



**BROWNFIELD
SOLUTIONS LTD**

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

WATSON HOMES

Spurr House, Bury

Phase II Geo-Environmental Assessment Report

CM/C5102/11367 Rev B

September 2024

EXECUTIVE SUMMARY	
Location and Brief Site Description	The site is located off Pole Lane, Bury, BL9 8QL. The site comprises an single storey building which was previously a care home with associated hardstanding car park and soft landscaping areas.
Ground Conditions	Generalised ground conditions from the ground investigation comprise (top down): • Made ground encountered from ground level to 1.95m bgl with an average thickness of 0.61m. • Natural strata encountered to 5.45m bgl. • Solid geology was not encountered during the investigation. • Groundwater recorded between 1.10m and 4.50m bgl during site works. • Post site works monitoring levels ranged between 3.20m and 4.09m bgl.
Human Health - Soils Contamination	Elevated concentrations of lead and arsenic.
Controlled Waters – Surface and Groundwater Contamination	The overall risk to controlled waters is considered to be low and no further action is required.
Ground Gas	Based on the monitoring and the assessment undertaken, the site is classified as CS1. Therefore no ground gas protection is required. However, additional gas monitoring is proposed to confirm the risk for the latest proposed residential development.
Outline Remedial Strategy	Subject to regulatory approval, the following outline remedial strategy is recommended: • Cover system with 450mm thick of ‘clean’ validated topsoil/subsoil in soft landscaping areas. • Verification of the above with validation reports produced.
Waste	Made ground at the site has revealed the majority of the soils to be hazardous.
Foundations and Floor Slabs	Safe bearing capacity of 80kN/m ² should be available at a minimum depth of 0.75m bgl increasing to 90kN/m ² at 1.00m bgl and 110kN/m ² at 2.00m bgl, keeping total and differential settlement within acceptable limits. Deepening of foundations/heave protection is likely to be required to allow for the effects of trees Suspended floor slabs may be adopted. Ground bearing floor slabs may be adopted.
Concrete Classification	DS-1 AC-1s conditions prevail.
Highways Design	Made Ground CBR – 2% Superficial Strata CBR – cohesive/fine soils – <2% 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 unsuitable for this site.
Further Work	The following further works will be required to progress to the construction phase: • Post demolition supplementary ground investigation comprising: ○ Windowless sampling. ○ Installation of standpipes within the building footprint in boreholes to allow gas concentrations and groundwater levels to be monitored. ○ Chemical and geotechnical testing of soils. ○ Contamination analyses of soil. ○ Updated geotechnical assessment. • Tree survey by qualified arboriculturist. • Detailed foundation design by a structural engineer. • Design of Remedial Strategy and confirmation with the Local Authority. • Production of Materials Management Plan (MMP) under the CL:AIRE DoWCoP, if required. • Implementation of the Remedial Strategy and verification of the remedial works..

This executive summary should be read in conjunction with the full report, reference CM/C5102/11367 Rev B and not as a standalone document.

PROJECT QUALITY CONTROL DATA SHEET

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DRAWINGS		
Drawing Number	Rev	Title
B1045 02	P7	Proposed Site Plan
C5102/01	A	Site Location Plan
C5102/02	A	Site Features Plan
C5102/03	A	Exploratory Hole Location Plan

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

1.0 INTRODUCTION

1.1 Context

This report describes a Phase II Geo-Environmental Assessment carried out by Brownfield Solutions Limited (BSL) for Watson Homes on a site at Spurr House, Bury 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 11.0.

1.2 Proposed Development

The project comprises the demolition of the existing on site structure to construct two apartment blocks 3/4 storey and 4 storeys, respectively. The apartment blocks will be developed with associated areas of soft landscaping and car parking as shown on the proposed site plan, drawing ref. B1045 02P7 provided to BSL by the client.

1.3 Previous Reports

This report should be read in conjunction with BSL Phase I Geo-Environmental Assessment Report, Ref CM/C5102/11348 Rev A issued in September 2024.

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.

1.5 Limitations

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

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

BSL have used reasonable skill, care and diligence for the investigation of the site and the production of this report. There may be other conditions prevailing on the site which are outside the scope of work and

have not been highlighted by this assessment and therefore have not been considered by this report. Responsibility cannot be accepted for such site conditions not revealed by the assessment.

This report has been prepared for the sole use and reliance of the Client, Watson Homes. 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 Pole Lane, Bury, BL9 8QL, centred on National Grid Reference 382101 , 406993 as shown on the Site Location Plan, Drawing No. C5102/01A.

Site Description

The main site features and potential issues identified are detailed below and are shown on the Site Features Plan, Drawing No. C5012/02A.

Feature	Description
Site Area	Approximately 0.47 hectares.
Site Access	Access to the site is gained off Pole Lane to the west.
Current Land Use and Site Features	The site comprises an single storey building which was previously a care home with associated hardstanding car park and soft landscaping areas.
Potential Sources of Gross Contamination	No significant sources of contamination were identified onsite.
Vegetation	There are sporadic mature/semi-mature trees across the perimeter of the site.
Topography	The site is generally flat however there is gentle gradient on the grassed area within the north-west of the site.
Site Boundaries	The northern boundary is fencing associated with the residential homes and mature and semi mature trees and hedges. The eastern and southern boundary is wooden fencing . Whilst the western boundary is open access
Surrounding Area	The site is set within a residential area with a cricket ground to the south-east of the site.

3.0 SUMMARY OF PREVIOUS REPORTS

3.1 BSL Phase I Geo-Environmental Assessment Report

A summary of the relevant points from the Desk Study completed by BSL (reference CM/C5012/11348 Rev A, issued September 2024) is presented below:

-
- The map evidence indicates that the site has remained as open fields until 1981 with the development of the care home.
 - Unspecified ponds were in close proximity of the site.
 - Geology comprises Hummocky Glacial Deposits (Secondary Undifferentiated Aquifer) over Pennine Middle Coal Measures Formation (Secondary A Aquifer).
 - No faults are within an influencing distance of the site.
 - There are no records of shallow mines in and around the site.
 - The nearest watercourse is the River Roch circa 1488m to the west of the site.
 - The site is located in a Zone 1 floodplain.
 - The risk to human health is considered to be low.
 - The risk from ground gas is considered to be moderate to low and the site is not located in an area requiring radon protection measures.
 - The risk to controlled waters is low.
 - The site is located in the UXO low risk zone.
 - Recommendations were for an appropriate Phase II ground investigation to be carried out to confirm the identified risks and obtain information for preliminary design.
-

4.0 METHOD OF INVESTIGATION

4.1 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 Geo-Environmental Assessment.

The aim of the fieldwork was to:

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

4.2 Site Works

The following site works have been undertaken as part of the intrusive investigation between the dates of 15th and 24th August 2022:

Method	No.	Range Depths (m bgl)	Purpose
Foundation Pits	10	0.28-2.40	Establish the type, geometry and bearing strata of existing foundations
Hand excavated pits	3	0.60-1.20	Establish general ground conditions
Lightweight Deflectometer (LWD)	6	0.45-1.00	Obtain indicative CBR values.
Window sample boreholes – Tracked WS rig	4	5.45	Establish general ground conditions on site. Allow Standard Penetration Tests (SPTs) to be carried out and obtain samples for contamination and geotechnical and testing. Installation of ground gas and water monitoring wells.

The approximate locations of the exploratory holes are indicated on the Exploratory Hole Location Plan, Drawing No C5012/03A. 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 and excavation 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 and geotechnical 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)	12
Disturbed (D)	36

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.

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

Determinand	No of Samples
BSL Default Soil Suite: Arsenic, Cadmium, Chromium (III), Chromium (VI), Copper, Nickel, Mercury, Lead, Zinc, Selenium, speciated polycyclic hydrocarbons (PAH 16), water soluble sulphate (2:1 Extract), soil organic matter (SOM) and pH.	6
Petroleum Hydrocarbons (TPH CWG) inc BTEX and MTBE.	3
Total phenol	6
Free cyanide	6

The Chemical Laboratory Testing Results are presented in Appendix C.

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

The following tests were scheduled for geotechnical purposes:

Description	No of Samples
Natural Water Content.	4
Plasticity Index Analysis.	4
pH Value	4
Water Soluble Sulphate Contents.	4
SD1 BRE Full Suite.	2

The Geotechnical Laboratory Testing Results are presented in Appendix D.

4.5 Monitoring

Ground gas and ground water monitoring standpipes were installed in 3 boreholes and subsequently 4 monitoring visits were undertaken, in line with the recommendations of CIRIA C665. All gas monitoring was undertaken using GFM436 infrared gas meter with integral electronic flow analyser.

Flow measurements on each standpipe (l/hr) were taken. Measurements of the percentage volume in air (%v/v) of oxygen (O₂), carbon dioxide (CO₂) and methane (CH₄) were recorded in addition to the

percentage Lower Explosive Limit (%LEL) of methane (Note: 100% LEL equates to 5% by volume), the atmospheric pressure (mb) and average temperature during the visit (°C).

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

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

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

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

5.0 GROUND CONDITIONS

5.1 Summary

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

Stratum	Range Depths - Top (m bgl)	Range Depths - Base (m bgl)	Range Thickness' (m)	Brief Description
Made Ground	0.00	0.05-0.32	0.05-0.32	Tarmacadam/ Paving slab.
	0.10-0.30	0.80-1.20	0.30-1.05	Sandy gravel / gravelly clay
Made Ground Topsoil	0.00	0.10-0.40	0.10-0.40	Slightly gravelly clayey sand.
Natural Topsoil	0.05	0.21-0.26	0.16-0.21	Slightly gravelly clayey SAND.
Natural Superficial Strata	0.21-1.00	5.45	4.45-5.24	Slightly gravelly CLAY.

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

5.2 Made Ground

Made Ground- Topsoil

Made ground topsoil was encountered across the site from ground level to between 0.10m and 0.40m bgl, generally comprising dark brown slightly gravelly slightly clayey sand with rootlets and anthropogenic inclusions of gravel sized brick and concrete alongside plastic fragments.

Made Ground – General

Hardstanding surfacing of tarmacadam was present towards the entrance to the building west of site facing the north-east and was 0.35m thick.

The composition of the made ground was fairly consistent across the site comprising gravelly clay to an average depth of 0.61m bgl. The gravel consisted of brick, concrete and sandstone. Locally deep made ground was encountered within CBR01 to 1.20m bgl, CBR03 to 0.80m bgl, and within FP05 to 1.95m bgl.

Existing Foundations

Ten inspection pits have been excavated: existing strip foundations were observed to comprise of concrete between 0.07 and 0.18m thick at depths of between 0.24 and 2.40m bgl.

For full details on existing foundations see Foundation Drawings ref. C5102/04.

5.3 Natural Topsoil

Topsoil was encountered across the site from ground level to between 0.30m and 0.50m bgl, generally comprising dark greyish brown slightly gravelly slightly clayey sand with occasional fine rootlets.

For the purpose of this assessment, topsoil is defined as the upper darker and more fertile layer of the soil profile which is a product of natural chemical, physical, biological and environmental processes. This does not imply compliance with BS 3882:2015.

5.4 Natural Superficial Strata

The natural strata underlying the site was generally firm to stiff clay with varying amounts of silt, sand and gravel as minor constituents. This is interpreted to represent Hummocky Glacial Deposits.

Medium dense sand and sand and gravel were encountered at the following depths and locations within the firm to stiff clay:

Location	Depth (m)	Strata
WS03	2.30-3.00	Medium dense SAND.
	4.00-5.45	
WS04	1.00-2.50	Medium dense SAND.
	2.50-4.50	

5.5 Solid Geology

The solid geology of the Pennine Middle Coal Measures Formation was not encountered in this investigation.

5.6 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)
FP06	1.28	-
FP07	1.10	-
WS01	1.30	2.98-3.29
WS02	4.50	3.70-4.09
WS03	1.20	2.16-2.60
WS04	2.10	-

5.7 Observations

Contamination

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

Stability of Excavations/Boreholes

The sides of the hand excavated pits were generally stable however collapsing of the made ground was observed in FP05. The stiff nature of the clay across the site proved difficult to excavate.

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

6.0 TEST RESULTS

6.1 Geotechnical Laboratory Testing

Plasticity Index Analysis

Plasticity index results ranged between 14% and 16% indicating the cohesive soils to be of low plasticity. Associated water contents ranged between 13.7% and 20.8%.

After modification of particle size in accordance with NHBC Chapter 4.2 the modified plasticity indices are in the range 13.44% to 15.52% indicating the cohesive soils to be of low volume change potential.

6.2 Aggressive Ground Conditions – Geotechnical Chemical Testing

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

6.3 In Situ Geotechnical Testing

In Situ Hand Shear Vane Tests

Two hand shear vane tests were carried out on suitable cohesive soils recovered from the trial pits. Each shear vane result recorded represents the mean value of three tests undertaken at the specified depth.

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

In Situ Standard Penetration Tests

Standard Penetration Tests (SPTs) were carried out within the window sample boreholes at regular 1.0m intervals. 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.

In Situ CBR Testing

The in situ CBR testing results are summarised in the table below:

Method	Location	Depth	Stratum Type	CBR (%)	Modulus Subgrade Reaction K^{762} (kN/m ² /mm)
Lightweight Deflectometer (LWD)	CBR 1	0.15	Made Ground	14.8	69.00
		0.80		3.0	27.24
	CBR 2	0.45	Made Ground	3.8	31.68
		0.50	Made Ground	0.2	6.45
	CBR 3	0.80	Natural	0.3	7.16
		1.00		0.4	8.80
	CBR 4	0.50	Made Ground	1.7	19.48
	CBR 5	0.50	Made Ground	0.5	9.50
	CBR 6	0.50	Made Ground	13.7	65.82

The full test results are presented in Appendix D.

6.4 Geo-Environmental Testing

Chemical Laboratory Testing

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

Ground Gas Monitoring

Ground gas monitoring installations have been monitored on 4 occasions out of 4 visits scheduled. The results are presented in Appendix E and are summarised and assessed within Section 8.0 of this report.

7.0 GEOTECHNICAL ASSESSMENT

7.1 Ground Model Summary

The site currently comprises a single storey building which was previously a care home with associated hardstanding car park and soft landscaping areas

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

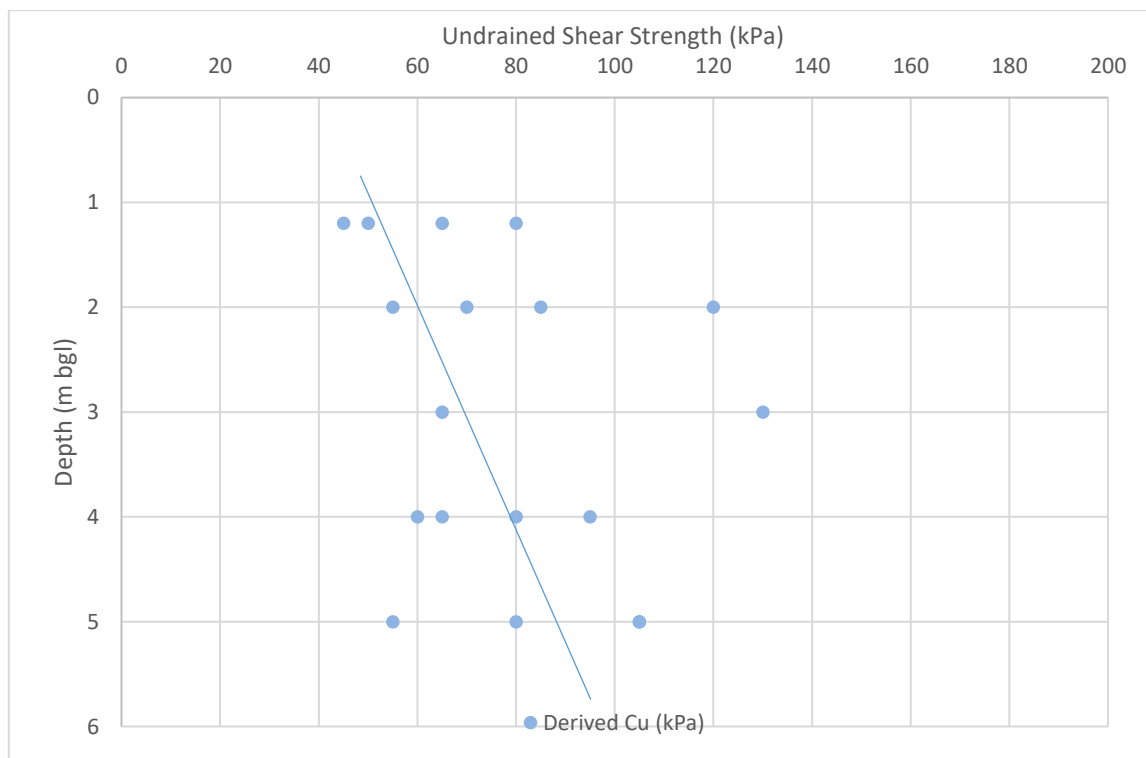
- Made ground generally comprising gravelly clay from ground level to 1.95m bgl with an average thickness of 0.61m.
- Natural superficial deposits comprising slightly gravelly clay proven to depths of 5.45m bgl.
- Solid geology was not encountered during the investigation.
- Groundwater levels ranging between 1.10m and 4.50m bgl during site works.
- Post site works monitoring levels ranging between 3.20m and 4.09m bgl.

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 f1 and f2 values respectively, based on the correlation of Stroud (1975) and the 'average' plasticity.

A depth (m bgl) vs derived shear strength (C_u) graph is provided below to provide a profile of the cohesive soils underlying the site.



The above graph shows a general increase in soils strengths 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 0.75m bgl is interpreted to be 45kN/m^2 , increasing to 50kN/m^2 at 1.00m bgl and to 60kN/m^2 at 2.00m bgl.

7.3 Foundations

The development will comprise comprises the demolition of the existing on site structure to construct two apartment blocks 3 storey and 4 storey respectively . At this stage, the below geotechnical section reflects the former proposed development and will be updated / reassessed following additional site investigation. The proposed single storey extensions are 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.

Shallow Foundations – Strip

The most suitable foundations for the proposed commercial development are considered to be strip foundations at a minimum depth of 0.75m bgl based on the low volume change potential clays and deepened near trees and hedges in accordance with NHBC Chapter 4.2.

At 0.75m bgl, an allowable bearing capacity not exceeding 85kN/m^2 may be assumed for a 0.6m wide strip. Increasing to 90kN/m^2 and 115kN/m^2 at 2.00m bgl. This adopts a factor of safety of 3 which should limit settlements to within acceptable limits.

Trees are noted within and close to the area of the site proposed for development. Depending on their size, type and maturity, the required depth of founding based on the recommendations of BRE 298 may exceed 2.5m. Should this prove to be the case, then piled foundations should be considered as a potentially more economical solution, unless it can be proven that the soils are not desiccated.

Note where foundations require deepening to greater than 2.5m below ground level, they must be designed by an engineer, as specified in NHBC Technical Requirement R5.

General Advice for Shallow Foundations

The bearing stratum should be inspected for 'soft spots' within the natural clay strata, resulting for instance from localised groundwater perched within the overlying fill materials. If soft soils are encountered, then foundations will need to be deepened to found on suitable strata. The stratum should also be inspected for "hard spots" which may require removal.

If the ground conditions encountered during the construction phase differ significantly to the conditions encountered during construction, work should cease and BSL contacted for further advice.

During the construction phase supervision should be on a continuous basis to check the design assumptions are correct and construction conforms to design. Supervision should include inspections, Control Ground Investigations and monitoring.

7.4 Building Near Trees

The clay soils on site are of low volume change potential. Where foundation excavations (or piles if adopted) encounter cohesive strata in the vicinity of existing, proposed or recently removed trees,

foundations should be adjusted in full accordance with BRE 298. All foundations should be deepened below roots of greater than 5mm diameter during excavations for footings.

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

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

7.5 Floor Slabs

A suspended floor slab should be adopted at the site. Given the presence of cohesive (shrinkable) strata, the required void size for beneath floor slabs on this site is 200mm based on the low volume change potential clays.

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

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

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.

Incorporation of geogrid reinforcement at formation level, before granular material is placed and compacted, will likely minimise required excavation depths and help provide a suitable foundation for the ground bearing slab.

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. To allow construction, all services will need to be disconnected and any suspected dead services are confirmed as dead by testing.

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

To protect against the effects of heave, new drainage should be designed to take account of potential ground movement, including where pipes and services which pass through substructure walls or foundations. The volume change potential on this site is low and the potential ground movements that need to be considered for design are 50mm.

Recorded post site works groundwater levels ranged between 2.60 and 4.09m bgl and therefore are unlikely to be encountered within likely excavation depths. Based on the exploratory holes logs and monitoring, it is considered that methods such as sump pumping are likely to be sufficient to deal with anticipated flows. Further guidance is provided in CIRIA C750 "Groundwater Control: Design and Practice". It should be noted that groundwater levels will vary seasonally and the timing of construction may influence requirements.

7.7 Concrete Classification

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

For the purposes of this assessment, the groundwater has been classified as static given the site is underlain by low permeability deposits.

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 accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005.

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

7.8 Highways

Based on the test results CBR values of <2% for natural clays 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 should be carried out in accordance with DMRB IAN 73/06 Rev 1 Chapter 5 and may include proof rolling, excavation and re-engineering / replacement of weaker soils, the inclusion of a geogrid or use of stabilisation techniques such as the addition of hydraulic binders (e.g. cement/lime).

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

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

7.9 Sustainable Drainage Systems (SuDS)

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

8.0 GEO-ENVIRONMENTAL RISK ASSESSMENT

8.1 Introduction

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

The following elevated metals were detected:

Exploratory Hole	Depth (m)	Metal	Concentration (mg/kg)	Adopted Screening Value (mg/kg)
HP02	0.10-0.30	Arsenic	43	40
HP02	0.10-0.30	Lead	2300	310
WS03	0.05-0.26		320	
WS04	0.10-0.26		1300	
HP03	0.10-0.40		11000	

Asbestos

No asbestos fibres have been detected in any of the six samples screened.

