls will need to be isolated from the ground bearing slab in order to allow for the slab to expand against them without resulting in cracking.

Prior to the placement of the founding materials and the construction of a ground bearing floor slab, the sub-formation and formation will need to be inspected and checked by a geotechnical engineer to ensure the ground conditions are as expected. If soft spots or hard spots are identified at the formation level, they should be reported to the Geotechnical Engineer immediately and remedial actions agreed.

7.6 Site Preparation and Construction

Topsoil and subsoil should be removed from beneath all buildings and hardstanding areas.

There are a number of services crossing the site, an unknown service crosses through the centre of the factory and multiple service run to the front of the building from Garman Road. To allow construction, all services will need to be disconnected and any suspected dead services are confirmed as dead by testing. Extra care will be required when working near to the 132kv fluid filled cables present to the north and east of the site. Consultation with the operator(s) of the fluid filled cables may also be necessary.

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

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

7.7 Concrete Classification

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

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

Stratum	No. Samples	Characteristic SO ₄ (mg/l)	Characteristic pH	Characteristic TPS %SO ₄	DS Class	ACEC Class
Made Ground	6	355.50	7.5	NA	DS1	AC-1s

Stratum	No. Samples	Characteristic SO ₄ (mg/l)	Characteristic pH	Characteristic TPS %SO ₄	DS Class	ACEC Class
Natural Superficial Strata-Clay	2	459.15	7.9	NA	DS-1	AC-1s
Natural Superficial Strata- Gravel	4	358.21	6.5	NA	DS-1	AC-2z
London Clay Formation	8	520	8	2.34	DS-4	AC3-s

Based on the above, the results of laboratory pH and sulphate content, alongside the BRE full suite tests, indicate that sulphate class DS-1 and ACEC Class AC-1s conditions prevail in made ground and clay whilst DS-1 and AC-2z conditions prevail in gravel in accordance with BRE Special Digest 1 “Concrete in aggressive ground” 2005. Due to the potential of pyritic ground within the London Clay Formation, the Total Potential Sulphate (%SO₄) governs the classification in this case. Therefore, sulphate class DS-4 and ACEC Class AC-3s prevail within the London Clay.

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

7.8 Highways

Based on Table 5.1 from DMRB IAN 73/06 Rev 1 equilibrium CBR values of between 20 – 60 % are likely to be achieved in undisturbed natural granular soils and 2% for natural clay soils for pavement design purposes, unless proven otherwise by in-situ testing at formation level by a specialist geotechnical engineer. Equilibrium CBR values are likely to be 2% within the made ground.

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

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

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

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

7.9 Sustainable Drainage Systems (SUDS)

The use of sustainable drainage systems, such as traditional soakaways within the shallow soils is not likely to be feasible due to the presence of low permeability cohesive strata underlying the site at shallow depths.

However, should the soakaway be excavated into the underlying sands and gravels, the use of sustainable drainage systems may be feasible.

If the use of sustainable drainage systems, such as traditional soakaways is anticipated, dependant on the location and depth proposed, this drainage system may be feasible. Low permeability, cohesive strata was generally encountered beneath the made ground to circa 2.0m bgl, and soakaway drainage would not be

feasible in this zone, however if soakaways are deepened, to sit within the more permeable sand and gravel stratum, then it is possible that soakaways would be feasible. The soakaways should avoid any areas of contamination.

It is recommended that if soakaway drainage is proposed that on-site infiltration testing is undertaken.

8.0 GEO-ENVIRONMENTAL RISK ASSESSMENT

8.1 Introduction

The samples were tested for an assessment of the chemical contamination that may pose a risk to human health. The results were examined with reference to a selection of guidance documents as detailed in Appendix A. In this case the LQM S4ULs and DEFRA C4SLs for a commercial end use have been adopted as Tier 1 generic screening values.

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

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

8.2 Soils Test Results and Risk Assessment – Human Health

Metals

No metals have been detected above the adopted screening criteria for commercial end use. As well as this, the majority of metals were found to be below the laboratory limits of detection (<LOD).

Asbestos

Chrysotile fibres have been detected in one sample from HP01 at 0.90m. Quantification analysis found the asbestos level to be <0.001% mass and is therefore classified as being trace levels.

Poly Aromatic Hydrocarbons (PAHs)

No PAHs have been detected above the adopted screening criteria. Generally, the PAHs were recorded below the laboratory LOD, with any other results being orders of magnitude below the screening criteria.

Total Petroleum Hydrocarbons (TPH CWG)

No petroleum hydrocarbons have been identified above the adopted screening criteria, including from the samples (WS01 at 3.50m, BH01 at 3.6.0m, and BH02 at 4.50m) which were targeted for analysis due to a suspected hydrocarbon or organic odour and sheen during the site works.

BTEX and MTBE

No BTEX or MTBE compounds have been identified above the adopted screening criteria, all samples were below the limit of detection.

Volatile Organic Compounds (VOCs)

No VOCs have been identified above the laboratory limit of detection.

8.3 Summary – Human Health Risk Assessment

Based on the testing and assessment undertaken, there are no determinands above the relevant assessment criteria and mitigation measures will not be required in respect to soils.

Chrysotile asbestos fibres have been detected in one sample to date and was found to be at trace levels.

8.4 Controlled Waters Risk Assessment

Based on the lack of contaminants present within soils and the lack of significant on-site sources, there are not considered to be any significant risks with respect to controlled waters.

A slight hydrocarbon and/or organic odour was noted between 3.50m and 3.60m bgl in WS01 and from 3.60m to the base of the superficial strata in the three cable percussive holes. However samples taken during the initial and supplementary investigations recorded no TPHs, BTEX or PAHs above the laboratory limit of detection. Therefore, it is likely that the odour and sheen were of a natural organic origin. This material is also shown on the BGS borehole logs in the surrounding area. During the monitoring visit, no sheen, odour, or product was observed on the water recovered. The likelihood of any impact to controlled waters from on-site contamination is considered unlikely.

8.5 Permanent Ground Gas and Vapours Results

Three ground gas monitoring visits have been carried out on 7th April, 21st April and 17th May 2022. Results are summarised in the table below:

	CH ₄ (%)		CO ₂ (%)		O ₂ (%)		CO (ppm)		H ₂ S (ppm)		TVOC (ppm)		Steady Flow (l/hr)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Peak	0.1	0.1	0.2	10.0	6.2	19.8	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.1
Steady	0.1	0.1	0.1	10.0	6.0	20.5							0.1	0.1

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

The highest carbon dioxide concentrations were recorded in WS02, recording 4.6% v/v on the first visit, 5.8% v/v on the second visit and 10.0% v/v.

The maximum flow of 2.1 l/hr was recorded in WS04 on the first visit. No other positive flows were recorded above the monitors limit of detection.

The atmospheric pressure ranged between 981mb and 1018mb over the monitoring period, of which visits were conducted over rising and falling pressure trends.

In addition to the above, PID head space monitoring was undertaken on all environmental soil samples taken during the initial ground investigation at the site, the results are recorded on the exploratory hole logs.

All of the samples tested recorded PID results of 0.0ppm, indicating that no significant volatile vapour contamination was present.

8.6 Ground Gas Risk Assessment

In order to assess the ground gas situation and the requirement for ground gas precautionary measures at the site, guidance was taken from CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings' and BS8485:2015+A1:2019 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

As the proposed end-use a commercial development, guidance dictates that the gas monitoring results should be assessed in accordance with the Wilson and Card methodology.

The Wilson and Card methodology uses the concept of a Gas Screening Value (GSV) which is derived using the following equation: (max gas concentration / 100) x maximum flow.

A maximum positive steady flow of 0.1l/hr has been used to derive the GSVs. The GSV's for the site are presented below.

Gas	GSV (l/h)	Classification Based on GSV	Typical Threshold Concentration Exceeded
Methane	0.0001	CS-1	No
Carbon Dioxide	0.0100	CS-1	Yes

The GSV for carbon dioxide and methane place the site the site into Characteristic Situation 1 (CS-1). However, the typical threshold concentration has been exceeded on two out of the three visits within the same borehole for carbon dioxide. The exceedances were for both peak and steady states. Therefore, a Ground Gas Risk Assessment Report has been produced, reference, AT/M4993/11821 dated February 2023 in order to further assess this risk from ground gases.

8.7 Qualitative Risk Assessment

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

Human Health						
Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
On-site Made Ground Metals and organic contamination	Migration into/chemical attack of water supply pipelines	Water Pipelines / End users	Unlikely	Mild	Very Low	Made ground is present across the site and was encountered to proven depths of between 0.90m 1.60m bgl. No contaminants were observed within the made ground. The risk is considered to be very low at this stage.
On-site Made ground Ground Gas (carbon dioxide and methane),	Migration into confined spaces, inhalation, and asphyxiation/explosion	End-users / property / structures	Unlikely	Severe	CS2 (Low Risk)	Made ground is present across the site and was encountered to proven depths of between 0.90m 1.20m bgl. It is likely that due to the age of the made ground, the majority of degassing is likely to have ceased. Gas monitoring on-site places the site into Characteristic Situation 2 (CS2 –Low Risk). Refer to the Ground Gas Risk Assessment (AT/M4993/11821).
On-site furniture works. Solvents, fuels, paints, oils	Inhalation of vapours	End-users / property / structures	Unlikely	Medium	Low	Solvents, fuels, paints, and varnishes may have been used on site in the manufacture of furniture, with vapours accumulating within buildings and being inhaled. However, these are likely to have been used in small volumes. There was no evidence of contamination around the site e.g. surface staining, all samples tested for VOCs and petroleum hydrocarbons were below relevant generic assessment criteria, with the majority also being below the laboratory limits of detection. Given this, it is unlikely that vapour contamination associated with the furniture works will affect end-users, property or structures and risks are considered to be low.
Off-site Natural Geology - Alluvium Ground Gas	Migration into confined spaces, inhalation, and asphyxiation/explosion	End-users / property / structures	Implausible	Severe	No Linkage	It has been assumed that no alluvium was encountered beneath the site. The layer of clay has been interpreted as the Enfield Silt member and the gravel layer has been interpreted as the Kempton Park gravel member.

Controlled Waters						
Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
On site Works (Paper, Cardboard and furniture manufacturing), including made ground On site PAH's, Metals, solvents, paints, varnishes	Leaching through unsaturated zone / Migration through saturated zone	Superficial Aquifers (Unproductive/ Secondary (A))	Unlikely	Medium	Low	The proposed development includes construction of a structure across the majority of the site. As well as this, site is currently surfaced in hardstanding and any open areas will remain so when developed. The combination of these two factors will significantly reduce the leaching potential of water falling on the site, which will reduce risks to controlled waters. The nearest active groundwater abstraction licence is 0.77km away. The site lies within a Zone II Source Protection Zone. There are several wells in the vicinity of the site, two of which are active and relate to potable drinking water abstraction, they are considered a sensitive receptor. However, two of the aquifers (bedrock and superficial Enfield Silt Member) are unproductive, comprising low permeability clays, limiting the migration and mobilisation of contaminants. Permeable deposits are present on-site underlying the unproductive aquifer. No significant on-site sources of contamination have been encountered, and no contaminants were recorded above their respective screening values within soils. As well as this, the majority of determinands were found to be below the laboratory limits of detection, and therefore it is not thought that any significant contamination is present on-site with respect to the on-site works. The risks to groundwater are considered to be low.
	Overland flow / migration along and within drainage	Pymme's Brook 230m away (Surface waters)	Unlikely	Medium	Low	No contaminants were identified above the commercial GAC, with the majority of determinands being below the laboratory limits of detection. As well as this, if present, any residual contamination would be unlikely to impact the river due to the low permeability of the clays underlying the area, which will inhibit lateral migration to drains. Any contamination reaching the drains is also likely to be diluted and attenuate prior to discharge into river. Risks to the river are considered to be low.

Controlled Waters						
Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
	Migration through saturated zone	Pymme's Brook 230m away (Surface waters)	Unlikely	Medium	Low	No contaminants were identified above the commercial GAC, with the majority of determinands being below the laboratory limits of detection. The clays underlying the area are of low permeability, which will inhibit vertical migration to the water table. The risks to the river are considered to be low.

8.8 Outline Remedial Measures

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

No significant sources of contamination have been identified on site; therefore, no specific remedial measures are required for soils in respect to human health for the proposed end use.

Ground gas risks have been assessed within a separate Ground Gas Risk Assessment, reference AT/M4993/11821 dated February 2023. The outcome of the report classifies the site as CS1.

8.9 Health and Safety Issues

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

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

Trace levels of Chrysotile asbestos has been identified in one sample to date, however seven other samples were tested within the made ground across the site with no trace of asbestos. It is assumed that the asbestos was localised to the area surrounding HP01. Asbestos has previously been identified within the building which will require removal prior to demolition. The risk from asbestos should be highlighted in the method statements and site induction. If further evidence of asbestos is encountered in the soils, work should cease until asbestos control measures have been agreed and put in place. Asbestos is further discussed in Section 8.10 below.

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

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

- All ground workers should be issued with the relevant protective clothing, footwear, and gloves. These protective items should not be removed from the site and personnel should be instructed as to why and how they are to be used.
- Handwashing and boot-washing facilities should be provided.
- Care should be taken to minimise the potential for off-site migration of contamination by the provision of dust suppression control and wheel cleaning equipment during the construction works.
- Good practices relating to personal hygiene should be adopted on the site.

-
- The contractor shall satisfy the Health and Safety Executive with regard to any other matters concerning the health, safety, and welfare of persons on the site.
-

8.10 Asbestos

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

Asbestos was previously detected in the building within cement, flash guards, cement ceiling, floor tiles, cement guttering and cement corrugated profile sheets. These materials were observed externally and within the ladies toilet, lobby, canteen, welfare room, offices, men's toilets, and warehouse. Any asbestos within structures will require removal prior to re-development. This will need to be done by a suitably qualified experienced and licensed contractor, who ensures that adequate PPE is provided to operatives, and that all the relevant legislation is adhered to.

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

-
- The use of qualified personnel where required.
 - Cleaning down of machinery in designated areas.
 - Decontamination unit for ground workers.
 - Damping down of soils to prevent dust migration.
-

Asbestos fibres have been identified in one sample at the site with the asbestos level within the sample being quantified as <0.001% mass and classified as being trace levels. At these concentrations the liberation of fibres is considered to be unlikely and no specific precautionary measures with regards to asbestos are likely to be required at the site. The level of precautions required are at the discretion of the principal contractor on site however good site practices including minimising the generation of dusts should be adhered to and sufficient to mitigate against the risk from asbestos. In addition, site personnel should have the risk communicated at the induction stage. It is recommended that the asbestos in construction materials assessment tool is used at the site to inform asbestos licensing and control measures.

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

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

9.0 CONCLUSIONS

9.1 Geo-Environmental

Geo-Environmental – Human Health

Testing of the made ground at the site did not reveal any exceedances of heavy metals, PAHs, petroleum hydrocarbons, BTEX or MTBE compounds.

Chrysotile fibres (loose fibres) have been detected in one sample of made ground across the site. On quantification analysis the asbestos level within the sample was <0.001% mass and classified as being trace levels.

Ground gas risks have been assessed in a separate Ground Gas Risk Assessment, reference AT/M4993/11821 dated February 2023, the site is classified as Gas Characteristic Situation 1.

Geo-Environmental – Controlled Waters

The overall risk to controlled waters is considered to be low.

9.2 Geotechnical

Foundations

It is understood the proposed building is steel framed and will provide point loads to the ground. Shallow pad foundations may be placed within the natural gravel strata at a minimum depth of 2.00m bgl, for a 1m² pad an allowable bearing capacity not exceeding 500kN/ m² should be assumed for the gravel.

Strip foundations may be utilised to support external masonry placed within the natural gravel strata at a minimum depth of 2.00m bgl, for a 0.6m wide foundation an allowable bearing capacity not exceeding 500kN/m² should be assumed for the gravel.

If higher loads than this are envisaged, or if the undercroft parking is proposed to be at a basement level, piled foundations may be more suitable to support internal and perimeter columns. A generalised soil profile revealed for a 300mm pile diameter, there are allowable loads of 115kN at 7.0m depth, and 200kN at 11.0m bgl, increasing to 165kN or 280kN respectively for 400mm diameter piles. The choice of piling system and the detailed design of piles are beyond the scope of this report and should be undertaken by a piling specialist.

Floor slabs

Given the design choice for undercroft parking, a ground bearing floor slab is likely to be the preferred construction choice for the proposed development, provided the criteria described in Section 7.5 are met.

Concrete classification

Sulphate class DS-1 and ACEC Class AC-1s conditions prevail in the made ground and clay whilst DS-1 and ACEC Class AC-2z conditions prevail within the gravel. The solid geology underlying the site is the London Clay which can be pyritic additional precautions against aggressive ground conditions are likely to be required.

Highways

CBR values of 20-60% are likely to be achieved in undisturbed natural gravel soils and 2% for natural clay soils. Should be confirmed by on-site in-situ testing.

Drainage (SUDS)

Not likely to be feasible within the low permeability cohesive strata. However, these deposits maybe locally absent and soakaways could be excavated into the underlying more permeable strata which are likely to be affective.

9.3 Further Work

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

- Demolition Asbestos survey.
 - Detailed foundation design by a structural engineer, including foundation zonation plan and depth schedule.
-

10.0 ABBREVIATIONS AND DEFINITIONS

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

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

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

11.0 REFERENCES

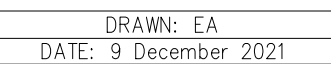
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DRAWINGS



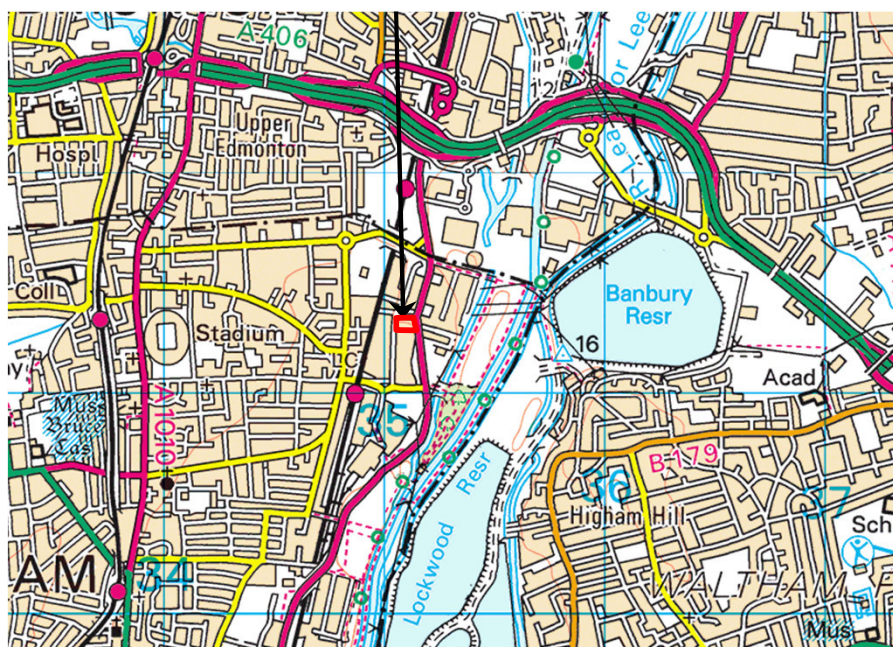
SK02

GROUND FLOOR



SITE LOCATION

NEAREST POSTCODE: N17 0UR



REV	DATE	DESCRIPTION	BY	CKD
 BROWNFIELD SOLUTIONS LTD GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE				
CLIENT				
SHURGARD UK				
PROJECT TITLE				
GARMAN ROAD, TOTTENHAM				
DRAWING TITLE				
SITE LOCATION PLAN				
DRAWING No.	REVISION	SCALE	DATE	
C4993/01	-	NTS	04/03/22	
DRAWN BY		CHECKED BY		
SRP		JW		



