



**PHASE 2 GROUND INVESTIGATION:
PINFOLD LANE, PRESTWICH**

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GroundSolve Ltd

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This report is confidential to the Client and GroundSolve Ltd accepts no responsibility whatsoever to third parties to whom this report is presented.

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1 INTRODUCTION

GroundSolve Ltd (GSL) was commissioned by Wyvern Partnership LLP (WP/ “the Client”) on behalf of the owner of the site to carry out a ground investigation to provide geotechnical information on ground conditions for an existing building off Pinfold Lane, Prestwich(the “Site”), see **Appendix A** for drawings.

This report has been devised to generally comply with the relevant principles and requirements of a range of guidance including:

- Part IIA of the Environment Protection Act, 1990;
- BS5930:2015 +A1:2020: “Code of practice for site investigations”;
- BS10175: 2011 +A2:2017 “Investigation of Potentially Contaminated Sites - Code of Practice”;
- The Building Regulations 2010. Part C (HM Government 2013)
- Environment Agency: Land Contamination Risk Management (LCRM), Version 3, October 2020;
- Environment Agency (2017) “The Environment Agency’s Approach to Groundwater Protection” November 2018 Version 1.2;

1.1 Proposed Development

The proposed development comprises the demolition of the existing building, with the construction of a new building with parking facilities, hardstanding surfaces and landscaped areas.

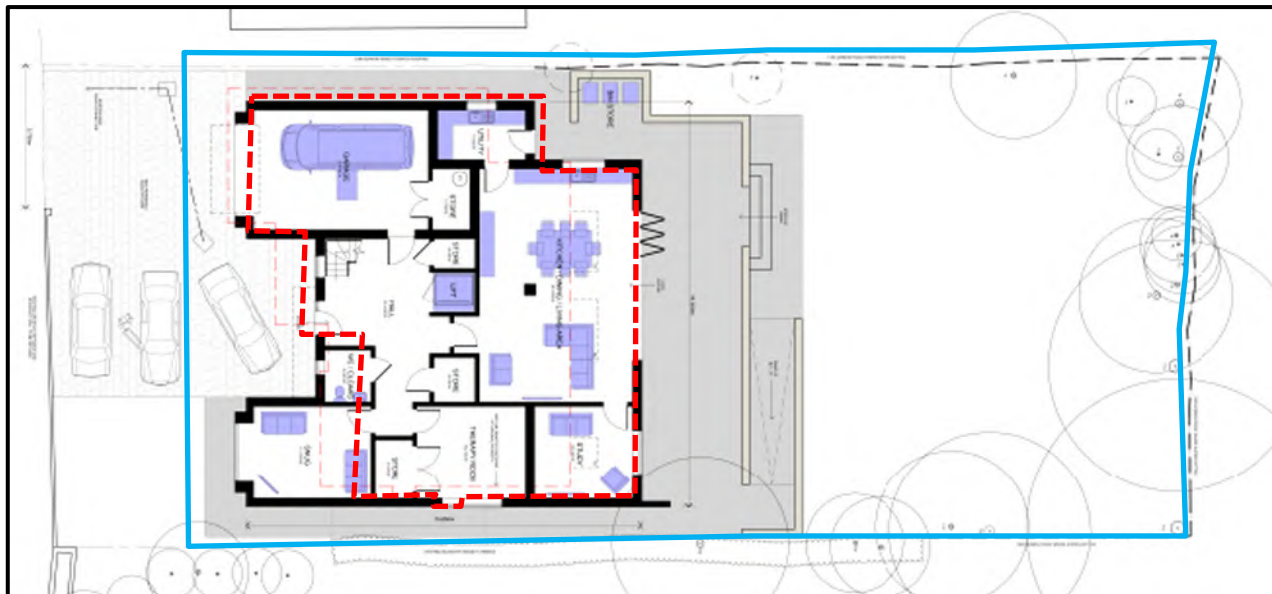


Figure 1 - Extract from the Proposed Development Plan

1.2 Objectives

The purpose of the report is to provide an assessment of the site using published information and information on conditions at the site in relation to the proposed residential development.

The findings and conclusions of the risk assessments have been set out and recommendations given for the proposed residential end use. If there is a subsequent change in the proposed land, the risk assessments and conclusions should be reviewed to determine whether they are still applicable for the revised end use.

This document is a working document and may need to be updated, in agreement with the relevant regulatory bodies, at any stage during development dependent on the conditions encountered.

1.3 Previous Investigations

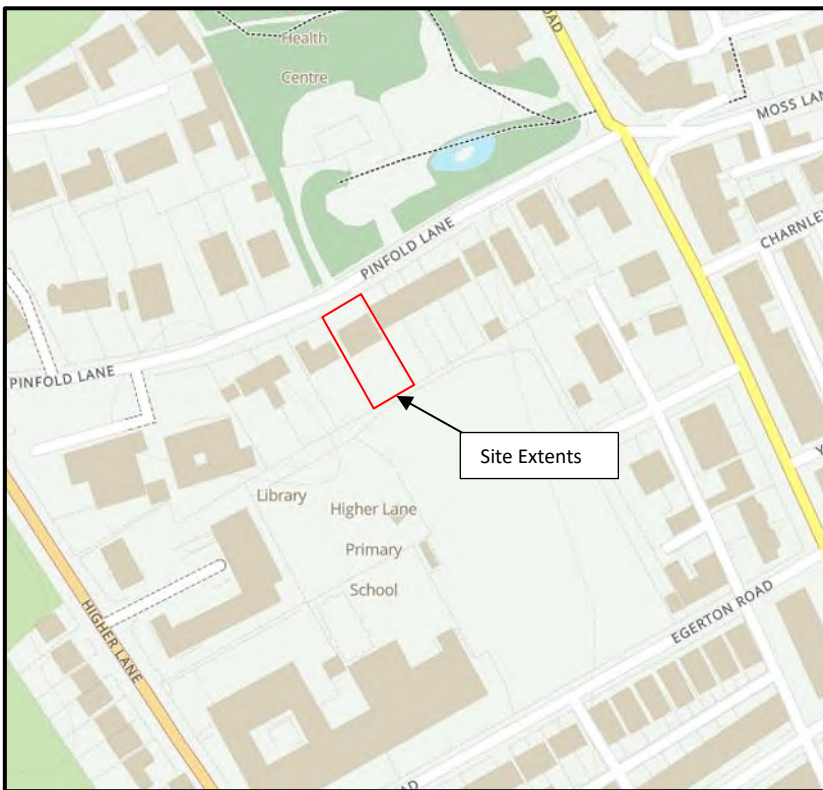
Groundsolve Ltd carried out a Phase1 Risk Assessment Report dated 21st June 2023. A summary of the report is provided in Section 3.