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

Poly Aromatic Hydrocarbons (PAHs)

BSL consider the main risk drivers for PAHs to be benzo(a)pyrene (B(a)P) and naphthalene. This is due to B(a)P being one of the most toxic of the PAHs, and naphthalene the most volatile and soluble. Category 4 Screening Levels (C4SLs) indicate B(a)P as a surrogate marker for carcinogenic PAHs, if it falls within appropriate limits, since the risk from other non-carcinogenic PAHs are considered negligible. Given the difference in chemical properties between the two, naphthalene will be treated separately using the LQM S4ULs.

PAHs and B(a)P as a Surrogate Marker

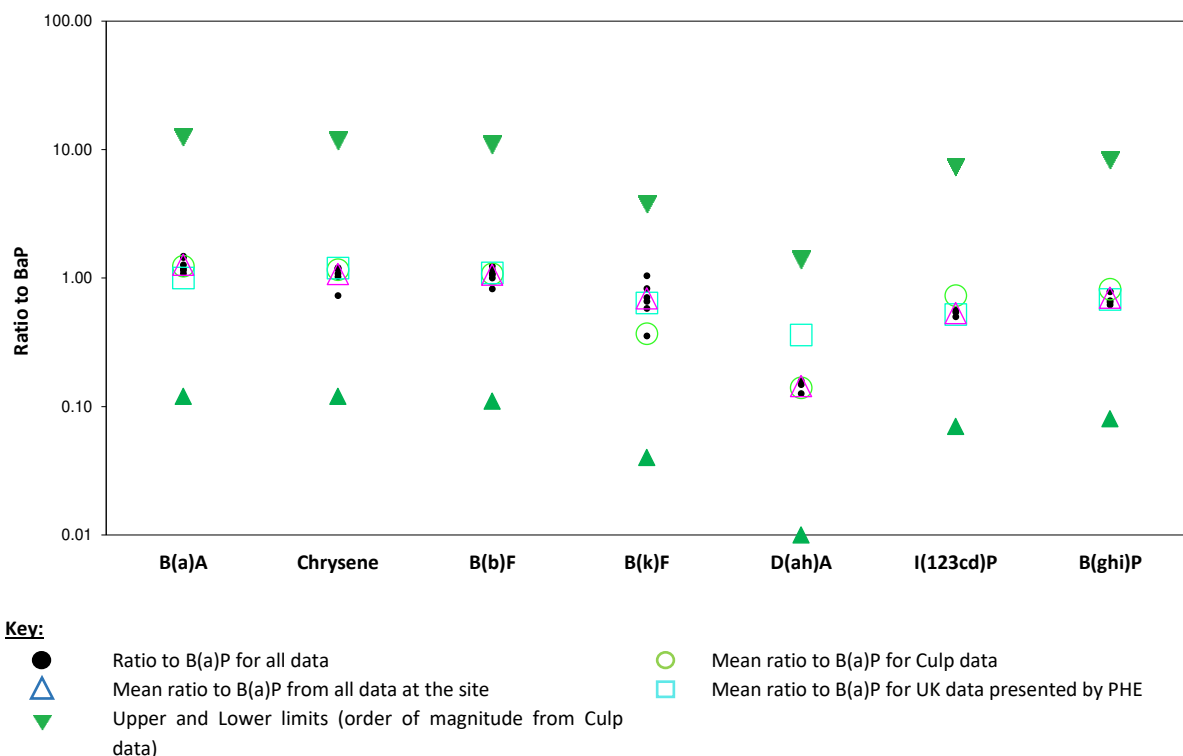
In line with CL:AIRE and Public Health England (PHE) guidance, benzo(a)pyrene is considered to be one of the most potent PAHs, and it would be appropriate to assume the cancer risk in a mixture is proportional to the concentration of a surrogate marker PAH (benzo(a)pyrene) in the mixture. The ratio of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

A more recent study by Bull et al (2013) which analysed PAH concentrations in soil samples from 274 sites, showed that the levels of PAH relative to B(a)P showed little variability and were similar to that recorded

for the coal tar mix used in the Culp et al study. Given this, it was concluded that benzo(a)pyrene is a suitable surrogate marker to represent mixtures of PAH in soil.

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

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



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

Based on the above, elevated PAHs were not recorded within any of the samples at the site.

8.3 Summary – Human Health Risk Assessment

Based on the testing and assessment undertaken it would appear that there is pervasive contamination within the made ground in the form of metals (arsenic and lead).

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

8.4 Waters and Leachate Test Results – Controlled Waters

No groundwater and surface water monitoring was undertaken at the site.

8.5 Permanent Ground Gas and Vapours Results

Four ground gas monitoring visits have been carried out between 2nd September and 28th October 2022. Results are summarised in the table below:

	CH ₄ (%)		CO ₂ (%)		O ₂ (%)		CO (ppm)		H ₂ S (ppm)		Steady Flow (l/hr)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Peak	0.1	0.2	0.1	7.8	3.0	20.6	0.0	0.0	0.0	0.0	-0.6	47.3
Steady	0.1	0.1	0.2	3.9	11.5	20.0					0.1	0.1

Notes: CH₄ = Methane; CO₂ = Carbon dioxide; O₂ = Oxygen; CO = Carbon Monoxide; H₂S = Hydrogen Sulphide; ppm = Parts Per Million.

The highest methane concentrations recorded was 0.2% in WS02 on the first visit, whilst the highest carbon dioxide concentrations were recorded in WS01 (7.8% v/v) on the final visit. The maximum flow of 47.3l/hr was recorded.

A maximum positive flow of 47.3l/hr was recorded in WS01 on the fourth visit, the site engineer did not report any noises associated with air expelled when the valve was opened and the flow rate quickly returned to the associated steady state flow of <0.1l/hr. The monitoring visit was undertaken during similar conditions to previous visits, although during a period of rising pressure trend rather than falling. There has been no justifiable rationale for the high flow rate recorded such as a significantly increased groundwater level or a fall in pressure. Based on the above, the flow rate of 47.3l/hr is considered to be anomalous and has not been included within the gas risk assessment below.

The atmospheric pressure was recorded between 996mb and 1013mb over the monitoring period, of which the visit were conducted over falling and raising pressure trends.

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'.

Derivation of a Gas Screening Values (GSV) has been undertaken based on the guidance with BS8485 using the following equation: (max gas concentration / 100) x maximum steady flow.

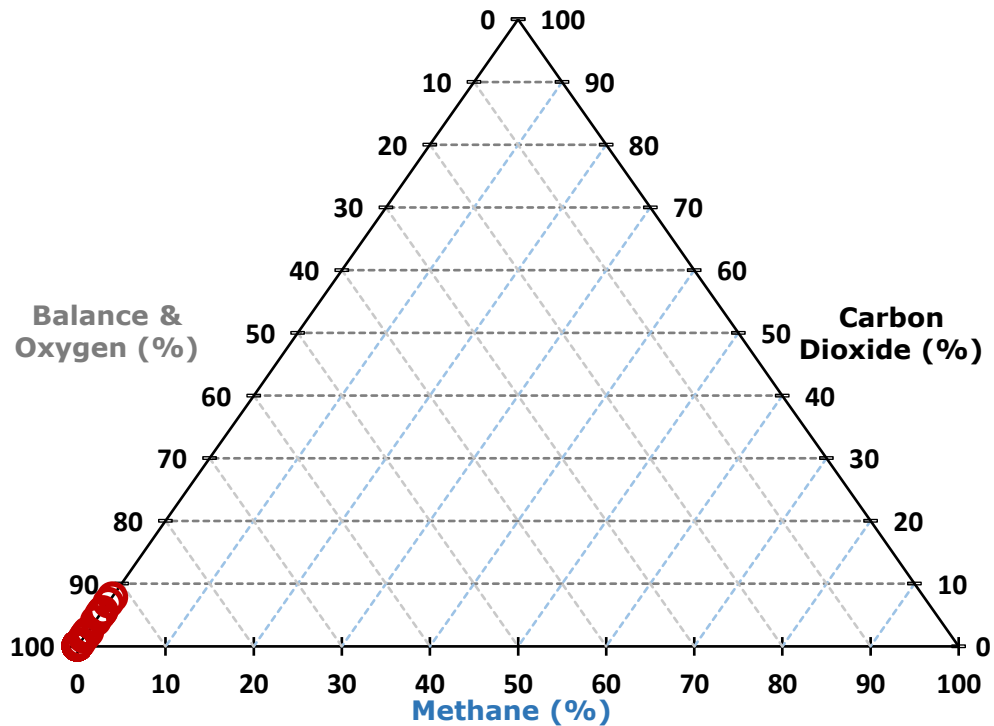
A maximum positive steady state flow of 0.1l/hr has been used to derive the GSVs. The GSV's for the site are presented below.

Gas	GSV (l/h)	Classification	Typical Threshold Concentration Exceeded
Methane	0.0001	CS-1	No
Carbon Dioxide	0.0078	CS-2	Yes

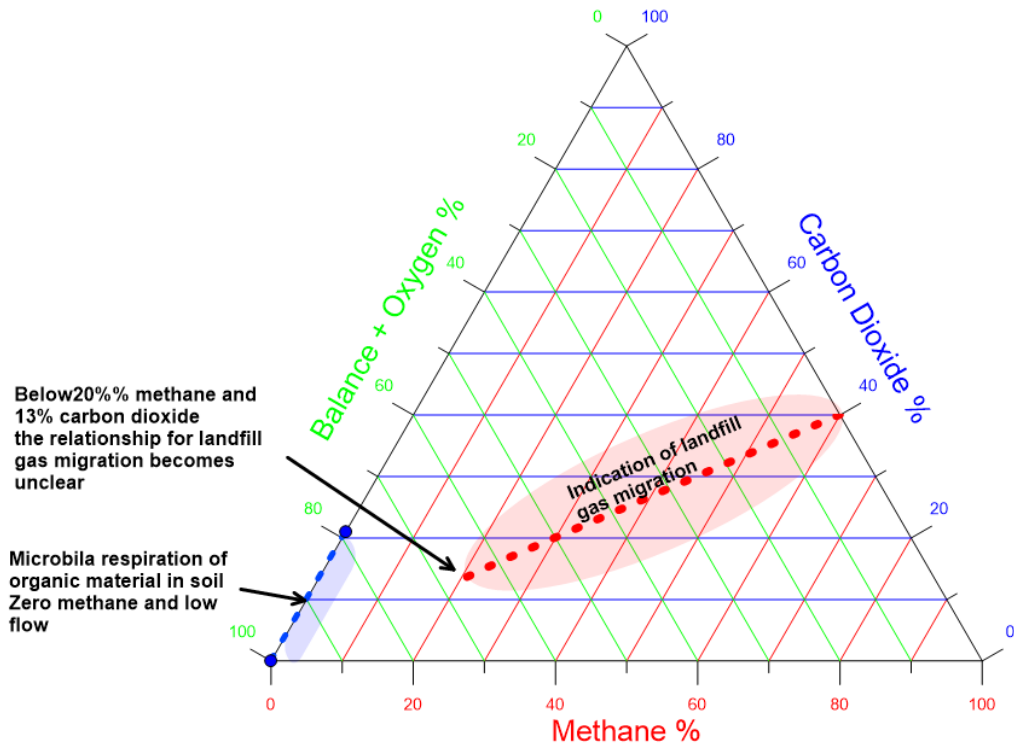
The GSV for methane place the site into Characteristic Situation 1 (CS1). However, due to concentrations of carbon dioxide greater than 5% v/v being recorded at the site then the site will be classified as Characteristic Situation 2 (CS2).

Guidance states that where results plot in the zone typical for microbial respiration there is no need to increase the characteristic situation. In order to increase confidence in this assessment and adopting a lines of evidence approach, reference has been made to the recent 2018 paper by Wilson et al (Ambisense and EPG Ltd) "Using ternary plots for interpretation of ground gas monitoring results". The data has been

presented on the ternary plot displayed below, which aims to determine the likely source of the ground gas.



The dataset falls within the zone attributed to microbial respiration of organic material in soils, and the hypothesis is supported by the low gas flow rates and very low methane concentrations which characterise the gas monitoring data as shown below (extract from Wilson et al 2018).



The rates of gas generation via microbial respiration are typically very low and subsequently high flow rates would not be expected from this source.

Based on this rationale, in this instance upgrading to Characteristic Situation 2 for carbon dioxide is not considered to be justified, therefore the site is classified as Characteristic Situation 1 and no gas protection measures are required. However, as the proposed development has now been altered, additional gas monitoring is recommended and the above assessment should be re-assessed following completion of this.

8.7 Potable Water Supply

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

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

8.8 Qualitative Risk Assessment

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

Human Health						
Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
On site Made Ground Metals.	Root uptake, ingestion, direct contact, inhalation of dusts	End-users	Likely	Medium	Moderate	Elevated arsenic and lead were identified within the made ground. A risk is considered to exist to the end-user through areas of proposed soft landscaping and will require further consideration.
On site Made Ground Metals and organic contamination	Migration into/chemical attack of water supply pipelines	Water Pipelines / End users	Likely	Medium	Moderate	Contaminants have been identified within the soil, which could potentially attack the clean potable water supply pipe, contaminants should be assessed in accordance with the relevant guidance to determine the correct pipe material and level of precautions required.
Made Ground Ground Gas (carbon dioxide and methane)	Migration into confined spaces, inhalation and asphyxiation/explosion	End-users / property / structures	Unlikely	Severe	Moderate / Low	Gas monitoring did not reveal elevated concentrations of methane, moderately elevated concentrations of carbon dioxide recorded are attributed to microbial activity. As such, gas protection measures are not required. Due the change in proposed development, further gas monitoring is recommended to confirm the risk.

Controlled Waters						
Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
Made Ground Metals	Overland flow, / migration through saturated zone	River Roch (Surface waters)	Unlikely	Medium	Low	Elevated metals were recorded within the made ground, however these were recorded to be overlaying cohesive superficial deposits which would limit migration into the underlying aquifers. The site is currently surfaced with hardstanding and will remain so. There are no Source Protection Zones near the site and no groundwater abstractions for potable water supply within 2000m. The risks to groundwater at the site are considered to be low.
	Leaching through unsaturated zone / Migration through saturated zone	Secondary Aquifer (undifferentiated) (Groundwater)	Low Likelihood	Mild	Low	
	Migration through saturated zone	Secondary A Aquifer (Groundwater)	Unlikely	Medium	Low	

8.9 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.

Where soft landscaping is present a cover of “clean” subsoil and topsoil should be provided to break the pathway to site end users. This should be 450mm in soft landscaping areas (Public Open Space – POS) in accordance with BRE 465. This will allow plants to be grown and prevent undesirable soils being brought to the surface. The inclusion of a geotextile marker layer at the base and / or a coarse granular, ‘hard dig’ layer is recommended.

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

General

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

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

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

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

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

8.10 Health and Safety Issues

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

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

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

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

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

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

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

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

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

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

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

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

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

9.0 WASTE SOIL CLASSIFICATION & ASSESSMENT

9.1 Summary

BSL have undertaken a preliminary assessment of potential excavation waste to arise from the site during redevelopment to:

- Classify the excavation waste to arise as either hazardous or non-hazardous.
- Identify the most sustainable options for the wastes to arise in accordance with the waste hierarchy.
- Provide a written description of the waste required as part of the Duty of Care.
- Provide details of “hazardous properties” to complete hazardous waste consignment note (where applicable).
- Be able to provide a basic classification report to a landfill operator (where waste is destined for landfill disposal).

9.2 Waste Classification Procedure

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

Hazardous wastes are signified by entries where the code is followed by an asterisk, where some wastes are deemed hazardous without further assessment, which are termed “Absolute Entries” e.g. most waste oils. Alternatively, waste entries are termed “Mirror” entries that require further assessment of hazardous properties, in order to determine whether they are hazardous waste or not (e.g. soil and stones). The EWC codes relevant to excavation wastes are:

- 17 05 03* - soil and stones containing dangerous substances.
- 17 05 04 – soil and stones other than those mentioned in 17 05 03.

The Landfill Directive (Directive 1999/31/EC on the landfilling of waste, Decision 2003/33/EC and Landfill Regulations 2005) led to the establishment of a methodology for classifying wastes.

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

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

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

There are no standard set of WAC limits for non-hazardous landfill sites and each non-hazardous landfill will have its own set of criteria under which it is licenced to accept non-hazardous waste. These will need to be determined through the selected waste receiver prior to disposal.

A non-hazardous waste should not be compared with WAC limits for hazardous or SNRHW waste sites and the WAC test should only be used to determine if the waste is suitable for disposal at an inert waste landfill site. Likewise, wastes classified as hazardous based on their total concentrations should not be compared with WAC limits for inert waste landfill sites, as these will not be accepted.

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

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

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

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

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

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

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

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

Inert Waste

The possibility of automatic inert classification of the naturally occurring “clean” soils should be explored in accordance with Section 4.3 of the EA guidance document. The Council Decision includes a list of wastes in Section 2.1.1 of the document that are assumed to be inert and therefore acceptable at a landfill for inert waste without testing. This is the case if:

- They are single stream waste of a single waste type (although different waste types from the list may be accepted together if they are from a single source); and
- There is no suspicion of material or substances such as metals, asbestos, plastics, chemicals, etc to an extent which increases the risk associated with the waste sufficiently to justify contamination and they do not contain other classes of landfill.

9.3 Waste Classification and Waste Acceptance Criteria (WAC)

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

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

The Waste Classification Report is presented in Appendix F The results of the waste assessment based on total concentrations are presented in the table below,

Location	Depth (m)	Stratum	Waste Classification
WS01	0.05-0.21	Topsoil	Non-hazardous
WS02	0.35-0.65	CLAY	
WS03	0.05-0.26	Made Ground	
WS04	0.10-0.26	Made Ground	Hazardous
HP02	0.10-00.20	Topsoil	
HP03	0.10-0.40	Made Ground	

Based on the waste classification database assessment, the majority of the made ground soils have been classified as **hazardous**.

Note that further testing of the soils (WAC testing) may be required on the actual arisings in order to satisfactorily categorise the soil for its suitability for disposal to landfill.

Waste Containing Asbestos

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

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

A watching brief should be maintained for evidence of Asbestos Containing Materials (ACMs), any ACMs observed should be handpicked and disposed of in accordance with current asbestos disposal regulations.

Testing for total contaminant concentrations on natural soils was not undertaken and they are assumed to be non-hazardous.

9.4 Options Assessment

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

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

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

Based on the above, the possible options for the generation of waste soils at the site are described in the table below:

Waste Generation Source	Comments
Natural ground from site levelling/foundations excavations/services excavations	The superficial deposits may be considered suitable for re-use onsite as fill where the criteria of the WFD exception for re-use of naturally occurring soils can be met. Naturally occurring clean materials could also be exported to another site under the direct transfer scenario of the DoWCoP. Classified as non-hazardous.

General

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

Where it is necessary to dispose material off site it is recommended that materials are segregated and sufficient time is allowed to further classify the actual soil arisings that constitute the waste, including discussion with landfill sites and waste transfer stations to find the best disposal route. It is illegal to dilute and mix soils without a suitable permit.

9.5 Re-use of Soils

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

Landfill tax rules allow HM Revenue & Customs (HMRC) to recover landfill tax on illegally deposited waste on construction sites. This could lead to excessive costs without the correct documentation in place. In addition, a person who makes, knowingly causes or knowingly facilitates a disposal to be made at an unauthorised site is also liable to pay Landfill Tax.

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

Soils Re-use Under DoWCoP

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

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

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

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

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

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

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

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

Regardless of implementing re-use under the code of practice or not, all sites should have some form of materials tracking in place in compliance with current legislation. Any re-use scheme should also be designed to minimise disposal costs.

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

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

Soils Re-use under Exemptions and Permits

Suitable options to allow the re-use and/or import of soils and aggregates on site are provided in the table below:

Re-use Mechanism	Description
U1 Exemption	Can be applied to re-use/import of soils and stones, but only up to 1000 tonnes or for brick and concrete up to 5000 tonnes. This is usually an efficient way to re-use small volumes of waste materials. However, only one U1 can be filled in per site in any 3-year period. Quick and free via online registration.
WRAP Quality Protocols	Describes how processed demolition arisings can be removed from regulatory waste regime. Requires a demonstration of appropriateness by: • Factory Production Control Manual. • Facility Permit (or Exemption). • Grading Analysis.

Re-use Mechanism	Description
Waste Framework Directive (WFD) exclusion	In regard to “clean” naturally occurring soils only that are to be re-used on their site of origin, these are covered by a Waste Framework Directive (WFD) exclusion which is an EA regulatory position statement. So long as the project can prove the four criteria listed above for the DoWCoP, then permits or the DoWCoP are not required. However, many projects still use the CoP to ensure compliance.
T5 Screening and blending of waste	The T5 exemption allows you to temporarily treat waste on a small scale to produce aggregate or soil at a particular location, such as a construction or demolition site. The limit is 5,000 tonnes. This applies to: • Screening soil on a demolition site to remove wood and rubble. • Blending soil and compost that has been produced under an exemption on a construction site to produce better soil for landscaping on that site (e.g. peaty deposits). • Crushing waste (except bricks, tiles and concrete) before screening or blending • Grading waste concrete after it has been crushed to produce a certain type of aggregate.
Other Permitting Routes	Other options include use under an Environmental Permit (Standard or Bespoke Rules), however these may be a time consuming and costly route, where use of the other above options (if applicable) are likely to be more feasible in construction.

10.0 CONCLUSIONS

10.1 Geo-Environmental

Geo-Environmental – Human Health

Testing of the made ground at the site revealed exceedances of heavy metals. No visible or olfactory evidence of petroleum hydrocarbon contamination was encountered.

The above are considered to pose a risk to human health and remedial measures are required in the form of a cover system in soft landscaping areas to mitigate the risk.

Ground gas monitoring has revealed a maximum peak carbon dioxide concentration of 7.8%v/v and methane concentrations of 0.2%v/v. Based on the gas monitoring undertaken and elevated carbon dioxide concentrations attributed to microbial activity, the site falls within Characteristic Situation 1 and no gas protection measures are required. However, given the proposed change in end-use, further gas monitoring is recommended to confirm the risk.