KEY

— APPROXIMATE SITE BOUNDARY

REV	DATE	DESCRIPTION	BY	CKD

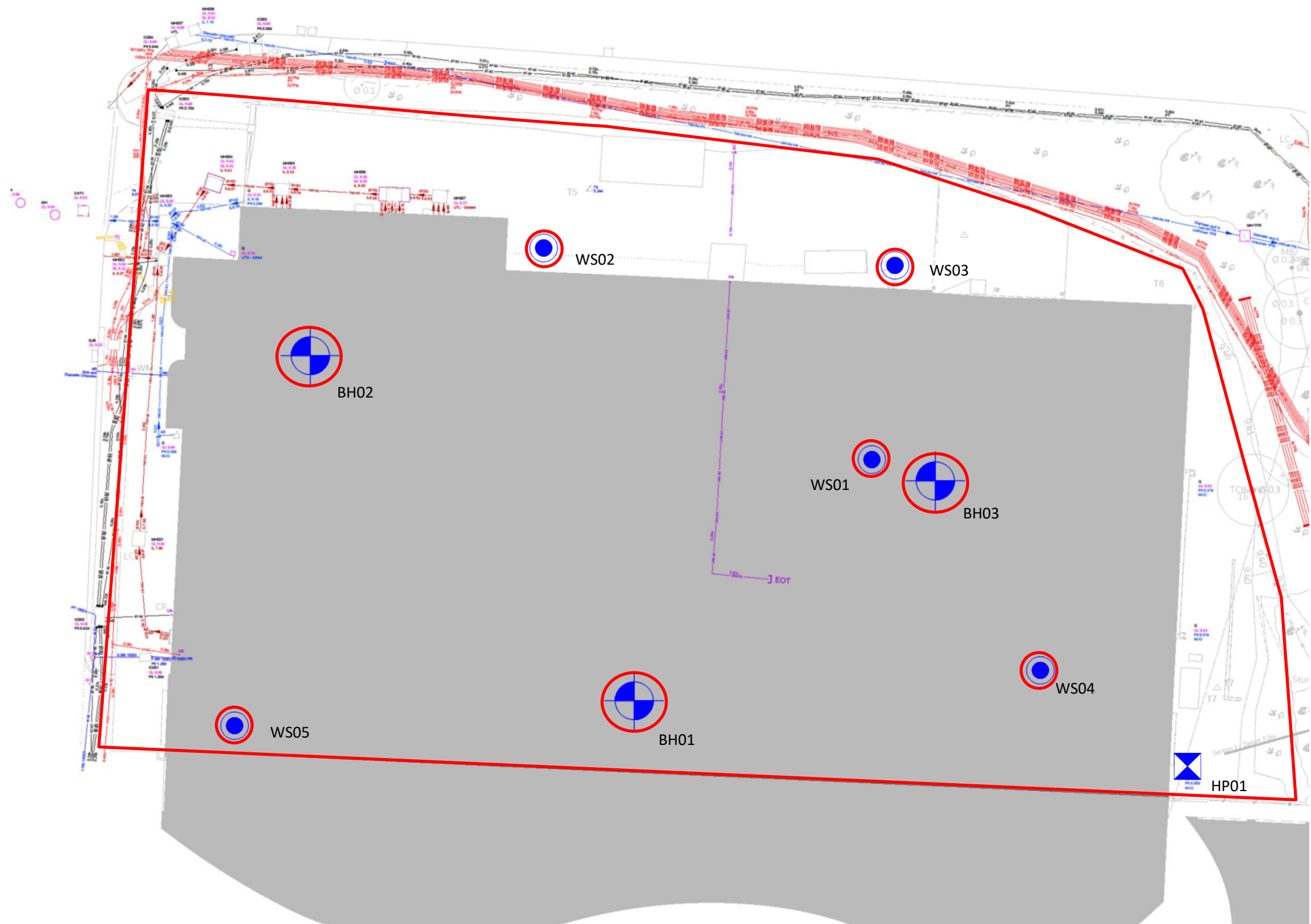


CLIENT
SHURGARD UK

PROJECT TITLE
GARMAN ROAD, TOTTENHAM

DRAWING TITLE
MH0 SITE FEATURES PLAN

DRAWING No. M4993/02	REVISION -	SCALE NTS	DATE 04/03/22
DRAWN BY SRP	CHECKED BY JW		



KEY

- APPROXIMATE SITE BOUNDARY
- WSXX WINDOW SAMPLE BOREHOLE (MARCH 2022)
- HP01 HAND EXCAVATED TRIAL PIT (MARCH 2022)
- BOREHOLE INSTALLATION
- BHXX CABLE PERCUSSIVE BOREHOLE (MARCH 2023)
- BUILDING OUTLINE

REV	DATE	DESCRIPTION	BY	CKD



CLIENT
SHURGARD UK

PROJECT TITLE
GARMAN ROAD, TOTTENHAM

DRAWING TITLE
EXPLORATORY HOLE LOCATION PLAN

DRAWING No. M4993/03	REVISION B	SCALE NTS	DATE 18/04/23
DRAWN BY HW		CHECKED BY AT	

PHOTOGRAPHS



PHOTO 1



PHOTO 2



PHOTO 3



PHOTO 4

Photo Descriptions

PHOTO NO.	DETAILS
1	Completed WS01.
2	Completed WS02.
3	Completed WS03.
4	Completed WS04.

REV	DATE	DESCRIPTION	BY	CKD



CLIENT	SHURGARD UK
PROJECT TITLE	GARMAN ROAD, TOTTENHAM
TITLE	SITE WORKS PHOTOGRAPHS
Associated Document Ref No. SRP/M4993/10981	PAGE 1 of 2
COMPLIED BY SRP	CHECKED BY MH



PHOTO 5



PHOTO 6



PHOTO 7

Photo Descriptions

PHOTO NO.	DETAILS
5	Completed WS05.
6	Completed HP01.
7	Concrete Cores.

REV	DATE	DESCRIPTION	BY	CKD



CLIENT	SHURGARD UK
PROJECT TITLE	GARMAN ROAD, TOTTENHAM
TITLE	SITE WORKS PHOTOGRAPHS
Associated Document Ref No. SRP/M4993/10981	PAGE 2 of 2
COMPILED BY SRP	CHECKED BY MH

APPENDIX A

BSL Methodology and Guidance

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

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

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

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

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

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

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

Contaminated Land - Legislative Background

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

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

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

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

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

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

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

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

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

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

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

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

Relevant Guidance Documents

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

- DETR: Circular 02/2000: Environmental Protection Act 1990: Part IIA: Contaminated land. 2012.
 - Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002.
 - BS 10175:2011+A2:2017.
 - Environment Agency (EA) - Land Contamination Risk Management (LCRM). 2019.
-

- Groundwater Protection - <https://www.gov.uk/government/collections/groundwater-protection>.
- UK Technical Advisory Group (UKTAG) - - Water Framework Directive
- Incidents and their classification: the Common Incident Classification Scheme (CICS) – Used by the Environment Agency to classify pollution incidents.

Relevant Legislative Documents

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

- The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012).
- The Environment Protection Act (1990).
- The Water Resources Act (1991).
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- The Contaminated Land (England) Act (2000).
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- Environmental Permitting Regulations (England and Wales) Regulations (2010).
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
- Health and Safety at Work Act.
- National Planning Policy Framework (NPPF)(2021).

Contaminated Land Risk Assessment Approach

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

Hazard Identification ➡ Hazard Assessment ➡ Risk Estimation ➡ Risk Evaluation.

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

Further information can be found at the below site:

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

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

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

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

The likelihood of an event is classified on a four-point system using the following terms and definitions from CIRIA C552, with reference to Incidents and their classification: the Common Incident Classification Scheme

(CICS), Environmental Protection Act 1990: Part 2A – Contaminated Land Statutory Guidance 2012 and other guidance as appropriate which will be detailed within the main body of the report if applied.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Ground Gas Risk Assessment Guidance

BS8485:2015+A1:2019, BS 8576:2013, CIRIA C665 and CL:AIRE RB17 are the current guidance which gives up-to-date advice on all aspects of ground gas. They outline good practice in investigation, the collection of relevant data and monitoring programmes in a risk-based approach to ground gas contamination.

Within BS8485:2015+A1:2019, BS 8576:2013 and CIRIA C665, two semi-quantitative methods are set out for the assessment of risk:

- 1 For low rise housing with a ventilated under floor void at minimum 150 mm (Boyle and Witherington).
- 2 For all other development types (Wilson and Card).

Both methods use the concept of Gas Screening Values (GSVs) to identify levels of risk. The mitigation and management of potentially unacceptable risk is described with reference to both passive and active systems of gas. Source removal is also discussed as an option. A separate approach is discussed under the RB17 header further below.

The aim of the guidance is for a consistent approach to decision making, particularly relating to the scope of protective design measures on a site-specific basis.

Legislative Framework

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

Generation Potential of Sources

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

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

Generation Potential	Typical Sources
High	- Landfill mid 1960s to early 1990s. - Mine workings – unflooded – less than 50 years since last worked.
Very High	- Municipal landfill sites. - Landfill early 1990s onward.

Frequency and Duration of Monitoring

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

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

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

Typical/idealised periods of monitoring

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

Typical/idealised frequency of monitoring/Number of Visits Required

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

Note

- NHBC guidance also recommends this period of monitoring (Boyle and Witherington, 2007).
- Generation potential of sources based on descriptions within BS 8576:2013.
- At least two sets of readings should be at low and falling atmospheric pressure (but not restricted to periods below <1000 mb) known as worst case conditions. Historical data can be used as part of the data set (Table 5.5b).

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

RB17 Approach

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

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

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

Unexploded Ordnance (UXO) Guidance

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

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

Contaminated Land Screening Values

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

General

The current recommended method for assessing contamination is on the basis of:

Source-Pathway-Receptor

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

Fundamentally, receptors can be considered as humans (human health) and controlled waters (surface and ground waters).

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

Human Health

Current UK guidance is provided by DEFRA and the Environment Agency (EA). Publications forming part of the guidance include the CLEA Model and toxicological reports collectively referred to as the CLEA Guidance. The CLEA Guidance has included a number of publications which have provided initial screening values for soil contamination based on standard land uses and soil assumptions.

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

C4SL values for six determinands including lead was published by DEFRA/CL:AIRE in December 2014 and they represent a low risk as opposed to minimal risk. These screening values were published by DEFRA for Part 2A use, although with the dual purpose for use under planning. However, S4ULs remain the first reference due to the broader range of end uses and soil organic content.

The preference from the EA is that site specific screening levels are used wherever possible. Due to numerous factors it is not always possible to utilise site specific values. In these instances the following data sources are used in the order of preference given below:

- CIEH S4UL values (derived by CIEH/LQM).
- DEFRA/CL:AIRE C4SL's.
- CL:AIRE GAC values.
- Guidance from other European countries.
- Guidance from the outside Europe.

Controlled Waters

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

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

Statutory Standards are set in legislation and if exceeded, this constitutes non-compliance with statutory obligations. European Directives are implemented in England and Wales by corresponding statutory instruments (i.e. regulations). The statutory instruments can be the exact same standards as they appear in the Directive or be more stringent.

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

The chemical standards used in the UK to control impact of contamination on controlled waters are Environmental Quality Standards (EQS). The EQS's cover a large number of compounds.

Where certain compounds are not covered by the EQS these are commonly compared to the UK Drinking Water Standards (DWS).

Further Assessment

When screening values are exceeded then further consideration is required. This could include the use of simple measures to break the pollution pathway and mitigate the risk, further additional detailed investigation, including the deriving of site-specific values to better define the risk, and to design appropriate remedial measures.

Re-Use Of Waste - Guidance Note

Definition of Waste

The Environment Agency considers waste to be “...any material that is discarded, or intended to be discarded...” This includes any soil from trenches, footing, site strip etc. It is no longer required in its original location, therefore it is considered to be waste.

CL:AIRE: Code of Practice

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

The developer/contractor is advised to complete all works under the DoWCoP.

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

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

The Code of Practice requires 4 No. Factors to be addressed:

- 1) Protection of human health and protection of the environment.
- 2) Suitability of use, without further treatment.
- 3) Certainty of use.
- 4) Quantity of material.

In order to satisfy these requirements the following are required:

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

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

Soils which require treatment on site (eg bioremediation, stabilisation) will require an Environmental Permit for treatment, together with justification and validation to prove, once treated, this material is suitable for use. Site management procedures need to be in place to ensure that material is tracked through from excavation stockpiling, treatment and remediation processes. Should the process of material tracking be considered non-robust, or not adhered to, this may fail the test whether excavated materials may be considered non-waste.

Waste Classification for Soils

Introduction

Waste producers have a duty of care to classify the waste they are producing:

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

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

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

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

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

Background for Landfill Disposal

In July 2005 the United Kingdom implemented the European Directive 1999/31/EC (The Landfill Directive), this introduced the current regime for waste and waste disposal to landfill. The Landfill Directive places controls on waste disposal. These controls include requirements to follow the waste acceptance procedures and criteria that have been agreed by the Council of the European Union and are laid out in Council Decision 2003/33/EC.

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

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

Key Points:

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

Classification

Wastes are listed in the European Waste Catalogue (EWC 2002) and grouped according to generic industry, process or waste types. Wastes within the EWC are either hazardous or non-hazardous. Some of these wastes are hazardous without further assessment (absolute entries) or are 'mirror' entries that require further assessment of their hazardous properties in order to determine whether they are hazardous waste.

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

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

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

In the first instance the concentrations of plausible contaminants within the soil should be identified and wastes should be **classified based on their total concentrations**.

Waste Definitions

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

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

WAC Testing

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

Classification based on Total Concentrations ¹	Non-Hazardous Waste		Hazardous Waste	
	Below inert WAC limit values:	Above inert WAC limit values:	Below hazardous WAC limit values	Above hazardous WAC limit values
WAC testing				
Landfill requirements	INERT landfill	NON-HAZARDOUS landfill ²	HAZARDOUS landfill	PRE-TREATMENT ³

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

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

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

Hydrocarbons in Soils

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

Known Oils

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

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

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

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

Unknown Oils

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

WM3 states that:

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

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

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

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

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

For example:

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

References

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

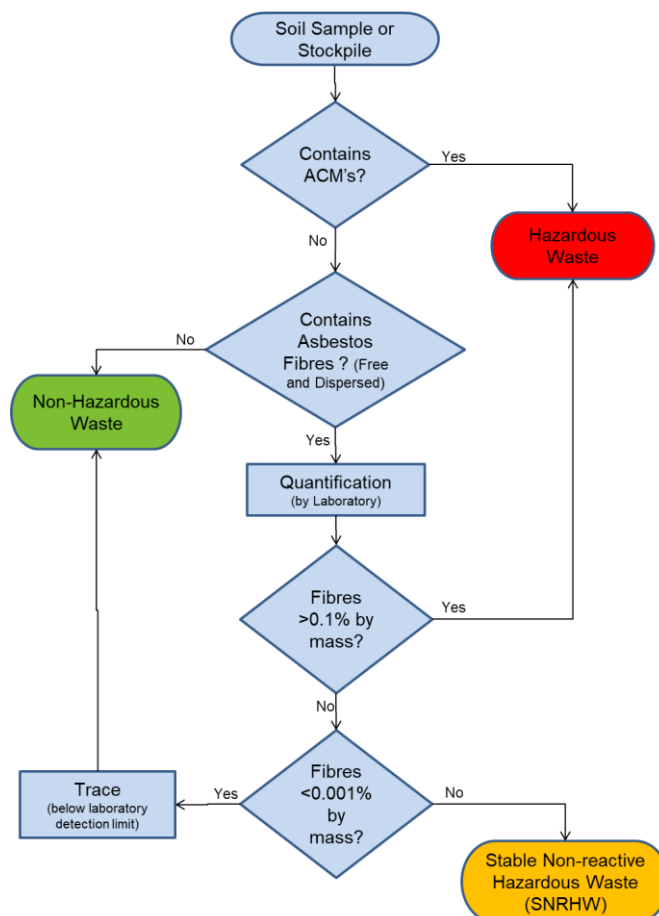
Additional Asbestos Guidance Notes

Disposal

The 1st Edition of WM3 "Guidance on the classification and assessment of waste", details the way in which Asbestos is assessed within soils.

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

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



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

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

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

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

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

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

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

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

Construction

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

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

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

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

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

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

End Use

The use of materials containing asbestos and material containing asbestos is prohibited under EU legislation. There is currently a Joint Industry Working Group (JIWG) tasked with producing a Code of Practice for Asbestos in Soil, Made Ground and Construction & Demolition Material that will clarify in due course the position of the various government agencies.

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

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

Preliminary publications from JIWG (April 2015) provide guides for decision making in relation to construction.

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

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

Asbestos in Soil as Free Fibres

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

Concentration (by weight)	Waste Disposal				Construction Issues	End Use	
	Recyc	Inert	SNR	Hazardo		Suitable for re-use on site	Precautions
						repeated handling and compaction.	

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

APPENDIX B

Exploratory Hole Logs



Borehole Log

No.

HP01

Sheet 1 of 1

PROJECT NO: M4993

CO-ORDS:

Hole Type

Hole Type

PROJECT NAME: GARMAN ROAD, TOTTENHAM

LEVEL:

Scale

1:50

CLIENT: SHURGARD UK

DATES: 21/03/22

Logged

Checked

SRP

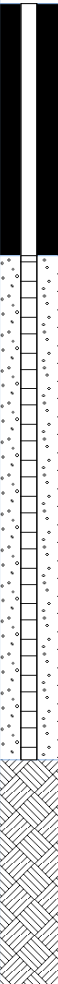
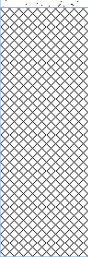
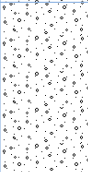
JW

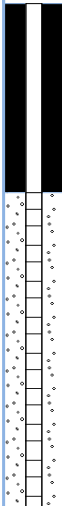
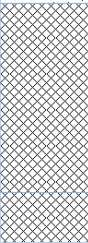
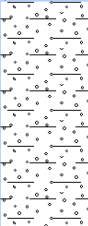
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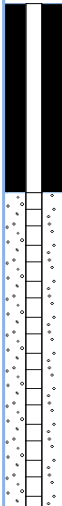
Remarks

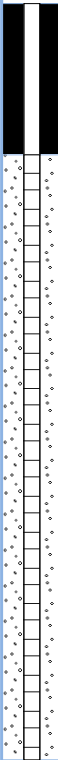
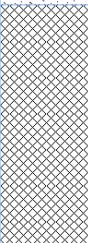
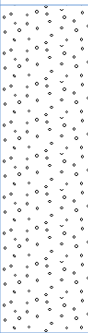
1. Location scanned and cleared with CAT and Genny.
2. Hand-dug inspection pit excavated to 1.00m bgl.
3. No groundwater encountered.
4. Borehole terminated due to concrete and suspect service at 1.00m bgl.
4. Borehole backfilled with arisings.

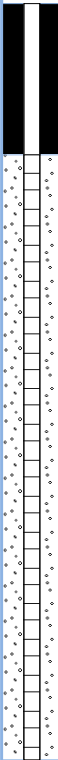
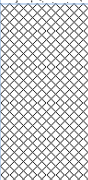
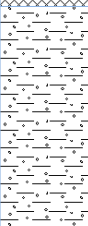
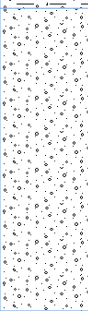
ES = Environmental Sample
D = Disturbed Sample
B = Bulk Sample
LB = Large Bulk Sample
U = Undisturbed Sample
UT = Undisturbed Thin Wall Sample
SPT = Standard Penetration Test
PID = Photoionization Detector (ppm)
PPM = Part Per Million
HSV = Hand Shear Vane

BROWNFIELD SOLUTIONS LTD						Borehole Log		Window Sampler No.		
								WS01		
PROJECT NO: M4993						CO-ORDS:		Sheet 1 of 1		
PROJECT NAME: GARMAN ROAD, TOTTENHAM						LEVEL:		Hole Type		
								WS		
CLIENT: SHURGARD UK						DATES: 21/03/22		Scale		
								1:30		
								Logged	Checked	
								SRP	JW	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.21			MADE GROUND: CONCRETE.		
		0.40	ES PID	0.0PPM				MADE GROUND: Firm to stiff dark brown slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to sub-rounded fine to coarse of brick, limestone and chert with occasional pottery and slate.	1.0	
		1.00	ES PID	0.0PPM			Occasional coal gravel between 1.10m and 1.20m bgl.			
		1.20	SPT	N=4 (1,1/1,1,1,1)	1.20			Firm brown slightly sandy CLAY. Sand is fine to coarse.		
		1.50	ES PID	0.0PPM						
		2.00	SPT	N=34 (3,4/6,8,10,10)	2.00			Brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is sub-rounded to rounded fine to medium of chert and siltstone.	2.0	
					2.30			Brown sandy GRAVEL. Sand is medium to coarse. Gravel is sub-angular to rounded fine to coarse of chert.		
		2.60	ES PID	0.0PPM						
		3.00	SPT	N=41 (8,10/11,11,11,8)			Collapse from 3.60m bgl up to 3.00m bgl.			3.0
		3.50	ES PID	0.0PPM			Black slightly clayey gravel with slight hydrocarbon odour between 3.50m and 3.60m bgl.			
	3.60	SPT	N≥50 (25 for 120mm/50 for 165mm)							
				3.90		End of Borehole at 3.90m			4.0	
										5.0
										6.0
Remarks		1. Location scanned and cleared with CAT and Genny. 2. Hand-dug inspection pit excavated to 1.20m bgl. 3. No groundwater encountered. 4. Borehole installed; GL to 1.00m bgl plain, 1.00m to 3.00m bgl slotted.							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