1.4 Limitations

This report has been prepared for the sole use of Wyvern Partnership LLP. No other third party may rely upon or reproduce the contents of this report without the written approval of GroundSolve Ltd. If any unauthorised third party comes into possession of this report, they rely on it entirely at their own risk.

2 SITE DETAILS AND DESCRIPTION

Table 2.1 Current Site Overview.

Site name	Pinfold Lane, Prestwich
Site address	Pinfold Lane, Park Lane, Whitefield, Bury, Greater Manchester, England, M45 7NY
National Grid Reference (NGR)	SD 80534 05648
Approximate Site area	0.09ha
Site shape	Rectangle
	 Figure 2 - Site Extents
Current land use on the Site	The property on site is currently vacant
Surrounding land uses	To the north is residential properties and a grassed area with mature trees. To the east and west are residential properties, with a school playing field to the south.
General topography and ground levels	The topography levels at the front of the site on the northern boundary are 110mAOD. The site slopes gently to the southern boundary which lies at an elevation of 109mAOD. The existing building level is at an elevation of 110mAOD.

3 PREVIOUS INVESTIGATION

3.1 Historic Summary

A previous Phase 1 Risk Assessment was undertaken by Groundsolve Ltd (GSL2940R01 dated June 2023). A summary of the findings from the report is given below:

Table 3.1 Summary of main findings from the previous reports.

Site History	The site prior to 1900 comprised of agricultural fields/grassland with a pond approximately 50m south and another pond 20m north. Pinfold Lane and some residential properties to the east and north west have already been constructed. By 1932 the pond south of the site has been infilled and a playing field constructed. More residential construction took place surrounding the site in 1947 with the pond north of the site being infilled by 1960. The existing property was constructed on site between 1960 and 2000
Geological Setting	Superficial deposits – Glacial Till Pennine Middle Coal Measures Formation (Sandstone, Siltstone, Mudstone) with Nob End Rock (Sandstone) to the south. Nearest fault 140m north.
Mining	The site is in a coal reporting mining area but outside the high risk development area.
Hydrogeology	The bedrock is classified as a Secondary Aquifer of low vulnerability. The closest abstraction is 261m southwest and related to historical borehole at Whitefield Golf Club for spray irrigation. • Pond present 75m northeast, • There are no surface water abstractions within 500m of the Site,
Waste	• There are no present or historical landfills within 250m.
Contamination Sources	• Made ground from the construction and demolition of the existing building. • The house appears not to have a working coal fire, therefore the risk of coal ashes spread on to garden areas is considered low. • Made ground from construction of buildings, playing fields and roads adjacent to the site which may overspill onto site. • Infilled ponds

4 FIELDWORK

4.1 Introduction

The fieldwork was carried out on 23rd October 2023. GroundSolve personnel were present to supervise all work, describe the ground encountered, and take samples. Fieldwork procedures were undertaken in accordance with the relevant sections of:

- BS5930:2015 + A1:2020 "Code of Practice for Site Investigations;"
- BS10175:2011 + A2:2017 "Investigation of Potentially Contaminated Sites – Code of Practice."

The investigation included:

- 5 No. windowless sample boreholes to a maximum depth of 5.45mBGL,
- 1 No. falling head test conducted across 1 of the windowless sample boreholes,
- Sampling for chemical and geotechnical testing of soils,
- Description of the ground encountered in accordance with BS5930:2015 + A1:2020, Code of Practice for Site Investigations.

Locations of exploratory holes are presented in **Appendix A**, with a photographic survey presented in **Appendix B**.

4.2 Dynamic (Windowless) Sample Boreholes

Five windowless sample boreholes (WS) were completed using a tracked windowless sample rig.

Standard Penetration Tests (SPTs) were carried out at 1.0m intervals in the holes in general accordance with BS EN ISO 22476-3:2005. Logs are presented in **Appendix C**.

4.3 Variable Head Permeability Tests

A single falling head permeability test was conducted within WS01. One cycle was undertaken over a period of three hours, however the water level failed to drop. The results are presented in **Appendix D**.

4.4 Samples and Sample Containers

Soil samples for chemical analysis each comprised a pair of samples: a plastic tub for metals and inorganics and an amber glass jar for organics.

Soil samples were stored in cool boxes with ice packs and dispatched directly to the testing laboratory, for all phases of the investigation.

Samples for physical testing comprised of disturbed tubs and bulk bags and were dispatched to the testing laboratory.

5 LABORATORY TESTING

5.1 Chemical Laboratory Testing

Chemical samples were submitted to a UKAS accredited laboratory in accordance with ISO17025 and are also MCERTS accredited for soil analysis in accordance with the Environment Agency's scheme. The laboratory carries out Quality Assurance and Quality Control in accordance with BS ISO 17025 and participate in external laboratory comparison and quality control schemes. Details of the accreditation and the methods of analysis are provided on the relevant test reports.

The selection of samples for laboratory testing and analytes to be determined were made based on the preliminary CSM and relevant observations during the investigations. The sample selection rationale is as follows:

- To gain a good coverage across the Site of the various material types and strata encountered;
- To investigate the specific locations of previous potentially contaminative land uses as identified within the Phase 1 desk study and subsequent CSM;
- To fully characterise the potential made ground materials within the identified higher-risk areas i.e. garden areas.