Geo-Environmental – Controlled Waters

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

Waste

Waste classification for the made ground at the site has revealed the majority of the soils to hazardous.

10.2 Geotechnical

The below is based on the previous extensions and refurbishment, further investigation and assessment is required to confirm appropriate geotechnical parameters for the current proposed residential apartment block development.

Foundations

The most suitable foundations for the proposed refurbishment and renovation of the existing structure are considered to be strip foundations at a minimum depth of 0.75m bgl based on the low volume change potential clays and deepened near trees and hedges in accordance with NHBC Chapter 4.2.

At 0.75m bgl, an allowable bearing capacity not exceeding 80kN/m² may be assumed for a 0.6m wide strip footing increasing to 90kN/m² at 1.00m bgl 110kN/m² at 2.00m bgl. This adopts a factor of safety of 3 which should limit settlements to within acceptable limits.

Floor slabs

Suspended floor slabs may be adopted.

Concrete classification

DS-1 AC-1s conditions prevail.

Highways

Based in the results CBR values of <2% for natural clays 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.

Drainage (SuDS)

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

10.3 Further Work

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

-
- Supplementary ground investigation comprising:
 - Windowless sampling.
 - Installation of standpipes within the building footprint in boreholes to allow gas concentrations and groundwater levels to be monitored.
 - Chemical and geotechnical testing of soils.
 - Contamination analyses of soil.
 - Reassessment of geotechnical data and proposed foundations relevant to likely proposed loads.
 - Tree survey by qualified arboriculturist.
 - Detailed foundation design by a structural engineer.
 - Design of Remedial Strategy and confirmation with the Local Authority.
 - Production of Materials Management Plan (MMP) under the CL:AIRE DoWCoP, if required.
 - Implementation of the Remedial Strategy and verification of the remedial works.
-

11.0 ABBREVIATIONS AND DEFINITIONS

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

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DRAWINGS



01	Proposed Site Plan
02	Scale 1:250 @ A1

General Notes
01: Dimensions must not be scaled from this drawing. If in doubt, please ask.
02: All dimensions are in millimetres unless noted otherwise.
03: All dimensions should be verified on site before proceeding with the work.
04: TADW Architects shall be notified in writing of any discrepancies.
05: © TADW Limited (UK) 2015

Legend

Schedule of Accommodation

- 15 x 1B2P apartments (50sqm each)
- 45 x 2B4P apartments (70sqm each)

Total 60 units

Block A GIFA - 3114sqm
Block B GIFA - 1953sqm

P7	Building areas added	30.8.24	MH	BB
P6	2B3P upgraded to 2B4P	30.8.24	MH	BB
P5	Design modified	29.8.24	MH	BB
P4	Entrance relocated	20.8.24	MH	BB
P3	Four storey element added	6.8.24	MH	BB
P2	Scheme redesigned	31.7.24	MH	BB
P1	Issued for comment	20.10.23	MH	BB
Issue	Description	Date	Drawn	Checked

Drawing Status
P - Planning | T - Tender | C - Construction | R - As Record

For Approval

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Client Watson Homes

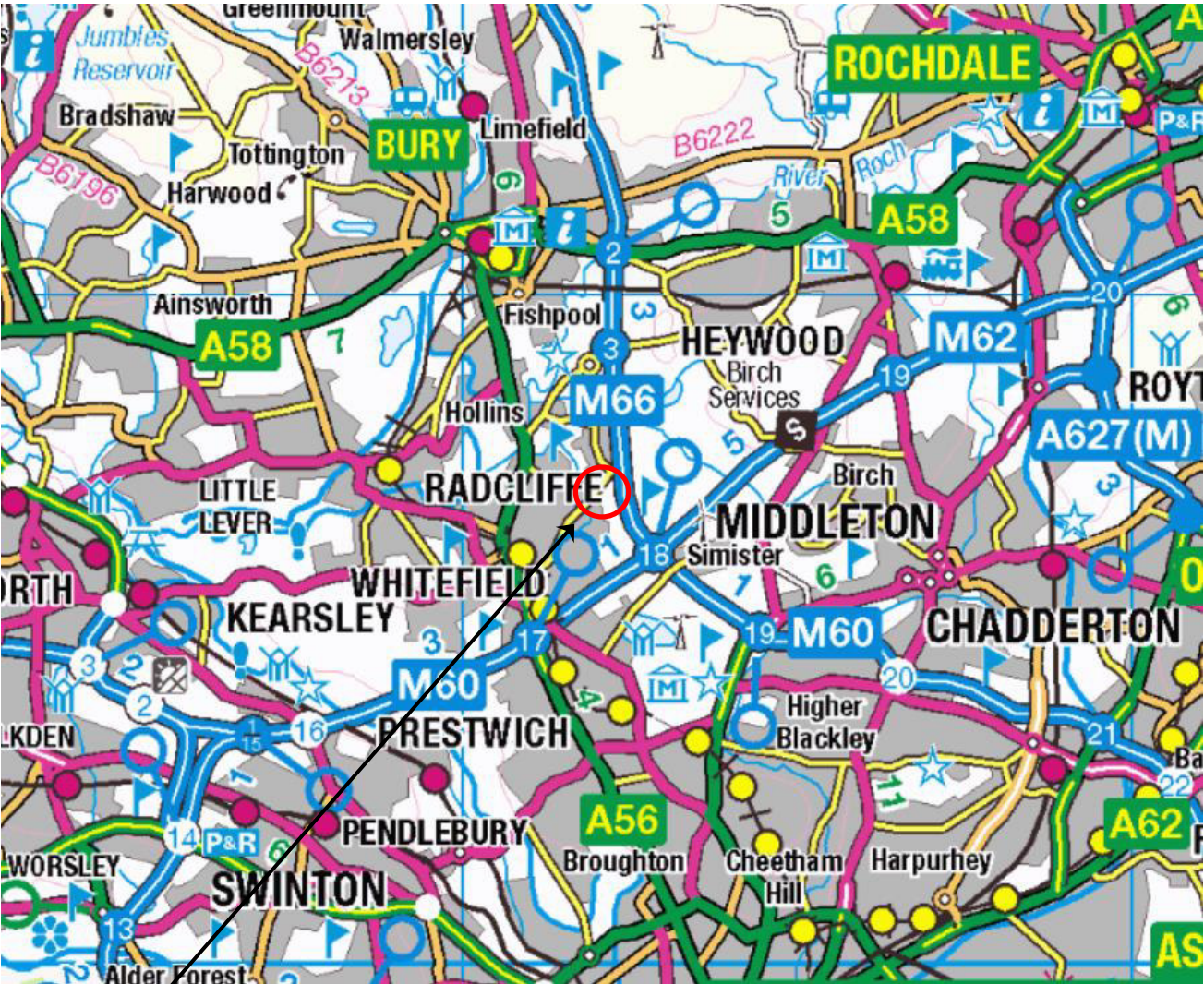
Job Pole Lane Bury

Title Proposed Site Plan

Scale 1:250 @ A1

Note - Prints from PDF files may not be to scale, check accuracy against scale

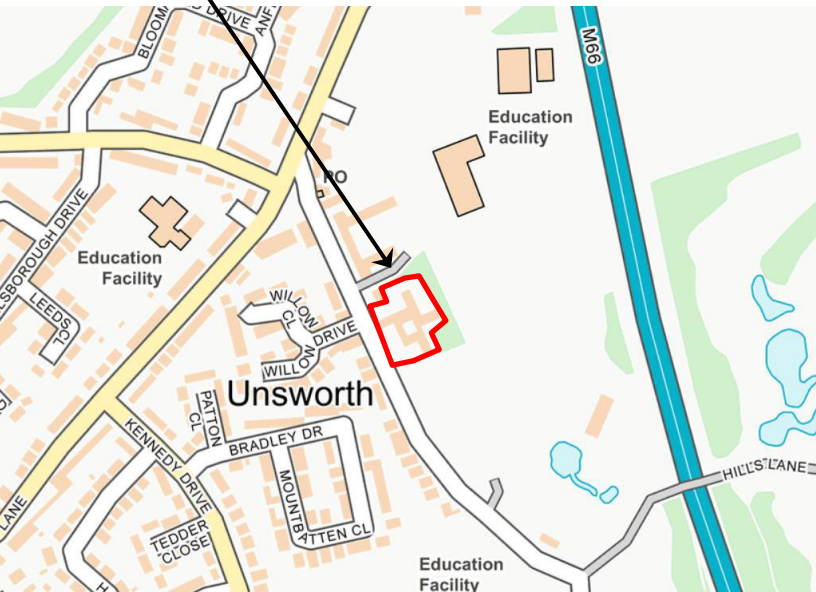
Job Number B1045	Drawing Number 02	Issue P7
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SITE LOCATION

NEAREST POSTCODE: BL9 8QL

SITE ENTRANCE WHAT3WORDS: ///MARCH.NURSES.SUPPER



REV	DATE	DESCRIPTION	BY	CKD
A	10/09/2024	CLIENT UPDATE	JEM	
 BROWNFIELD SOLUTIONS LTD CEO ENVIRONMENTAL ENGINEERING EXCELLENCE				
CLIENT WATSON HOMES				
PROJECT TITLE SPURR HOUSE, BURY				
DRAWING TITLE SITE LOCATION PLAN				
DRAWING No. C5102/01		REVISION A	SCALE NTS	DATE 10/08/22
DRAWN BY SD			CHECKED BY NS	



WOODEN FENCING



GENTLE SLOPE



LANDSCAPED AREA

PLASTIC SHED

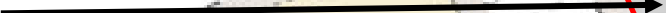
POSSIBLE STORAGE
OUTBUILDING



LARGE METAL
WHEELED BINS



PEDESTRIAN
ACCESS



VEHICLE ACCESS



POLE LANE

KEY

- APPROXIMATE SITE BOUNDARY
- AREAS WITH MATURE AND SEMI MATURE TREES

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A	10/09/2024	CLIENT UPDATE	JEM	

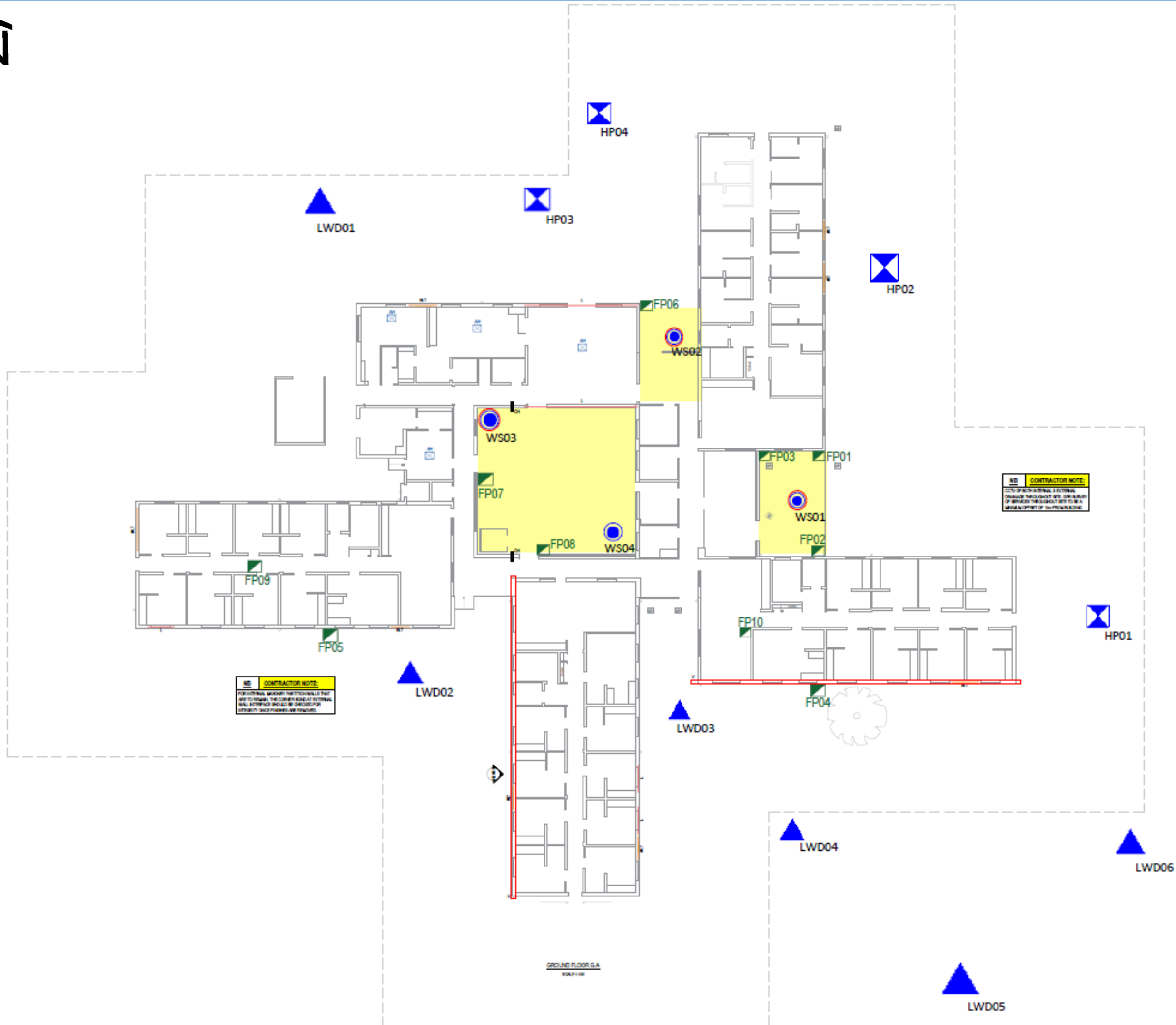


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PROJECT TITLE
SPURR HOUSE, BURY

DRAWING TITLE
SITE FEATURES PLAN

DRAWING No. C5102	REVISION A	SCALE NTS	DATE 17/08/22
DRAWN BY CM		CHECKED BY NS	



KEY

-  HAND EXCAVATED TRIAL PIT
-  WINDOW SAMPLE BOREHOLE
-  BOREHOLE INSTALLATION
-  LWD
-  FOUNDATION TRIAL PIT

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A	10/09/2024	CLIENT UPDATE	JEM	



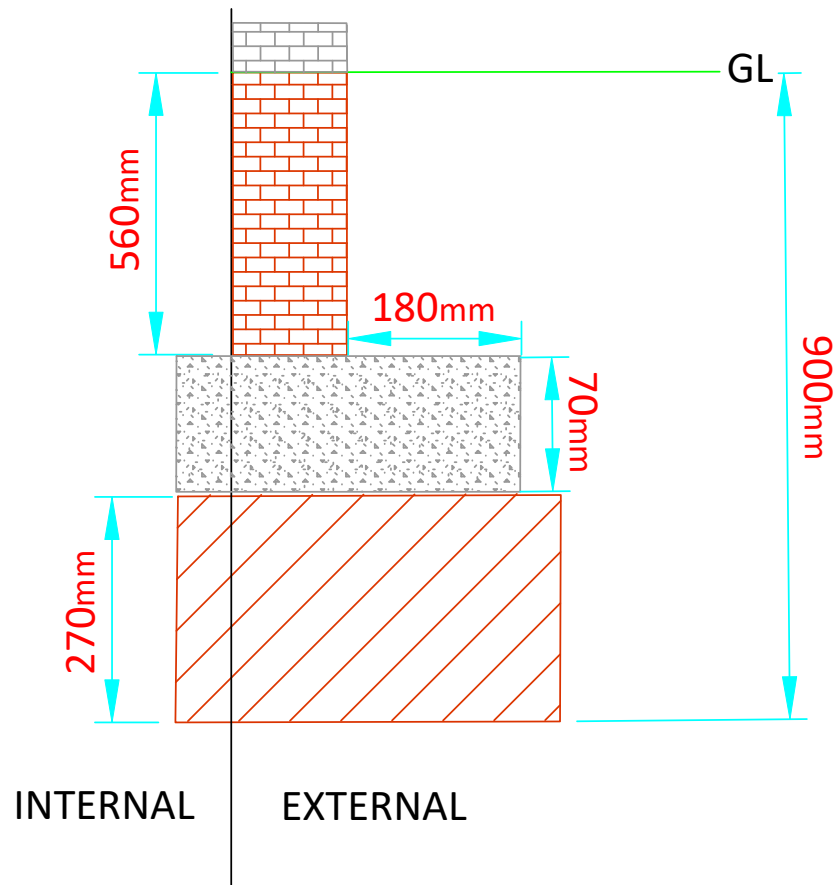
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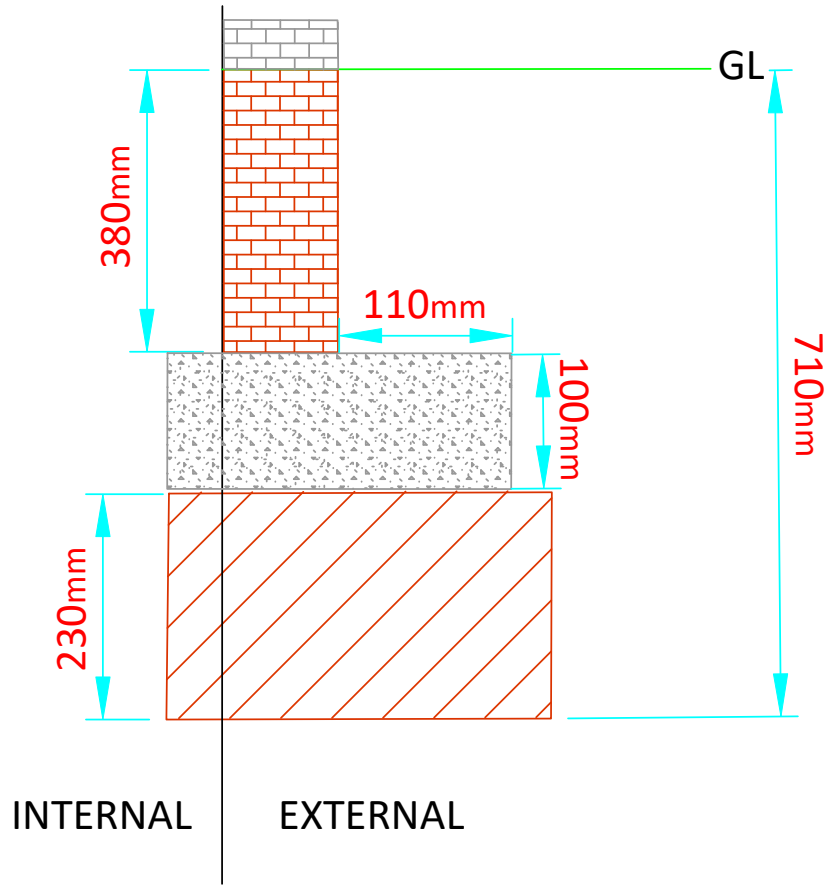
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C5102/03	A	NTS	20/09/22
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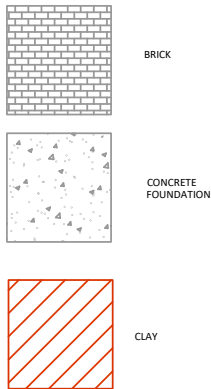
FP01



FP02



KEY



NOTES

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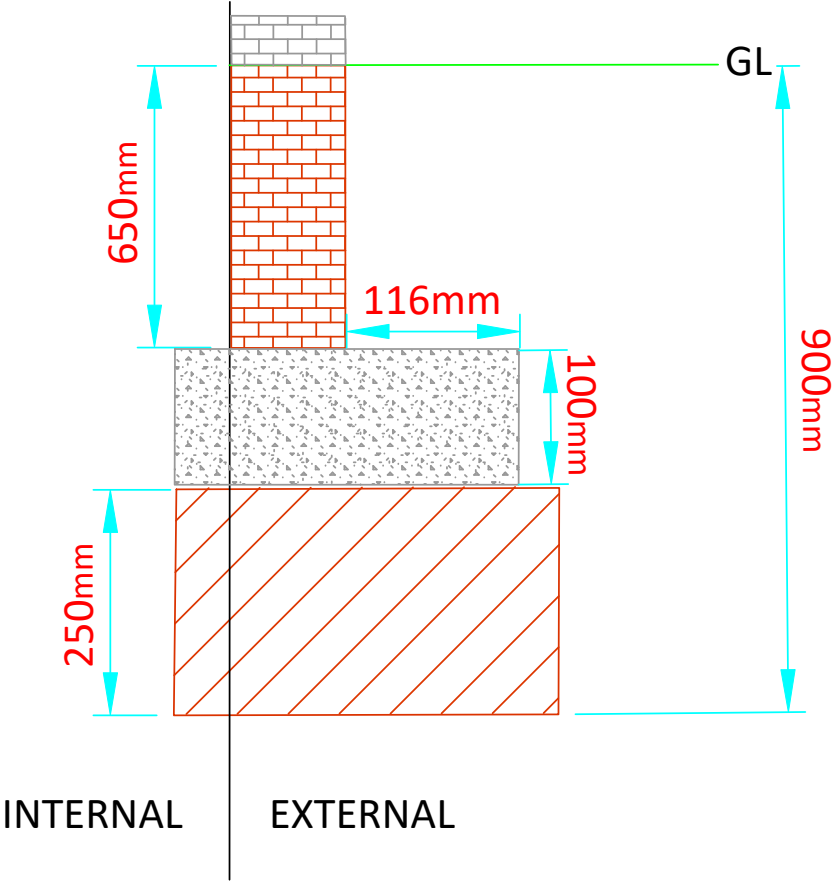
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SPURR HOUSE, BURY