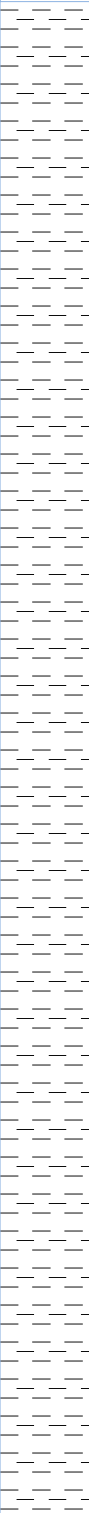
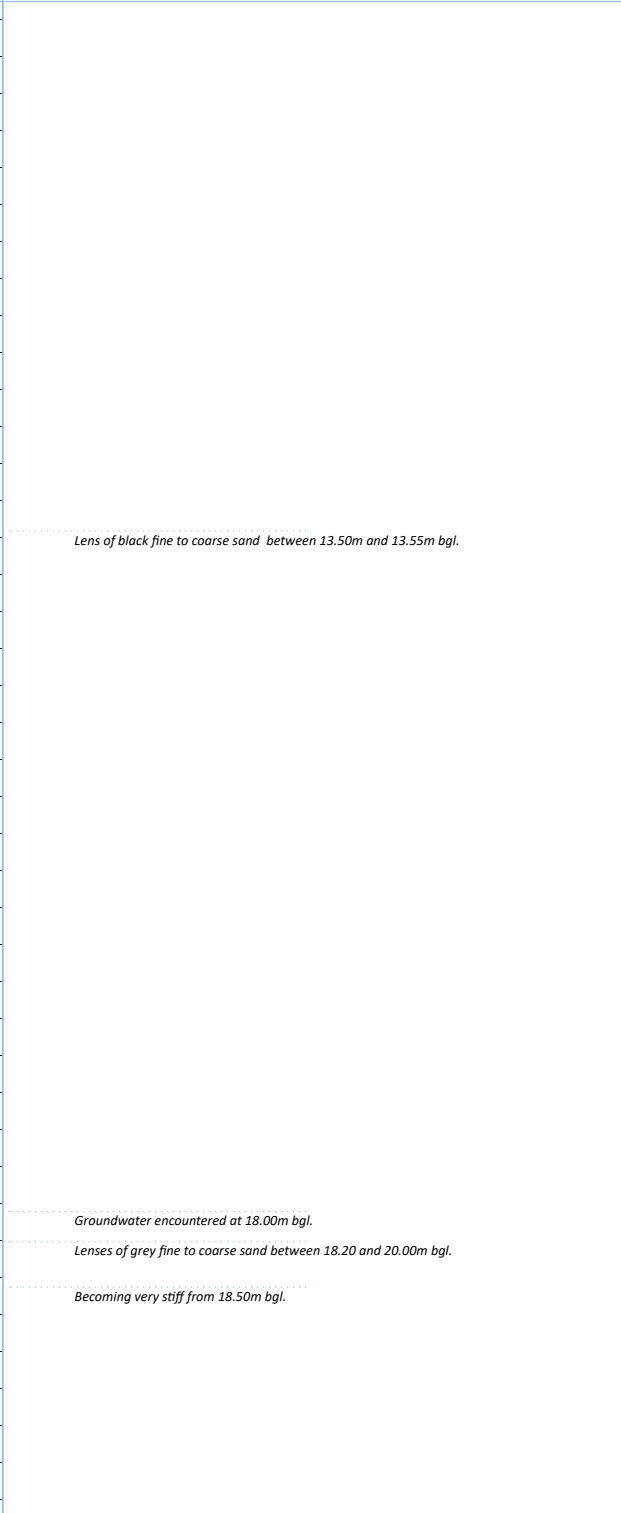
 BROWNFIELD SOLUTIONS LTD						Borehole Log		Window Sampler No. WS02 Sheet 1 of 1 Hole Type WS Scale 1:30 Logged Checked SRP JW		
PROJECT NO: M4993						CO-ORDS:				
PROJECT NAME: GARMAN ROAD, TOTTENHAM						LEVEL:				
CLIENT: SHURGARD UK						DATES: 21/03/22 - 22/03/22				
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.15			MADE GROUND: CONCRETE.	1.0	
		0.30	ES PID	0.0PPM				MADE GROUND: Firm dark brown gravelly clay. Gravel is angular to sub-angular fine to coarse of concrete, brick, chert and siltstone.		
		1.00	ES PID	0.0PPM	0.90			MADE GROUND: Firm brown gravelly clay. Gravel is sub-angular fine to coarse of brick and chert with rare pottery.		
		1.20	SPT	N=16 (1,1/4,4,4,4)	1.10			Orange and brown clayey GRAVEL. Gravel is sub-angular fine to coarse of chert.		
		1.60	ES PID	0.0PPM						
		2.00	SPT	N≥50 (6,9/50 for 250mm)	2.00			End of Borehole at 2.00m	2.0	
									3.0	
									4.0	
									5.0	
									6.0	
Remarks		1. Location scanned and cleared with CAT and Genny. 2. Hand-dug inspection pit excavated to 1.20m bgl. 3. No groundwater encountered. 4. Borehole installed; GL to 0.75m bgl plain, 0.75m to 2.00m bgl slotted.							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

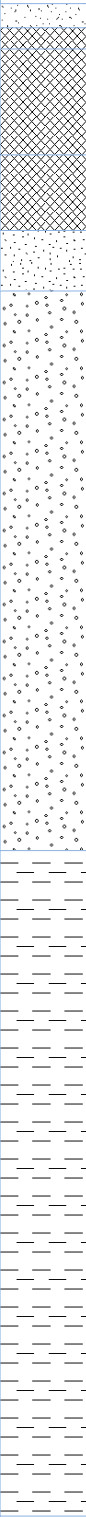
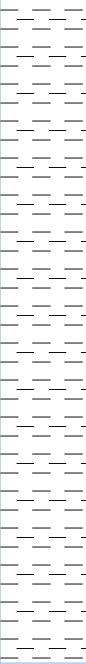
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								WS03	
								Sheet 1 of 1	
PROJECT NO: M4993						CO-ORDS:		Hole Type	
								WS	
PROJECT NAME: GARMAN ROAD, TOTTENHAM						LEVEL:		Scale	
								1:30	
CLIENT: SHURGARD UK						DATES: 21/03/22 - 22/03/22		Logged	Checked
								SRP	JW
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES PID	0.0PPM	0.12 0.32			MADE GROUND: CONCRETE.	
								MADE GROUND: Light brown and grey sandy gravel with medium cobble content. Gravel is angular to sub-angular fine to coarse of brick, concrete, pottery and chert. Cobble are angular of brick and concrete.	
								MADE GROUND: Firm dark brown gravelly clay. Gravel is sub-angular fine to coarse of brick and chert.	
		0.80	ES PID	0.0PPM	0.95			Firm brown CLAY.	1.0
		1.20	SPT	N=4 (0,0/1,1,1,1)					
		1.30	ES PID	0.0PPM					
					1.70				
		1.90	ES PID	0.0PPM	2.00			Brown clayey GRAVEL. Gravel is sub-rounded fine to coarse of chert.	2.0
		2.00	SPT	N≥50 (5,7/50 for 290mm)				End of Borehole at 2.00m	

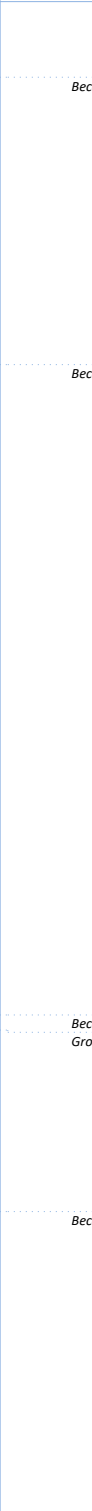
 BROWNFIELD SOLUTIONS LTD						Borehole Log		Window Sampler No.			
								WS04			
								Sheet 1 of 1			
								Hole Type			
PROJECT NO: M4993						CO-ORDS:		WS			
PROJECT NAME: GARMAN ROAD, TOTTENHAM						LEVEL:		Scale			
								1:30			
CLIENT: SHURGARD UK						DATES: 22/03/22		Logged	Checked		
								SRP	JW		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					0.14			MADE GROUND: CONCRETE.			
								MADE GROUND: Firm dark brown gravelly clay. Gravel is sub-angular fine to coarse of brick, pottery and chert.			
		0.60	ES PID	0.0PPM							
		1.20	SPT	N=7 (1,2/2,2,1,2)	1.10			Firm brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is sub-angular fine to medium of chert.			
		1.60	ES PID	0.0PPM	1.70						
		2.00	SPT	N=36 (5,7/8,9,9,10)				Orange and brown GRAVEL. Gravel is sub-rounded fine to coarse of chert.			
								Slow seepage of groundwater below 2.60m bgl.			
		2.80	ES PID	0.0PPM							
		3.00	SPT	N≥50 (8,11/50 for 215mm)	3.00		End of Borehole at 3.00m				
Remarks		1. Location scanned and cleared with CAT and Genny. 2. Hand-dug inspection pit excavated to 1.20m bgl. 3. Groundwater encountered at 2.60m bgl. 4. Borehole installed; GL to 1.00m bgl plain, 1.00m to 3.00m bgl slotted.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane			

 BROWNFIELD SOLUTIONS LTD						Borehole Log		Window Sampler No.			
								WS05			
								Sheet 1 of 1			
								Hole Type			
PROJECT NO: M4993						CO-ORDS:		WS			
PROJECT NAME: GARMAN ROAD, TOTTENHAM						LEVEL:		Scale			
								1:30			
CLIENT: SHURGARD UK						DATES: 22/03/22		Logged	Checked		
								SRP			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					0.18			MADE GROUND: CONCRETE.			
		0.40	ES PID	0.0PPM				MADE GROUND: Firm dark brown gravelly clay. Gravel is angular fine to coarse of chert, siltstone, brick and concrete with occasional pottery.			
					0.90			Firm brown slightly gravelly CLAY. Gravel is sub-angular fine to coarse of chert.			
		1.20	SPT	N=5 (1,1/1,1,1,2)							
		1.30	ES PID	0.0PPM							
					1.80			Brown sandy GRAVEL. Sand is medium to coarse. Gravel is sub-rounded fine to medium of chert and siltstone.			
		2.00	SPT	N=25 (7,7/5,5,6,9)							
		2.90	ES PID	0.0PPM	3.00						
		3.00	SPT	N≥50 (7,8/50 for 280mm)				End of Borehole at 3.00m			
Remarks		1. Location scanned and cleared with CAT and Genny. 2. Hand-dug inspection pit excavated to 1.20m bgl. 3. No groundwater encountered. 4. Borehole installed; GL to 0.60m bgl plain, 0.60m to 3.00m bgl slotted.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane			

Borehole Log							Borehole No.			
							BH01			
							Sheet 1 of 2			
PROJECT NO: M4993							CO-ORDS:			
PROJECT NAME: GARMAN ROAD, TOTTENHAM							Hole Type			
							CP			
CLIENT: SHURGARD UK LTD							Scale			
							1:50			
DATES: 27/03/23 - 28/03/23							Logged	Checked		
							HW	AT		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.16-0.20	ES		0.16 0.20 0.30			MADE GROUND: Concrete reinforced with crossing metal rebar.	1.0	
		0.90	ES			1.20				MADE GROUND: Dark greyish brown slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse of concrete, glass and brick.
		1.50-2.00	D							MADE GROUND: Brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse of concrete and brick.
		1.50	SPT	N=8 (1,0/1,1,3,3)	2.00 2.10	MADE GROUND: Dark greyish brown slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse of concrete and brick.				
		2.50	SPT	N=35 (4,5/6,8,9,12)						Soft bluish grey CLAY. <i>Becoming brown slightly sandy slightly gravelly CLAY at 1.90m bgl. Sand is fine to coarse. Gravel is sub-angular to rounded fine to coarse of sandstone and mudstone.</i>
		3.50	SPT	N≥50 (4,7/9,13,14,14)						Soft bluish grey and orangish brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub-rounded to rounded fine to coarse of sandstone and mudstone.
		3.60	B ES							Dense slightly sandy slightly silty sub-angular to rounded fine to coarse GRAVEL of sandstone, mudstone, and quartz. Sand is fine to coarse.
		4.50	SPT	N=36 (5,5/7,8,9,12)						<i>Gravel becoming black with moderate organic odour at 3.60m bgl.</i>
		5.40	D		5.40					<i>Groundwater encountered at 4.50m bgl.</i>
		6.00-6.45	D							Firm bluish grey slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is sub-angular to rounded fine to coarse of sandstone and mudstone. (LONDON CLAY).
6.00	SPT	N=11 (1,2/2,3,3,3)				<i>No gravel from 6.00m bgl.</i>	6.0			
7.50	SPT	N=16 (2,2/3,4,4,5)				<i>Becoming stiff from 7.50m bgl.</i>	7.0			
9.00-9.45	U						9.0			
9.00-9.50	D						10.0			
Remarks										
1. Clearance of services by BSL engineer using CAT and Genny. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 4.50m and 18.00m bgl. 4. Borehole terminated at 20.0m in natural strata. 5. Borehole installed with 1.50m plain pipe, 3.50m slotted pipe.								ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane		

 BROWNFIELD SOLUTIONS LTD							Borehole Log		Borehole No.	
PROJECT NO: M4993		CO-ORDS:		BH01						
				Sheet 2 of 2						
PROJECT NAME: GARMAN ROAD, TOTTENHAM							LEVEL:		Hole Type	
									CP	
CLIENT: SHURGARD UK LTD							DATES: 27/03/23 - 28/03/23		Scale	
									1:50	
							Logged		Checked	
							HW		AT	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		10.50	SPT	N=27 (3,5/6,6,7,8)						11.0
		12.00	SPT	N=28 (4,5/6,7,7,8)						12.0
		13.50-13.95 13.50	D SPT	N=27 (3,5/7,6,7,7)						13.0
		15.00	SPT	N=29 (4,6/6,7,8,8)						14.0
		16.50-16.95	U							15.0
		16.95	D							16.0
		18.50	SPT	N=39 (4,7/9,8,10,12)						17.0
		19.50-19.95 19.50	D SPT	N=41 (3,8/8,10,10,13)						18.0
										19.0
										20.0
							End of Borehole at 20.00m			
Remarks		1. Clearance of services by BSL engineer using CAT and Genny. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 4.50m and 18.00m bgl. 4. Borehole terminated at 20.0m in natural strata. 5. Borehole installed with 1.50m plain pipe, 3.50m slotted pipe.							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

 BROWNFIELD SOLUTIONS LTD						Borehole Log		Borehole No.	
PROJECT NO: M4993						CO-ORDS:		BH02	
								Sheet 1 of 2	
PROJECT NAME: GARMAN ROAD, TOTTENHAM						LEVEL:		Hole Type	
								CP	
CLIENT: SHURGARD UK LTD						DATES: 28/08/23 - 29/03/23		Scale	
								1:50	
								Logged	Checked
								HW	AT
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40	ES		0.16 0.30			MADE GROUND: Concrete reinforced with crossing metal rebar. MADE GROUND: Greyish brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse of brick and concrete. MADE GROUND: Yellowish brown and greyish brown slightly clayey gravelly fine to coarse sand with a moderate cobble content. Gravel is angular to subangular fine to coarse of concrete, ceramic, and brick. Cobbles are angular up to 250mm of brick. MADE GROUND: Light brown slightly gravelly sandy clay with low cobble content. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse of brick, slate, and concrete. Cobbles are angular up to 250mm of brick. Medium dense yellowish brown slightly clayey gravelly fine to coarse SAND. Gravel is subangular to rounded fine to coarse of sandstone and mudstone. Medium dense to dense yellowish brown slightly silty slightly sandy sub-angular to rounded fine to coarse GRAVEL of mudstone, sandstone, and quartz. Sand is fine to coarse. Groundwater encountered at 2.00m bgl. Moderate organic odour encountered from 4.30m bgl to 7.00m bgl.	1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0
		1.00	D		1.00				
		1.50	D SPT	N=18 (3,4/5,4,5,4)	1.50				
		1.90			1.90				
		2.50	SPT	N=29 (5,4/5,7,9,8)					
		3.50	SPT	N=48 (7,9/11,10,12,15)					
		4.50	B ES SPT	N=32 (4,5/6,8,8,10)					
		5.10	B D						
		5.60			5.60				
6.00-6.45 6.00	D SPT	N=10 (1,2/1,2,3,4)				Firm to very stiff dark bluish grey slightly sandy CLAY with slight iridescent sheen and low hydrocarbon odour. Sand is fine to coarse. (LONDON CLAY).	6.0 7.0 8.0 9.0 10.0		
7.50	U								
8.00	D								
		9.00	D SPT	N=19 (3,3/4,5,5,5)					
Remarks		1. Clearance of services by BSL engineer using CAT and Genny. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 2.00m and 16.80m. bgl. 4. Borehole terminated at 20.0m. 5. Borehole installed 0.50m plain pipe and 1.00m slotted pipe.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

 BROWNFIELD SOLUTIONS LTD							Borehole Log		Borehole No.	
									BH02	
									Sheet 2 of 2	
PROJECT NO: M4993							CO-ORDS:		Hole Type	
									CP	
PROJECT NAME: GARMAN ROAD, TOTTENHAM							LEVEL:		Scale	
									1:50	
CLIENT: SHURGARD UK LTD							DATES: 28/08/23 - 29/03/23		Logged	Checked
									HW	AT
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		10.50	D SPT	N=28 (3,3/5,7,8,8)					Becoming sandy from 10.50m bgl.	11.0
		12.00	D SPT	N=18 (2,3/3,4,5,6)						12.0
		13.50	U							13.0
		14.00	D							14.0
		15.00	SPT	N=26 (3,4/5,6,7,8)						15.0
		15.40	D							16.0
		16.50	D SPT	N=12 (9,14/2,2,4,4)						17.0
		18.00-18.45 18.00	D SPT	N=37 (5,7/10,7,9,11)						18.0
		19.50-19.95 19.50	D SPT	N=41 (4,8/9,9,11,12)						19.0
						20.00				
							End of Borehole at 20.00m			
Remarks		1. Clearance of services by BSL engineer using CAT and Genny. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 2.00m and 16.80m. bgl. 4. Borehole terminated at 20.0m. 5. Borehole installed 0.50m plain pipe and 1.00m slotted pipe.							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

Borehole Log						Borehole No.			
						BH03			
						Sheet 1 of 2			
PROJECT NO: M4993						CO-ORDS:			
PROJECT NAME: GARMAN ROAD, TOTTENHAM						Hole Type			
						CP			
CLIENT: SHURGARD UK LTD						Scale			
						1:50			
DATES: 30/03/23 - 31/03/12						Logged	Checked		
						HW	AT		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20-0.30	ES		0.20 0.30			MADE GROUND: Concrete reinforced with crossing metal rebar.	
		0.70-0.80	ES		0.70			MADE GROUND: Greyish brown slightly gravelly clayey fine to coarse sand. Gravel is angular to sub-angular fine to coarse of concrete and brick.	
		1.50	SPT	N=3 (1,0/0,1,1,1)	1.60			MADE GROUND: Yellowish brown slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse of concrete, brick, and slate.	1.0
		2.50	SPT	N=42 (5,7/9,9,11,13)				MADE GROUND: Dark brown slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to sub-rounded fine to coarse of brick, chalk, sandstone, and concrete.	
		3.00	D					Becoming slightly gravelly from 1.40m bgl.	
		3.50	SPT	N=49 (6,9/11,13,13,12)	3.30			Very stiff greyish brown slightly sandy CLAY. Sand is fine to coarse.	2.0
		3.60	B					Becoming sandy and gravelly from 3.00m bgl. Gravel is sub-angular to rounded fine to coarse of sandstone and mudstone.	3.0
		4.50	SPT	N=43 (4,5/9,9,12,13)				Dense yellowish brown slightly silty sandy sub-angular to rounded fine to coarse GRAVEL of sandstone, mudstone and quartz. Sand is fine to coarse.	4.0
		4.60	B					Moderate organic odour from 3.60m bgl.	
		4.80	ES						5.0
					5.60			Firm to very stiff greyish blue CLAY. (LONDON CLAY).	6.0
		6.00	D SPT	N=14 (1,3/2,3,4,5)					7.0
		7.50	D SPT	N=14 (1,3/3,3,4,4)					8.0
		9.00	SPT	N=23 (3,3/4,5,7,7)					9.0
									10.0
Remarks		1. Clearance of services by BSL engineer using CAT and Genny. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 3.60m and 18.80m bgl. 4. Borehole terminated at 20.00m bgl. 5. Borehole installed with 0.50m plain pipe and 1.00m slotted pipe.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

Borehole Log							Borehole No.			
							BH03			
							Sheet 2 of 2			
PROJECT NO: M4993							CO-ORDS:			
PROJECT NAME: GARMAN ROAD, TOTTENHAM							LEVEL:			
CLIENT: SHURGARD UK LTD							DATES: 30/03/23 - 31/03/12			
							Logged	Checked		
							HW	AT		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		10.50	U							
		11.00	D					Becoming slightly sandy from 11.00m bgl.	11.0	
		12.00	SPT	N=24 (2,3/5,6,6,7)					12.0	
		13.50	D SPT	N=24 (2,3/4,6,7,7)				No sand from 13.00m bgl.	13.0	
		15.00-15.45	U					Becoming slightly sandy from 15.50m bgl.	15.0	
		16.50	D SPT	N=32 (3,4/7,8,9,8)				Fine quartz gravel encountered from 16.50m bgl.	17.0	
		18.00	D SPT	N≥50 (25 for 75mm/52 for 150mm)	17.70			Very dense grey slightly gravelly clayey fine to coarse SAND. Gravel is sub-rounded to rounded fine to medium of sandstone. Becoming sandy from 17.90m bgl.	18.0	
					19.00			Groundwater encountered from 18.80m bgl.	19.0	
		19.50	D SPT	N=28 (5,5/5,7,8,8)				Stiff bluish grey and light grey CLAY.	19.0	
					20.00			End of Borehole at 20.00m	20.0	
Remarks		1. Clearance of services by BSL engineer using CAT and Genny. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 3.60m and 18.80m bgl. 4. Borehole terminated at 20.00m bgl. 5. Borehole installed with 0.50m plain pipe and 1.00m slotted pipe.							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

APPENDIX C

Chemical Testing Results

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Analytical Report Number : 22-47831