The selected soil samples were tested for a range of typical contamination indicators including specific tests for contaminants suspected as being present from the desk study, CSM, and observations made on-site. Tests were also performed which were used to support the modelling of contaminant transport and impacts (e.g. TOC) and for waste classification purposes.

Each of the soil samples were analysed for the 'total' concentration of a suite of potential contaminants.

The results of the laboratory analysis are summarised in **Appendix F**, with the full report presented in **Appendix E**. The various suites of analysis for the soil are presented in **Table 5.1** below:

Table 5.1: Suites of Analysis for Environmental Soil Samples

Determinand	Soil Suite 1
Number of Samples	3
Index Tests	
Asbestos Screen / Quantification	x
pH	x
Metals	
As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn (all totals)	x
Inorganics	
Acid Soluble Sulphate	x
Cyanide - Total	x
Sulphate (2:1 extract on soil samples)	x

Determinand	Soil Suite 1
Organics	
Phenols - Total (monohydric)	x
Total Organic Carbon (TOC)	x
PAH (Speciated USEPA 16)	x
Speciated TPH (C5-C35)	x
Benzene, Toluene, Ethyl Benzene, Xylenes (BTEX);	x

5.2 Physical Laboratory Testing

Samples were submitted to Professional Soils Laboratory (PSL) who are UKAS accredited in accordance with ISO17025. The following geotechnical testing was undertaken, the results of this testing are presented in **Appendix G**. The various suites of analysis for the soil are presented in **Table 5.2**:

Table 5.2: Summary of Physical Testing

Determinant	Samples Used in Testing
Atterberg	4
Moisture Content	4
BRE SD-1 Suite C	2

6 GROUND CONDITIONS

6.1 General

The site investigations have allowed the site-specific ground conditions to be described and this information was used to provide an improved conceptual ground model. The geology encountered during the site investigations was generally consistent with existing publicly available information online on the British Geological Survey (BGS) GeoIndex (onshore) viewer. A summary of the general strata encountered across the site is provided in **Table 6.1** below, with more detailed description given in the following sub sections.

Table 6.1: Summary of Strata Encountered

Geological Strata	Topsoil	Made Ground	Glacial Till
WS01	0.00 – 0.80	-	0.80 – 2.45
WS02	0.00 – 0.50	-	0.50 – 5.45
WS03	0.00 – 0.30	-	0.30 – 5.45
WS04	0.00 – 0.60	-	0.60 – 5.45
WS05	-	0.00 – 1.00	1.00 – 4.45

6.2 Ground Surface / Topsoil

Topsoil was encountered within four of the exploratory holes to a maximum depth of 0.80m bgl. The topsoil was generally described as loose black sandy slightly clayey silt and soft dark brown sandy slightly silty clay.

6.3 Anthropogenic Materials

Made ground was only encountered within WS05 and proven to a depth of 1.00m bgl. The made ground was generally described as soft black sandy slightly gravelly clay.

No visual or olfactory evidence of contamination was noted during the fieldwork.

6.4 Natural Deposits

The underlying natural drift deposits comprised Devensian (Glacial) Till proven to a depth of 5.45m bgl.

The Till typically comprises soft grey brown slightly sandy slightly gravelly clay to 1.5m overlying Firm brown slightly sandy slightly gravel clay proven to 5.45m. SPT N values range from 6 to >50, with subordinate layers of medium dense fine to coarse sand in WS02 and 05.

WS05 encountered brown fine to coarse sand from 2.0m to 2.4m. SPT N values was recorded as 4. It is considered that the SPT N value may have been affected by shallow groundwater, therefore, the SPT N is underestimated and does not fully reflect the insitu density.

Soil classification tests were carried out on the Till samples which revealed all such samples to be a clay of low to intermediate plasticity, with liquid limits ranging from 25% to 38%, plastic limits ranging from 14% to 18%, a plasticity index between 11% and 20%, and a moisture content ranging from 18% to 20%.

All results are presented in **Appendix G**.

6.5 Bedrock

Bedrock was not encountered during this investigation.

7 GENERIC QUANTITATIVE RISK ASSESSMENT

7.1 Assessment for the Protection of Human Health

The results of the soil analyses are presented below, where they have been compared to suitable generic assessment criteria (GACs), in order to allow a generic quantitative risk assessment (GQRA) to be carried out for the site and the proposed development.

The Category 4 Screening Levels (C4SLs) published by DEFRA (2014) have been adopted in the first instance, which have been published for six substances to date. Where a C4SL is unavailable, the “Suitable 4 Use Levels” (S4ULs) published by LQM/CIEH (2015) have been adopted.

These criteria have been derived using the CLEA model for a range of standard end-use scenarios and a range of soil organic matter (SOM) contents. It should be noted that the C4SL values are derived on the basis of a “low level of toxicological concern”, while the S4UL values are based on a “tolerable” or “minimal” level of risk. As such, the S4ULs describe a lower level of risk than the C4SLs, and are equivalent to the former Soil Guideline Values (SGVs, published by the Environment Agency) and the previous editions of the LQM/CIEH GAC values.

The GQRA is based on a soil with a Soil Organic Matter of 1.0%, for a residential (with gardens) end use.

A full summary of the chemical test results is presented in **Appendix E**.

None of the samples tested exceeded the SVG guidelines for Metals & Non-Metals, PAH, Petroleum Hydrocarbons or other contaminants.

Asbestos

Asbestos can be present in soil as fragments of bulk Asbestos Containing Materials (ACMs) (e.g., asbestos cement sheeting) and also as discrete asbestos fibres within the soil matrix. This investigation has carried out assessments to determine whether both bulk fragments of asbestos and discrete fibres are present in the soil at the site. The asbestos assessment commenced on site with inspection of the Made Ground by our site staff for the presence of bulk ACMs. During the fieldwork no suspected ACMs were identified.