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DRAWING**

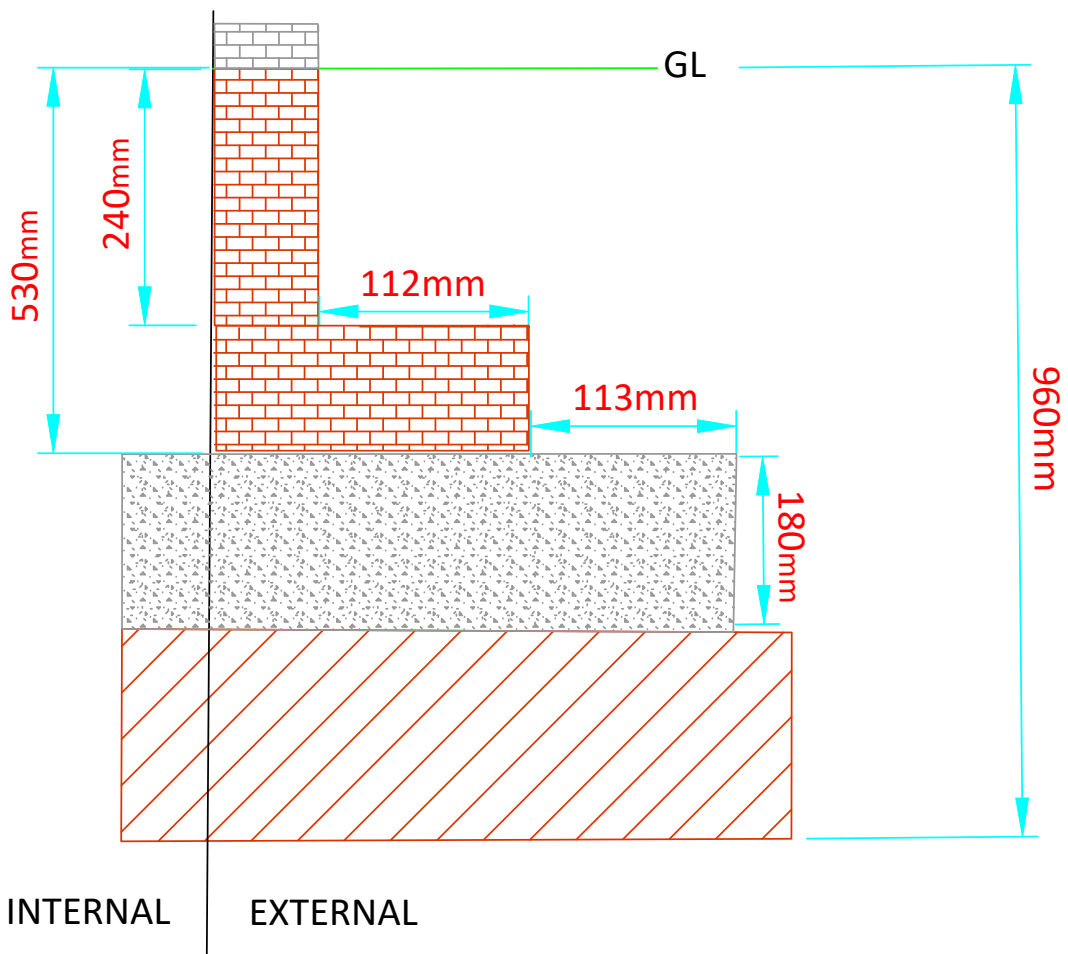
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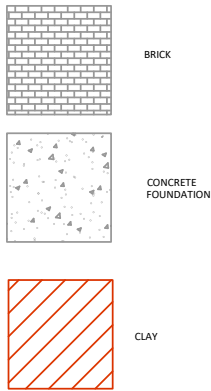
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FP04



KEY



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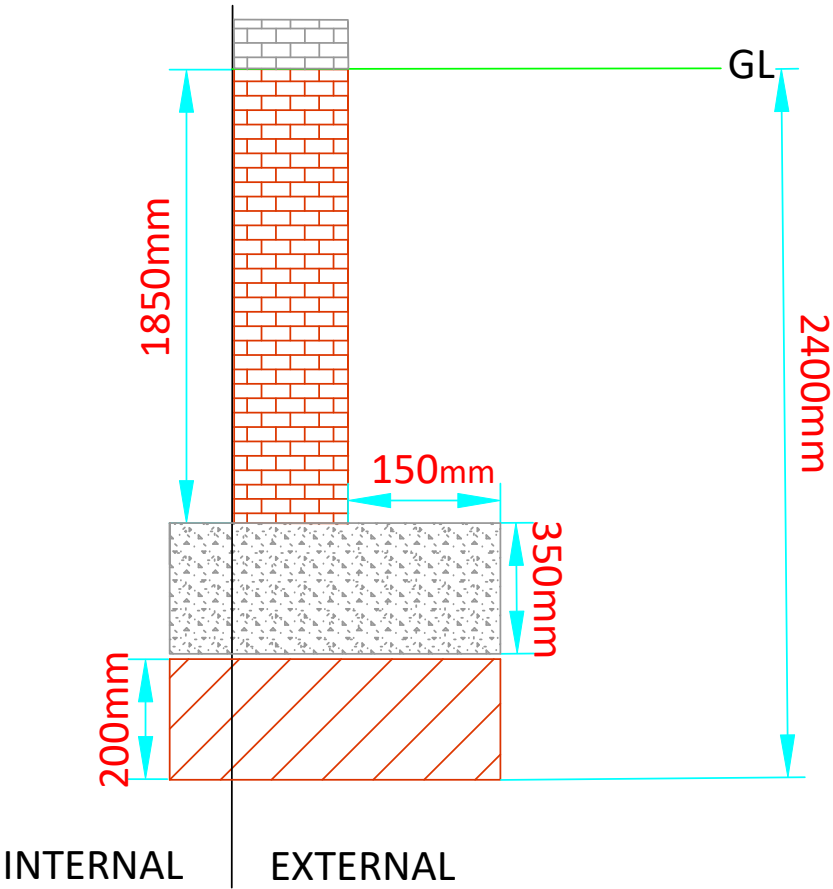
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DRAWING TITLE
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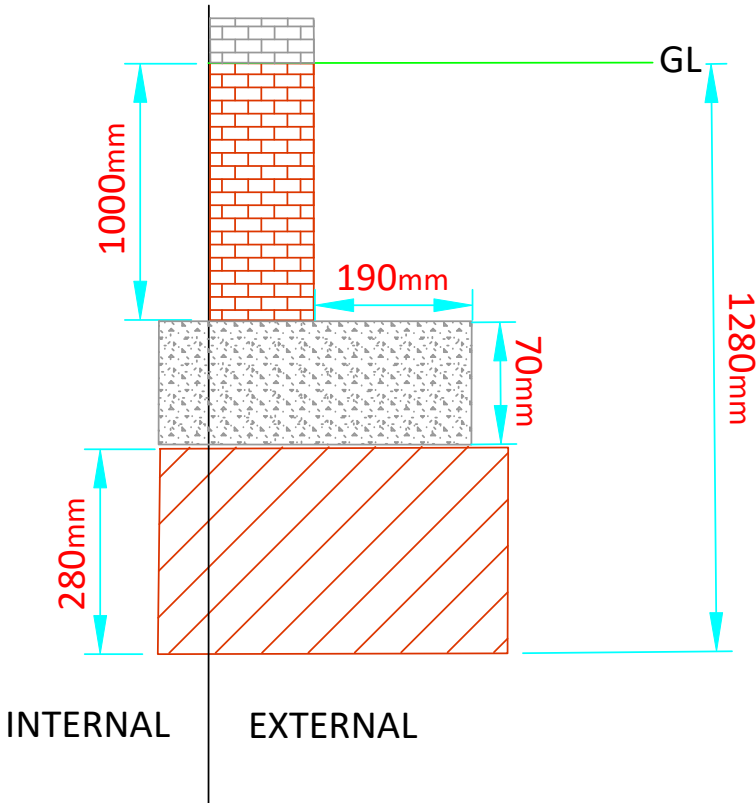
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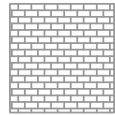
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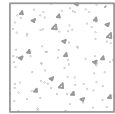
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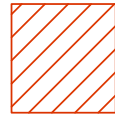
KEY



BRICK



CONCRETE FOUNDATION



CLAY

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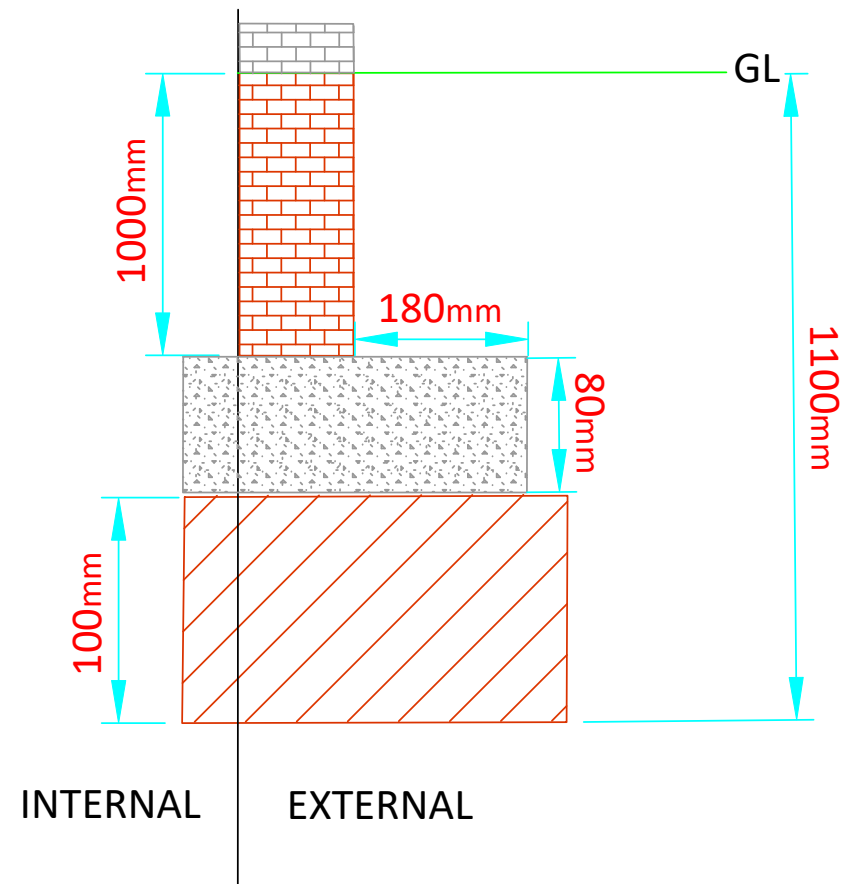
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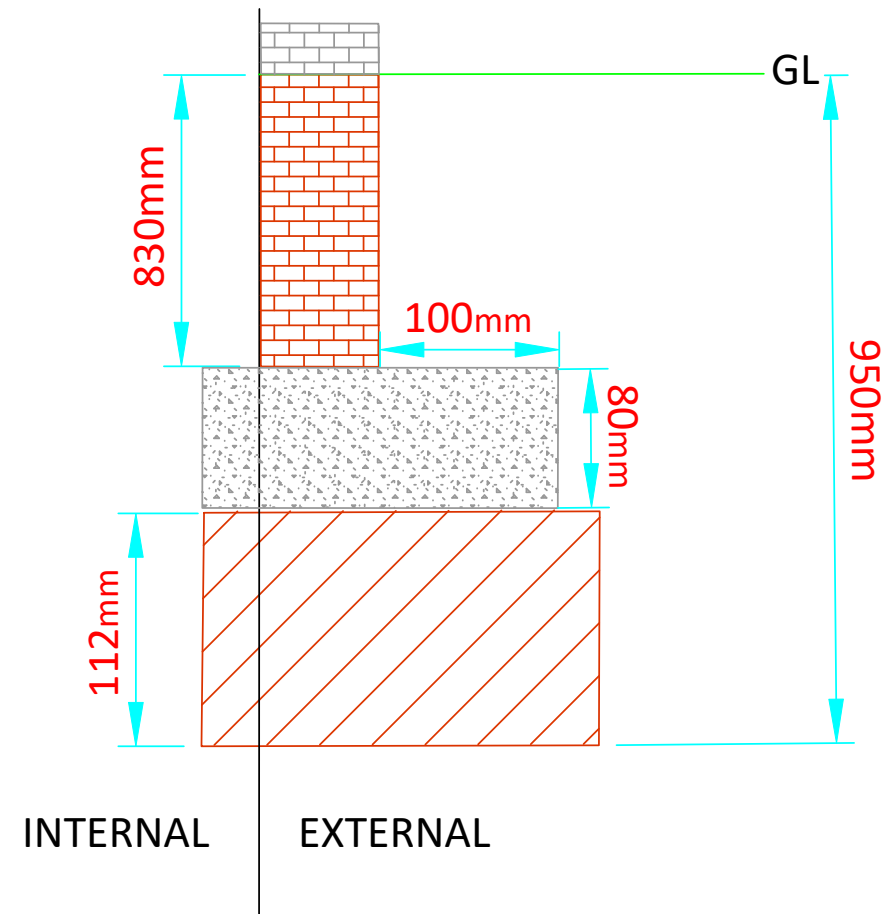
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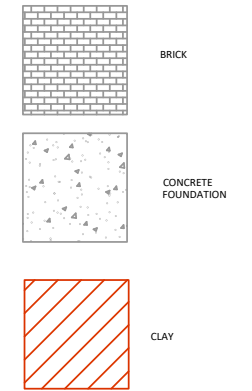
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FP08



KEY



NOTES

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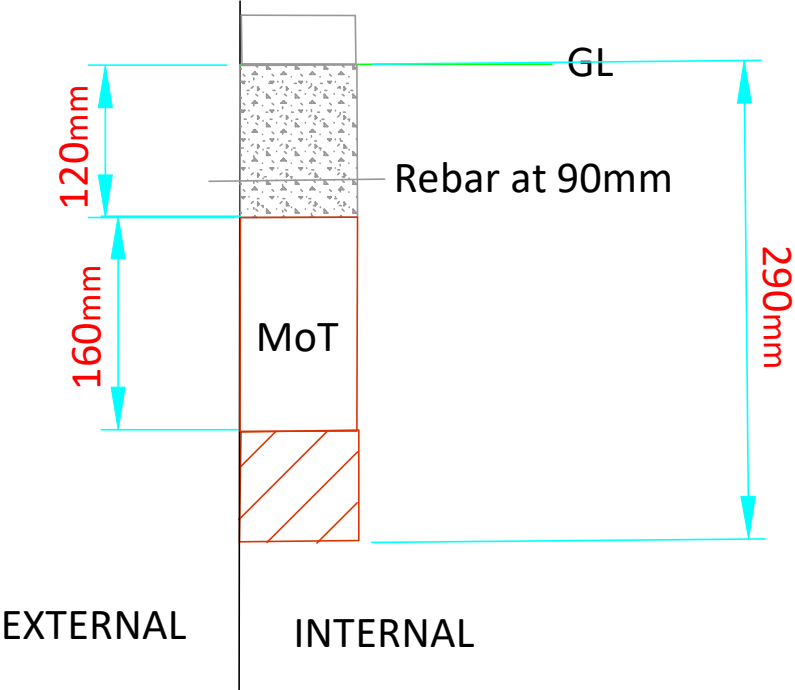
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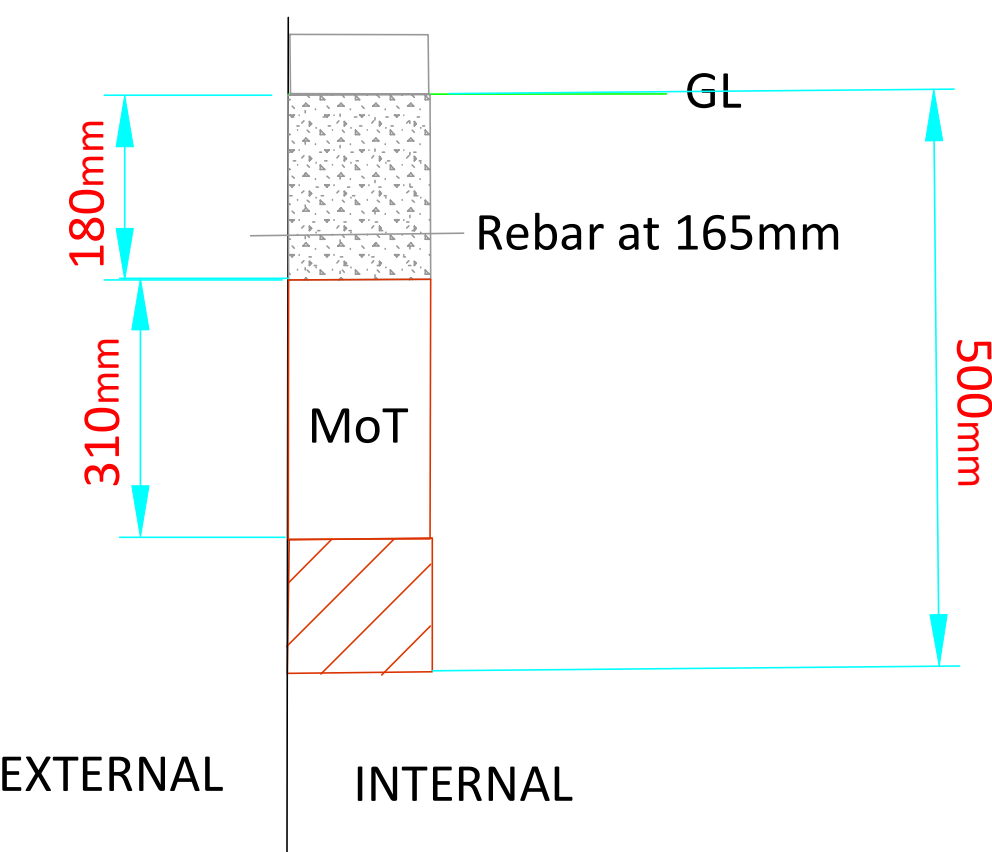
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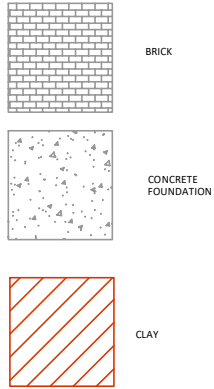
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KEY



NOTES

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REV	DATE	DESCRIPTION	BY	CKD



CLIENT

WATSON HOMES

PROJECT TITLE

SPURR HOUSE, BURY

DRAWING TITLE

FOUNDATION INSPECTION PIT DRAWING

DRAWING No.	REVISION	SCALE	DATE
C5102/04	A	NTS	18/08/22
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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).
- The Environment Act (1995).
- The Contaminated Land (England) Act (2000).
- The Pollution Prevention and Control (England and Wales) Regulations (2000).
- The Landfill Regulations (England and Wales) Regulations (2002).
- The Landfill (England and Wales) (Amendment) Regulations (2004).
- Contaminated Land (England) Regulations (2012).
- The Environmental Damage (Prevention and Remediation) Regulations (2009).
- Environmental Permitting Regulations (England and Wales) Regulations (2010).
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
- Health and Safety at Work Act.
- National Planning Policy Framework (NPPF)(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 impaction 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).

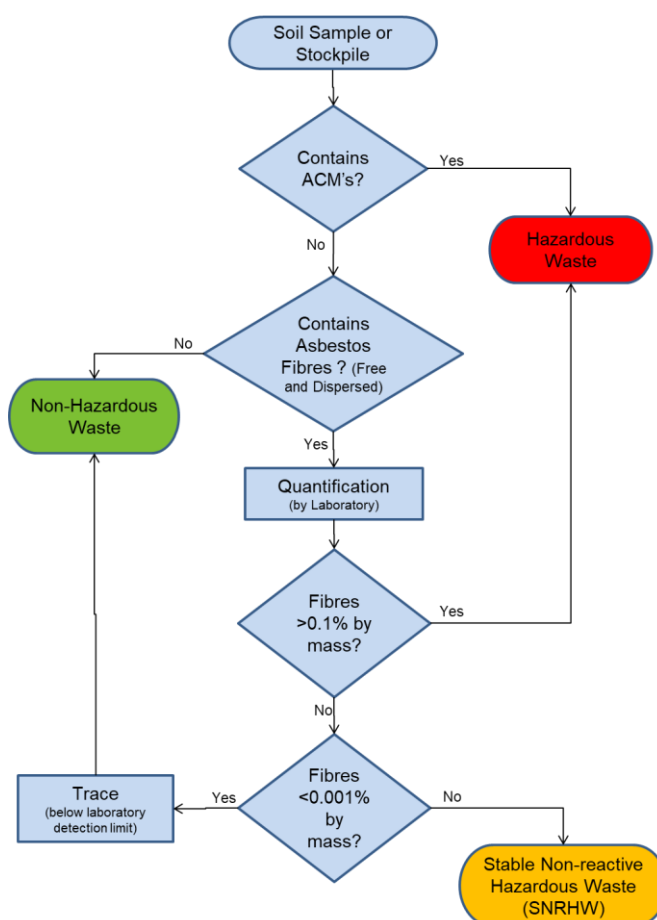
Additional Asbestos Guidance Notes

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

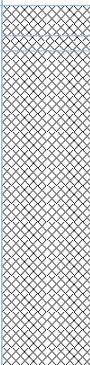


No.	
CBR01	
Sheet 1 of 1	
Hole Type	
TP	
Scale	
1:25	
ged	Checked
H	NS

CO-ORDS:

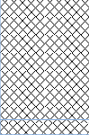
LEVEL:

DATES: 30/08/22

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.20-0.30	D	126kPa	0.10 0.15			MADE GROUND: Macadam.	1.0
	0.50-0.60	D		MADE GROUND: Light brown sandy gravel. Sand is fine to coarse. Gravel is subangular fine to coarse of limestone (sub-base).				
	1.20-1.30	D		MADE GROUND: Brown sandy gravel with low cobble content. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse of brick, sandstone, slate, concrete and ceramic. Cobbles are angular of brick and concrete.				
	1.30	HSV		Firm brown slightly gravelly slightly sandy clay. Sand is fine to medium. Gravel is sub-rounded fine of sandstone. End of Trial Pit at 1.30m				
								2.0
								3.0
								4.0
								5.0