Project / Site name:	Garman Road	Samples received on:	24/03/2022
Your job number:	M4993	Samples instructed on/ Analysis started on:	24/03/2022
Your order number:	M4993-2969-SRP	Analysis completed by:	31/03/2022
Report Issue Number:	1	Report issued on:	31/03/2022
Samples Analysed:	14 soil samples		

Signed:



Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216768	2216769	2216770	2216771	2216772
Sample Reference				WS01	WS01	WS01	WS01	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	1.00	1.50	3.50	1.00
Date Sampled				21/03/2022	21/03/2022	21/03/2022	21/03/2022	21/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Stone Content				%	0.1	NONE	-	< 0.1
Moisture Content				%	0.01	NONE	-	19
Total mass of sample received				kg	0.001	NONE	-	0.8

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	-	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	GFI	GFI			GFI

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	8.7	8.3	8.6	7.6
Total Sulphate as SO ₄	%	0.005	MCERTS	-	-	0.16	-	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	710	-	130	90
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.35	0.4	0.063	0.045
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	353	400	63.1	45.1
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	21	-	-
Total Sulphur	%	0.005	MCERTS	-	-	0.066	-	-
Ammoniacal Nitrogen as NH ₄	mg/kg	0.5	MCERTS	-	-	1	-	-
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-	-	0.1	-	-
Organic Matter (automated)	%	0.1	MCERTS	-	3.9	-	0.4	1.1
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	40	-	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	0.94	-	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	1.9	-	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	-	1.9	-	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	1.1	-	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	-	1.1	-	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	1.1	-	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.78	-	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	1	-	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.64	-	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.69	-	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	11.2	-	< 0.80	< 0.80
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Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number	2216768	2216769	2216770	2216771	2216772
Sample Reference	WS01	WS01	WS01	WS01	WS02
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.40	1.00	1.50	3.50	1.00
Date Sampled	21/03/2022	21/03/2022	21/03/2022	21/03/2022	21/03/2022
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	20	-	7.1	9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	< 0.2
Chromium (III)	mg/kg	1	NONE	-	43	-	13	47
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	43	-	13	47
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	66	-	8.8	24
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	310	-	9.2	55
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	0.9	-	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	31	-	15	34
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	180	-	22	80

Magnesium (water soluble)	mg/kg	5	NONE	-	-	40	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	20	-	-

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
Toluene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
Ethylbenzene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
p & m-xylene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
o-xylene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	-	< 2.0	-	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	-	< 8.0	-	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	-	< 8.0	-	< 8.0	-
TPH-CWG - Aliphatic >EC16 - EC35 EH_CU_1D_AL	mg/kg	10	MCERTS	-	< 10	-	< 10	-
TPH-CWG - Aliphatic > EC35 - EC44 EH_CU_1D_AL	mg/kg	8.4	NONE	-	< 8.4	-	< 8.4	-
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	MCERTS	-	< 10	-	< 10	-
TPH-CWG - Aliphatic (EC5 - EC44) EH_CU+HS_1D_AL	mg/kg	10	NONE	-	< 10	-	< 10	-

TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	-	< 2.0	-	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	-	12	-	< 10	-
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	-	31	-	< 10	-
TPH-CWG - Aromatic > EC35 - EC44 EH_CU_1D_AR	mg/kg	8.4	NONE	-	< 8.4	-	< 8.4	-
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	MCERTS	-	43	-	< 10	-
TPH-CWG - Aromatic (EC5 - EC44) EH_CU+HS_1D_AR	mg/kg	10	NONE	-	43	-	< 10	-

VOCs

Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Chloroethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-

Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216768	2216769	2216770	2216771	2216772
Sample Reference				WS01	WS01	WS01	WS01	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	1.00	1.50	3.50	1.00
Date Sampled				21/03/2022	21/03/2022	21/03/2022	21/03/2022	21/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Styrene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Tri bromomethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-

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

Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216773	2216774	2216775	2216776	2216777
Sample Reference				WS02	WS03	WS03	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.60	0.20	0.80	1.30	0.60
Date Sampled				22/03/2022	22/03/2022	22/03/2022	22/03/2022	22/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	-	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	6.1	-	22	24	8.4
Total mass of sample received	kg	0.001	NONE	0.8	-	0.8	0.4	0.8

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	Not-detected	-	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A		GFI	ASE		ASE

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.5	-	8.2	7.9	8.2
Total Sulphate as SO4	%	0.005	MCERTS	-	-	-	0.037	-
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	20	-	150	-	21
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.01	-	0.075	0.074	0.011
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	10.1	-	75.4	73.9	10.5
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	-	2.7	-
Total Sulphur	%	0.005	MCERTS	-	-	-	0.016	-
Ammoniacal Nitrogen as NH4	mg/kg	0.5	MCERTS	-	-	-	< 0.5	-
Ammonium as NH4 (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-	-	-	< 0.05	-
Organic Matter (automated)	%	0.1	MCERTS	0.3	-	3.2	-	0.3
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	-	2.5	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	0.43	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.95	-	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	0.84	-	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	0.8	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	0.55	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.66	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.5	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	0.73	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	0.37	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	0.42	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-	6.25	-	< 0.80
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Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216773	2216774	2216775	2216776	2216777
Sample Reference				WS02	WS03	WS03	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.60	0.20	0.80	1.30	0.60
Date Sampled				22/03/2022	22/03/2022	22/03/2022	22/03/2022	22/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	-	19	-	5.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	< 0.2
Chromium (III)	mg/kg	1	NONE	18	-	43	-	10
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	-	43	-	10
Copper (aqua regia extractable)	mg/kg	1	MCERTS	11	-	92	-	13
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9	-	240	-	8.3
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	1.2	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	-	29	-	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	28	-	170	-	20

Magnesium (water soluble)	mg/kg	5	NONE	-	-	-	15	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	-	7.3	-

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
Toluene	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
o-xylene	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	-	-	-	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	-	-	-	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	-	-	-	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	-	-	-	-	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35 EH_CU_1D_AL	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aliphatic > EC35 - EC44 EH_CU_1D_AL	mg/kg	8.4	NONE	-	-	-	-	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aliphatic (EC5 - EC44) EH_CU+HS_1D_AL	mg/kg	10	NONE	-	-	-	-	< 10

TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	-	-	-	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	-	-	-	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic > EC35 - EC44 EH_CU_1D_AR	mg/kg	8.4	NONE	-	-	-	-	< 8.4
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic (EC5 - EC44) EH_CU+HS_1D_AR	mg/kg	10	NONE	-	-	-	-	< 10

VOCs

Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Chloroethane	µg/kg	1	NONE	-	-	-	-	< 1.0
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Vinyl Chloride	µg/kg	1	NONE	-	-	-	-	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	-	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	-	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	< 1.0

Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216773	2216774	2216775	2216776	2216777
Sample Reference				WS02	WS03	WS03	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.60	0.20	0.80	1.30	0.60
Date Sampled				22/03/2022	22/03/2022	22/03/2022	22/03/2022	22/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	-	< 1.0
Benzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Trichloroethene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Dibromomethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Tetrachloroethene	µg/kg	1	NONE	-	-	-	-	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Styrene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Tri bromomethane	µg/kg	1	NONE	-	-	-	-	< 1.0
o-Xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0

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

Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216778	2216779	2216780	2216781
Sample Reference				WS04	WS05	WS05	HP01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80	0.40	2.90	0.90
Date Sampled				22/03/2022	22/03/2022	22/03/2022	21/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	70	< 0.1
Moisture Content	%	0.01	NONE	16	16	4.4	17
Total mass of sample received	kg	0.001	NONE	0.8	0.4	0.8	0.8

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	Chrysotile- Loose Fibres
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Detected
Asbestos Analyst ID	N/A	N/A	N/A		ASE		ASE

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.4	7.4	8.3	8.1
Total Sulphate as SO ₄	%	0.005	MCERTS	0.176	-	0.022	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	720	-	65
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.3	0.36	0.028	0.032
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	301	358	28.4	32.3
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	15	-	5.1	-
Total Sulphur	%	0.005	MCERTS	0.075	-	0.008	-
Ammoniacal Nitrogen as NH ₄	mg/kg	0.5	MCERTS	< 0.5	-	< 0.5	-
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	< 0.05	-	< 0.05	-
Organic Matter (automated)	%	0.1	MCERTS	-	4.4	-	5.6
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	48	-	3.6	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	0.73	-	1.4
Anthracene	mg/kg	0.05	MCERTS	-	0.19	-	0.3
Fluoranthene	mg/kg	0.05	MCERTS	-	1.4	-	2.8
Pyrene	mg/kg	0.05	MCERTS	-	1.3	-	2.8
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	0.91	-	1.6
Chrysene	mg/kg	0.05	MCERTS	-	0.91	-	1.4
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	0.95	-	1.6
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.71	-	0.9
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	1	-	1.7
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.57	-	0.86
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.17
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.72	-	1.2

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	9.4	-	16.7
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Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216778	2216779	2216780	2216781
Sample Reference				WS04	WS05	WS05	HP01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80	0.40	2.90	0.90
Date Sampled				22/03/2022	22/03/2022	22/03/2022	21/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	26	-	99
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2
Chromium (III)	mg/kg	1	NONE	-	40	-	45
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	40	-	45
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	70	-	280
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	460	-	270
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	1.6	-	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	30	-	56
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	210	-	560

Magnesium (water soluble)	mg/kg	5	NONE	63	-	7.1	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	32	-	3.6	-

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	< 0.001	-	-	-
Toluene	mg/kg	0.001	MCERTS	< 0.001	-	-	-
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001	-	-	-
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001	-	-	-
o-xylene	mg/kg	0.001	MCERTS	< 0.001	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_ID_AL	mg/kg	1	MCERTS	< 1.0	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_ID_AL	mg/kg	2	MCERTS	< 2.0	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	-	-	-
TPH-CWG - Aliphatic >EC16 - EC35 EH_CU_ID_AL	mg/kg	10	MCERTS	< 10	-	-	-
TPH-CWG - Aliphatic > EC35 - EC44 EH_CU_ID_AL	mg/kg	8.4	NONE	< 8.4	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_ID_AL	mg/kg	10	MCERTS	< 10	-	-	-
TPH-CWG - Aliphatic (EC5 - EC44) EH_CU+HS_ID_AL	mg/kg	10	NONE	< 10	-	-	-

TPH-CWG - Aromatic >EC5 - EC7 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aromatic >EC7 - EC8 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aromatic >EC8 - EC10 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_ID_AR	mg/kg	1	MCERTS	< 1.0	-	-	-
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_ID_AR	mg/kg	2	MCERTS	< 2.0	-	-	-
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_ID_AR	mg/kg	10	MCERTS	11	-	-	-
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_ID_AR	mg/kg	10	MCERTS	26	-	-	-
TPH-CWG - Aromatic > EC35 - EC44 EH_CU_ID_AR	mg/kg	8.4	NONE	< 8.4	-	-	-
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_ID_AR	mg/kg	10	MCERTS	37	-	-	-
TPH-CWG - Aromatic (EC5 - EC44) EH_CU+HS_ID_AR	mg/kg	10	NONE	37	-	-	-

VOCs

Chloromethane	µg/kg	1	ISO 17025	-	-	-	-
Chloroethane	µg/kg	1	NONE	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-
Vinyl Chloride	µg/kg	1	NONE	-	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	-

Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216778	2216779	2216780	2216781
Sample Reference				WS04	WS05	WS05	HP01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80	0.40	2.90	0.90
Date Sampled				22/03/2022	22/03/2022	22/03/2022	21/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	-
Benzene	µg/kg	1	MCERTS	-	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-
Trichloroethene	µg/kg	1	MCERTS	-	-	-	-
Dibromomethane	µg/kg	1	MCERTS	-	-	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	-
Tetrachloroethene	µg/kg	1	NONE	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-
Tri bromomethane	µg/kg	1	NONE	-	-	-	-
o-Xylene	µg/kg	1	MCERTS	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-
Butylbenzene	µg/kg	1	MCERTS	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-

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

Analytical Report Number : 22-47831

Project / Site name: Garman Road

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2216769	WS01	None Supplied	1	Brown clay and sand with gravel and vegetation.
2216770	WS01	None Supplied	1.5	Light brown clay and sand with gravel.
2216771	WS01	None Supplied	3.5	Light grey sand with gravel and stones.
2216772	WS02	None Supplied	1	Light brown clay and sand with gravel.
2216773	WS02	None Supplied	1.6	Light brown sand with gravel.
2216775	WS03	None Supplied	0.8	Brown clay and loam with gravel.
2216776	WS03	None Supplied	1.3	Light brown clay.
2216777	WS04	None Supplied	0.6	Light brown sand with gravel.
2216778	WS04	None Supplied	2.8	Brown loam and clay with gravel.
2216779	WS05	None Supplied	0.4	Brown loam and clay with gravel and brick.
2216780	WS05	None Supplied	2.9	Light brown sand with stones and gravel
2216781	HP01	None Supplied	0.9	Brown loam and clay with gravel and coal.

Analytical Report Number : 22-47831

Project / Site name: Garman Road

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	NONE
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

Analytical Report Number : 22-47831

Project / Site name: Garman Road

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

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

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

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

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

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Analytical Report Number : 22-47831

Replaces Analytical Report Number: 22-47831, issue no. 1
Additional analysis undertaken.

Project / Site name:	Garman Road	Samples received on:	24/03/2022
Your job number:	M4993	Samples instructed on/ Analysis started on:	24/03/2022
Your order number:	M4993-2969-SRP	Analysis completed by:	07/04/2022
Report Issue Number:	2	Report issued on:	08/04/2022
Samples Analysed:	14 soil samples		


Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216768	2216769	2216770	2216771	2216772
Sample Reference				WS01	WS01	WS01	WS01	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	1.00	1.50	3.50	1.00
Date Sampled				21/03/2022	21/03/2022	21/03/2022	21/03/2022	21/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	-	< 0.1	< 0.1	40	< 0.1
Moisture Content	%	0.01	NONE	-	19	24	7.5	17
Total mass of sample received	kg	0.001	NONE	-	0.8	0.8	0.8	0.8

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	8.7	8.3	8.6	7.6
Total Sulphate as SO ₄	%	0.005	MCERTS	-	-	0.16	-	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	710	-	130	90
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.35	0.4	0.063	0.045
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	353	400	63.1	45.1
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	21	-	-
Total Sulphur	%	0.005	MCERTS	-	-	0.066	-	-
Ammoniacal Nitrogen as NH ₄	mg/kg	0.5	MCERTS	-	-	1	-	-
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-	-	0.1	-	-
Organic Matter (automated)	%	0.1	MCERTS	-	3.9	-	0.4	1.1
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	40	-	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	0.94	-	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	1.9	-	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	-	1.9	-	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	1.1	-	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	-	1.1	-	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	1.1	-	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.78	-	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	1	-	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.64	-	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.69	-	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	11.2	-	< 0.80	< 0.80
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Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number	2216768	2216769	2216770	2216771	2216772
Sample Reference	WS01	WS01	WS01	WS01	WS02
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.40	1.00	1.50	3.50	1.00
Date Sampled	21/03/2022	21/03/2022	21/03/2022	21/03/2022	21/03/2022
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	20	-	7.1	9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	-	< 1.2	-	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	-	43	-	13	47
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	43	-	13	47
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	66	-	8.8	24
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	310	-	9.2	55
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	0.9	-	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	31	-	15	34
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	180	-	22	80

Magnesium (water soluble)	mg/kg	5	NONE	-	-	40	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	20	-	-

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
Toluene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
Ethylbenzene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
p & m-xylene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
o-xylene	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	-	< 2.0	-	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	-	< 8.0	-	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	-	< 8.0	-	< 8.0	-
TPH-CWG - Aliphatic >EC16 - EC35 EH_CU_1D_AL	mg/kg	10	MCERTS	-	< 10	-	< 10	-
TPH-CWG - Aliphatic > EC35 - EC44 EH_CU_1D_AL	mg/kg	8.4	NONE	-	< 8.4	-	< 8.4	-
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	MCERTS	-	< 10	-	< 10	-
TPH-CWG - Aliphatic (EC5 - EC44) EH_CU+HS_1D_AL	mg/kg	10	NONE	-	< 10	-	< 10	-

TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	MCERTS	-	< 0.001	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	-	< 2.0	-	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	-	12	-	< 10	-
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	-	31	-	< 10	-
TPH-CWG - Aromatic > EC35 - EC44 EH_CU_1D_AR	mg/kg	8.4	NONE	-	< 8.4	-	< 8.4	-
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	MCERTS	-	43	-	< 10	-
TPH-CWG - Aromatic (EC5 - EC44) EH_CU+HS_1D_AR	mg/kg	10	NONE	-	43	-	< 10	-

Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216768	2216769	2216770	2216771	2216772
Sample Reference				WS01	WS01	WS01	WS01	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	1.00	1.50	3.50	1.00
Date Sampled				21/03/2022	21/03/2022	21/03/2022	21/03/2022	21/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

VOCs

Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Chloroethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Styrene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Tribromomethane	µg/kg	1	NONE	-	< 1.0	-	< 1.0	-
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-

Analytical Report Number: 22-47831
 Project / Site name: Garman Road
 Your Order No: M4993-2969-SRP

Lab Sample Number				2216768	2216769	2216770	2216771	2216772
Sample Reference				WS01	WS01	WS01	WS01	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	1.00	1.50	3.50	1.00
Date Sampled				21/03/2022	21/03/2022	21/03/2022	21/03/2022	21/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-

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

Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216773	2216774	2216775	2216776	2216777
Sample Reference				WS02	WS03	WS03	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.60	0.20	0.80	1.30	0.60
Date Sampled				22/03/2022	22/03/2022	22/03/2022	22/03/2022	22/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Stone Content				%	0.1	NONE	< 0.1	< 0.1
Moisture Content				%	0.01	NONE	6.1	22
Total mass of sample received				kg	0.001	NONE	0.8	0.4

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

General Inorganics

pH - Automated				pH Units	N/A	MCERTS	6.5	-	8.2	7.9	8.2
Total Sulphate as SO ₄				%	0.005	MCERTS	-	-	-	0.037	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)				mg/kg	2.5	MCERTS	20	-	150	-	21
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)				g/l	0.00125	MCERTS	0.01	-	0.075	0.074	0.011
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)				mg/l	1.25	MCERTS	10.1	-	75.4	73.9	10.5
Water Soluble Chloride (2:1) (leachate equivalent)				mg/l	0.5	MCERTS	-	-	-	2.7	-
Total Sulphur				%	0.005	MCERTS	-	-	-	0.016	-
Ammoniacal Nitrogen as NH ₄				mg/kg	0.5	MCERTS	-	-	-	< 0.5	-
Ammonium as NH ₄ (10:1 leachate equivalent)				mg/l	0.05	MCERTS	-	-	-	< 0.05	-
Organic Matter (automated)				%	0.1	MCERTS	0.3	-	3.2	-	0.3
Water Soluble Nitrate (2:1) as N (leachate equivalent)				mg/l	2	NONE	-	-	-	2.5	-

Speciated PAHs

Naphthalene				mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthylene				mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthene				mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluorene				mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Phenanthrene				mg/kg	0.05	MCERTS	< 0.05	-	0.43	-	< 0.05
Anthracene				mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluoranthene				mg/kg	0.05	MCERTS	< 0.05	-	0.95	-	< 0.05
Pyrene				mg/kg	0.05	MCERTS	< 0.05	-	0.84	-	< 0.05
Benzo(a)anthracene				mg/kg	0.05	MCERTS	< 0.05	-	0.8	-	< 0.05
Chrysene				mg/kg	0.05	MCERTS	< 0.05	-	0.55	-	< 0.05
Benzo(b)fluoranthene				mg/kg	0.05	MCERTS	< 0.05	-	0.66	-	< 0.05
Benzo(k)fluoranthene				mg/kg	0.05	MCERTS	< 0.05	-	0.5	-	< 0.05
Benzo(a)pyrene				mg/kg	0.05	MCERTS	< 0.05	-	0.73	-	< 0.05
Indeno(1,2,3-cd)pyrene				mg/kg	0.05	MCERTS	< 0.05	-	0.37	-	< 0.05
Dibenz(a,h)anthracene				mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(ghi)perylene				mg/kg	0.05	MCERTS	< 0.05	-	0.42	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs				mg/kg	0.8	MCERTS	< 0.80	-	6.25	-	< 0.80
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Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216773	2216774	2216775	2216776	2216777
Sample Reference				WS02	WS03	WS03	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.60	0.20	0.80	1.30	0.60
Date Sampled				22/03/2022	22/03/2022	22/03/2022	22/03/2022	22/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	-	19	-	5.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	-	< 1.2	-	< 1.2
Chromium (III)	mg/kg	1	NONE	18	-	43	-	10
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	-	43	-	10
Copper (aqua regia extractable)	mg/kg	1	MCERTS	11	-	92	-	13
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9	-	240	-	8.3
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	1.2	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	-	29	-	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	28	-	170	-	20

Magnesium (water soluble)	mg/kg	5	NONE	-	-	-	15	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	-	7.3	-

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
Toluene	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
o-xylene	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	-	-	-	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	-	-	-	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	-	-	-	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	-	-	-	-	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35 EH_CU_1D_AL	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aliphatic > EC35 - EC44 EH_CU_1D_AL	mg/kg	8.4	NONE	-	-	-	-	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aliphatic (EC5 - EC44) EH_CU+HS_1D_AL	mg/kg	10	NONE	-	-	-	-	< 10

TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	-	-	-	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	-	-	-	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic > EC35 - EC44 EH_CU_1D_AR	mg/kg	8.4	NONE	-	-	-	-	< 8.4
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic (EC5 - EC44) EH_CU+HS_1D_AR	mg/kg	10	NONE	-	-	-	-	< 10