Laboratory assessments were carried out in order to confirm the site assessment that ACMs were absent, and no asbestos was detected in any of the samples retrieved from site.

7.2 Assessment for the Protection of Controlled Waters

The total concentrations detected within soil samples are predominantly relatively marginal in human health terms and do not indicate particularly high concentrations which would be indicative of a significant source of groundwater contamination. There is a significant layer of low permeability Glacial Till below the Topsoil. Overall it is assessed that there is a low possibility of a contaminant linkage between the made ground and the underlying groundwater in the (Bedrock) Undifferentiated Aquifer.

Groundsolve believes that the site does not pose a significant risk to Controlled Water because:

- the site is underlain by low permeability Glacial Till;
- the groundwaters at and in the vicinity of the site are not abstracted for human consumption;
- the nearest surface water receptor is beyond 250m of the site with no credible contamination source or pathway; and;
- the concentrations of potential contaminants within the topsoil do not represent a significant source.

7.3 Permanent Ground Gases

There is no credible on-site ground gas source.

The site is not within a Coal Mining High Risk Development Area, therefore there is very low risk from underground mine gas.

There are a number of former ponds, which are potentially infilled with the closest infilled, according to the historical mapping, by 1932. Due to the age and volume of the fill material together with the lack of credible pathway (Glacial Clay) to the site, there is no risk to the proposed development from ground gases.

The site investigation identified no organic material and is directly underlain by Glacial Till mostly comprising impermeable clay, therefore, the risk from ground gases to the proposed development is negligible.

7.4 Risks to Human Health (Construction Phase)

During the construction works there will be a risk from dust to on-site workers and people occupying adjacent properties. Appropriate risk assessments should be carried out by the contractor to allow appropriate controls for the mitigation of risk to health of construction workers to be put in place. This risk can be controlled to within acceptable limits by:

- Method statement for site activities including control of dust generation;
- Having adequate site hygiene facilities allowing staff to keep a good level of personal hygiene;
- The method statement shall have a contingency plan which should be implemented if the presence of significantly elevated levels of lead is suspected in groundworks; and
- Only permitting smoking or eating on site in appropriate pre-designated areas.

As a minimum it is anticipated the works will be undertaken in accordance with BRE best practise guidance, and that the following measures will be introduced to assist with control of dust generation during the groundworks phase of the works:

- Access roads and any stockpiles created during groundworks should be regularly damped down with water;
- Vehicles used to transport materials/wastes and aggregates should be enclosed or tarpaulined;
- Vehicle movements and speed should be kept to a minimum within the site ;
- Dust generating equipment (e.g., mobile crushing and screening equipment) should be located to minimise potential nuisance impacts to receptors as far as practicable; and
- Minimising drop heights of all loading and unloading activities that involve the transfer of soils and demolition materials.

7.5 Conceptual Site Model

The proposed development comprises the demolition of the existing building, and the construction of a new building with parking facilities, hardstanding surfaces and landscaped areas.

The conceptual site model has been created from the findings of the Phase 2 site investigation which revealed the following general downward succession:

- Site surface: topsoil or Hardstanding;
- Made Ground (one location);
- Devensian Till: Encountered in all areas, comprising a layer of soft to firm grey mottled brown sandy slightly silty clay, firm to stiff brown slightly sandy clay and medium dense brown sand.

The potential contamination at the site has been assessed using the contaminant-pathway-receptor linkage approach. Following the site investigation, the plausible contaminant sources have been confirmed as low.

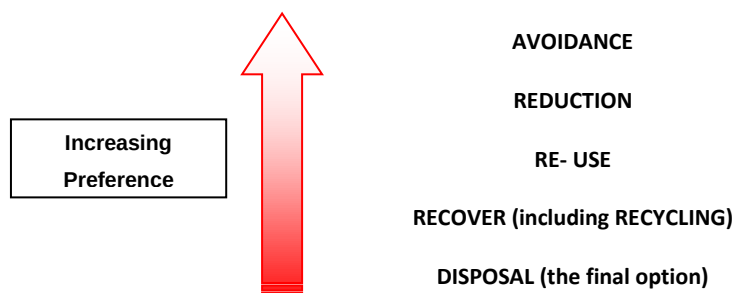
The results of site investigation and laboratory analysis generally record negligible to zero concentrations of potential contaminants, within the area of the proposed new building and landscaped or hardstanding areas.

Whilst unexpected contamination is not anticipated, the proposed development could encounter previously unrecorded hotspots of contaminants. These will be assessed and mitigated in accordance with current good practice.

8 WASTE ASSESSMENT

8.1 Waste Hierarchy

In accordance with government guidance, it is required that the production and disposal of waste is managed in accordance with the following hierarchy of preference:



8.2 Waste Characterisation and Classification

If there is a portion of excess soil this will then have to be sent to a suitable landfill site. A two-phase approach is required comprising:

- Waste Characterisation; and
- Waste Classification (Waste Acceptance Criteria).

Waste Characterisation

The results of the total concentrations from the chemical testing on soil samples have been assessed to determine whether or not they are hazardous in terms of waste classification. The results of this assessment indicate that the materials encountered during the investigation can be classified as non-hazardous.

Waste Classification

In order to determine whether soils can be sent to a licensed landfill for disposal further testing is required comprising landfill Waste Acceptance Criteria (WAC) analysis for both total concentrations for certain chemicals and for leachate analysis. No WAC testing was carried out as part of this investigation. WAC testing will have to be carried out to confirm the landfill waste classification and if any pre-treatment is required. This is best carried out once all material to be disposed of is stockpiled, and volumes can be accurately assessed. It should be noted that natural clay can be classified as Inert Waste 17 05 04: Soil and stones only (excluding topsoil, peat, soil and stones).

Testing Frequency

There are also set requirements for the required sampling and testing frequencies for materials being sent for disposal at landfills. The required testing frequencies for each different waste type are summarised in **Table 8.1** below.