1. No groundwater encountered.
2. Trial pit sides were stable.
3. Trial pit backfilled with arisings upon completion.

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

 BROWNFIELD SOLUTIONS LTD						Trial Pit Log		No. CBR02 Sheet 1 of 1	
PROJECT NO: C5102						CO-ORDS:		Hole Type TP	
PROJECT NAME: SPURR HOUSE, BURY						LEVEL:		Scale 1:25	
CLIENT: WATSON HOMES						DATES: 30/08/22		Logged PH Checked NS	
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
	0.20	D					MADE GROUND TOPSOIL: Grass over dark brown slightly gravelly slightly clayey sand with rootlets. Sand is fine to coarse. Gravel is sub-angular to angular fine to coarse of brick, sandstone, concrete and plastic.		1.0
	0.45	D		0.40 0.45			MADE GROUND: Light brown gravelly clay. Gravel is fine to coarse sub-angular of brick, concrete and sandstone. End of Trial Pit at 0.45m		
									3.0
									4.0
									5.0
Remarks		1. No groundwater encountered. 2. Trial pit sides were stable. 3. Trial pit backfilled with arisings upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	



No.	
CBR03	
Sheet 1 of 1	
Hole Type	
TP	
Scale	
1:25	
Logged	Checked
PH	NS

CO-ORDS:

LEVEL:

DATES: 30/08/22

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.30	D		0.10			MADE GROUND TOPSOIL: Grass over dark brown slightly clayey sand with rootlets. Sand is fine to coarse.	1.0
				0.25			MADE GROUND: Macadam.	
							MADE GROUND: Light brown gravelly clay. Gravel is angular to sub-angular fine to coarse of sandstone, brick, concrete, plastic and potential asbestos cement board (blue).	
				0.80			Stiff light brown slightly gravelly CLAY. Gravel is fine to medium sub-angular to sub-rounded of sandstone.	
				1.00			End of Trial Pit at 1.00m	
								1.0
								2.0
								3.0
								4.0
								5.0

1. No groundwater encountered.
2. Trial pit sides were stable.
3. Trial pit backfilled with arisings upon completion.

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

 BROWNFIELD SOLUTIONS LTD						Trial Pit Log		No. CBR04 Sheet 1 of 1	
PROJECT NO: C5102						CO-ORDS:		Hole Type TP	
PROJECT NAME: SPURR HOUSE, BURY						LEVEL:		Scale 1:25	
CLIENT: WATSON HOMES						DATES: 30/08/22		Logged PH Checked NS	
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
	0.40	D		0.30 0.50		MADE GROUND TOPSOIL: Grass over dark brown slightly gravelly slightly clayey sand with rootlets. Sand is fine to coarse. Gravel is sub-angular to angular fine to coarse of brick and sandstone. MADE GROUND: Firm dark brown slightly gravelly slightly sandy clay. Sand is fine to coarse. Gravel is sub-angular fine to coarse of brick, slate, concrete and sandstone. End of Trial Pit at 0.50m			
1.0 2.0 3.0 4.0 5.0									
Remarks		1. No groundwater encountered. 2. Trial pit sides were stable. 3. Trial pit backfilled with arisings upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

 BROWNFIELD SOLUTIONS LTD						Trial Pit Log		No.			
CBR05											
Sheet 1 of 1											
PROJECT NO: C5102						CO-ORDS:		Hole Type			
PROJECT NAME: SPURR HOUSE, BURY						LEVEL:		TP			
CLIENT: WATSON HOMES						DATES: 30/08/22		Scale			
								1:25			
								Logged		Checked	
								PH		NS	
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description				
	Depth (m)	Type	Results								
	0.40	D		0.20			MADE GROUND TOPSOIL: Grass over dark brown slightly gravelly slightly clayey sand with rootlets. Sand is fine to coarse. Gravel is sub-angular to angular fine to coarse of brick and sandstone.				
	0.50	HSV	140kPa	0.50			MADE GROUND: Stiff dark brown slightly gravelly slightly sandy clay. Sand fine to coarse. Gravel is sub-rounded to sub-angular fine to medium of sandstone and rare brick. End of Trial Pit at 0.50m				
1.0 2.0 3.0 4.0 5.0											
Remarks		1. No groundwater encountered. 2. Trial pit sides were stable. 3. Trial pit backfilled with arisings upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane			

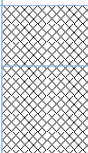


No.	
CBR06	
Sheet 1 of 1	
Hole Type	
TP	
Scale	
1:25	
Logged	Checked
PH	NS

CO-ORDS:

LEVEL:

DATES: 30/08/22

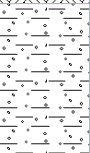
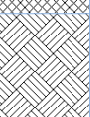
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.50	D		0.20			MADE GROUND TOPSOIL: Grass over dark brown slightly gravelly slightly clayey sand with rootlets. Sand is fine to coarse. Gravel is sub-angular to angular fine to coarse of brick and sandstone.	1.0
				0.50			MADE GROUND: Stiff light brown slightly gravelly clay. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to medium of sandstone, slate, quartz and brick.	
							End of Trial Pit at 0.50m	3.0
								4.0
								5.0

1. No groundwater encountered.
2. Trial pit sides were stable.
3. Trial pit backfilled with arisings upon completion.

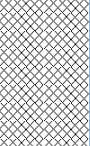
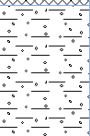
- ES = Environmental Sample
- D = Disturbed Sample
- B = Bulk Sample
- LB = Large Bulk Sample
- U = Undisturbed Sample
- UT = Undisturbed Thin Wall Sample
- SPT = Standard Penetration Test
- PID = Photoionization Detector (ppm)
- PPM = Part Per Million
- HSV = Hand Shear Vane

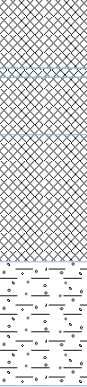
 BROWNFIELD SOLUTIONS LTD					Trial Pit Log		No. FP01 Sheet 1 of 1	
PROJECT NO: C5102					CO-ORDS:		Hole Type TP	
PROJECT NAME: SPURR HOUSE, BURY					LEVEL:		Scale 1:25	
CLIENT: WATSON HOMES					DATES: 15/08/22		Logged CM	Checked NS
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.63-0.90	D		0.05		   	MADE GROUND: Paving slab. Dark brown slightly gravelly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse of mudstone (TOPSOIL). Firm brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone and sandstone.	
				0.30				
				0.90			End of Trial Pit at 0.90m	
							1.0	
							2.0	
							3.0	
							4.0	
							5.0	
Remarks		1. Service clearance by BSL engineer. 2. No groundwater encountered. 3. Excavation backfilled with arisings upon completion.					ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

 BROWNFIELD SOLUTIONS LTD					Trial Pit Log		No. FP02 Sheet 1 of 1	
PROJECT NO: C5102					CO-ORDS:		Hole Type TP	
PROJECT NAME: SPURR HOUSE, BURY					LEVEL:		Scale 1:25	
CLIENT: WATSON HOMES					DATES: 15/08/22		Logged CM	Checked NS
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.10-0.30	D					MADE GROUND: Paving slab.	
							Dark brown slightly gravelly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse of mudstone (TOPSOIL).	
				0.05		0.30	Firm brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone and sandstone.	
				0.71			End of Trial Pit at 0.71m	
							1.0	
							2.0	
							3.0	
							4.0	
							5.0	
Remarks		1. Service clearance by BSL engineer. 2. No groundwater encountered. 3. Excavation backfilled with arisings upon completion.					ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

 BROWNFIELD SOLUTIONS LTD					Trial Pit Log		No. FP03 Sheet 1 of 1		
PROJECT NO: C5102					CO-ORDS:		Hole Type TP		
PROJECT NAME: SPURR HOUSE, BURY					LEVEL:		Scale 1:25		
CLIENT: WATSON HOMES					DATES: 15/08/22		Logged CM	Checked NS	
Water Strikes	Sample and In Situ Testing			Depth (m) 0.05 0.40 0.90	Level (m OD)	Legend 	Stratum Description		1.0 2.0 3.0 4.0 5.0
	Depth (m)	Type	Results				MADE GROUND: Paving slab. Dark brown slightly gravelly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse of mudstone (TOPSOIL). Firm brown mottled grey slightly gravelly clay. Gravel is sub-angular fine to coarse of mudstone and sandstone.		
							End of Trial Pit at 0.90m		
Remarks		1. Service clearance by BSL engineer. 2. No groundwater encountered. 3. Excavation backfilled with arisings upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

 BROWNFIELD SOLUTIONS LTD					Trial Pit Log		No. FP04 Sheet 1 of 1	
PROJECT NO: C5102					CO-ORDS:		Hole Type TP	
PROJECT NAME: SPURR HOUSE, BURY					LEVEL:		Scale 1:25	
CLIENT: WATSON HOMES					DATES: 15/08/22		Logged CM	Checked NS
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
				0.05 0.10			MADE GROUND: Paving slab. Dark brown slightly gravelly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse of mudstone (TOPSOIL). Firm brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone and sandstone.	
				0.96			End of Trial Pit at 0.96m	1.0
								2.0
								3.0
								4.0
								5.0
Remarks		1. Service clearance by BSL engineer. 2. No groundwater encountered. 3. Excavation backfilled with arisings upon completion.					ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

 BROWNFIELD SOLUTIONS LTD					Trial Pit Log		No. FP05 Sheet 1 of 1 Hole Type TP Scale 1:25 Logged CM Checked NS	
PROJECT NO: C5102					CO-ORDS:			
PROJECT NAME: SPURR HOUSE, BURY					LEVEL:			
CLIENT: WATSON HOMES					DATES: 15/08/22 - 30/08/22			
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
				0.05 0.10			MADE GROUND: Paving slab.	
							MADE GROUND TOPSOIL: Dark brown slightly gravelly clayey fine to coarse sand. Gravel is sub-angular to sub-rounded fine to coarse of mudstone.	
							MADE GROUND: Yellowish brown sandy gravel with high cobble content. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse of sandstone. Cobbles are angular to sub-angular of sandstone up to 200mm in diameter.	1.0
	1.80	D		1.50			MADE GROUND: Firm brown mottled red slightly gravelly clay. Gravel is sub-angular fine to coarse of brick and sandstone.	
	2.00	D		1.95			Stiff dark brown slightly gravelly CLAY. Gravel is sub-rounded to sub-angular fine to coarse of sandstone and shale.	2.0
				2.40			End of Trial Pit at 2.40m	
								3.0
								4.0
								5.0
Remarks		1. Service clearance by BSL engineer. 2. No groundwater encountered. 3. Excavation backfilled with arisings upon completion.					ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

 BROWNFIELD SOLUTIONS LTD						Trial Pit Log		No. FP06 Sheet 1 of 1 Hole Type TP Scale 1:25 Logged CM Checked NS	
PROJECT NO: C5102						CO-ORDS:			
PROJECT NAME: SPURR HOUSE, BURY						LEVEL:			
CLIENT: WATSON HOMES						DATES: 16/08/22			
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
▼				0.23			MADE GROUND: Tarmacadam.	1.0 2.0 3.0 4.0 5.0	
				0.26			MADE GROUND: Brown gravelly fine to coarse sand. Gravel is sub-angular fine to coarse of sandstone.		
				0.45			MADE GROUND: Brown mottled grey slightly gravelly clay. Gravel is sub-angular fine to coarse of mudstone and sandstone.		
				0.87			MADE GROUND: Three layers of breeze blocks with 0.04m of brown mottled grey clay inbetween.		
				1.28			Firm brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone and sandstone.		
End of Trial Pit at 1.28m									
Remarks		1. Service clearance by BSL engineer. 2. Groundwater encountered at 1.28m bgl. 3. Excavation backfilled with arisings upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	



No.

FP07

Sheet 1 of 1

PROJECT NO: C5102

CO-ORDS:

Hole Type

Hole Type

PROJECT NAME: SPURR HOUSE, BURY

LEVEL:

Scale

1:25

CLIENT: WATSON HOMES

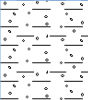
DATES: 16/08/22

Logged

Checked

CM

NS

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
				0.05			MADE GROUND: Paving slab.	1.0
				0.12			MADE GROUND: Yellowish brown slightly gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse of sandstone.	
				0.17			MADE GROUND: Paving slab.	
				0.30			Dark brown slightly gravelly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse of mudstone (TOPSOIL).	
							Firm brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone and sandstone.	
				1.10			End of Trial Pit at 1.10m	
								2.0
								3.0
								4.0
								5.0

Remarks

1. Service clearance by BSL engineer.
2. Groundwater encountered at 1.10m bgl.
3. Excavation backfilled with arisings upon completion.

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

 BROWNFIELD SOLUTIONS LTD					Trial Pit Log		No. FP08 Sheet 1 of 1	
PROJECT NO: C5102					CO-ORDS:		Hole Type TP	
PROJECT NAME: SPURR HOUSE, BURY					LEVEL:		Scale 1:25	
CLIENT: WATSON HOMES					DATES: 16/08/22		Logged CM	Checked NS
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
				0.05 0.12		                                                      		

 BROWNFIELD SOLUTIONS LTD					Trial Pit Log		No. FP09 Sheet 1 of 1		
PROJECT NO: C5102					CO-ORDS:		Hole Type TP		
PROJECT NAME: SPURR HOUSE, BURY					LEVEL:		Scale 1:25		
CLIENT: WATSON HOMES					DATES: 17/08/22		Logged CM	Checked NS	
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
				0.12			MADE GROUND: Reinforced concrete. Reinforcement mesh at 0.09m.		
				0.28			MADE GROUND: Yellowish brown sandy gravel. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse of sandstone (MOT).		
				0.29			Firm brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone and sandstone.		
							End of Trial Pit at 0.29m		
								1.0	
								2.0	
								3.0	
								4.0	
								5.0	
Remarks		1. Service clearance by BSL engineer. 2. No groundwater encountered. 3. Excavation backfilled with arisings upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	



No.

FP10

Sheet 1 of 1

PROJECT NO: C5102

CO-ORDS:

Hole Type

Hole Type

PROJECT NAME: SPURR HOUSE, BURY

LEVEL:

Scale

1:25

CLIENT: WATSON HOMES

DATES: 17/08/22

Logged

Checked

CM

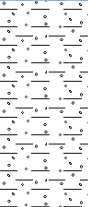
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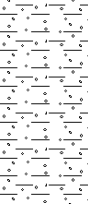
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
				0.18			MADE GROUND: Reinforced concrete. Reinforcement mesh at 0.165m.	1.0
				0.49 0.50			MADE GROUND: Yellowish brown sandy gravel. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse of sandstone (MOT).	
							Firm brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone and sandstone. End of Trial Pit at 0.50m	
								3.0
								4.0
								5.0

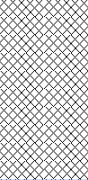
Remarks

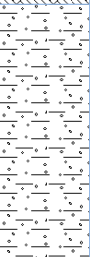
1. Service clearance by BSL engineer.
2. No groundwater encountered.
3. Excavation backfilled with arisings upon completion.

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

 BROWNFIELD SOLUTIONS LTD						Trial Pit Log		No. HP01 Sheet 1 of 1	
PROJECT NO: C5102						CO-ORDS:		Hole Type TP	
PROJECT NAME: SPURR HOUSE, BURY						LEVEL:		Scale 1:25	
CLIENT: WATSON HOMES						DATES: 17/08/22		Logged CM	Checked NS
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
	0.10-0.30	D ES		0.30			Grass over dark brown slightly gravelly slightly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse of mudstone and sandstone (TOPSOIL).		
	0.40-0.60	D ES					Friable brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone.		
				1.00			End of Trial Pit at 1.00m		1.0
									2.0
									3.0
									4.0
									5.0
Remarks		1. Service clearance by BSL engineer. 2. No groundwater encountered. 3. Excavation backfilled with arisings upon completion.					ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane		

 BROWNFIELD SOLUTIONS LTD					Trial Pit Log		No.		
HP02									
Sheet 1 of 1									
PROJECT NO: C5102					CO-ORDS:		Hole Type		
PROJECT NAME: SPURR HOUSE, BURY					LEVEL:		TP		
							Scale		
CLIENT: WATSON HOMES					DATES: 17/08/22		1:25		
							Logged		Checked
		CM		NS					
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
	0.10-0.30	D ES		0.50			Grass over dark brown slightly gravelly slightly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse of mudstone, sandstone and brick fragments (TOPSOIL).		1.0
	0.50-0.60	D					Firm brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone.		
				1.20			End of Trial Pit at 1.20m		2.0
									3.0
									4.0
									5.0
Remarks		1. Service clearance by BSL engineer. 2. No groundwater encountered. 3. Excavation backfilled with arisings upon completion.					ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane		

 BROWNFIELD SOLUTIONS LTD						Trial Pit Log		No. HP03 Sheet 1 of 1	
PROJECT NO: C5102						CO-ORDS:		Hole Type TP	
PROJECT NAME: SPURR HOUSE, BURY						LEVEL:		Scale 1:25	
CLIENT: WATSON HOMES						DATES: 17/08/22		Logged CM	Checked NS
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
	0.10-0.40	D ES		0.60			MADE GROUND: Grass over greyish brown slightly gravelly slightly clayey fine to coarse sand with low cobble content. Gravel is sub-angular fine to coarse of mudstone. Cobbles are angular to sub-angular of limestone up to 200mm in diameter.		
							End of Trial Pit at 0.60m		1.0
									2.0
									3.0
									4.0
									5.0
Remarks		1. Service clearance by BSL engineer. 2. No groundwater encountered. 3. Excavation backfilled with arisings upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

 BROWNFIELD SOLUTIONS LTD						Trial Pit Log		No. HP04 Sheet 1 of 1	
PROJECT NO: C5102						CO-ORDS:		Hole Type TP	
PROJECT NAME: SPURR HOUSE, BURY						LEVEL:		Scale 1:25	
CLIENT: WATSON HOMES						DATES: 17/08/22		Logged CM	Checked NS
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
	0.10-0.30	D ES		0.30			Grass over greyish brown slightly gravelly slightly clayey fine to coarse sand. Gravel is sub-angular fine to coarse of sandstone (TOPSOIL).		1.0
	0.30-1.14	D				Friable brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone.			
				1.14			End of Trial Pit at 1.14m		2.0
									3.0
									4.0
									5.0
Remarks		1. Service clearance by BSL engineer. 2. No groundwater encountered. 3. Excavation backfilled with arisings upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	



Window Sampler No.

Sheet 1 of 1

CO-ORDS:

LEVEL:

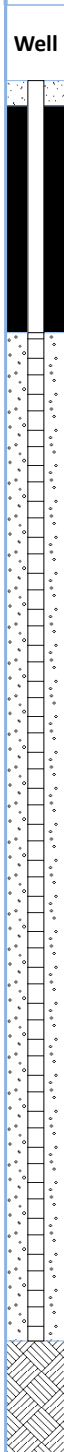
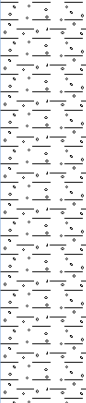
DATES: 17/08/22

Logged

Checked

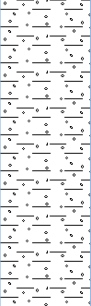
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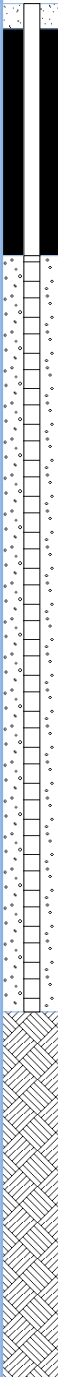
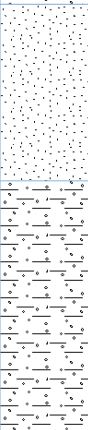
NS

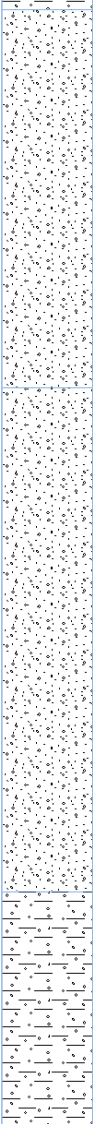
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05-0.21	ES		0.05			MADE GROUND: Paving slab.	
		0.05-20.21	D		0.21				Dark brown slightly gravelly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse of mudstone with fine rootlets (TOPSOIL).
		0.25-0.75	D ES						Soft brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone and sandstone.
		1.20	SPT	N=9 (2,2/2,2,2,3)			Becoming slightly sandy from 1.30m bgl.		
		1.30-1.50	D				Becoming firm from 1.80m bgl.		
		2.00-2.30	D			N=14 (3,3/3,3,4,4)		Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular fine to coarse of mudstone and sandstone with occasional coal fragments.	
		2.00	SPT					Becoming sandy from 3.00m bgl.	
		3.00-3.30	D	N=13 (1,2/2,3,4,4)				Becoming soft from 3.10m bgl.	
		3.00	SPT					Becoming stiff from 4.00m bgl.	
		4.00	SPT		N=19 (3,3/4,5,5,5)		Rare gravels of mudstone from 4.20m bgl.		
4.30	D		End of Borehole at 5.45m						
5.00-5.10	D		N=21 (3,4/4,5,6,6)						
		5.00	SPT		5.45				