Analytical Report Number: 22-47831
Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216773	2216774	2216775	2216776	2216777
Sample Reference				WS02	WS03	WS03	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.60	0.20	0.80	1.30	0.60
Date Sampled				22/03/2022	22/03/2022	22/03/2022	22/03/2022	22/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Chloroethane	µg/kg	1	NONE	-	-	-	-	< 1.0
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Vinyl Chloride	µg/kg	1	NONE	-	-	-	-	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	-	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	-	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	-	< 1.0
Benzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Trichloroethene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Dibromomethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Tetrachloroethene	µg/kg	1	NONE	-	-	-	-	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Styrene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Tribromomethane	µg/kg	1	NONE	-	-	-	-	< 1.0
o-Xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	-	< 1.0

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Lab Sample Number				2216773	2216774	2216775	2216776	2216777
Sample Reference				WS02	WS03	WS03	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.60	0.20	0.80	1.30	0.60
Date Sampled				22/03/2022	22/03/2022	22/03/2022	22/03/2022	22/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0

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

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 Project / Site name: Garman Road
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Lab Sample Number				2216778	2216779	2216780	2216781
Sample Reference				WS04	WS05	WS05	HP01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80	0.40	2.90	0.90
Date Sampled				22/03/2022	22/03/2022	22/03/2022	21/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	70	< 0.1
Moisture Content	%	0.01	NONE	16	16	4.4	17
Total mass of sample received	kg	0.001	NONE	0.8	0.4	0.8	0.8

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.4	7.4	8.3	8.1
Total Sulphate as SO ₄	%	0.005	MCERTS	0.176	-	0.022	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	720	-	65
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.3	0.36	0.028	0.032
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	301	358	28.4	32.3
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	15	-	5.1	-
Total Sulphur	%	0.005	MCERTS	0.075	-	0.008	-
Ammoniacal Nitrogen as NH ₄	mg/kg	0.5	MCERTS	< 0.5	-	< 0.5	-
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	< 0.05	-	< 0.05	-
Organic Matter (automated)	%	0.1	MCERTS	-	4.4	-	5.6
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	48	-	3.6	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	0.73	-	1.4
Anthracene	mg/kg	0.05	MCERTS	-	0.19	-	0.3
Fluoranthene	mg/kg	0.05	MCERTS	-	1.4	-	2.8
Pyrene	mg/kg	0.05	MCERTS	-	1.3	-	2.8
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	0.91	-	1.6
Chrysene	mg/kg	0.05	MCERTS	-	0.91	-	1.4
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	0.95	-	1.6
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.71	-	0.9
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	1	-	1.7
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.57	-	0.86
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.17
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.72	-	1.2

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	9.4	-	16.7
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Project / Site name: Garman Road
Your Order No: M4993-2969-SRP

Lab Sample Number				2216778	2216779	2216780	2216781
Sample Reference				WS04	WS05	WS05	HP01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80	0.40	2.90	0.90
Date Sampled				22/03/2022	22/03/2022	22/03/2022	21/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	26	-	99
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	-	< 1.2	-	< 1.2
Chromium (III)	mg/kg	1	NONE	-	40	-	45
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	40	-	45
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	70	-	280
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	460	-	270
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	1.6	-	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	30	-	56
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	210	-	560

Magnesium (water soluble)	mg/kg	5	NONE	63	-	7.1	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	32	-	3.6	-

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	< 0.001	-	-	-
Toluene	mg/kg	0.001	MCERTS	< 0.001	-	-	-
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001	-	-	-
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001	-	-	-
o-xylene	mg/kg	0.001	MCERTS	< 0.001	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	-	-	-
TPH-CWG - Aliphatic >EC16 - EC35 EH_CU_1D_AL	mg/kg	10	MCERTS	< 10	-	-	-
TPH-CWG - Aliphatic > EC35 - EC44 EH_CU_1D_AL	mg/kg	8.4	NONE	< 8.4	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	MCERTS	< 10	-	-	-
TPH-CWG - Aliphatic (EC5 - EC44) EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	-	-	-

TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	MCERTS	< 0.001	-	-	-
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0	-	-	-
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	< 2.0	-	-	-
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	11	-	-	-
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	26	-	-	-
TPH-CWG - Aromatic > EC35 - EC44 EH_CU_1D_AR	mg/kg	8.4	NONE	< 8.4	-	-	-
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	MCERTS	37	-	-	-
TPH-CWG - Aromatic (EC5 - EC44) EH_CU+HS_1D_AR	mg/kg	10	NONE	37	-	-	-

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Lab Sample Number				2216778	2216779	2216780	2216781
Sample Reference				WS04	WS05	WS05	HP01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80	0.40	2.90	0.90
Date Sampled				22/03/2022	22/03/2022	22/03/2022	21/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
VOCs							
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-
Chloroethane	µg/kg	1	NONE	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-
Vinyl Chloride	µg/kg	1	NONE	-	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	-
Benzene	µg/kg	1	MCERTS	-	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-
Trichloroethene	µg/kg	1	MCERTS	-	-	-	-
Dibromomethane	µg/kg	1	MCERTS	-	-	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	-
Tetrachloroethene	µg/kg	1	NONE	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-
Tribromomethane	µg/kg	1	NONE	-	-	-	-
o-Xylene	µg/kg	1	MCERTS	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-
Butylbenzene	µg/kg	1	MCERTS	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	-

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Lab Sample Number				2216778	2216779	2216780	2216781
Sample Reference				WS04	WS05	WS05	HP01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80	0.40	2.90	0.90
Date Sampled				22/03/2022	22/03/2022	22/03/2022	21/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-

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

Analytical Report Number: 22-47831
Project / Site name: Garman Road
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Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

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

Quantitative Analysis

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

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

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

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
2216781	HP01	0.90	159	Loose Fibres	Chrysotile	< 0.001	< 0.001

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

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2216769	WS01	None Supplied	1	Brown clay and sand with gravel and vegetation.
2216770	WS01	None Supplied	1.5	Light brown clay and sand with gravel.
2216771	WS01	None Supplied	3.5	Light grey sand with gravel and stones.
2216772	WS02	None Supplied	1	Light brown clay and sand with gravel.
2216773	WS02	None Supplied	1.6	Light brown sand with gravel.
2216775	WS03	None Supplied	0.8	Brown clay and loam with gravel.
2216776	WS03	None Supplied	1.3	Light brown clay.
2216777	WS04	None Supplied	0.6	Light brown sand with gravel.
2216778	WS04	None Supplied	2.8	Brown loam and clay with gravel.
2216779	WS05	None Supplied	0.4	Brown loam and clay with gravel and brick.
2216780	WS05	None Supplied	2.9	Light brown sand with stones and gravel
2216781	HP01	None Supplied	0.9	Brown loam and clay with gravel and coal.

Analytical Report Number : 22-47831
Project / Site name: Garman Road

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

Analytical Report Number : 22-47831
Project / Site name: Garman Road

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

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

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

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

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

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e: a.thornes@brownfield-solutions.co.uk

Analytical Report Number : 23-26306

Project / Site name:	German Road, Tottenham	Samples received on:	03/04/2023
Your job number:	M4993	Samples instructed on/ Analysis started on:	03/04/2023
Your order number:	M4993 4111 AT	Analysis completed by:	11/04/2023
Report Issue Number:	1	Report issued on:	11/04/2023
Samples Analysed:	2 soil samples		


Signed:

Dominika Warjan
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 23-26306
Project / Site name: German Road, Tottenham
Your Order No: M4993 4111 AT

Lab Sample Number				2637190	2637191
Sample Reference				BH1	BH2
Sample Number				None Supplied	None Supplied
Depth (m)				3.60	4.50
Date Sampled				27/03/2023	29/03/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	30
Moisture Content	%	0.01	NONE	13	6.9
Total mass of sample received	kg	0.001	NONE	0.9	0.9

Speciated PAHs

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

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80
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Monoaromatics & Oxygenates

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

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

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35 EH_CU_1D_AL	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aliphatic >EC35 - EC40 EH_CU_1D_AL	mg/kg	10	NONE	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	< 10

Analytical Report Number: 23-26306
 Project / Site name: German Road, Tottenham
 Your Order No: M4993 4111 AT

Lab Sample Number				2637190	2637191
Sample Reference				BH1	BH2
Sample Number				None Supplied	None Supplied
Depth (m)				3.60	4.50
Date Sampled				27/03/2023	29/03/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC35 - EC40 EH_CU_1D_AR	mg/kg	10	NONE	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	NONE	< 10	< 10
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	NONE	< 10	< 10
TPH (C5 - C10) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0
TPH (C10 - C16) EH_CU_1D_TOTAL	mg/kg	10	NONE	< 10	< 10
TPH (C16 - C40) EH_CU_1D_TOTAL	mg/kg	10	NONE	< 10	< 10

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

Analytical Report Number : 23-26306

Project / Site name: German Road, Tottenham

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2637190	BH1	None Supplied	3.6	Black sand with gravel.
2637191	BH2	None Supplied	4.5	Brown sand with gravel and stones.

Analytical Report Number : 23-26306
Project / Site name: German Road, Tottenham

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS

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

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

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

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC. Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

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

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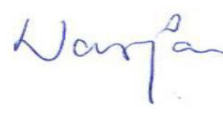
Analytical Report Number : 23-26604-2

Replaces Analytical Report Number: 23-26604, issue no. 1

Client sampling date amended.

Sampling date amended for all samples as per client's request

Project / Site name:	Garman Road, Tottenham	Samples received on:	04/04/2023
Your job number:	M4993	Samples instructed on/ Analysis started on:	04/04/2023
Your order number:	M4994/4115/HW	Analysis completed by:	19/04/2023
Report Issue Number:	2	Report issued on:	20/04/2023
Samples Analysed:	8 soil samples		


Signed:

Dominika Warjan
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 23-26604
Project / Site name: Garman Road, Tottenham
Your Order No: M4994/4115/HW

Lab Sample Number				2638778	2638779	2638780	2638781	2638782
Sample Reference				BH01	BH01	BH02	BH03	BH03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				6.00	19.50	9.00	11.00	16.50
Date Sampled				28/03/2023	28/03/2023	29/03/2023	30/03/2023	30/03/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	21	16	18	15	16
Total mass of sample received	kg	0.001	NONE	0.2	0.5	0.2	0.2	0.1

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.6	9.5	8.7	8.6	8.7
Total Sulphate as SO ₄	%	0.005	MCERTS	0.038	-	-	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.22	0.025	0.18	0.24	0.38
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	32	-	-	-	-
Total Sulphur	%	0.005	MCERTS	0.781	-	-	-	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	-	-	-	-

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	19	-	-	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	9.3	-	-	-	-

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

Analytical Report Number: 23-26604
 Project / Site name: Garman Road, Tottenham
 Your Order No: M4994/4115/HW

Lab Sample Number				2638783	2638784	2638785
Sample Reference				BH01	BH02	BH03
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				9.50	14.00	18.00
Date Sampled				28/03/2023	29/03/2023	30/03/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	19	17	14
Total mass of sample received	kg	0.001	NONE	0.6	0.5	0.1

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.8	8.3	8
Total Sulphate as SO ₄	%	0.005	MCERTS	0.036	0.084	0.066
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.2	0.52	0.3
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	26	34	24
Total Sulphur	%	0.005	MCERTS	0.676	0.687	0.229
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	33	76	54
Magnesium (leachate equivalent)	mg/l	2.5	NONE	16	38	27

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

Analytical Report Number : 23-26604

Project / Site name: Garman Road, Tottenham

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2638778	BH01	None Supplied	6	Brown clay and sand.
2638779	BH01	None Supplied	19.5	Brown clay and sand.
2638780	BH02	None Supplied	9	Brown clay and sand.
2638781	BH03	None Supplied	11	Brown clay and sand.
2638782	BH03	None Supplied	16.5	Brown clay and sand.
2638783	BH01	None Supplied	9.5	Brown clay and sand.
2638784	BH02	None Supplied	14	Brown clay and sand.
2638785	BH03	None Supplied	18	Brown clay and sand.

Analytical Report Number : 23-26604

Project / Site name: Garman Road, Tottenham

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS

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

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

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

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

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

APPENDIX D

Geotechnical Testing Results

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

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

Client: Brownfield Solutions Ltd
Client Address: William Smith House, 173 - 183 Witton Street,
Northwich, Cheshire,
CW9 5LP
Contact: S. Piercy
Site Address: Garman Road

Client Reference: M4993
Job Number: 22-47846
Date Sampled: 21/03/2022
Date Received: 24/03/2022
Date Tested: 06/04/2022
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

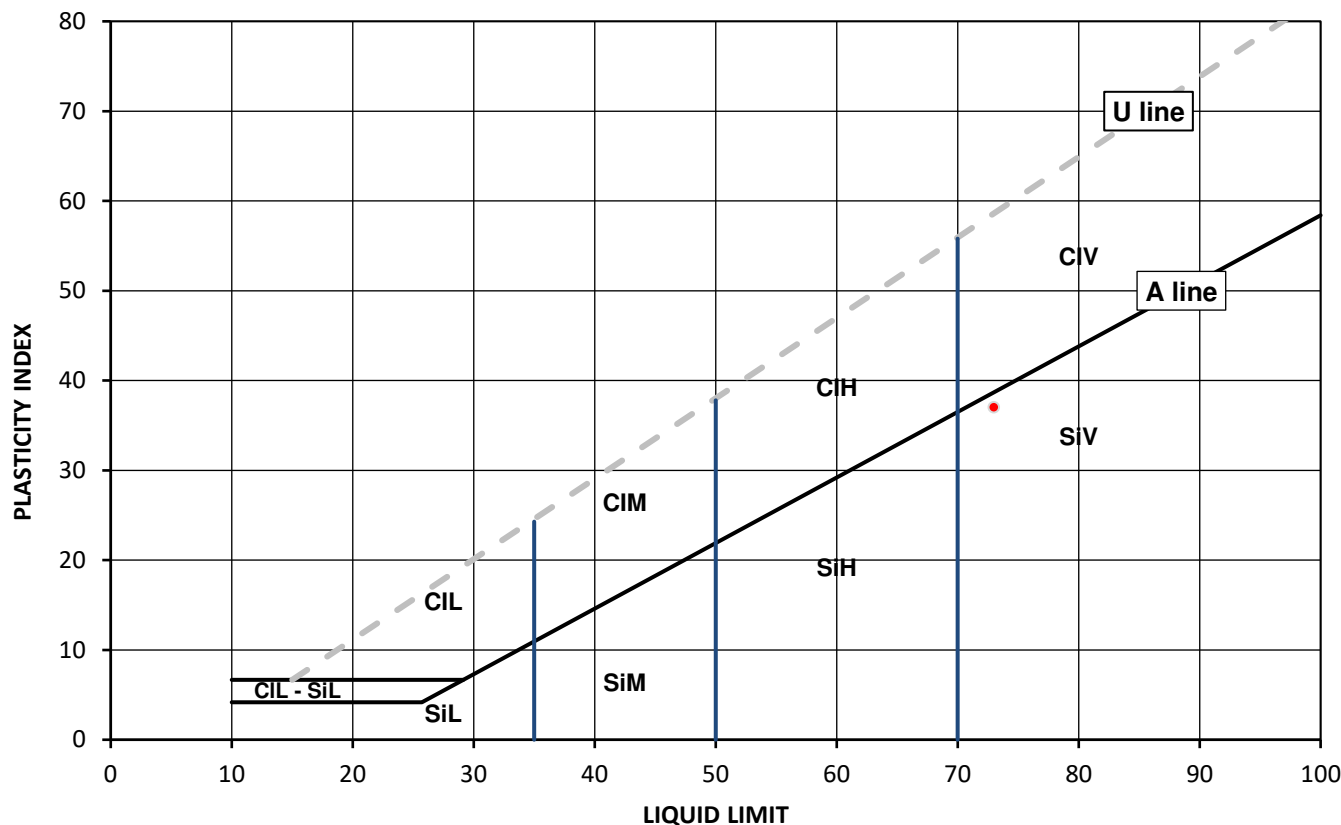
Test Results:

Laboratory Reference: 2216878
Hole No.: WS01
Sample Reference: Not Given
Sample Description: Brownish grey slightly gravelly CLAY

Depth Top [m]: 1.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
44.6	73	36	37	98



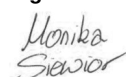
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

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

Note: Water Content by BS EN 17892-1: 2014

Remarks:

Signed:



Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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4041

Client: Brownfield Solutions Ltd
Client Address: William Smith House, 173 - 183 Witton Street,
Northwich, Cheshire,
CW9 5LP
Contact: S. Piercy
Site Address: Garman Road

Client Reference: M4993
Job Number: 22-47846
Date Sampled: 22/03/2022
Date Received: 24/03/2022
Date Tested: 06/04/2022
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

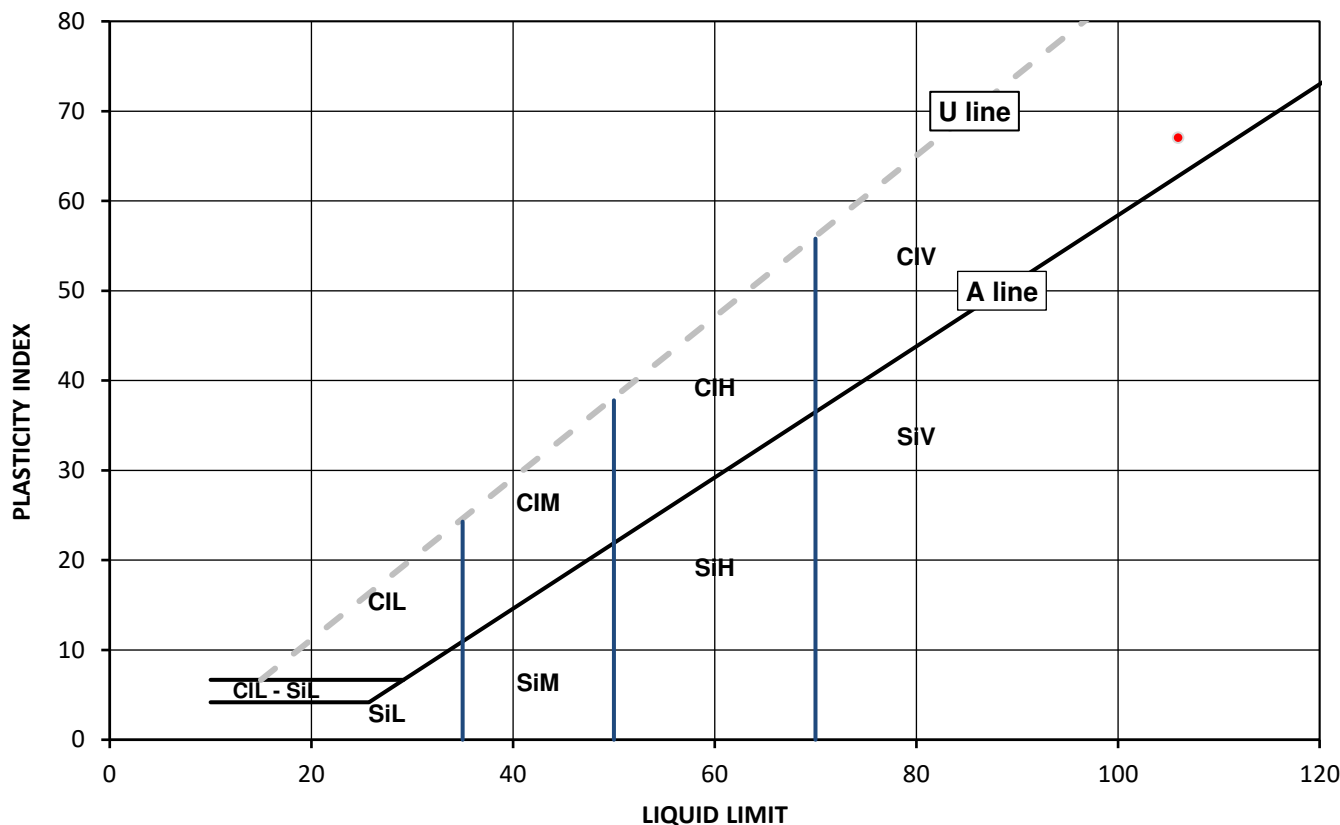
Test Results:

Laboratory Reference: 2216879
Hole No.: WS03
Sample Reference: Not Given
Sample Description: Brownish grey CLAY

Depth Top [m]: 1.30
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
45.4	106	39	67	100



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

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

Note: Water Content by BS EN 17892-1: 2014

Remarks:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
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Client Address: William Smith House, 173 - 183 Witton Street,
Northwich, Cheshire,
CW9 5LP
Contact: S. Piercy
Site Address: Garman Road

Client Reference: M4993
Job Number: 22-47846
Date Sampled: 22/03/2022
Date Received: 24/03/2022
Date Tested: 06/04/2022
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