Table 8.1: Laboratory Sampling Testing Frequencies

Testing Level	Quantity of Waste	Number of Samples	
		Homogeneous	Heterogeneous & New Wastes
Level 1 Characterisation (Description, Total Concentrations & Leaching)	<100T	2	5
	<500T	3	8
	<1000T	5	14
	10,000 T	11	22
	Per additional 10,000T	+5 pro rata	+10 pro rata
Level 2 Compliance For Regularly Generated Wastes (Total Concentrations & Leaching)		1 per defined waste sub-population per year	3 per defined waste sub-population per year
Level 3 Verification Delivery document & visual check Chemical testing as per Level 2 suite		Visual – Each Load	Visual – Each Load
		1 per year per waste stream	3 per year per waste stream

9 GEOTECHNICAL ASSESSMENT AND RECOMMENDATIONS

9.1 Fieldwork and Laboratory Data Review

The proposed development comprises the demolition of the existing building, with the construction of a new building with parking facilities, hardstanding surfaces and landscaped areas.

The topography levels at the front of the site on the northern boundary are 110mAOD. The sight slopes gently to the southern boundary which lies at an elevation of 109mAOD. The existing building level is at an elevation of 110mAOD.

No loading information has been provided for this report.

The shallow ground conditions predominantly comprise dark brown slightly silty sandy clay (topsoil) varying in thickness from 0.3m to 0.60m bgl. Made Ground is only encountered within one location of hardstanding and is generally absent within the landscaped areas. These materials will not be considered any further in this section.

The drift deposits have been confirmed to comprise firm becoming stiff brown sandy gravelly clay and medium dense brown sand proven to 5.45m.

The natural clay should prove suitable for conventional spread foundations (pads/strips). However, due to the presence of a range of trees, the depth of desiccation and the volume change potential of the clays will have to be considered in the design. The classification test results on the clay strata are summarised below:

Table 9.1: Summary of Classification Testing

Hole	Depth (m)	Moisture Content (%)	% passing 425um sieve	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Modified Plasticity Index	Plasticity	Volume Change Potential
WS02	0.80	18	94	28	15	13	12.22	Low	Low
WS03	1.10	20	94	38	18	20	18.80	Intermediate	Low
WS04	0.90	20	93	31	15	16	14.88	Low	Low
WS05	1.20	19	94	25	14	11	10.34	Low	Low
Minimum		18	93	25	14	11			
Average		19.25	93.75	30.50	15.5	15.0			
Maximum		20	94	38	18	20			

Testing indicates that the clays show evidence of desiccation with moisture contents lower than the plastic limits. The clays are low to intermediate plasticity and low volume change potential.

SPT N-values were recorded throughout each borehole and are summarised in **Table 9.2** below for the material encountered.

Table 9.2: Summary of SPT Results

Location	Depth (m bgl)	SPT N Values	Stratum	Estimated Undrained Shear strength (kPa) *
WS01	1.0	6	CLAY	30
	2.0	11	CLAY	55
WS02	1.0	7	CLAY	35
	2.0	11	CLAY	55
	3.0	14	SAND	n/a
	4.0	13	SAND	n/a
	5.0	16	SAND	n/a
WS03	1.0	11	CLAY	55
	2.0	10	CLAY	50
	3.0	21	CLAY	105
	4.0	15	CLAY	75
	5.0	17	CLAY	85
WS04	1.0	8	CLAY	40
	2.0	12	CLAY	60
	3.0	14	CLAY	70
	4.0	25	CLAY	125
	5.0	30	CLAY	150
WS05	1.0	8	CLAY	40
	2.0	4	SAND	n/a
	3.0	29	CLAY	145
	4.0	50	CLAY	250

* Conversion factor=5 (Stroud & Butler)

The SPT N values vary within the clay from 4 to 50 with an average of 17. The SPT values indicate an undrained shear strength typically in the range of 30 to 250 kN/m² (low to very high strength). When plotted against depth, see **Figure 3** there is a gradual increase in N-Value with depth although recorded N-Values do lie predominantly within the firm to stiff or medium dense consistency.

WS05 encountered fine to coarse Sand between 2.0m to 2.4m. The SPT N at 2.0m was recorded as 4, which would indicate loose sand. However, it is anticipated that the SPT N has been affected by groundwater disturbance, which has reduced the SPT N value. The remainder of the results within the sand record values of between 13 to 16 (Medium dense) which is more consistent with anticipated values.