1. Service clearance by BSL engineer.
2. Inspection pit to 1.20m bgl.
3. Groundwater encountered at 1.30m bgl.
4. Borehole installation of 1.00m PVC plain and 4.00m PVC 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.		
PROJECT NO: C5102						CO-ORDS:		WS02		
								Sheet 1 of 1		
								Hole Type		
PROJECT NAME: SPURR HOUSE, BURY						LEVEL:		WS		
								Scale		
								1:30		
CLIENT: WATSON HOMES						DATES: 17/08/22		Logged	Checked	
								CM	NS	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.16-0.32	D ES		0.16			MADE GROUND: Tarmacadam.		
		0.35-0.65	D ES		0.32			MADE GROUND: Dark greyish brown sub-angular fine to coarse gravels of tarmacadam.		
								Firm brown mottled grey slightly gravelly CLAY. Gravel is sub-angular to sub-rounded fine to coarse of mudstone and sandstone.		1.0
		1.20	SPT	N=13 (3,3/3,3,3,4)						
					1.90					
		2.00	SPT	N=17 (3,3/3,4,5,5)				Firm brown slightly gravelly clay. Sand is fine to coarse. Gravel is sub-angular fine to coarse of mudstone and sandstone with occasional coal fragments.		2.0
		2.10-2.40	D							
								Becoming stiff from 2.40m bgl.		
		3.00	SPT	N=26 (5,5/6,6,7,7)						3.0
		3.10-3.40	D							
								Becoming slightly sandy from 3.80m bgl.		
		4.00	SPT	N=12 (3,3/3,3,3,3)				Becoming firm from 4.00m bgl.		4.0
		4.10-4.40	D							
		5.00-5.10	D SPT	N=21 (3,4/5,5,5,6)				Becoming sandy from 5.00m bgl.		5.0
		5.00				5.45		End of Borehole at 5.45m		6.0
Remarks		1. Service clearance by BSL engineer. 2. Inspection pit to 1.20m bgl. 3. Groundwater encountered at 4.50m bgl. 4. Borehole installation of 1.00m PVC plain and 4.00m PVC 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.			
								WS03			
								Sheet 1 of 1			
PROJECT NO: C5102						CO-ORDS:		Hole Type			
								WS			
PROJECT NAME: SPURR HOUSE, BURY						LEVEL:		Scale			
								1:30			
CLIENT: WATSON HOMES						DATES: 17/08/22		Logged	Checked		
								CM	NS		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.05-0.26	D ES		0.05			MADE GROUND: Paving slab. MADE GROUND TOPSOIL: Dark brown slightly gravelly clayey fine to coarse sand. Gravel is sub-angular to sub-rounded fine to coarse of mudstone with fine rootlets. MADE GROUND: Soft brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone, breeze block and brick fragments.	1.0		
		0.30-0.60	D ES		0.26						
		1.10-1.40	D		1.00						
		1.20	SPT	N=10 (1,1/2,2,3,3)							
		2.00-2.30	D		1.90						
		2.00	SPT	N=24 (2,2/4,6,7,7)							
		2.30-3.00	D		2.30						
		3.00	SPT	N=16 (2,2/4,4,4,4)	3.00						
		3.10-3.40	D								
		4.00	SPT	N=13 (2,3/3,3,3,4)	4.00						
		4.10-4.40	D					Medium dense brown fine to coarse SAND. Firm brown slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone.	3.0		
		5.00	SPT	N=11 (2,2/3,2,3,3)							
						5.45	End of Borehole at 5.45m				
									6.0		
Remarks		1. Service clearance by BSL engineer. 2. Inspection pit to 1.20m bgl. 3. Groundwater encountered at 1.20m bgl. 4. Borehole installation of 1.00m PVC plain and 3.00m PVC 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.	
									WS04	
PROJECT NO: C5102							CO-ORDS:		Sheet 1 of 1	
PROJECT NAME: SPURR HOUSE, BURY							LEVEL:		Hole Type	
									WS	
CLIENT: WATSON HOMES							DATES: 17/08/22		Scale	
									1:30	
									Logged	Checked
									CM	NS
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.10-0.26	D		0.26			MADE GROUND TOPSOIL: Grass over dark brown slightly gravelly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse of mudstone with fine rootlets. Occasional brick fragment.		1.0
		0.26-0.70	ES D ES					MADE GROUND: Firm brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone and brick fragments.		
		0.70-1.00	D		0.70			Firm brown mottled grey slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone.		
		1.10-1.40	D		1.00			Medium dense orangey brown slightly gravelly fine to medium SAND. Gravel is sub-angular to sub-rounded of mudstone and sandstone.		
		1.20	SPT	N=16 (1,2/4,4,4,4)						
		2.00	SPT	N=11 (1,2/2,3,3,3)						
		2.50-2.80	D		2.50			Medium dense dark brown slightly gravelly slightly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded of mudstone and sandstone.		
		3.00	SPT	N=11 (1,2/2,3,3,3)						
		4.00	SPT	N=16 (2,3/4,4,4,4)						
		4.10-4.50	D					Becoming gravelly from 4.10m bgl.		
		4.50-5.00	D		4.50			Firm brown slightly gravelly CLAY. Gravel is sub-angular fine to coarse of mudstone.		
		5.00	SPT	N=16 (2,3/3,4,4,5)						
					5.45			End of Borehole at 5.45m		
Remarks		1. Service clearance by BSL engineer. 2. Inspection pit to 1.20m bgl. 3. Groundwater encountered at 2.10m bgl. 4. Borehole backfilled with arisings upon completion.							ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

APPENDIX C

Chemical Testing Results

**C McShane**

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e: reception@i2analytical.com

e: c.mcshane@brownfield-solutions.co.uk

Analytical Report Number : 22-79277

Project / Site name:	Spurr House Bury	Samples received on:	22/08/2022
Your job number:	C5102	Samples instructed on/ Analysis started on:	22/08/2022
Your order number:		Analysis completed by:	29/08/2022
Report Issue Number:	1	Report issued on:	29/08/2022
Samples Analysed:	6 soil samples		

Signed:

Joanna Wawrzeczko
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

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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: 22-79277
Project / Site name: Spurr House Bury

Lab Sample Number				2396776	2396777	2396778	2396779	2396780
Sample Reference				WS01	WS02	WS03	WS04	HP02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.05-0.21	0.35-0.65	0.05-0.26	0.10-0.26	0.10-0.30
Date Sampled				17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022
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	< 0.1
Moisture Content	%	0.01	NONE	6.1	11	7.8	11	4.2
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5	0.5	0.5

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5	8.5	8	8	7.6
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	24	81	340	650	1100
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.012	0.04	0.17	0.32	0.56
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	12	40.4	171	324	555
Organic Matter (automated)	%	0.1	MCERTS	6.1	1.2	6.3	3	6.6

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	0.62	< 0.05	0.69	< 0.05	0.96
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.36	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.37	< 0.05	0.36	< 0.05	2.5
Fluorene	mg/kg	0.05	MCERTS	0.24	< 0.05	0.37	< 0.05	1.5
Phenanthrene	mg/kg	0.05	MCERTS	3.5	0.43	4.2	0.53	15
Anthracene	mg/kg	0.05	MCERTS	0.96	< 0.05	1.2	< 0.05	1.8
Fluoranthene	mg/kg	0.05	MCERTS	7.5	0.59	9	0.74	15
Pyrene	mg/kg	0.05	MCERTS	7.2	0.49	8.8	0.66	12
Benzo(a)anthracene	mg/kg	0.05	MCERTS	5.2	0.34	5.2	0.39	5.9
Chrysene	mg/kg	0.05	MCERTS	3.5	0.25	4.2	0.4	6
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	5.1	0.19	4.1	0.37	5.8
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.7	0.24	2.7	0.24	2.9
Benzo(a)pyrene	mg/kg	0.05	MCERTS	4.8	0.23	4.1	0.34	5
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.6	< 0.05	2.3	< 0.05	2.5
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.71	< 0.05	0.65	< 0.05	0.63
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.2	< 0.05	3.2	0.22	3.1

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	47.1	2.76	51.2	3.89	80.8
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	33	9.2	11	14	43
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	1.6	2.4	12	19
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	21	17	17	20	37
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	17	17	20	37
Copper (aqua regia extractable)	mg/kg	1	MCERTS	190	32	50	240	2200
Lead (aqua regia extractable)	mg/kg	1	MCERTS	160	90	320	1300	2300
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.3	< 0.3	< 0.3	< 0.3	0.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	36	12	18	14	32
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	140	490	1000	4800	6200

Analytical Report Number: 22-79277
Project / Site name: Spurr House Bury

Lab Sample Number				2396776	2396777	2396778	2396779	2396780
Sample Reference				WS01	WS02	WS03	WS04	HP02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.05-0.21	0.35-0.65	0.05-0.26	0.10-0.26	0.10-0.30
Date Sampled				17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Petroleum Hydrocarbons

TPH C10 - C40 _{EH_CU_1D_TOTAL}	mg/kg	10	MCERTS	100	< 10	830	-	-
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 22-79277

Project / Site name: Spurr House Bury

Lab Sample Number				2396781
Sample Reference				HP03
Sample Number				None Supplied
Depth (m)				0.10-0.40
Date Sampled				17/08/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	3.9
Total mass of sample received	kg	0.001	NONE	0.5

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7
Free Cyanide	mg/kg	1	MCERTS	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	3500
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.8
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	1770
Organic Matter (automated)	%	0.1	MCERTS	6.6

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.43
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.65
Pyrene	mg/kg	0.05	MCERTS	0.57
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.42
Chrysene	mg/kg	0.05	MCERTS	0.35
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.36
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.24
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.29
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.23

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	3.54
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	22
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	76
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2
Chromium (III)	mg/kg	1	NONE	27
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27
Copper (aqua regia extractable)	mg/kg	1	MCERTS	250
Lead (aqua regia extractable)	mg/kg	1	MCERTS	11000
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	22
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	40000



Analytical Report Number: 22-79277
 Project / Site name: Spurr House Bury

Lab Sample Number				2396781
Sample Reference				HP03
Sample Number				None Supplied
Depth (m)				0.10-0.40
Date Sampled				17/08/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Petroleum Hydrocarbons				
TPH C10 - C40 EH_CU_1D_TOTAL	mg/kg	10	MCERTS	-

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

Analytical Report Number : 22-79277
Project / Site name: Spurr House Bury

* 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 *
2396776	WS01	None Supplied	0.05-0.21	Brown loam and sand with gravel.
2396777	WS02	None Supplied	0.35-0.65	Brown clay and sand.
2396778	WS03	None Supplied	0.05-0.26	Brown loam and sand with gravel and vegetation.
2396779	WS04	None Supplied	0.10-0.26	Brown loam and sand with gravel and vegetation.
2396780	HP02	None Supplied	0.10-0.30	Brown loam and sand with gravel and vegetation.
2396781	HP03	None Supplied	0.10-0.40	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 22-79277
Project / Site name: Spurr House Bury

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
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

Analytical Report Number : 22-79277
Project / Site name: Spurr House Bury

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
----------------------	-------------------------------	-----------------------------	---------------	--------------------	----------------------

List of HWOL Acronyms and Operators

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

APPENDIX D

Geotechnical Testing Results

**C McShane**

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

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

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

e: c.mcshane@brownfield-solutions.co.uk

Analytical Report Number : 22-79279

Project / Site name:	Spurr House, Bury	Samples received on:	22/08/2022
Your job number:	C5102	Samples instructed on/ Analysis started on:	22/08/2022
Your order number:		Analysis completed by:	01/09/2022
Report Issue Number:	1	Report issued on:	05/09/2022
Samples Analysed:	6 soil samples		

Signed:

Izabela Wójcik

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

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

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

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

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

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

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

Analytical Report Number: 22-79279
Project / Site name: Spurr House, Bury

Lab Sample Number				2396786	2396787	2396788	2396789	2396790
Sample Reference				WS01	WS02	WS03	WS04	HP01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25-0.75	1.10-1.40	0.30-0.60	0.70-1.00	0.25-0.30
Date Sampled				17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022
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	< 0.1
Moisture Content	%	0.01	NONE	8.9	11	11	9.7	7.2
Total mass of sample received	kg	0.001	NONE	0.2	0.3	0.3	0.3	0.3

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.3	7	8.6	7.9	7.2
Total Sulphate as SO ₄	%	0.005	MCERTS	-	-	-	-	0.056
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	29	59	16	89	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.015	0.029	0.0079	0.045	0.0085
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	14.6	29.4	7.9	44.5	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	-	-	5
Total Sulphur	%	0.005	MCERTS	-	-	-	-	0.033
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	-	-	3.5

Heavy Metals / Metalloids

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

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

Analytical Report Number: 22-79279
Project / Site name: Spurr House, Bury

Lab Sample Number				2396791
Sample Reference				HP04
Sample Number				None Supplied
Depth (m)				0.30-1.14
Date Sampled				17/08/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	9.1
Total mass of sample received	kg	0.001	NONE	0.3

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.9
Total Sulphate as SO ₄	%	0.005	MCERTS	0.047
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.093
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	4.1
Total Sulphur	%	0.005	MCERTS	0.025
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	6
Magnesium (leachate equivalent)	mg/l	2.5	NONE	3

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

Analytical Report Number : 22-79279
Project / Site name: Spurr House, Bury

* 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 *
2396786	WS01	None Supplied	0.25-0.75	Light brown clay with gravel.
2396787	WS02	None Supplied	1.10-1.40	Light brown clay with gravel.
2396788	WS03	None Supplied	0.30-0.60	Brown clay and sand with gravel.
2396789	WS04	None Supplied	0.70-1.00	Brown clay and sand.
2396790	HP01	None Supplied	0.25-0.30	Brown loam and sand with gravel and vegetation.
2396791	HP04	None Supplied	0.30-1.14	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 22-79279
Project / Site name: Spurr House, Bury

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
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.

4041

Client: Brownfield Solutions Ltd
 Client Address: William Smith House,
 173 - 183 Witton Street, Northwich,
 Cheshire, CW9 5LP
 Contact: Coral McShane
 Site Address: Spurr House, Bury

Client Reference: C5102
 Job Number: 22-79278
 Date Sampled: 17/08/2022
 Date Received: 22/08/2022
 Date Tested: 30/08/2022
 Sampled By: Not Given

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

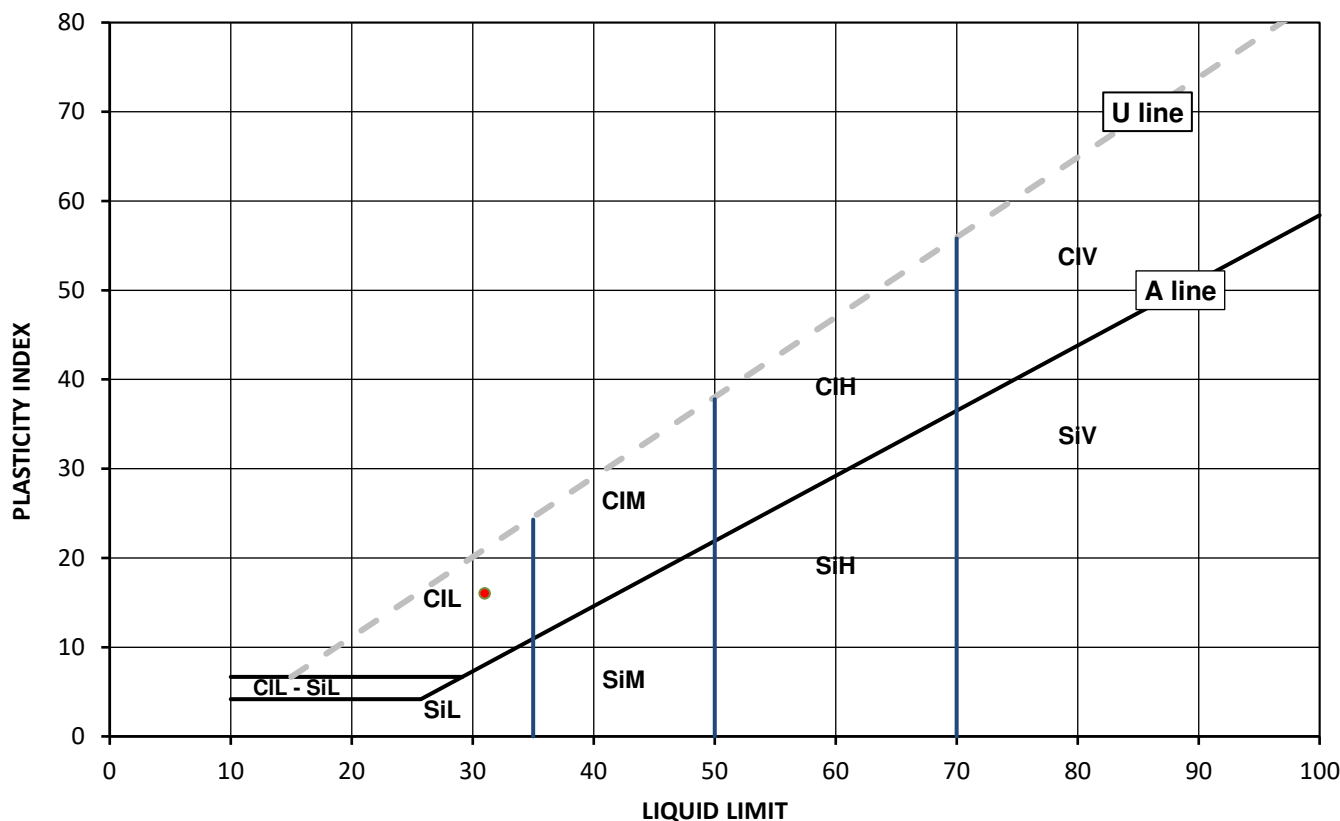
Test Results:

Laboratory Reference: 2396782
 Hole No.: WS01
 Sample Reference: Not Given
 Sample Description: Brown slightly gravelly very sandy CLAY

Depth Top [m]: 0.25
 Depth Base [m]: 0.75
 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
14.9	31	1.015	15	16	97



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:

Monika Siewior

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

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 173 - 183 Witton Street, Northwich,
 Cheshire, CW9 5LP
 Contact: Coral McShane
 Site Address: Spurr House, Bury

Client Reference: C5102
 Job Number: 22-79278
 Date Sampled: 17/08/2022
 Date Received: 22/08/2022
 Date Tested: 30/08/2022
 Sampled By: Not Given

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

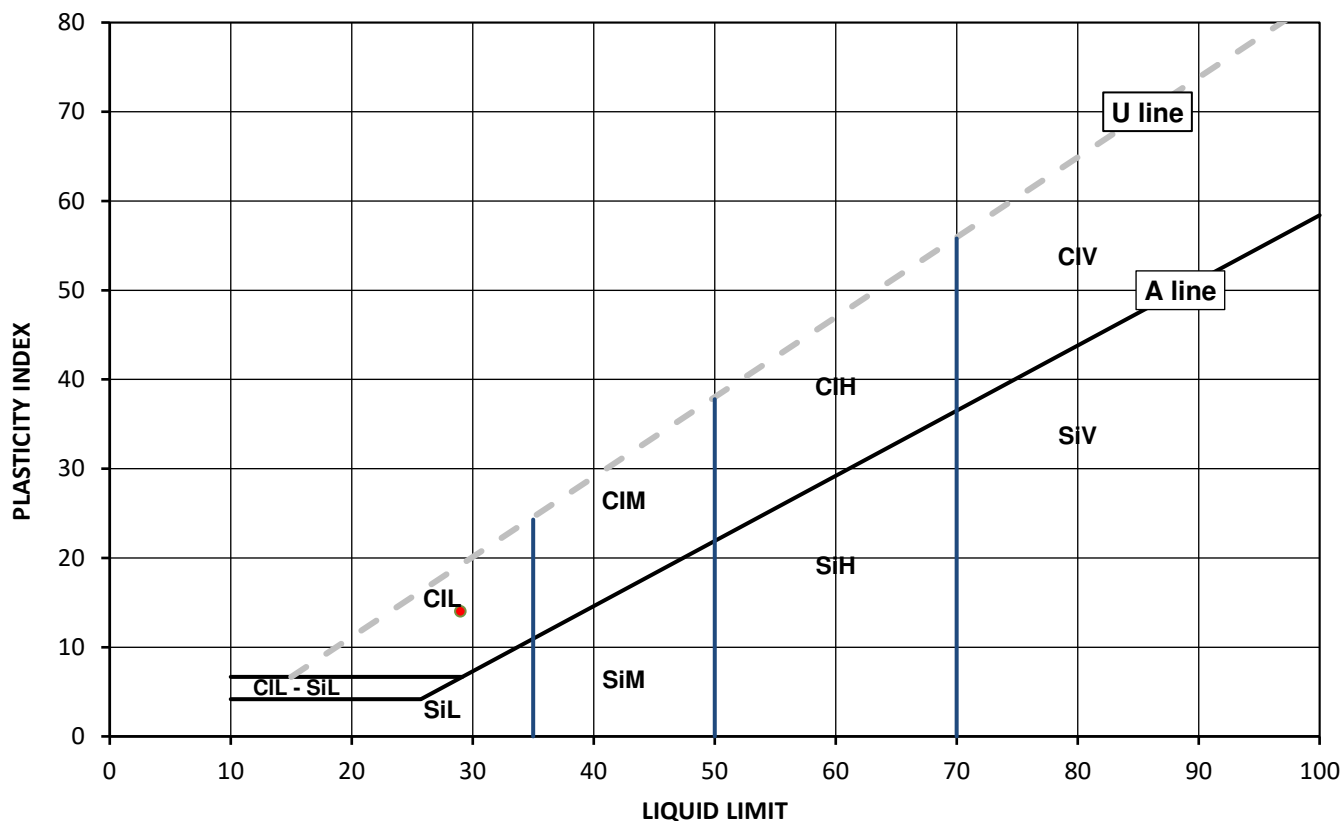
Test Results:

Laboratory Reference: 2396783
 Hole No.: WS02
 Sample Reference: Not Given
 Sample Description: Brown slightly gravelly very sandy CLAY

Depth Top [m]: 1.10
 Depth Base [m]: 1.40
 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
15.8	29	1.015	15	14	96



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:

Monika Siewior

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

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 Client Address: William Smith House,
 173 - 183 Witton Street, Northwich,
 Cheshire, CW9 5LP
 Contact: Coral McShane
 Site Address: Spurr House, Bury

Client Reference: C5102
 Job Number: 22-79278
 Date Sampled: 17/08/2022
 Date Received: 22/08/2022
 Date Tested: 30/08/2022
 Sampled By: Not Given