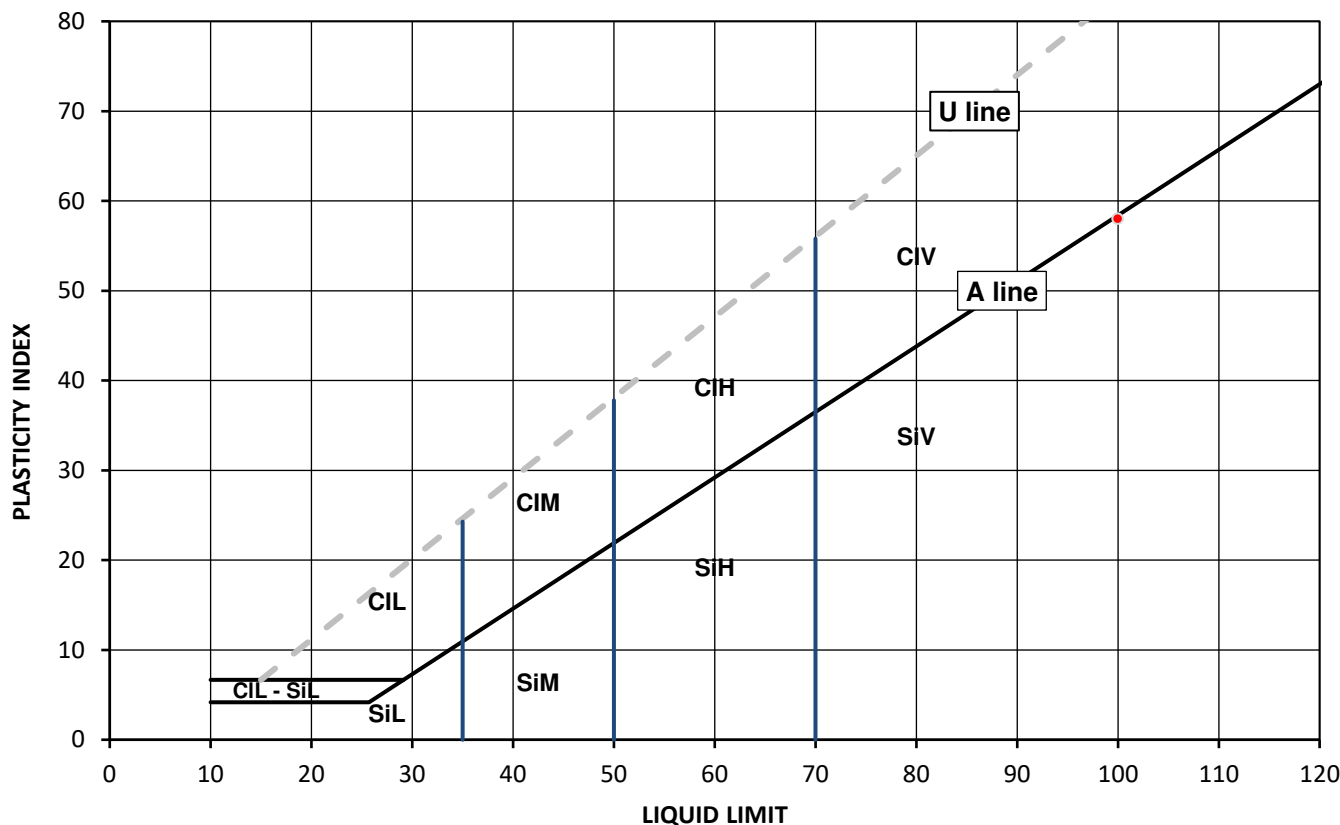
Test Results:

Laboratory Reference: 2216880
Hole No.: WS04
Sample Reference: Not Given
Sample Description: Brownish grey CLAY

Depth Top [m]: 1.60
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
46.2	100	42	58	100



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

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

Note: Water Content by BS EN 17892-1: 2014

Remarks:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

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

Client: Brownfield Solutions Ltd
Client Address: William Smith House, 173 - 183 Witton Street,
Northwich, Cheshire,
CW9 5LP
Contact: S. Piercy
Site Address: Garman Road

Client Reference: M4993
Job Number: 22-47846
Date Sampled: 22/03/2022
Date Received: 24/03/2022
Date Tested: 06/04/2022
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

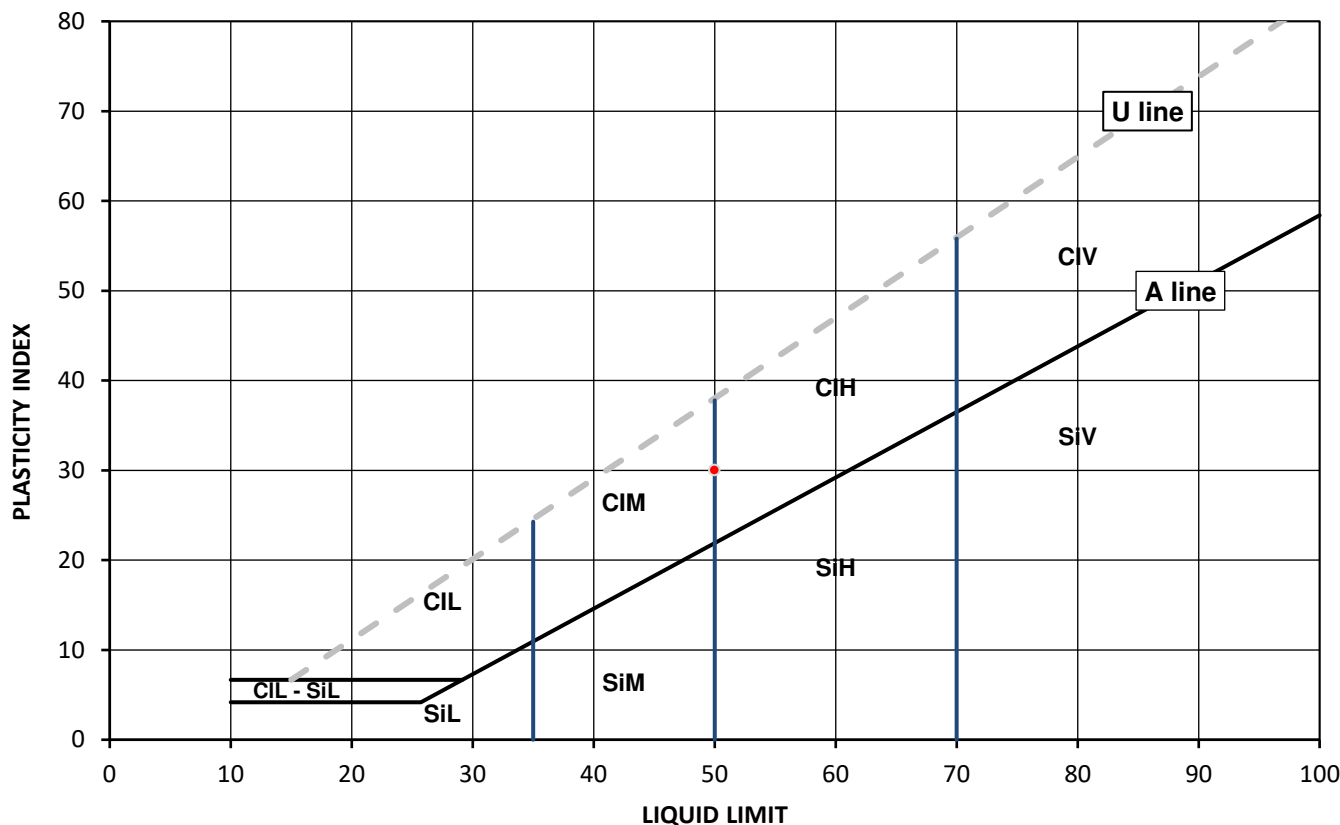
Test Results:

Laboratory Reference: 2216881
Hole No.: WS05
Sample Reference: Not Given
Sample Description: Brownish grey slightly sandy CLAY

Depth Top [m]: 1.30
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
23.5	50	20	30	100



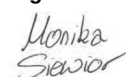
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

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

Note: Water Content by BS EN 17892-1: 2014

Remarks:

Signed:



Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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4041

Client: Brownfield Solutions Ltd
 Client Address: William Smith House, 173 - 183 Witton Street,
 Northwich, Cheshire,
 CW9 5LP
 Contact: S. Piercy
 Site Address: Garman Road

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

Water Content by BS EN ISO 17892-1:2014; Atterberg by BS 1377-2: 1990:
 Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:
 1990: Clause 8.2

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



Environmental Science

Client Reference: M4993
 Job Number: 22-47846
 Date Sampled: 21/03 - 22/03/2022
 Date Received: 24/03/2022
 Date Tested: 06/04/2022
 Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-1 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
2216878	WS01	Not Given	1.50	Not Given	D	Brownish grey slightly gravelly CLAY	Atterberg 1 Point		44.6	98	73	36	37						
2216879	WS03	Not Given	1.30	Not Given	D	Brownish grey CLAY	Atterberg 1 Point		45.4	100	106	39	67						
2216880	WS04	Not Given	1.60	Not Given	D	Brownish grey CLAY	Atterberg 1 Point		46.2	100	100	42	58						
2216881	WS05	Not Given	1.30	Not Given	D	Brownish grey slightly sandy CLAY	Atterberg 1 Point		23.5	100	50	20	30						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Monika Siewior

Monika Siewior
 Reporting Specialist
 for and on behalf of i2 Analytical Ltd

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4041

Client: Brownfield Solutions Ltd
 Client Address: William Smith House, 173 - 183 Witton Street,
 Northwich, Cheshire,
 CW9 5LP
 Contact: Amy Thornes
 Site Address: Garman Road, Tottenham

Client Reference: M4993
 Job Number: 23-26601-1
 Date Sampled: Not Given
 Date Received: 04/04/2023
 Date Tested: 13/04/2023
 Sampled By: Client - HW

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

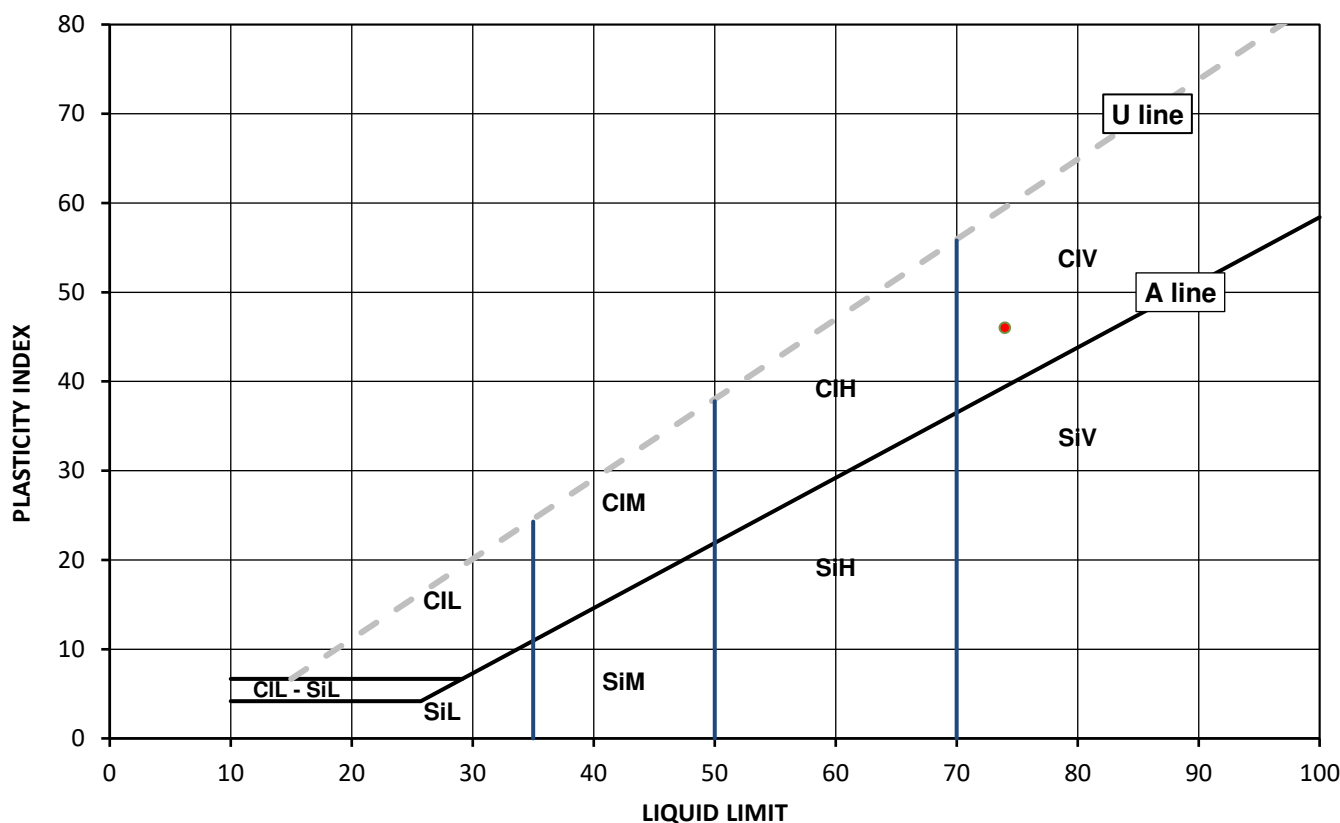
Test Results:

Laboratory Reference: 2638765
 Hole No.: BH01
 Sample Reference: Not Given
 Sample Description: Grey CLAY

Depth Top [m]: 6.00
 Depth Base [m]: Not Given
 Sample Type: D

Sample Preparation: Tested in natural condition;
 Cone Type: 80g/30deg

As Received Water Content [W] %	Corrected Liquid Limit [WL] %	Correlation Factor	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
32.7	74	1.055	28	46	100



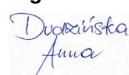
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

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

Note: Water Content by BS EN 17892-1: 2014; Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

Remarks:

Signed:



Anna Dudzinska
 PL Deputy Head of Reporting Team
 for and on behalf of i2 Analytical Ltd

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4041

Client: Brownfield Solutions Ltd
 Client Address: William Smith House, 173 - 183 Witton Street,
 Northwich, Cheshire,
 CW9 5LP
 Contact: Amy Thornes
 Site Address: Garman Road, Tottenham

Client Reference: M4993
 Job Number: 23-26601-1
 Date Sampled: Not Given
 Date Received: 04/04/2023
 Date Tested: 13/04/2023
 Sampled By: Client - HW

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

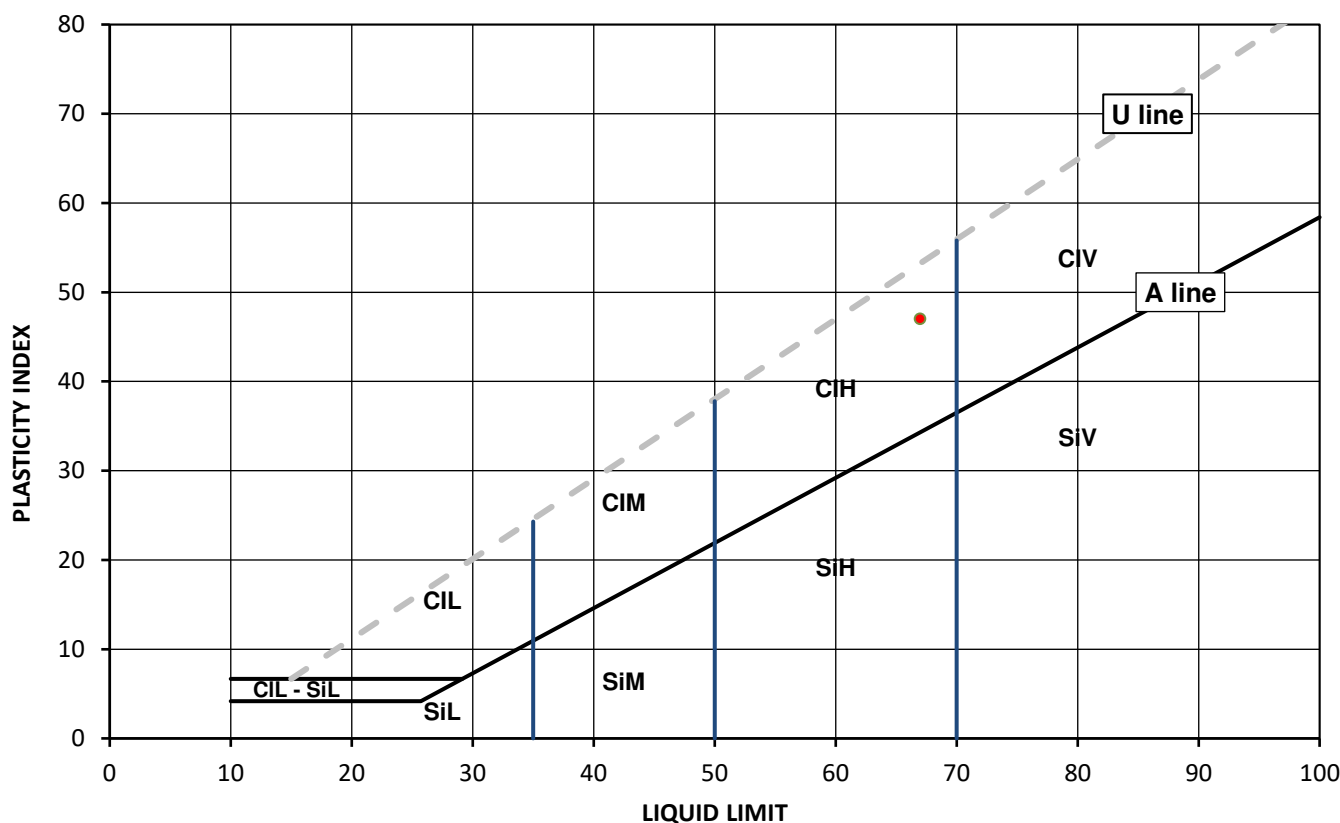
Test Results:

Laboratory Reference: 2638766
 Hole No.: BH02
 Sample Reference: Not Given
 Sample Description: Brown CLAY

Depth Top [m]: 9.00
 Depth Base [m]: Not Given
 Sample Type: D

Sample Preparation: Tested in natural condition;
 Cone Type: 80g/30deg

As Received Water Content [W] %	Corrected Liquid Limit [WL] %	Correlation Factor	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
22.8	67	1.075	20	47	100



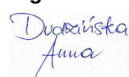
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

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

Note: Water Content by BS EN 17892-1: 2014; Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

Remarks:

Signed:



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 PL Deputy Head of Reporting Team
 for and on behalf of i2 Analytical Ltd

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4041

Client: Brownfield Solutions Ltd
 Client Address: William Smith House, 173 - 183 Witton Street,
 Northwich, Cheshire,
 CW9 5LP
 Contact: Amy Thornes
 Site Address: Garman Road, Tottenham

Client Reference: M4993
 Job Number: 23-26601-1
 Date Sampled: Not Given
 Date Received: 04/04/2023
 Date Tested: 13/04/2023
 Sampled By: Client - HW

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

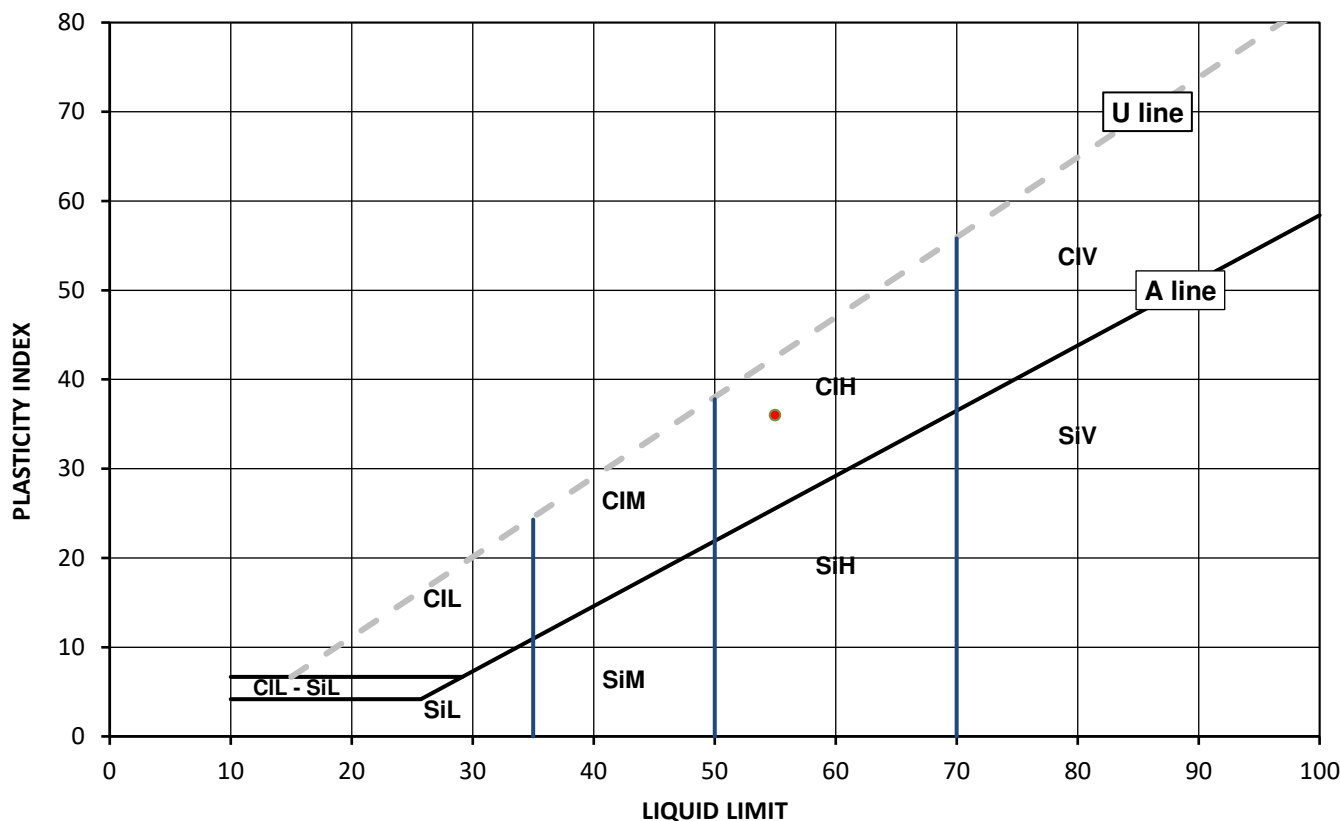
Test Results:

Laboratory Reference: 2638767
 Hole No.: BH03
 Sample Reference: Not Given
 Sample Description: Brownish grey slightly sandy CLAY

Depth Top [m]: 11.00
 Depth Base [m]: Not Given
 Sample Type: D

Sample Preparation: Tested in natural condition;
 Cone Type: 80g/30deg

As Received Water Content [W] %	Corrected Liquid Limit [WL] %	Correlation Factor	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
20.4	55	1.055	19	36	100



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

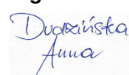
	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS EN 17892-1: 2014; Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

Remarks:

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 PL Deputy Head of Reporting Team
 for and on behalf of i2 Analytical Ltd

4041

Client: Brownfield Solutions Ltd
 Client Address: William Smith House, 173 - 183 Witton Street,
 Northwich, Cheshire,
 CW9 5LP
 Contact: Amy Thornes
 Site Address: Garman Road, Tottenham

Client Reference: M4993
 Job Number: 23-26601-1
 Date Sampled: Not Given
 Date Received: 04/04/2023
 Date Tested: 13/04/2023
 Sampled By: Client - HW

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

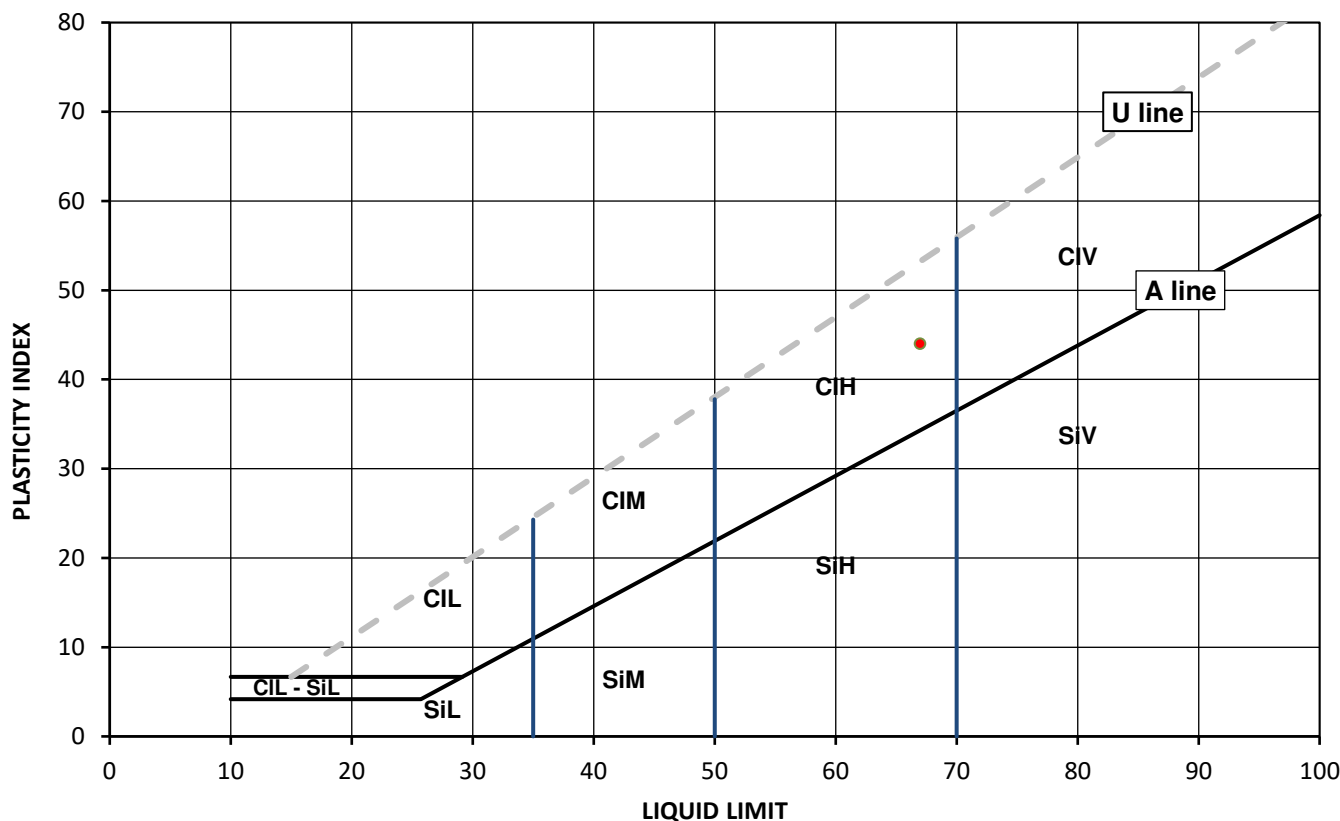
Test Results:

Laboratory Reference: 2638768
 Hole No.: BH03
 Sample Reference: Not Given
 Sample Description: Brownish grey slightly gravelly CLAY

Depth Top [m]: 16.50
 Depth Base [m]: Not Given
 Sample Type: D

Sample Preparation: Tested after >0.425mm removed by hand;
 Cone Type: 80g/30deg

As Received Water Content [W] %	Corrected Liquid Limit [WL] %	Correlation Factor	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
23.1	67	1.036	23	44	95



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

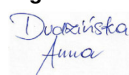
	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
		50 to 70
		exceeding 70
		append to classification for organic material (eg CIHO)

Note: Water Content by BS EN 17892-1: 2014; Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

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Signed:



Anna Dudzinska
 PL Deputy Head of Reporting Team
 for and on behalf of i2 Analytical Ltd



SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

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



Environmental Science

4041

Client: Brownfield Solutions Ltd
Client Address: William Smith House, 173 - 183 Witton Street,
Northwich, Cheshire,
CW9 5LP
Contact: Amy Thornes
Site Address: Garman Road, Tottenham

W by BS EN 17892-1: 2014; Liquid and Plastic Limit by BS EN ISO 17892-12:2018+A1:2021: Clause 5.3 (4 Point Test), Clause 5.3.14 (1 Point Test) and 5.5; Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

Client Reference: M4993
Job Number: 23-26601-1
Date Sampled: Not Given
Date Received: 04/04/2023
Date Tested: 13/04/2023
Sampled By: Client - HW

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	W	Liquid & Plastic Limit							Density		
		Reference	Depth Top	Depth Base	Type				% Passing 425um	WL*	Correlation Factor	Wp	Ip	Cone type	Sample Preparation	bulk	dry	PD
			m	m					%	%		%	%		Mg/m3	Mg/m3	Mg/m3	
2638765	BH01	Not Given	6.00	Not Given	D	Grey CLAY	Atterberg 1 Point	32.7	100	74	1.055	28	46	80g/30 deg	N			
2638766	BH02	Not Given	9.00	Not Given	D	Brown CLAY	Atterberg 1 Point	22.8	100	67	1.075	20	47	80g/30 deg	N			
2638767	BH03	Not Given	11.00	Not Given	D	Brownish grey slightly sandy CLAY	Atterberg 1 Point	20.4	100	55	1.055	19	36	80g/30 deg	N			
2638768	BH03	Not Given	16.50	Not Given	D	Brownish grey slightly gravelly CLAY	Atterberg 1 Point	23.1	95	67	1.036	23	44	80g/30 deg	R			
2638769	BH03	Not Given	18.00	Not Given	D	Brownish grey CLAY		21.7										

Note: # Non accredited; NP - Non plastic; N - Tested in natural condition, R - Tested after >0.425mm removed by hand, W - Tested after washing to remove >425mm; * - One point liquid limit corrected as per the report Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

Comments:

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Signed:

Dudzińska Anna

Anna Dudzińska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

DETERMINATION OF THE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

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

Tested in Accordance with: BS 1377-7: 1990: Clause 8

Client: Brownfield Solutions Ltd
Client Address: William Smith House, 173 - 183 Witton Street,
Northwich, Cheshire,
CW9 5LP
Contact: Amy Thornes
Site Address: Garman Road, Tottenham

Client Reference: M4993
Job Number: 23-26601-1
Date Sampled: Not Given
Date Received: 04/04/2023
Date Tested: 17/04/2023
Sampled By: Client - HW

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2638762

Hole No.: BH01

Sample Reference: Not Given

Sample Description: Brown slightly silty CLAY

Sample Preparation: Sample prepared in accordance with BS 1377-1:2016 Clause 9.1.1.

Depth Top [m]: 9.00

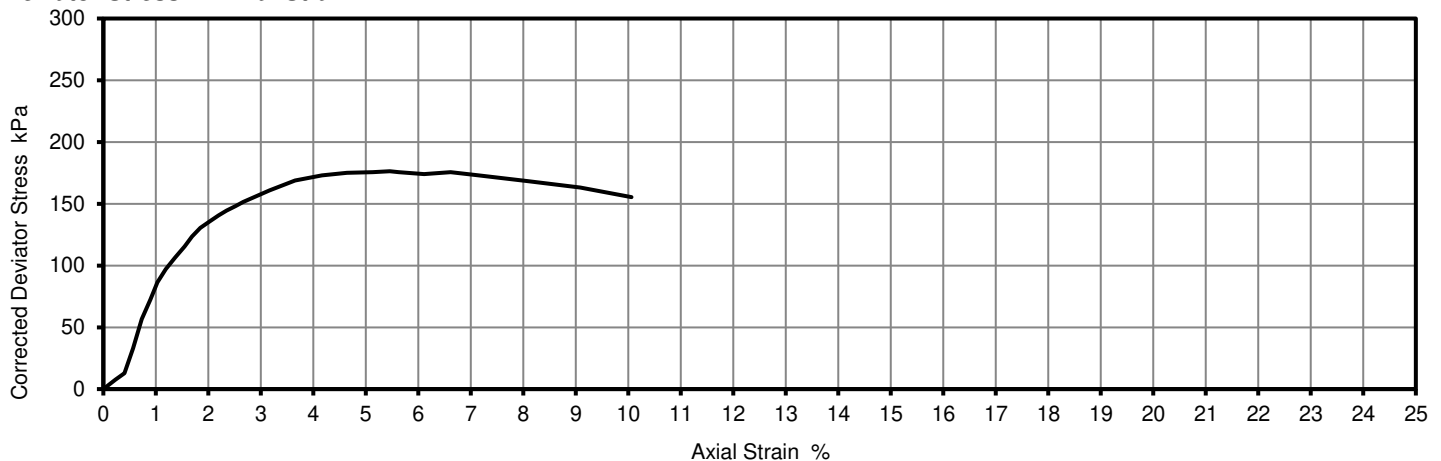
Depth Base [m]: 9.45

Sample Type: U

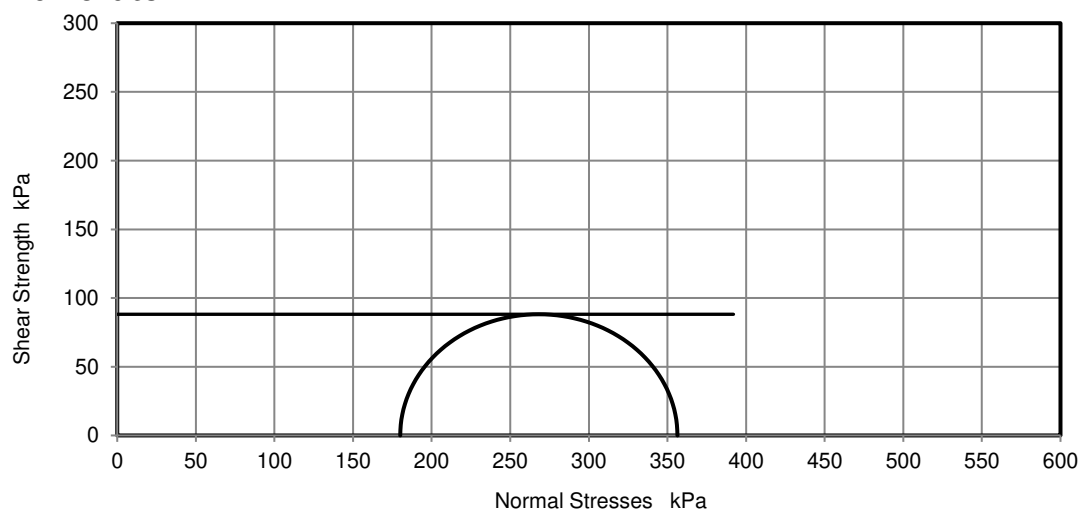
Test Number	1
Length	100.20 mm
Diameter	49.48 mm
Bulk Density	1.89 Mg/m3
Moisture Content	28 %
Dry Density	1.48 Mg/m3
Membrane Correction	0.63 kPa

Rate of Strain	2.00 %/min
Cell Pressure	180 kPa
Axial Strain at failure	5.5 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	176 kPa
Undrained Shear Strength, c_u	88 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Brittle
Latex membrane thickness	0.21 mm

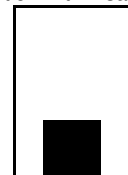
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks:

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Signed:

Anna Dudzinska

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

DETERMINATION OF THE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

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

Tested in Accordance with: BS 1377-7: 1990: Clause 8

Client: Brownfield Solutions Ltd
Client Address: William Smith House, 173 - 183 Witton Street,
Northwich, Cheshire,
CW9 5LP
Contact: Amy Thornes
Site Address: Garman Road, Tottenham

Client Reference: M4993
Job Number: 23-26601-1
Date Sampled: Not Given
Date Received: 04/04/2023
Date Tested: 18/04/2023
Sampled By: Client - HW

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

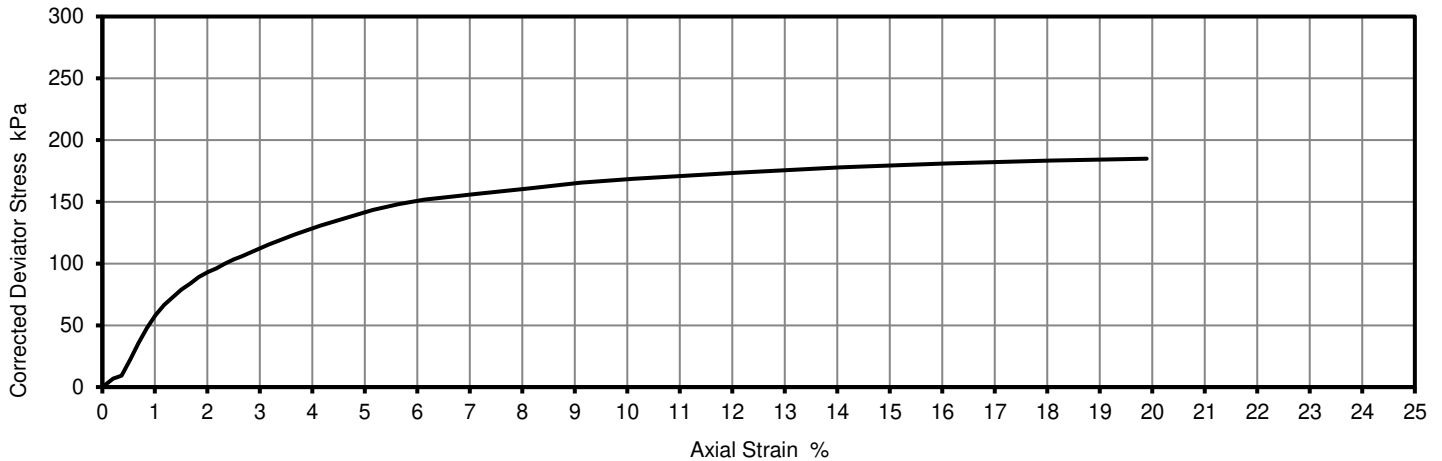
Test Results:

Laboratory Reference: 2638763
Hole No.: BH02
Sample Reference: Not Given
Sample Description: Greyish brown slightly silty CLAY
Sample Preparation: Sample prepared in accordance with BS 1377-1:2016 Clause 9.1.1.

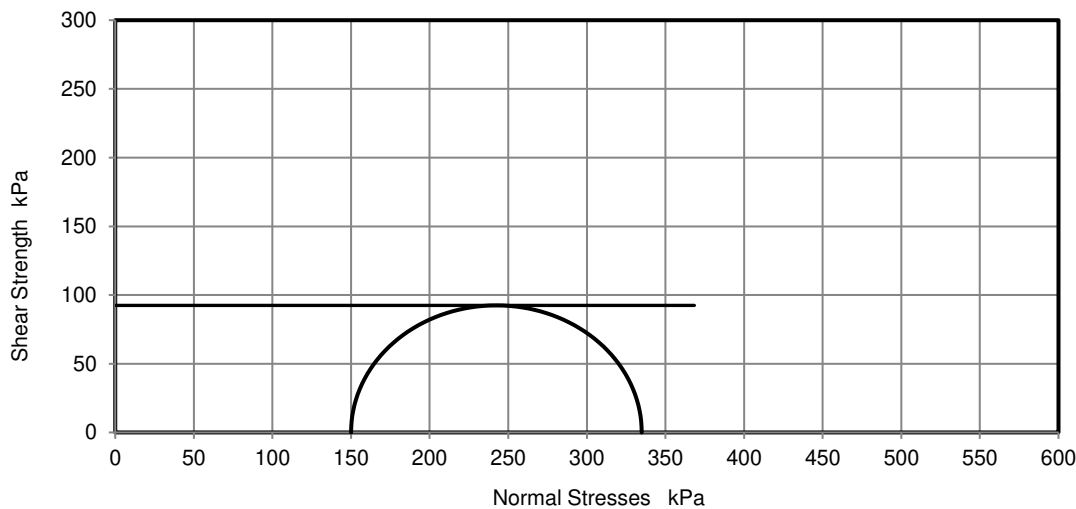
Depth Top [m]: 7.50
Depth Base [m]: 7.95
Sample Type: U

Test Number	1	Rate of Strain	2.00	%/min
Length	200.13	Cell Pressure	150	kPa
Diameter	102.10	Axial Strain at failure	19.9	%
Bulk Density	2.02	Deviator Stress, ($\sigma_1 - \sigma_3$) _f	185	kPa
Moisture Content	29	Undrained Shear Strength, c_u	92	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Dry Density	1.57	Mode of Failure	Compound	
Membrane Correction	1.01	Latex membrane thickness	0.27	mm

Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks:

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Signed:

Anna Dudzinska
Anna

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

DETERMINATION OF THE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

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

Tested in Accordance with: BS 1377-7: 1990: Clause 8

Client: Brownfield Solutions Ltd
Client Address: William Smith House, 173 - 183 Witton Street,
Northwich, Cheshire,
CW9 5LP
Contact: Amy Thornes
Site Address: Garman Road, Tottenham

Client Reference: M4993
Job Number: 23-26601-1
Date Sampled: Not Given
Date Received: 04/04/2023
Date Tested: 18/04/2023
Sampled By: Client - HW

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

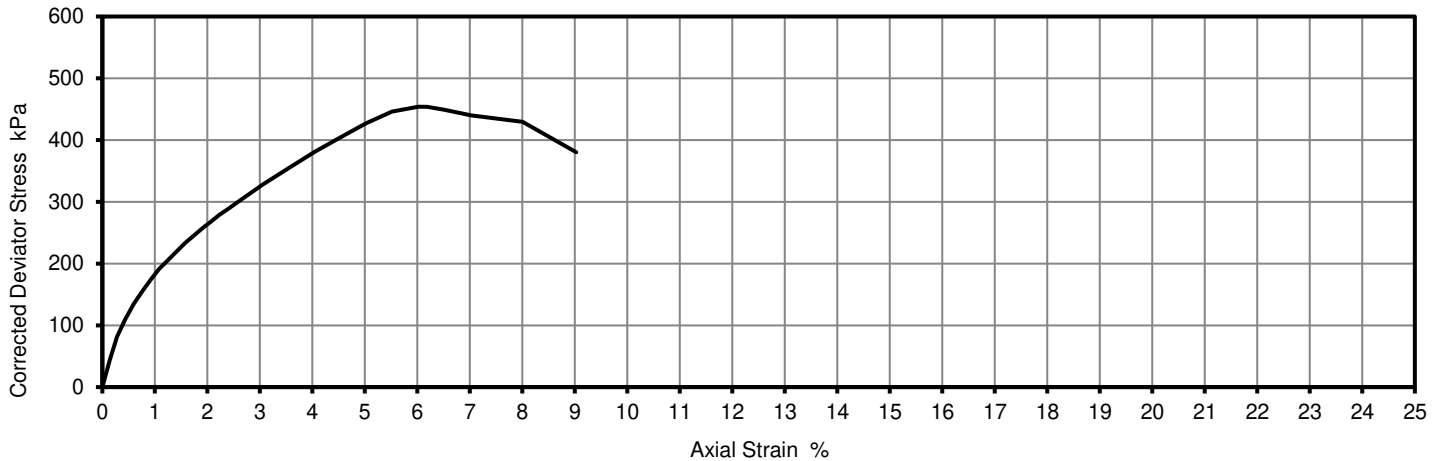
Test Results:

Laboratory Reference: 2638764
Hole No.: BH03
Sample Reference: Not Given
Sample Description: Greyish brown CLAY
Sample Preparation: Sample prepared in accordance with BS 1377-1:2016 Clause 9.1.1.