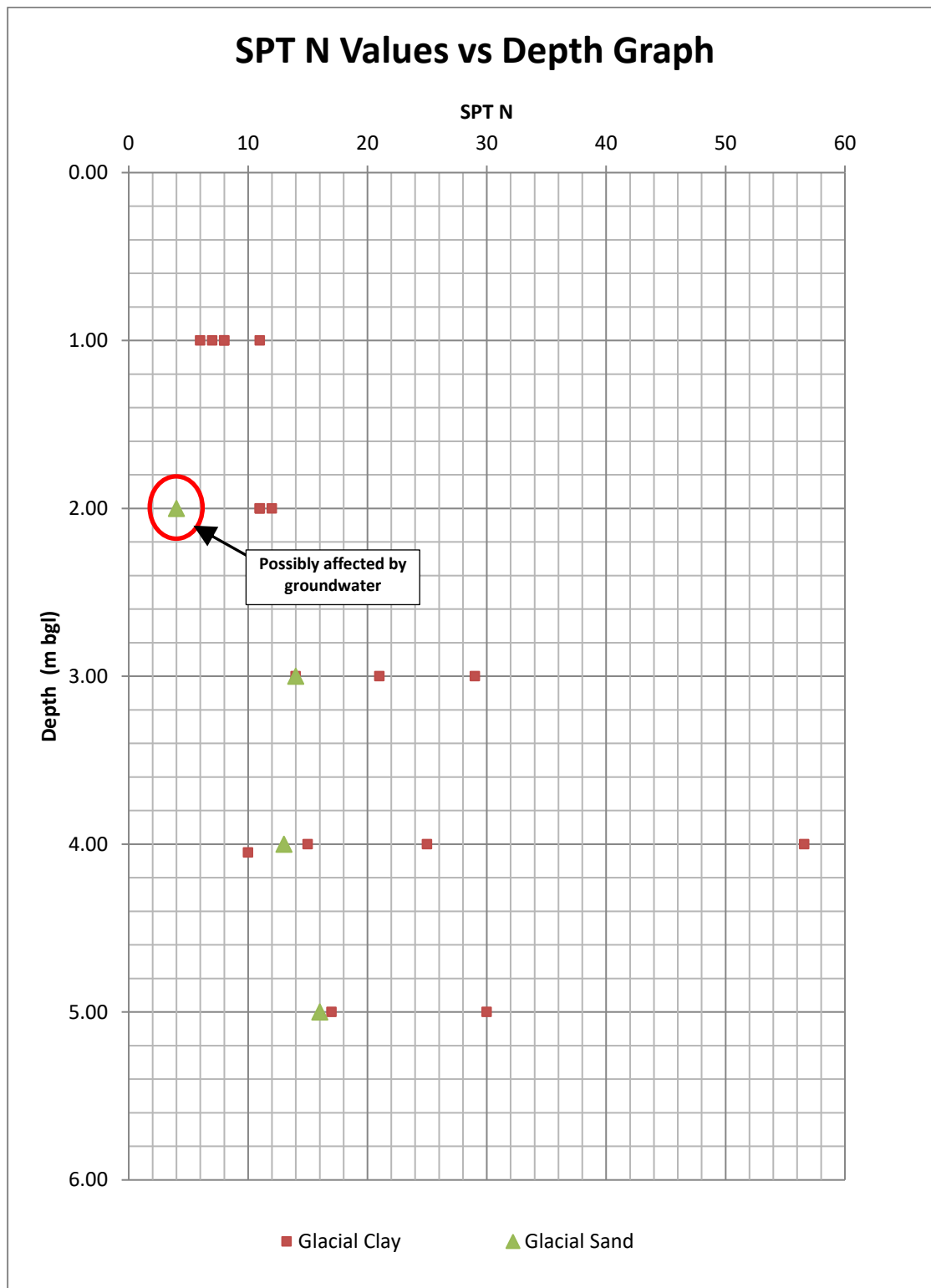


Figure 3 – SPT N Value vs Depth

In-situ hand vane tests were carried out on the window sample cores to estimate the shear strength. Test results are recorded on the exploratory hole records and are summarised in **Table 9.3** below:

Table 9.3: Summary of In-Situ Hand Shear Vane Tests

Location	Depth (m bgl)	Estimated Undrained Shear strength (kPa) *
WS01	1.20	60
	1.80	50
WS02	0.90	60
	1.40	60
WS03	1.10	85
	1.60	110
	2.80	70
WS04	0.80	100
	1.60	50
WS05	1.20	70
	1.80	70
	2.80	70

Recorded results ranged from 50 to 110kPa, which is broadly consistent with the derived values. When plotted against depth, see **Figure 4** undrained shear strength shows generally a medium to high value throughout the entire Glacial Till stratum.