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

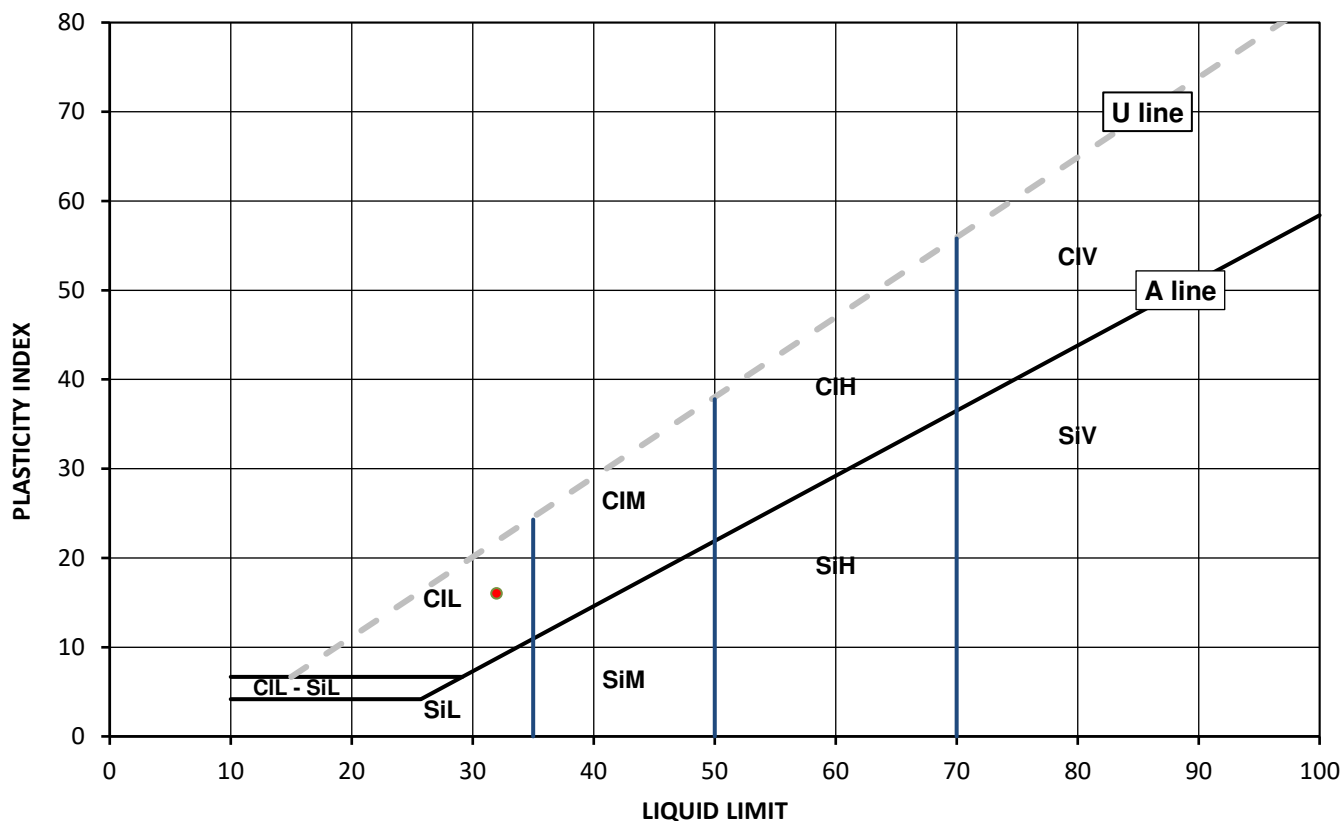
Test Results:

Laboratory Reference: 2396784
 Hole No.: WS03
 Sample Reference: Not Given
 Sample Description: Brownish grey slightly gravelly very sandy CLAY

Depth Top [m]: 0.30
 Depth Base [m]: 0.60
 Sample Type: D

Sample Preparation: Tested after washing to remove >0.425mm;
 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
20.8	32	1.015	16	16	91



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:

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: Coral McShane
 Site Address: Spurr House, Bury

Client Reference: C5102
 Job Number: 22-79278
 Date Sampled: 17/08/2022
 Date Received: 22/08/2022
 Date Tested: 30/08/2022
 Sampled By: Not Given

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

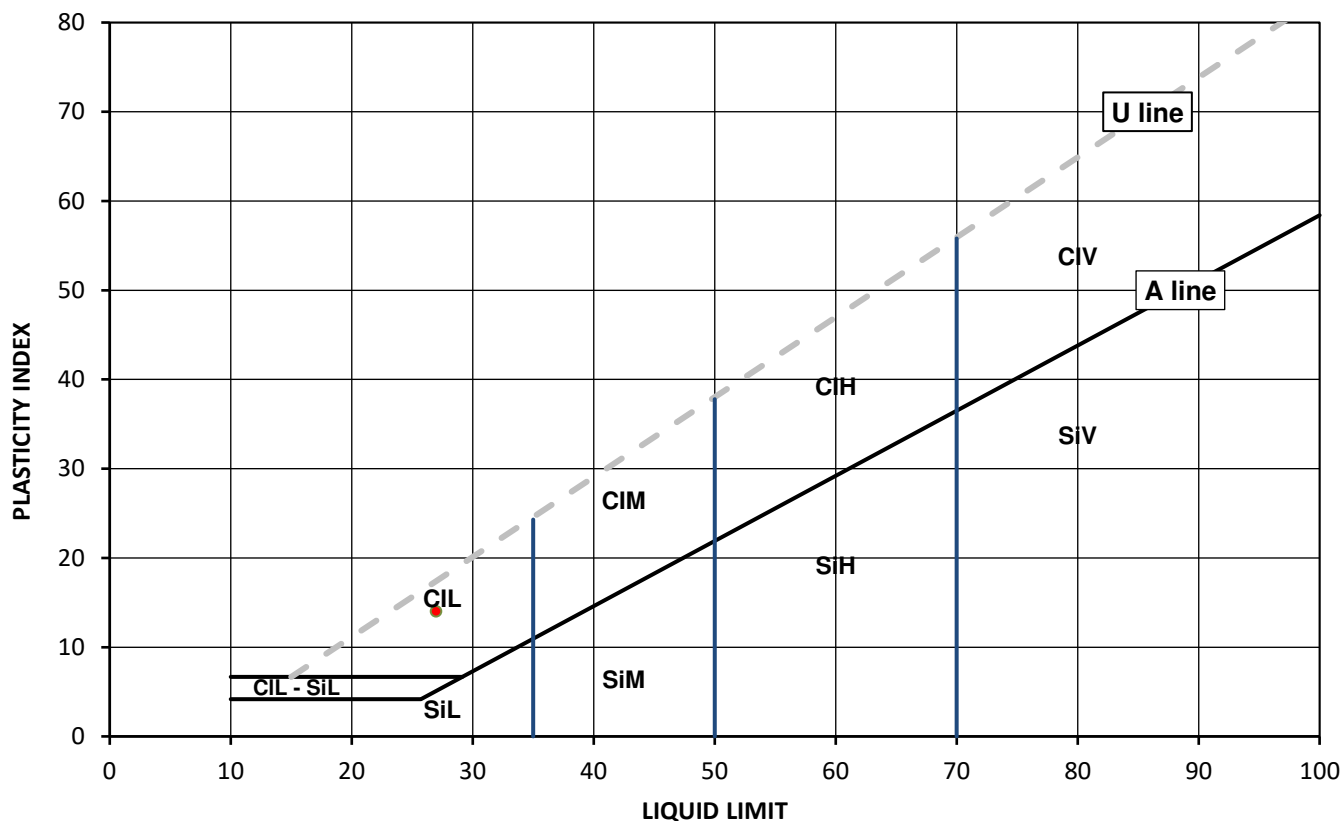
Test Results:

Laboratory Reference: 2396785
 Hole No.: WS04
 Sample Reference: Not Given
 Sample Description: Brown very sandy CLAY

Depth Top [m]: 0.70
 Depth Base [m]: 1.00
 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
13.7	27	1.015	13	14	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
		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)

Remarks:

Signed:

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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: Coral McShane
Site Address: Spurr House, Bury

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); PD by BS 1377-2: 1990: Clause 8.2

Client Reference: C5102
Job Number: 22-79278
Date Sampled: 17/08/2022
Date Received: 22/08/2022
Date Tested: 30/08/2022
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	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														
2396782	WS01	Not Given	0.25	0.75	D	Brown slightly gravelly very sandy CLAY	Atterberg 1 Point	14.9	97	31	1.015	15	16	80g/30 deg	N/A			
2396783	WS02	Not Given	1.10	1.40	D	Brown slightly gravelly very sandy CLAY	Atterberg 1 Point	15.8	96	29	1.015	15	14	80g/30 deg	N/A			
2396784	WS03	Not Given	0.30	0.60	D	Brownish grey slightly gravelly very sandy CLAY	Atterberg 1 Point	20.8	91	32	1.015	16	16	80g/30 deg	N/A			
2396785	WS04	Not Given	0.70	1.00	D	Brown very sandy CLAY	Atterberg 1 Point	13.7	100	27	1.015	13	14	80g/30 deg	N/A			

Note: # Non accredited; NP - Non plastic; I - The water content in the sample was increased ; D - The water content in the sample was decreased; * - 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:

Monika Siewior

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

Determination of Indicative CBR Value by Lightweight Deflectometer (LWD)

IAN 73/06 (2009 amendment), LWD Manufacturer's Manual and Barounis, N. & Smith, T. (2017)

Client: Bury Council
Site Name: Spurr House
Job Number: C5102
Date(s) Tested: 30/08/2022



www.brownfield-solutions.com
(+44) 0800 044 8025
info@brownfield-solutions.co.uk

Equipment: Terratest 4000 STREAM
Plate Size: 300mm
Drop Weight Mass: 10kg

Location	Depth (m)	Stratum Type	Brief Description	Evd (MN/m ²)	Poisson's Ratio	Ev1 (MN/m ²)	k ₃₀₀	k ₇₆₂	Estimated CBR (%)
CBR01	0.15	Made Ground - Granular/Coarse	Light brown sandy GRAVEL (sub-base).	48.5	0.15	48.13	156.81	69.00	14.8
CBR01	0.80	Made Ground - Granular/Coarse	Brown sandy GRAVEL with low cobble content.	22.8	0.15	19.00	61.91	27.24	3.0
CBR02	0.45	Made Ground - Cohesive/Fine	Light brown gravelly CLAY.	27.0	0.2	22.50	72.00	31.68	3.8
CBR03	0.50	Made Ground - Cohesive/Fine	Light brown gravelly CLAY.	5.5	0.2	4.58	14.67	6.45	0.2
CBR03	0.80	Natural - Cohesive/Fine	Light brown slightly gravelly CLAY.	6.1	0.2	5.08	16.27	7.16	0.3
CBR03	1.00	Natural - Cohesive/Fine	Light brown slightly gravelly CLAY.	7.5	0.2	6.25	20.00	8.80	0.4
CBR04	0.50	Made Ground - Cohesive/Fine	Dark brown slightly sandy slightly gravelly CLAY.	16.6	0.2	13.83	44.27	19.48	1.7
CBR05	0.50	Made Ground - Cohesive/Fine	Dark brown slightly sandy slightly gravelly CLAY.	8.1	0.2	6.75	21.60	9.50	0.5
CBR06	0.50	Made Ground - Cohesive/Fine	Light brown slightly gravelly CLAY.	56.1	0.2	46.75	149.60	65.82	13.7

Compiled By: PH

Signature:

Checked By: NS

Signature:

Date: 31/08/22

APPENDIX E

Monitoring Results

TEST DATE AND CONDITIONS	
Date	9/12/21
Atmospheric pressure	987 mb
Ambient Temp	21.7 °C
EnviroNics Serial No.	N/A

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



GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS			
SO Number	Instrument Banner	Instrument Serial Number + SW Version	Job Number(s)
329746	GFM436	13233/27-10	22521

Calibration Technician *[Signature]*

DATE 7-12-21

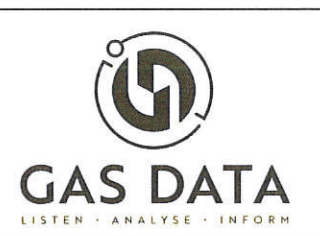
Inspection Technician *[Signature]*

DATE 9/12/21

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable(NA)	INSTRUMENT PACKING LIST		Tick if included
Function Tests	Dust Caps Fitted	P	Instrument		✓
	Keyboard Test (All keys)	P	Leather Case		✓
	Backlight Test	P	Instrument Strap		✓
	Clock Set / Running	P	AC Battery Charger (UK)		X
	Comms Test	P	AC Battery Charger (EURO)		X
	Pump Flow Test (In & Out)	P	AC Battery Charger (US)		X
	Overall Leak Test (30mb)	N/A	AC Battery Charger (AUS)		X
	Battery Charge Test	P	Gas Sample Pipe		✓
	Service Date set to?	4/12/22	Hard Carry Case		X
Channel Tests	Data Logging Enabled?	P	Spares Pot		X
	Verify CH4/LEL/Hexane/PID	P	Allen Key		X
	Verify CO2	P	Flow Sample Pipe		✓
	Verify O2	P	Temperature Probe		X
	Verify H2S	P	Vane Anemometer		X
	Verify CO	P	USB Cable		X
	Verify LEL	P	USB Memory Stick		X
	Verify 1st Option gas	N/A	SM V5 Software	Ver	X
	Verify atmospheric pressure	P	Internal Filter Pack	Qty 1	✓
	Verify differential pressure	P	External Filter Pack	Qty	X
	Verify flow	P	Field Guide		X
	Verify temperature probe input	P	Extra Items:		
	Verify vane anemometer input	P			
DataBase Checks	Jobcard(s) completed and signed	P			
	Jobcard(s) booked off database	P			
	Calibration certificate completed	P			
	Complete & print QI record	N/A			
Label Checks	No. of Calibration label fitted	10499	Comments		
	MCERTS label not displayed	P			
	Warranty label fitted	P			
H2S Range	H2S Range from SO	50000 ppm			
	H2S Range from cal cert	50000 ppm			
	Over-range value correct?	P			

TEST DATE AND CONDITIONS	
Date	07/12/21
Atmospheric pressure	974mb
Ambient Temp	21.9°C
EnviroNics Serial No.	2518

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



GFM436-1 FINAL INSPECTION & CALIBRATION CHECK CERTIFICATE

INSTRUMENT DETAILS	
Serial No	Customer
13233	Brownfield Solutions Ltd

INSTRUMENT CHECKS			
Keyboard	✓	Pump Flow	500cc/min
Display Contrast	✓	Pump Flow @ -200mB	325cc/min
Clock Set / Running	✓	S/W Version	G436.0027/0010
Labels Fitted	✓	Recalibration Date	07/12/22

GAS CHECKS							
Calibration Gas		Instrument Gas Channels Read					
Gas Type	Applied Conc.	CH4 (%)	tol. (% vol.)	CO2 (%)	tol. (% vol.)	O2 (%)	tol. (% vol.)
N2	100%	0.0	0.0	0.0	0.0	0.0	+/-0.1
CH4	5%	5.0	+/-0.3	0.0	0.0	0.0	+/-0.1
	60%	59.8	+/-3.0	0.0	0.0	0.0	+/-0.1
CO2	5%	0.0	0.0	5.0	+/-0.3	0.0	+/-0.1
	40%	0.0	0.0	39.9	+/-3.0	0.0	+/-0.1
O2	20.9%	0.0	0.0	0.1	+0.1	20.9	+/-0.5

OPTIONAL GAS CHECKS							
Calibration Gas		Instrument Gas Channels Read					
Gas Type	Applied Conc.	Label	H2S	CO		Hexane	tol. (% vol.)
		Range	5000ppm	2000ppm		2.00%	
N2	100%		0	0		0	0.0
H2S	1500ppm		1500	0			+/- 5.0
CO	1000ppm		80	1005			+/- 5.0
Hexane	2.00%					1.922	+/- 10.0

PRESSURE CHECKS							
Calibration Pressure		Instrument Pressure Channels Read					
Pressure @	Applied Pressure	Atmospheric [Ap] (mB)	tol. (mB)	Static [Sp] (mB)	tol. (mB)		
All Ports	Current Atmospheric	972	+/-2.0		0.0		
Ap Port (Internal)	+800mB(a)	799	+/-5.0		0.0		
	+1200mB(a)	1202	+/-5.0		0.0		

Ground Gas Monitoring Results



CLIENT:	Date	Operator	Analysr	Weather Observations			Temp (°C)	Pressure Trend	Min Barometric Pressure (mb)	Notes
BURY COUNCIL	02/09/2022	CGM	GFM 436	Sunny	No wind	Warm	21	Falling	1013	
JOB NO.	20/09/2022	CGM	GFM 436	Overcast	No wind	Cool	14	Rising	1011	
C5102	04/10/2022	CGM	GFM 436	Sunny	Light breeze	Cool	13	Falling	996	
SITE:	28/10/2022	CGM	GFM 436	Overcast	Light breeze	Warm	18	Rising	998	
SPURR HOUSE, BURY										

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

Date	Time	Location	Response zone (m)	Pressures (mb)		Gas flows (l/hr)		CH ₄ (%v/v)		CH ₄ (%LEL)		CO ₂ (%v/v)		O ₂ (%v/v)		Other Gases (PPM)			Depth to Water (m)	Well Base (m)	Gas Screening Value (CH ₄) (l/hr)	Gas Screening Value (CO ₂) (l/hr)	Notes	
				Atmospheric Pressure	Relative Well Pressure	Initial	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	CO	H ₂ S	TVOC (PID)						
				Summary Statistics																				
Max. values:				1013	0.0	47.3	0.1	0.2	0.1	4.0	2.0	7.8	3.9	20.6	20.0	0.0	0.0	0.0	4.1	5.0	#VALUE!	#VALUE!		
Min. values:				996	-62.0	-0.6	0.0	0.0	0.1	0.0	2.0	0.0	0.2	3.0	11.5	0.0	0.0	0.0	2.2	2.9	#VALUE!	#VALUE!		
				Worst-case GSVs based on maximum recorded steady flow and maximum individual peak concentrations:																		0.000	0.008	
02/09/2022	AM	Ambient		1013				0.1		2.0		0.1		20.5		0.0	0.0					Bung stuck		
		WS01	1.00-5.00	1013	0.0	0.1	0.1	0.1	0.1	2.0	2.0	2.2	0.7	18.0	20.0	0.0	0.0	/	3.20	4.94	0.000		0.002	
		WS02	1.00-5.00	1013	0.0	0.1	0.1	0.2	0.1	4.0	2.0	2.2	0.7	15.6	19.1	0.0	0.0	/	4.09	5.00	0.000		0.002	
		WS03	1.00-4.00	1013	0.0	0.1		0.1		2.0		4.0		10.3		0.0	0.0	/	NA	NA				
02/09/2022	AM	Ambient		1013																				
20/09/2022	AM	Ambient		1011				0.0		0.0		0.0		20.6		0.0	0.0							
		WS01	1.00-5.00	1011	-62.0	0.5	0.1	0.1	0.1	2.0	2.0	5.6	0.2	11.7	19.1	0.0	0.0	/	3.29	4.96	0.000	0.006		
		WS02	1.00-5.00	1011	-54.0	0.6	0.1	0.1	0.1	2.0	2.0	1.7	0.9	17.4	19.1	0.0	0.0	/	3.92	5.00	0.000	0.002		
		WS03	1.00-4.00	1011	0.0	0.1	0.1	0.1	0.1	2.0	2.0	1.3	0.4	17.4	19.6	0.0	0.0	/	2.60	2.95	0.000	0.001		
20/09/2022	AM	Ambient		1011																				
04/10/2022	AM	Ambient		996				0.1		2.0		0.1		20.5		0.0	0.0							
		WS01	1.00-5.00	996	0.0	-0.6	0.1	0.1	0.1	2.0	2.0	6.9	1.5	7.7	18.7	0.0	0.0	/	3.20	4.95	0.000	0.007		
		WS02	1.00-5.00	996	0.0	0.1	0.1	0.1	0.1	2.0	2.0	5.0	0.8	6.9	18.5	0.0	0.0	/	3.90	4.95	0.000	0.005		
		WS03	1.00-4.00	996	0.0	1.0	0.1	0.1	0.1	2.0	2.0	0.5	0.5	19.3	20.0	0.0	0.0	/	2.53	2.95	0.000	0.001		
04/10/2022	AM	Ambient		996																				
28/10/2022	AM	Ambient		998				0.1		0.0		0.1		20.4										
		WS01	1.00-5.00	998	0.0	47.3	0.0	0.1	0.1	2.0	2.0	7.8	3.9	3.6	13.3	0.0	0.0	/	2.98	4.90	0.000	0.000		
		WS02	1.00-5.00	998	0.0	0.1	0.1	0.1	0.1	2.0	2.0	5.4	3.2	3.0	11.5	0.0	0.0	/	3.70	4.94	0.000	0.005		
		WS03	1.00-4.00	998	0.0	0.1	0.1	0.1	0.1	2.0	2.0	1.8	0.7	18.2	19.4	0.0	0.0	/	2.16	2.89	0.000	0.002		
28/10/2022	AM	Ambient		998				0.1		2.0		0.1		20.4										

APPENDIX F

Waste Assessment Report

Waste Classification Report

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

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



05W3K-ZA96V-7BNIO

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

Job name

Spurr House, Bury[1]

Description/Comments

Project

C5102

Site

Spurr House, Bury

Classified by

Name: **Matthew Shore**
Date: **20 Sep 2022 15:11 GMT**
Telephone: **01606334844**
Company: **Brownfield Solutions Limited**
Brownfield Solutions Ltd
173-183 Witton Street
Northwich
CW9 5LP

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

HazWasteOnline™ Certification:

CERTIFIED

Course
Hazardous Waste Classification

Date
07 Oct 2021

Next 3 year Refresher due by Oct 2024

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	WS01	0.05-0.21	Non Hazardous		2
2	WS02	0.35-0.65	Non Hazardous		4
3	WS03	0.05-0.26	Non Hazardous		6
4	WS04	0.10-0.26	Hazardous	HP 14	8
5	HP02	0.10-0.30	Hazardous	HP 14	10
6	HP03	0.10-0.40	Hazardous	HP 7, HP 10, HP 14	12

Related documents

#	Name	Description
1	BSL Suite	waste stream template used to create this Job

Report

Created by: Matthew Shore

Created date: 20 Sep 2022 15:11 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	15
Appendix B: Rationale for selection of metal species	16
Appendix C: Version	16