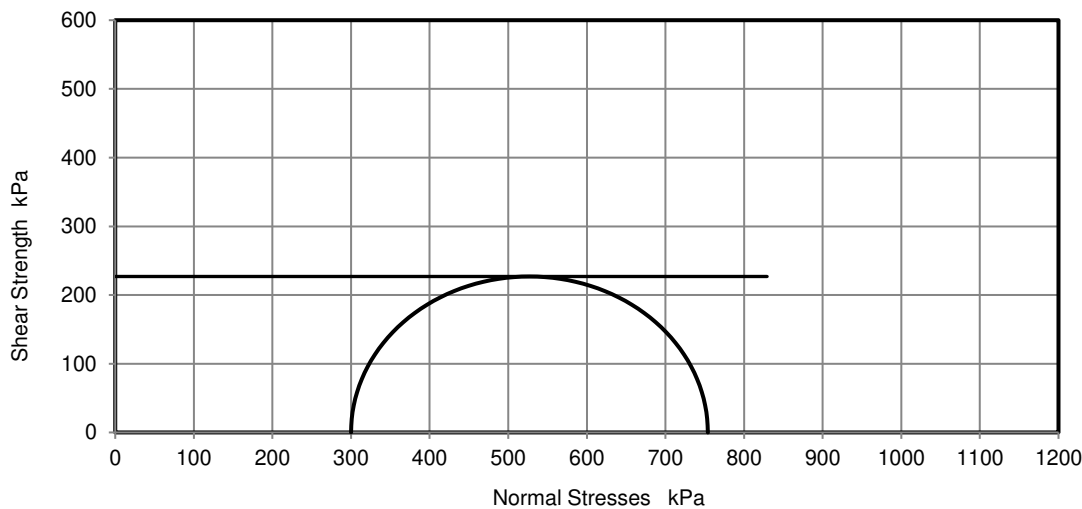
Depth Top [m]: 15.00
Depth Base [m]: 15.45
Sample Type: U

Test Number	1	Rate of Strain	2.00	%/min
Length	199.52	Cell Pressure	300	kPa
Diameter	102.95	Axial Strain at failure	6.0	%
Bulk Density	2.05	Deviator Stress, ($\sigma_1 - \sigma_3$) _f	454	kPa
Moisture Content	23	Undrained Shear Strength, c_u	227	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Dry Density	1.67	Mode of Failure	Brittle	
Membrane Correction	0.40	Latex membrane thickness	0.26	mm

Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
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Remarks:

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Signed:

Anna Dudzinska

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd



DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in Accordance with: BS 1377-5:1990: Clause 3

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



Contact: Amy Thornes
Site Address: Garman Road, Tottenham

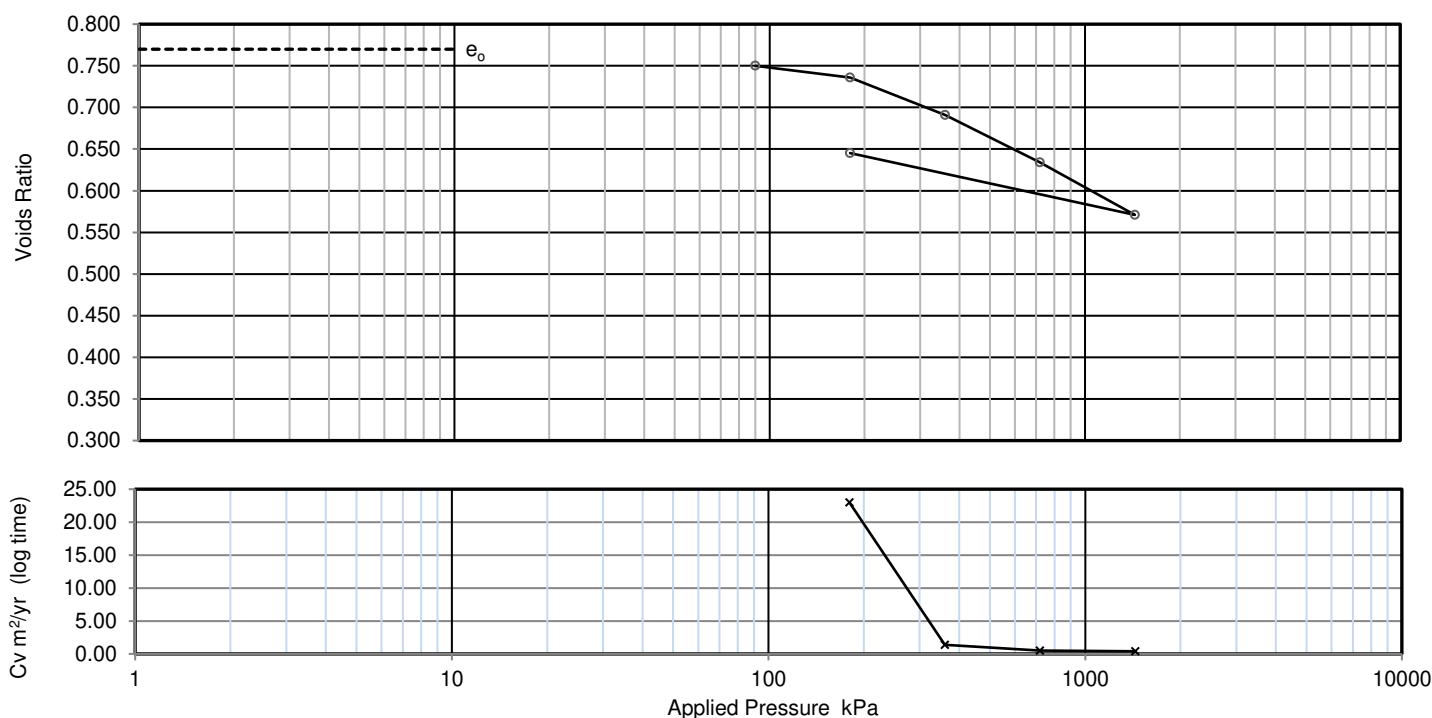
Client Reference: M4993
Job Number: 23-26601-1
Date Sampled: Not Given
Date Received: 04/04/2023
Date Tested: 16/04/2023
Sampled By: Client - HW

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2638762
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown slightly silty CLAY

Depth Top [m]: 9.00
Depth Base [m]: 9.45
Sample Type: U

[illegible]

Preparation

Carried out on top of U100

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Total test time

Vertical	
assumed	2.65 Mg/m3
N/A	%
N/A	%

Initial	Final	
50.11	-	mm
20.15	18.72	mm
28	27	%
1.92	2.05	Mg/m3
1.50	1.61	Mg/m3
0.770	0.645	
98	112	%
22.0		°C
Not measured		kPa
		%
5		days

Note: Cv corrected to 20°C

Remarks: Stage 1 - swelling

Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

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Date Reported: 25/04/2023

GF 172.16



DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in Accordance with: BS 1377-5:1990: Clause 3

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



Contact: Amy Thornes
Site Address: Garman Road, Tottenham

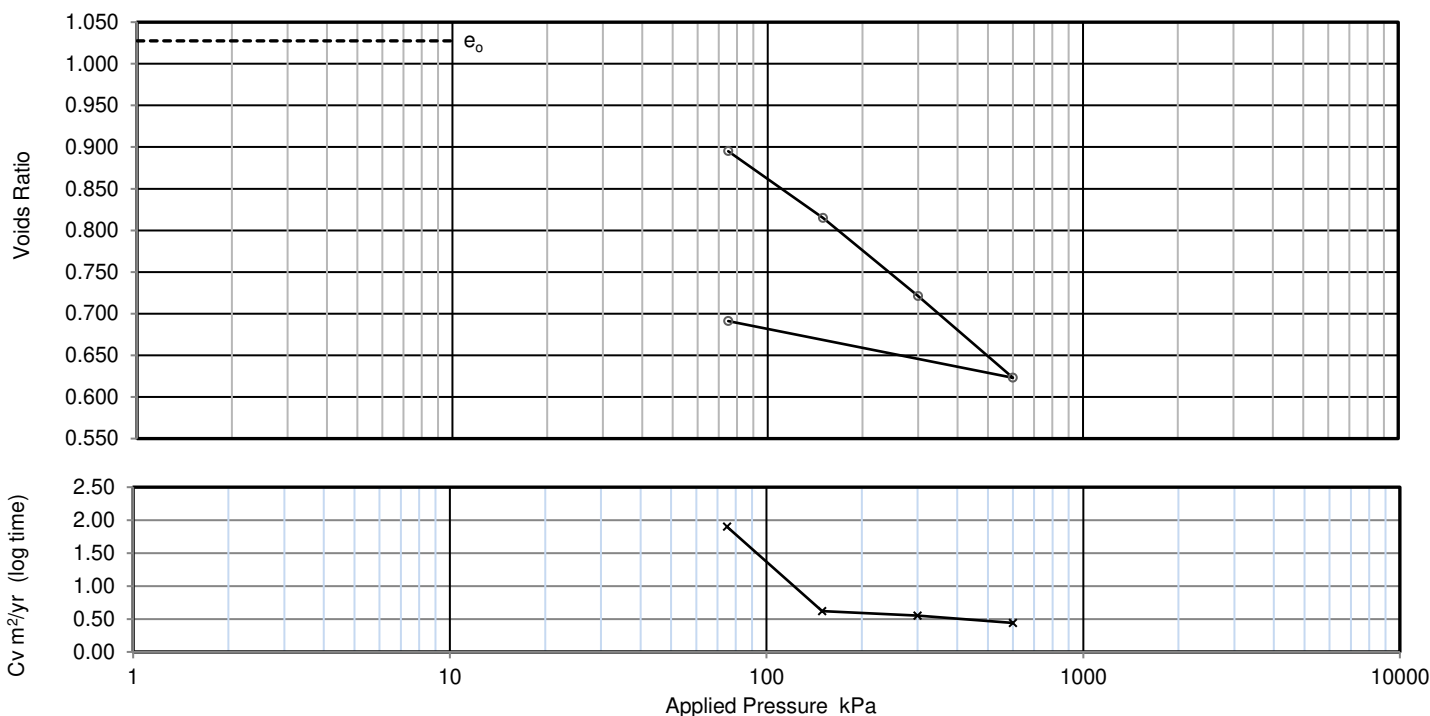
Client Reference: M4993
Job Number: 23-26601-1
Date Sampled: Not Given
Date Received: 04/04/2023
Date Tested: 18/04/2023
Sampled By: Client - HW

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2638763
Hole No.: BH02
Sample Reference: Not Given
Sample Description: Greyish brown slightly silty CLAY

Depth Top [m]: 7.50
Depth Base [m]: 7.95
Sample Type: U

[illegible]

Preparation

Carried out on top of U100

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Vertical	
assumed	2.65 Mg/m3
N/A	%
N/A	%

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Total test time

Initial	Final	
50.00	-	mm
20.09	16.75	mm
40	31	%
1.82	2.05	Mg/m ³
1.31	1.57	Mg/m ³
1.028	0.691	
102	119	%
22.0		°C
Not measured		kPa
		%
5		days

Note: Cv corrected to 20°C

Remarks:

Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

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Date Reported: 25/04/2023

GF 172.16



DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in Accordance with: BS 1377-5:1990: Clause 3

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



Contact: Amy Thornes
Site Address: Garman Road, Tottenham

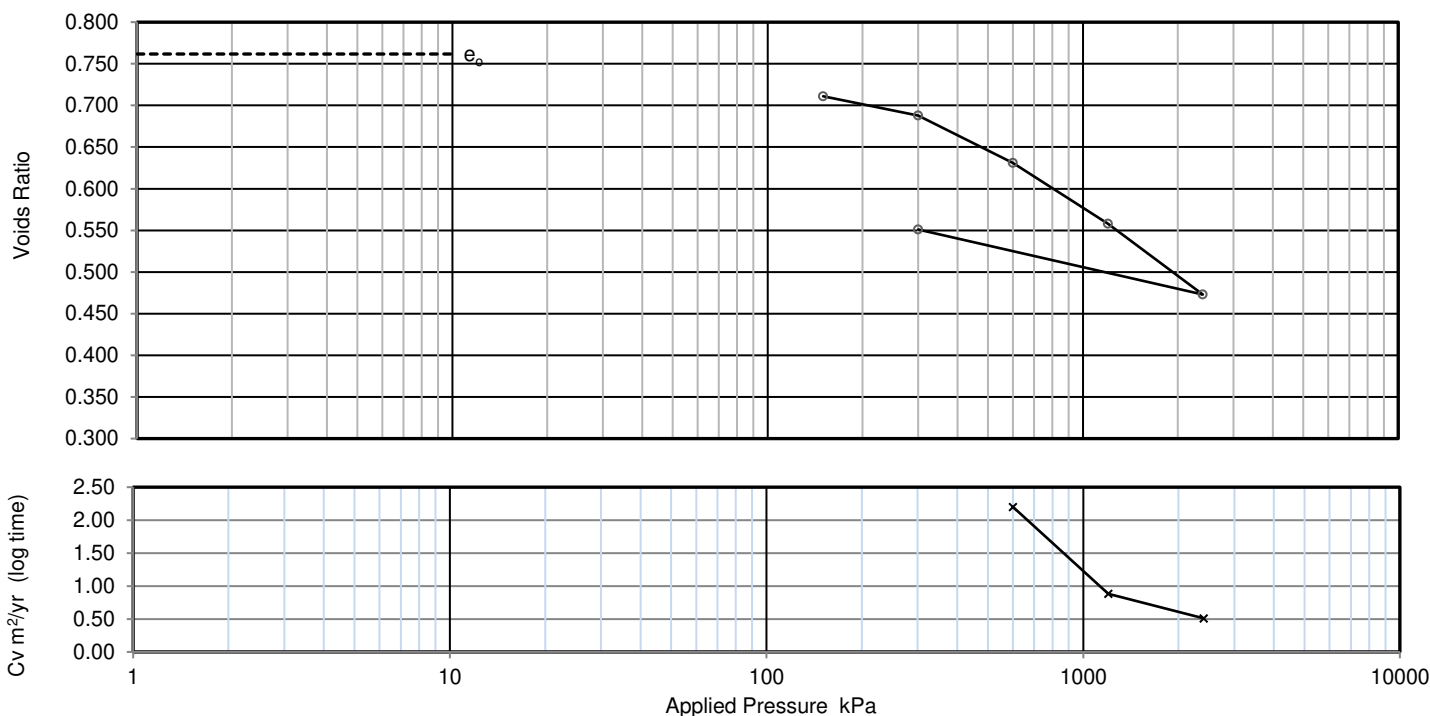
Client Reference: M4993
Job Number: 23-26601-1
Date Sampled: Not Given
Date Received: 04/04/2023
Date Tested: 18/04/2023
Sampled By: Client - HW

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2638764
Hole No.: BH03
Sample Reference: Not Given
Sample Description: Greyish brown CLAY

Depth Top [m]: 15.00
Depth Base [m]: 15.45
Sample Type: U

[illegible]

Preparation

Carried out on top of U100

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Total test time

Vertical		
assumed	2.65	Mg/m3
N/A		%
N/A		%

Initial	Final	
50.08	-	mm
20.10	17.69	mm
28	26	%
1.93	2.16	Mg/m3
1.50	1.71	Mg/m3
0.762	0.551	
99	127	%
22.0		°C
Not measured		kPa
		days
5		days

Note: Cv corrected to 20°C

Remarks: Stage 1 - swelling

Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

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Date Reported: 25/04/2023

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APPENDIX E

Monitoring Results

Ground Gas Monitoring Results



CLIENT:	Date	Operator	Analysar	Weather Observations			Temp (°C)	Pressure Trend	Min Barometric Pressure (mb)	Notes
SHURGARD UK	07/04/2022	PG	GFM	Intermittent cloud	Windy	Cool	11	Falling	981	
JOB NO.	21/04/2022	PG	GFM	Sunny	No wind	Warm	14	Falling	1009	
M4993	17/05/2022	PG	GA5000	Intermittent cloud	No wind	Warm	19	Rising	1018	
SITE:										
GARMAN ROAD TOTTENHAM										

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

Date	Time	Location	Response zone (m)	Pressures (mb)		Gas flows (l/hr)		CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases (PPM)			Depth to Water (m)	Well Base (m)	Gas Screening Value (CH ₄) (l/hr)	Gas Screening Value (CO ₂) (l/hr)	Notes
				Atmospheric Pressure	Well Pressure	Initial	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	CO	H ₂ S	TVOC (PID)					
				Summary Statistics																			
Max. values:				1009	0.2	2.1	0.1	0.1	0.1	2.0	2.0	10.0	10.0	20.9	20.5	0.0	0.0	0.0	2.4	21.6	0.000	0.010	
Min. values:				982	-0.1	0.1	0.1	0.1	0.1	2.0	2.0	0.1	0.1	6.2	6.0	0.0	0.0	0.0	1.9	2.0	0.000	0.000	
				Worst-case GSVs based on maximum recorded steady flow and maximum individual peak concentrations:																		0.000	
07/04/2022	AM	Ambient	X.00 - X.00	982				0.1		2.0		0.1		19.7		0.0	0.0	0.0					
		WS03	0.75-2.00	982.00	0.0	0.1	0.1	0.1	0.1	2.0	2.0	0.2	0.1	19.4	19.7	0.0	0.0	0.0	1.91	2.03	0.000	0.000	
		WS02	0.75-2.00	982.00	0.0	0.1	0.1	0.1	0.1	2.0	2.0	4.6	4.6	13.9	13.2	0.0	0.0	0.0	1.97	2.05	0.000	0.005	
		WS01	1.00-3.00	982.00	0.0	0.1	0.1	0.1	0.1	2.0	2.0	1.0	1.1	18.2	18.5	0.0	0.0	0.0	2.09	2.61	0.000	0.001	
		WS04	0.60-3.00	982.00	0.0	2.1	0.1	0.1	0.1	2.0	2.0	3.1	3.3	16.9	17.0	0.0	0.0	0.0	2.10	2.57	0.000	0.003	
		WS05	0.60-3.00	982.00	0.0	0.1	0.1	0.1	0.1	2.0	2.0	2.0	0.2	17.9	19.4	0.0	0.0	0.0	2.21	2.71	0.000	0.002	
07/04/2022	AM	Ambient	X.00 - X.00	981				0.1		2.0		0.1		19.7		0.0	0.0	0.0					
21/04/2022	AM	Ambient	X.00 - X.00	1009		0.1		0.1		2.0		0.1		19.4		0.0	0.0	0.0					
		WS03	0.75-2.00		0.0	0.1	0.1	0.1	0.1	2.0	2.0	0.5	0.2	19.3	19.4	0.0	0.0	0.0	NGW	2.08	0.000	0.001	
		WS02	0.75-2.00		0.0	0.1	0.1	0.1	0.1	2.0	2.0	5.8	5.8	9.7	9.7	0.0	0.0	0.0	NGW	2.05	0.000	0.006	
		WS01	1.00-3.00		0.0	0.1	0.1	0.1	0.1	2.0	2.0	2.0	0.9	17.8	18.9	0.0	0.0	0.0	2.25	2.53	0.000	0.002	
		WS04	0.60-3.00		0.0	0.1	0.1	0.1	0.1	2.0	2.0	2.2	1.8	18.0	18.4	0.0	0.0	0.0	2.26	2.60	0.000	0.002	
		WS05	0.60-3.00		0.0	0.1	0.1	0.1	0.1	2.0	2.0	1.9	1.9	18.6	18.7	0.0	0.0	0.0	2.34	2.65	0.000	0.002	
21/04/2022	AM	Ambient	X.00 - X.00	1009		0.1		0.1		2.0		0.1		19.4		0.0	0.0	0.0					
17/05/2022	AM	Ambient	X.00 - X.00	1009		0.1		0.1		2.0		0.1		20.9		NA	0.0	0.0					
		WS03	0.75-2.00		0.05	0.1	0.1	0.1	0.1	2.0	2.0	0.6	0.3	19.8	20.5	NA	0.0	0.0	NGW	2.07	0.000	0.001	
		WS02	0.75-2.00		-0.10	0.1	0.1	0.1	0.1	2.0	2.0	10.0	10.0	6.2	6.0	NA	0.0	0.0	NGW	2.04	0.000	0.010	
		WS01	1.00-3.00		0.05	0.1	0.1	0.1	0.1	2.0	2.0	2.3	2.3	17.9	17.9	NA	0.0	0.0	2.30	2.63	0.000	0.002	
		WS04	0.60-3.00		0.19	0.1	0.1	0.1	0.1	2.0	2.0	3.7	4.0	17.4	17.1	NA	0.0	0.0	2.31	21.58	0.000	0.004	
		WS05	0.60-3.00		0.09	0.1	0.1	0.1	0.1	2.0	2.0	2.5	2.6	18.5	18.3	NA	0.0	0.0	2.37	2.65	0.000	0.003	
17/05/2022	AM	Ambient	X.00 - X.00	1009		0.1		0.1		2.0		0.1		20.9		NA	0.0	0.0					

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