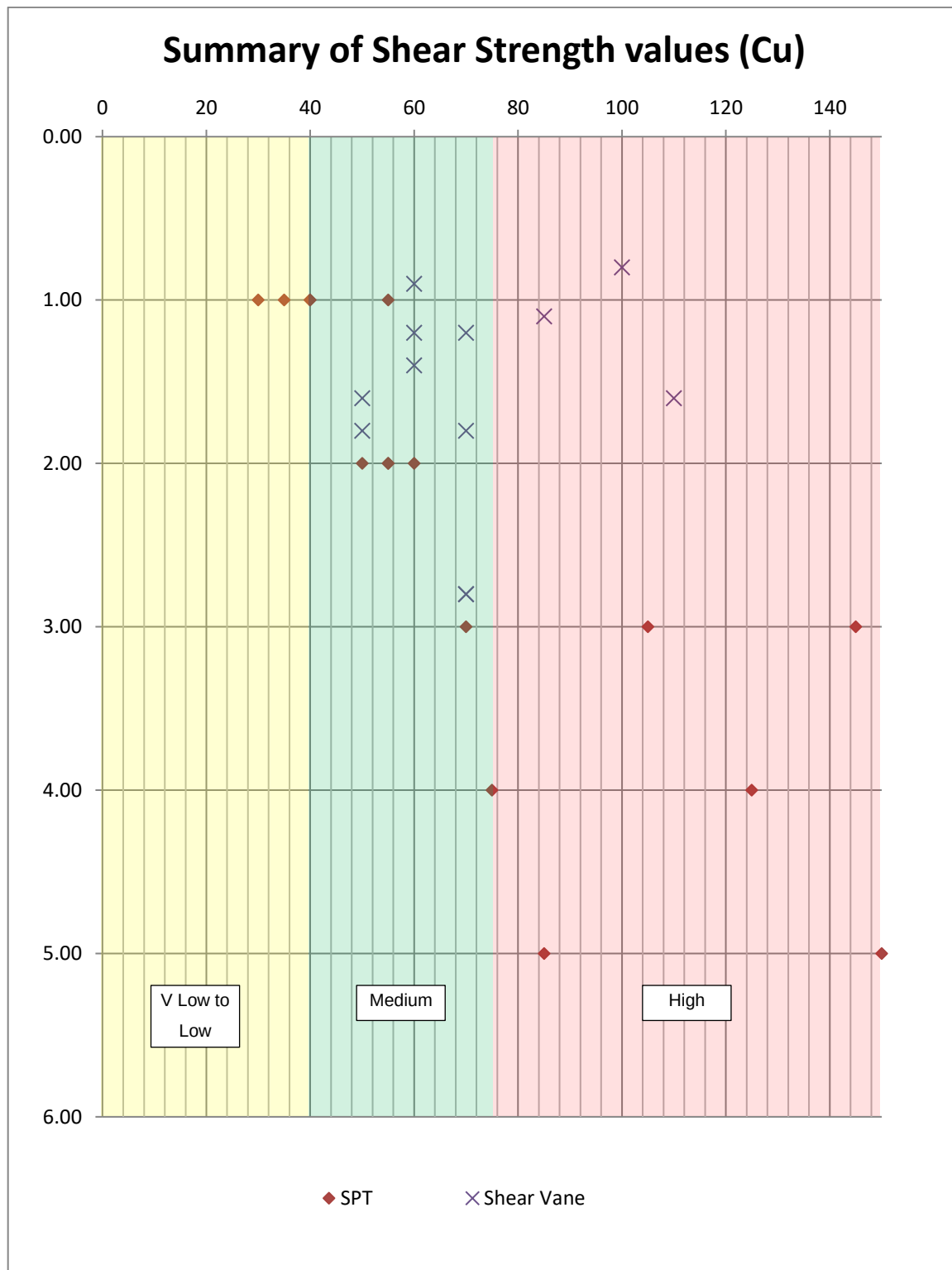


Figure 4 – CU (kPa) Value vs Depth

9.2 Trees

A number of mature trees and bushes are located on or adjacent to the field boundaries. A comprehensive tree survey of those trees within the site boundary, and up to 20m beyond the site boundary (assuming mature high water demand trees are not present along the boundary) will be required to determine the effect of existing trees to proposed properties and also to assess the condition of trees which are to remain.

Any proposed felling or removal of trees or hedgerows should be agreed with the Local Authority as part of the pre-planning discussions for development and should be carried out outside the bird nesting season (it may be possible that tree felling can be carried out during the bird nesting season under the direction of an ecologist).

Care must be taken to ensure that any existing trees scheduled for retention are not adversely affected by construction operations. Further guidance on this aspect of site works is given in the British Standards "Guidance for Trees in Relation to Construction", BS5837.

9.3 Foundation Recommendations

For the purpose of this assessment it is assumed the site will not be subject to extensive reprofiling.

It is anticipated that spread footings could be adopted for the foundations at this site but the following factors should be taken into account for the design:

- The type and height of trees present at the site and proposals for any new planting, adopt NHBC Standards (2023) based on low volume change potential clay;
- Potential for shrinkage or heave on the sides of any footings;
- Shallow Groundwater
- the variability of the formation material across geological horizons giving the potential for differential settlements,

In accordance with NHBC Chapter 4.3 Table 2 the acceptable foundation widths for the formation materials at this site are as follows:

Table 9.4: Acceptable Foundation Widths (After NHBC Chapter 4.3 Table 2).

Ground Type	Condition of Ground	Total Load of Load-Bearing Walling Not More Than (kN/linear m)					
		20	30	40	50	60	70
		Minimum Width of Strip Foundation (mm)					
Clay Sandy Clay	Firm	300	350	450	600	750	850

Minimum foundation depth of 1.5 m below finished ground level (dependant on the depth to Firm Clay) assuming restricted new planting. In order to limit the potential for differential settlement it is recommended that for preliminary design purposes a net allowable bearing capacity of a trench fill type strip footing is 80 kPa in firm clay.

Should a localised transition between cohesive strata to granular strata be encountered then we would recommend nominal mesh (A393) to be provided in the footing across the transition of the mixed strata and for a distance of 1 metre to either side.

Any foundations greater than 2.5m (NHBC Stipulate 2.50m) in depth must be designed by a chartered structural or civil engineer.

When footings have been initially sized then full design of these should be carried out in accordance with BS EN 1997-1: 2004 +A1 2013: Eurocode 7 – Geotechnical Design – Part 1: General rules (including UK National Annex of November 2007) and BS8004: 2015 : Code of practice for foundations.

Deep Foundations

As an alternative to the spread footings, deep foundations including vibro stone columns or piles could be considered. The design of deep foundations would still have to take into account the potential for volumetric changes in the clays adding to the cost of this type of foundation. Additional deeper boreholes would also be required for the design of deep foundations at the site.

Raft Foundations

Raft foundations are a possible foundation option for the lightly loaded structure. Raft foundations will need to be designed by an engineer and constructed in accordance with the recommendations of the NHBC Standards.

Engineered granular infill will be required beneath the raft foundations in the zone of influence of existing or proposed trees. The infill should not be less than 50% of the foundation depth derived in accordance with NHBC Standards Chapter 4.2 and should not exceed 1.25m.

9.4 Ground Floor Slab Recommendations

Suspended floor slabs is recommended due to the variability of the Made Ground and the variability of the glacial clay to prevent differential settlement.

9.5 Groundwater & Excavations

Groundwater strikes were encountered all exploratory holes at between 0.50 and 1.00m below existing ground level. Consequently it is anticipated that groundwater will be encountered within excavations. However the low permeability of the Glacial Till means flow rates and volumes are likely to be low and it should be possible to control any inflows via conventional pumping from sumps. This may cause softening of the natural clay deposits and require localised excavation support in order to prevent instability of the sides of excavations.

Excavations through the soils to a depth of about 1.5m should be stable in the short term (up to 3 to 4 hours). However, it is anticipated that these will gradually collapse, leading to instability of the sides of excavations. All excavations should be carried out in accordance with CIRIA Report 97 "Trenching Practice" and BS6031: 2009: Code of Practice for Earthworks. Further guidance on this aspect of site works is given in the British Standards for "Workmanship on Building Sites", BS 8000, Parts 1 and 14, and in the Construction Industry Training Board's Site Safety Note 10.

Excavation depths should generally be readily achieved using conventional hydraulic plant (e.g. wheeled JCB or similar) although larger plant will have higher excavation rates.