Classification of sample: WS01

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

Sample details

Sample name:	LoW Code:
WS01	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.05-0.21 m	
Moisture content:	
6.1%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 6.1% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	pH				8.5 pH		8.5 pH	8.5 pH		
2	arsenic { arsenic trioxide }				33 mg/kg	1.32	40.913 mg/kg	0.00409 %	✓	
	033-003-00-0	215-481-4	1327-53-3							
3	cadmium { cadmium sulfide }			1	<0.2 mg/kg	1.285	<0.257 mg/kg	<0.00002 %		<LOD
	048-010-00-4	215-147-8	1306-23-6							
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308 mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				21 mg/kg	1.462	28.82 mg/kg	0.00288 %	✓	
		215-160-9	1308-38-9							
6	copper { dicopper oxide; copper (I) oxide }				190 mg/kg	1.126	200.87 mg/kg	0.0201 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	160 mg/kg		150.24 mg/kg	0.015 %	✓	
	082-001-00-6									
8	mercury { mercury dichloride }				0.3 mg/kg	1.353	0.381 mg/kg	0.0000381 %	✓	
	080-010-00-X	231-299-8	7487-94-7							
9	nickel { nickel dihydroxide }				36 mg/kg	1.579	53.393 mg/kg	0.00534 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]							
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		<LOD
	034-002-00-8									
11	zinc { zinc oxide }				140 mg/kg	1.245	163.63 mg/kg	0.0164 %	✓	
	030-013-00-7	215-222-5	1314-13-2							
12	naphthalene				1 mg/kg		0.939 mg/kg	0.0000939 %	✓	
	601-052-00-2	202-049-5	91-20-3							
13	acenaphthylene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8							
14	acenaphthene				0.37 mg/kg		0.347 mg/kg	0.0000347 %	✓	
		201-469-6	83-32-9							
15	fluorene				0.24 mg/kg		0.225 mg/kg	0.0000225 %	✓	
		201-695-5	86-73-7							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	phenanthrene	201-581-5	85-01-8		3.5 mg/kg		3.287 mg/kg	0.000329 %	✓	
17	anthracene	204-371-1	120-12-7		0.96 mg/kg		0.901 mg/kg	0.0000901 %	✓	
18	fluoranthene	205-912-4	206-44-0		7.5 mg/kg		7.043 mg/kg	0.000704 %	✓	
19	pyrene	204-927-3	129-00-0		7.2 mg/kg		6.761 mg/kg	0.000676 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		5.2 mg/kg		4.883 mg/kg	0.000488 %	✓	
21	chrysene	601-048-00-0	205-923-4		3.5 mg/kg		3.287 mg/kg	0.000329 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		5.1 mg/kg		4.789 mg/kg	0.000479 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		1.7 mg/kg		1.596 mg/kg	0.00016 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		4.8 mg/kg		4.507 mg/kg	0.000451 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		2.6 mg/kg		2.441 mg/kg	0.000244 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.71 mg/kg		0.667 mg/kg	0.0000667 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		3.2 mg/kg		3.005 mg/kg	0.0003 %	✓	
28	phenol	604-001-00-2	203-632-7		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
29	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5			<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
Total:								0.069 %		

Key

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



Classification of sample: WS02

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

Sample details

Sample name:	LoW Code:
WS02	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.35-0.65 m	
Moisture content:	
11%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 11% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	pH		PH		8.5 pH		8.5	pH	8.5 pH		
2	arsenic { arsenic trioxide }				9.2 mg/kg	1.32	10.811	mg/kg	0.00108 %	✓	
	033-003-00-0	215-481-4	1327-53-3								
3	cadmium { cadmium sulfide }			1	1.6 mg/kg	1.285	1.83	mg/kg	0.000142 %	✓	
	048-010-00-4	215-147-8	1306-23-6								
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				17 mg/kg	1.462	22.113	mg/kg	0.00221 %	✓	
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				32 mg/kg	1.126	32.065	mg/kg	0.00321 %	✓	
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	90 mg/kg		80.1	mg/kg	0.00801 %	✓	
	082-001-00-6										
8	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7								
9	nickel { nickel dihydroxide }				12 mg/kg	1.579	16.869	mg/kg	0.00169 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8										
11	zinc { zinc oxide }				490 mg/kg	1.245	542.82	mg/kg	0.0543 %	✓	
	030-013-00-7	215-222-5	1314-13-2								
12	naphthalene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3								
13	acenaphthylene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8								
14	acenaphthene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9								
15	fluorene				<0.05 mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7								



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	phenanthrene	201-581-5	85-01-8		0.43 mg/kg		0.383 mg/kg	0.0000383 %	✓	
17	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
18	fluoranthene	205-912-4	206-44-0		0.59 mg/kg		0.525 mg/kg	0.0000525 %	✓	
19	pyrene	204-927-3	129-00-0		0.49 mg/kg		0.436 mg/kg	0.0000436 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		0.34 mg/kg		0.303 mg/kg	0.0000303 %	✓	
21	chrysene	601-048-00-0	205-923-4		0.25 mg/kg		0.223 mg/kg	0.0000222 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.19 mg/kg		0.169 mg/kg	0.0000169 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.24 mg/kg		0.214 mg/kg	0.0000214 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.23 mg/kg		0.205 mg/kg	0.0000205 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
27	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
28	phenol	604-001-00-2	203-632-7		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
29	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5			<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
Total:								0.0716 %		

Key

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



Classification of sample: WS03

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

Sample details

Sample name:	LoW Code:
WS03	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.05-0.26 m	
Moisture content:	
7.8%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 7.8% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	pH		PH		8 pH		8 pH	8pH		
2	arsenic { arsenic trioxide }				11 mg/kg	1.32	13.391 mg/kg	0.00134 %	✓	
	033-003-00-0	215-481-4	1327-53-3							
3	cadmium { cadmium sulfide }			1	2.4 mg/kg	1.285	2.844 mg/kg	0.000221 %	✓	
	048-010-00-4	215-147-8	1306-23-6							
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308 mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				17 mg/kg	1.462	22.908 mg/kg	0.00229 %	✓	
		215-160-9	1308-38-9							
6	copper { dicopper oxide; copper (I) oxide }				50 mg/kg	1.126	51.903 mg/kg	0.00519 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	320 mg/kg		295.04 mg/kg	0.0295 %	✓	
	082-001-00-6									
8	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
9	nickel { nickel dihydroxide }				18 mg/kg	1.579	26.213 mg/kg	0.00262 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]							
10	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		<LOD
	034-002-00-8									
11	zinc { zinc oxide }				1000 mg/kg	1.245	1147.626 mg/kg	0.115 %	✓	
	030-013-00-7	215-222-5	1314-13-2							
12	naphthalene				0.69 mg/kg		0.636 mg/kg	0.0000636 %	✓	
	601-052-00-2	202-049-5	91-20-3							
13	acenaphthylene				0.36 mg/kg		0.332 mg/kg	0.0000332 %	✓	
		205-917-1	208-96-8							
14	acenaphthene				0.36 mg/kg		0.332 mg/kg	0.0000332 %	✓	
		201-469-6	83-32-9							
15	fluorene				0.37 mg/kg		0.341 mg/kg	0.0000341 %	✓	
		201-695-5	86-73-7							



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
16	phenanthrene	201-581-5	85-01-8		4.2 mg/kg		3.872 mg/kg	0.000387 %	✓	
17	anthracene	204-371-1	120-12-7		1.2 mg/kg		1.106 mg/kg	0.000111 %	✓	
18	fluoranthene	205-912-4	206-44-0		9 mg/kg		8.298 mg/kg	0.00083 %	✓	
19	pyrene	204-927-3	129-00-0		8.8 mg/kg		8.114 mg/kg	0.000811 %	✓	
20	benzo[a]anthracene	601-033-00-9	200-280-6		5.2 mg/kg		4.794 mg/kg	0.000479 %	✓	
21	chrysene	601-048-00-0	205-923-4		4.2 mg/kg		3.872 mg/kg	0.000387 %	✓	
22	benzo[b]fluoranthene	601-034-00-4	205-911-9		4.1 mg/kg		3.78 mg/kg	0.000378 %	✓	
23	benzo[k]fluoranthene	601-036-00-5	205-916-6		2.7 mg/kg		2.489 mg/kg	0.000249 %	✓	
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		4.1 mg/kg		3.78 mg/kg	0.000378 %	✓	
25	indeno[123-cd]pyrene	205-893-2	193-39-5		2.3 mg/kg		2.121 mg/kg	0.000212 %	✓	
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.65 mg/kg		0.599 mg/kg	0.0000599 %	✓	
27	benzo[ghi]perylene	205-883-8	191-24-2		3.2 mg/kg		2.95 mg/kg	0.000295 %	✓	
28	phenol	604-001-00-2	203-632-7		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
29	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5			<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
Total:								0.161 %		

Key

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



Classification of sample: WS04

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample name:	LoW Code:
WS04	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 03 * (Soil and stones containing hazardous substances)
0.10-0.26 m	
Moisture content:	
11%	
(wet weight correction)	

Hazard properties

HP 14: Ecotoxic "waste which presents or may present immediate or delayed risks for one or more sectors of the environment"

Hazard Statements hit:

Aquatic Chronic 1; H410 "Very toxic to aquatic life with long lasting effects."

Because of determinands:

lead compounds with the exception of those specified elsewhere in this Annex: (Note 1 conc.: 0.103%)

zinc oxide: (compound conc.: 0.473%)

Determinands

Moisture content: 11% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	pH				8	pH		8	pH	8pH		
2	arsenic { arsenic trioxide }				14	mg/kg	1.32	16.451	mg/kg	0.00165 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
3	cadmium { cadmium sulfide }			1	12	mg/kg	1.285	13.726	mg/kg	0.00107 %	✓	
	048-010-00-4	215-147-8	1306-23-6									
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2	mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0									
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				20	mg/kg	1.462	26.016	mg/kg	0.0026 %	✓	
		215-160-9	1308-38-9									
6	copper { dicopper oxide; copper (I) oxide }				240	mg/kg	1.126	240.49	mg/kg	0.024 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	1157	mg/kg		1029.73	mg/kg	0.103 %	✓	
	082-001-00-6											
8	mercury { mercury dichloride }				<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
9	nickel { nickel dihydroxide }				14	mg/kg	1.579	19.681	mg/kg	0.00197 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
10	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8											
11	zinc { zinc oxide }				4272	mg/kg	1.245	4732.502	mg/kg	0.473 %	✓	
	030-013-00-7	215-222-5	1314-13-2									



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
12	naphthalene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
13	acenaphthylene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8							
14	acenaphthene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9							
15	fluorene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7							
16	phenanthrene				0.53 mg/kg		0.472 mg/kg	0.0000472 %	✓	
		201-581-5	85-01-8							
17	anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		204-371-1	120-12-7							
18	fluoranthene				0.74 mg/kg		0.659 mg/kg	0.0000659 %	✓	
		205-912-4	206-44-0							
19	pyrene				0.66 mg/kg		0.587 mg/kg	0.0000587 %	✓	
		204-927-3	129-00-0							
20	benzo[a]anthracene				0.39 mg/kg		0.347 mg/kg	0.0000347 %	✓	
	601-033-00-9	200-280-6	56-55-3							
21	chrysene				0.4 mg/kg		0.356 mg/kg	0.0000356 %	✓	
	601-048-00-0	205-923-4	218-01-9							
22	benzo[b]fluoranthene				0.37 mg/kg		0.329 mg/kg	0.0000329 %	✓	
	601-034-00-4	205-911-9	205-99-2							
23	benzo[k]fluoranthene				0.24 mg/kg		0.214 mg/kg	0.0000214 %	✓	
	601-036-00-5	205-916-6	207-08-9							
24	benzo[a]pyrene; benzo[def]chrysene				0.34 mg/kg		0.303 mg/kg	0.0000303 %	✓	
	601-032-00-3	200-028-5	50-32-8							
25	indeno[123-cd]pyrene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5							
26	dibenz[a,h]anthracene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
27	benzo[ghi]perylene				0.22 mg/kg		0.196 mg/kg	0.0000196 %	✓	
		205-883-8	191-24-2							
28	phenol				<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
29	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD
	006-007-00-5									
Total:								0.609 %		

Key

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



Classification of sample: HP02

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample name:	LoW Code:
HP02	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 03 * (Soil and stones containing hazardous substances)
0.10-0.30 m	
Moisture content:	
4.2%	
(wet weight correction)	

Hazard properties

HP 14: Ecotoxic "waste which presents or may present immediate or delayed risks for one or more sectors of the environment"

Hazard Statements hit:

Aquatic Chronic 1; H410 "Very toxic to aquatic life with long lasting effects."

Because of determinands:

dicopper oxide; copper (I) oxide: (compound conc.: 0.227%)

lead compounds with the exception of those specified elsewhere in this Annex: (Note 1 conc.: 0.211%)

zinc oxide: (compound conc.: 0.708%)

Determinands

Moisture content: 4.2% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	pH				7.6 pH		7.6	pH	7.6 pH		
2	arsenic { arsenic trioxide }				43 mg/kg	1.32	54.389	mg/kg	0.00544 %	✓	
	033-003-00-0	215-481-4	1327-53-3								
3	cadmium { cadmium sulfide }			1	19 mg/kg	1.285	23.394	mg/kg	0.00182 %	✓	
	048-010-00-4	215-147-8	1306-23-6								
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308	mg/kg	<0.000231 %		<LOD
	024-001-00-0	215-607-8	1333-82-0								
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				37 mg/kg	1.462	51.806	mg/kg	0.00518 %	✓	
		215-160-9	1308-38-9								
6	copper { dicopper oxide; copper (I) oxide }				2107.6 mg/kg	1.126	2273.26	mg/kg	0.227 %	✓	
	029-002-00-X	215-270-7	1317-39-1								
7	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	2203.4 mg/kg		2110.857	mg/kg	0.211 %	✓	
	082-001-00-6										
8	mercury { mercury dichloride }				0.4 mg/kg	1.353	0.519	mg/kg	0.0000519 %	✓	
	080-010-00-X	231-299-8	7487-94-7								
9	nickel { nickel dihydroxide }				32 mg/kg	1.579	48.421	mg/kg	0.00484 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
10	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
	034-002-00-8										



#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number								
11	 zinc { zinc oxide }	030-013-00-7	215-222-5	1314-13-2		5939.6 mg/kg	1.245	7082.593 mg/kg	0.708 %	✓		
12	naphthalene	601-052-00-2	202-049-5	91-20-3		0.96 mg/kg		0.92 mg/kg	0.000092 %	✓		
13	 acenaphthylene		205-917-1	208-96-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD	
14	 acenaphthene		201-469-6	83-32-9		2.5 mg/kg		2.395 mg/kg	0.00024 %	✓		
15	 fluorene		201-695-5	86-73-7		1.5 mg/kg		1.437 mg/kg	0.000144 %	✓		
16	 phenanthrene		201-581-5	85-01-8		15 mg/kg		14.37 mg/kg	0.00144 %	✓		
17	 anthracene		204-371-1	120-12-7		1.8 mg/kg		1.724 mg/kg	0.000172 %	✓		
18	 fluoranthene		205-912-4	206-44-0		15 mg/kg		14.37 mg/kg	0.00144 %	✓		
19	 pyrene		204-927-3	129-00-0		12 mg/kg		11.496 mg/kg	0.00115 %	✓		
20	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		5.9 mg/kg		5.652 mg/kg	0.000565 %	✓		
21	chrysene	601-048-00-0	205-923-4	218-01-9		6 mg/kg		5.748 mg/kg	0.000575 %	✓		
22	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		5.8 mg/kg		5.556 mg/kg	0.000556 %	✓		
23	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		2.9 mg/kg		2.778 mg/kg	0.000278 %	✓		
24	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		5 mg/kg		4.79 mg/kg	0.000479 %	✓		
25	 indeno[123-cd]pyrene		205-893-2	193-39-5		2.5 mg/kg		2.395 mg/kg	0.00024 %	✓		
26	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.63 mg/kg		0.604 mg/kg	0.0000604 %	✓		
27	 benzo[ghi]perylene		205-883-8	191-24-2		3.1 mg/kg		2.97 mg/kg	0.000297 %	✓		
28	phenol	604-001-00-2	203-632-7	108-95-2		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD	
29	 cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }					<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %		<LOD	
	006-007-00-5											
Total:									1.172 %			

Key

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



Classification of sample: HP03

 **Hazardous Waste**
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample name:	LoW Code:
HP03	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 03 * (Soil and stones containing hazardous substances)
0.10-0.40 m	
Moisture content:	
3.9%	
(wet weight correction)	

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 2; H351 "Suspected of causing cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

lead compounds with the exception of those specified elsewhere in this Annex: (Note 1 conc.: 1.016%)

HP 10: Toxic for reproduction "waste which has adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring"

Hazard Statements hit:

Repr. 1A; H360Df "May damage the unborn child. Suspected of damaging fertility."

Because of determinand:

lead compounds with the exception of those specified elsewhere in this Annex: (Note 1 conc.: 1.016%)

HP 14: Ecotoxic "waste which presents or may present immediate or delayed risks for one or more sectors of the environment"

Hazard Statements hit:

Aquatic Chronic 1; H410 "Very toxic to aquatic life with long lasting effects."

Because of determinands:

lead compounds with the exception of those specified elsewhere in this Annex: (Note 1 conc.: 1.016%)

zinc oxide: (compound conc.: 4.598%)

Determinands

Moisture content: 3.9% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	pH				7 pH		7 pH	7pH		
2	arsenic { arsenic trioxide }				22 mg/kg	1.32	27.914 mg/kg	0.00279 %	✓	
3	cadmium { cadmium sulfide }			1	76 mg/kg	1.285	93.869 mg/kg	0.0073 %	✓	
4	chromium in chromium(VI) compounds { chromium(VI) oxide }				<1.2 mg/kg	1.923	<2.308 mg/kg	<0.000231 %		<LOD
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				27 mg/kg	1.462	37.923 mg/kg	0.00379 %	✓	



#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used	
		EU CLP index number	EC Number	CAS Number									
6		copper { dicopper oxide; copper (I) oxide }			1	250	mg/kg	1.126	270.495	mg/kg	0.027 %	✓	
		029-002-00-X	215-270-7	1317-39-1									
7		lead {  lead compounds with the exception of those specified elsewhere in this Annex }			1	10571	mg/kg		10158.731	mg/kg	1.016 %	✓	
		082-001-00-6											
8		mercury { mercury dichloride }			1	0.4	mg/kg	1.353	0.52	mg/kg	0.000052 %	✓	
		080-010-00-X	231-299-8	7487-94-7									
9		nickel { nickel dihydroxide }			1	22	mg/kg	1.579	33.394	mg/kg	0.00334 %	✓	
		028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
10		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }			1	<1	mg/kg	1.405	<1.405	mg/kg	<0.000141 %		<LOD
		034-002-00-8											
11		zinc { zinc oxide }			1	38440	mg/kg	1.245	45980.78	mg/kg	4.598 %	✓	
		030-013-00-7	215-222-5	1314-13-2									
12		naphthalene			1	<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
13		acenaphthylene			1	<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			205-917-1	208-96-8									
14		acenaphthene			1	<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-469-6	83-32-9									
15		fluorene			1	<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			201-695-5	86-73-7									
16		phenanthrene			1	0.43	mg/kg		0.413	mg/kg	0.0000413 %	✓	
			201-581-5	85-01-8									
17		anthracene			1	<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			204-371-1	120-12-7									
18		fluoranthene			1	0.65	mg/kg		0.625	mg/kg	0.0000625 %	✓	
			205-912-4	206-44-0									
19		pyrene			1	0.57	mg/kg		0.548	mg/kg	0.0000548 %	✓	
			204-927-3	129-00-0									
20		benzo[a]anthracene			1	0.42	mg/kg		0.404	mg/kg	0.0000404 %	✓	
		601-033-00-9	200-280-6	56-55-3									
21		chrysene			1	0.35	mg/kg		0.336	mg/kg	0.0000336 %	✓	
		601-048-00-0	205-923-4	218-01-9									
22		benzo[b]fluoranthene			1	0.36	mg/kg		0.346	mg/kg	0.0000346 %	✓	
		601-034-00-4	205-911-9	205-99-2									
23		benzo[k]fluoranthene			1	0.24	mg/kg		0.231	mg/kg	0.0000231 %	✓	
		601-036-00-5	205-916-6	207-08-9									
24		benzo[a]pyrene; benzo[def]chrysene			1	0.29	mg/kg		0.279	mg/kg	0.0000279 %	✓	
		601-032-00-3	200-028-5	50-32-8									
25		indeno[123-cd]pyrene			1	<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
			205-893-2	193-39-5									
26		dibenz[a,h]anthracene			1	<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
27		benzo[ghi]perylene			1	0.23	mg/kg		0.221	mg/kg	0.0000221 %	✓	
			205-883-8	191-24-2									
28		phenol			1	<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
29		cyanides {  salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }			1	<1	mg/kg	1.884	<1.884	mg/kg	<0.000188 %		<LOD
		006-007-00-5											
Total:											5.659 %		



Key

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

Appendix A: Classifier defined and non GB MCL determinands

• pH (CAS Number: PH)

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

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

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

• lead compounds with the exception of those specified elsewhere in this Annex

GB MCL index number: 082-001-00-6
Description/Comments: Least-worst case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following MCL protocols, considers many simple lead compounds to be Carcinogenic category 2
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium
www.reach-lead.eu/substanceinformation.html. Review date 29/09/2015

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case species based on hazard statements

cadmium {cadmium sulfide}

Worst case species based on hazard statements

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case species based on hazard statements

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

Worst case species based on hazard statements

copper {dicopper oxide; copper (I) oxide}

Most likely common species

lead {lead compounds with the exception of those specified elsewhere in this Annex}

The absence of chromium VI within the soil samples indicates that lead chromate could not be present within the site soils. Given this the next most conservative lead species has been selected.

mercury {mercury dichloride}

Worst case species based on hazard statements

nickel {nickel dihydroxide}

Worst case species based on hazard statements

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

Worst case species based on hazard statements

zinc {zinc oxide}

The absence of chromium VI within the soil samples indicates that zinc chromate could not be present within the site soils. Given this the next most conservative zinc species has been selected.

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

Worst case species

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2022.261.5334.9968 (18 Sep 2022)
HazWasteOnline Database: 2022.261.5334.9968 (18 Sep 2022)



This classification utilises the following guidance and legislation:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

GB MCL List - version 1.1 of 09 June 2021

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