9.6 Buried Concrete and Pipework

The results of laboratory pH and sulphate content indicate that ACEC Class AC-1s conditions prevail in accordance with BRE Special Digest 1, 2005 (the Design Concrete Class). Therefore, special precautions are not required at the site for the design of concrete in terms of the durability and structural performance.

9.7 Permeability Testing

Variable head permeability testing was undertaken at one location (WS01). Only a single cycle was undertaken, which subsequently failed to drain due to the low permeability Glacial clay. Consequently, the use of soakaways for drainage is not recommended.

The soakaway testing result are presented in **Appendix D**.

10 REFERENCES

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11 DEFINITIONS

AOD	Above Ordnance Datum
bgl	Below ground level
BGS	British Geological Survey
BRE	Building Research Establishment
CBR	California Bearing Ratio (test)
COMAH	Control of Major Accident Hazards (regulations)
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EQS	Environmental Quality Standard
GAC	Generic Assessment Criterion
GQA	General Quality Assessment (Environment Agency)
GQRA	Generic Quantitative Risk Assessment
GSV	Gas Screening Value
HCV	Health Criteria Value
IPPC	Integrated Pollution Prevention and Control (regulations)
NGR	National Grid Reference
NIHHS	Notification of Installations Handling Hazardous Substances (regulations)
OS	Ordnance Survey
ppm	Parts per million
ppmv	Parts per million by volume
SAC	Special Area of Conservation
SPZ	Source Protection Zone (see Error! Reference source not found.)
SSAC	Site-Specific Assessment Criterion
SSSI	Site of Special Scientific Interest

APPENDIX A – DRAWINGS



Legend

Exploratory Hole Location

Site Boundary

A	Original Drawing	06.11.23
Revision	Description	Date

GroundSolve Ltd
Consulting Geotechnical Engineers

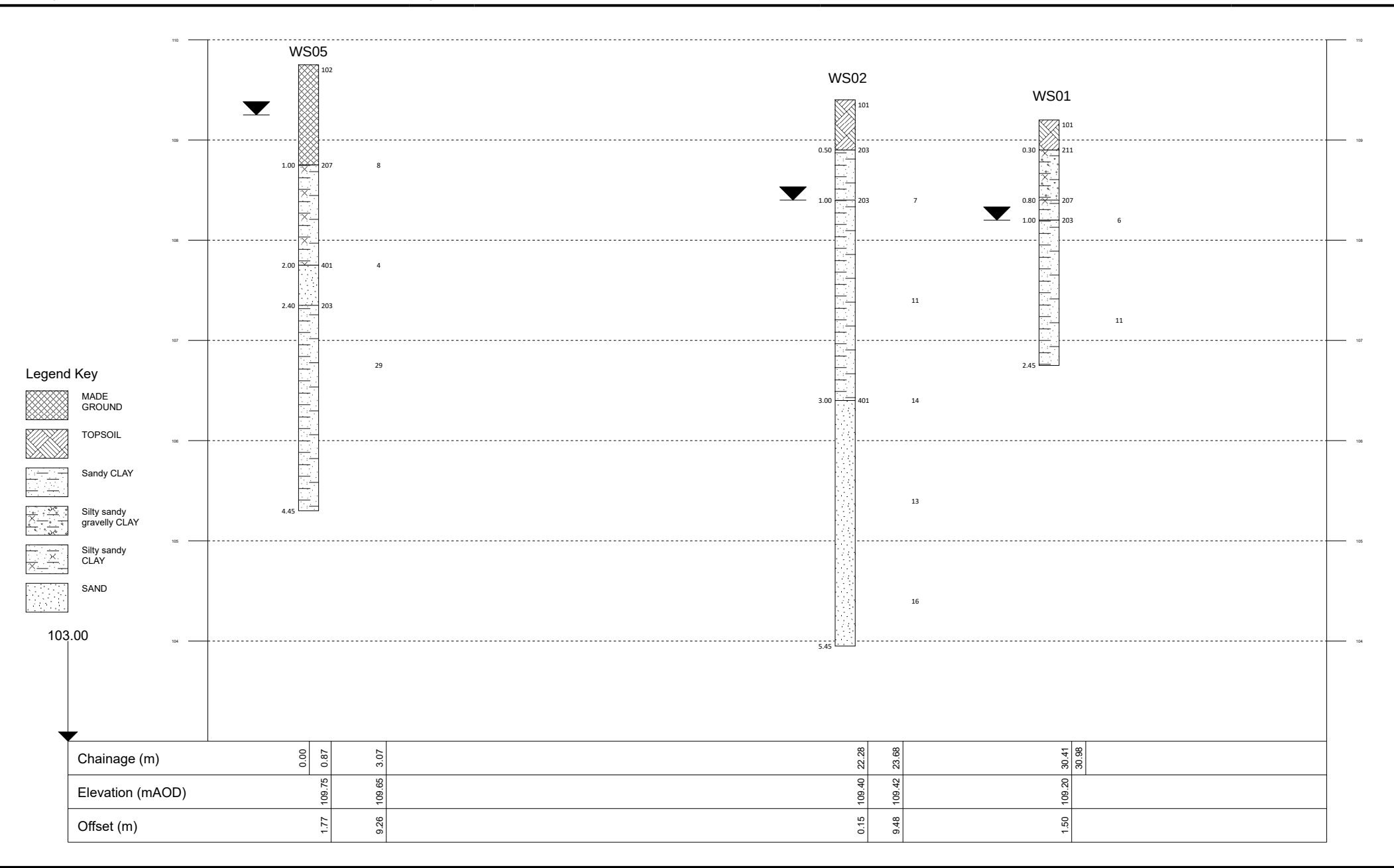
Unit 1, Charter Court
Well House Barns
Chester Road Bretton
Flintshire CH4 0DH

Tel: 01244 661361
Fax: 01244 661289

Job Title
Pinfold Lane, Prestwich

Drawing Title
Exploratory Hole Locations

Drawing Scale	Drawn By	Approved By
NTS	ALB	JT
Drawing Status	Date of Issue	
Information	06.11.23	
Drawing No	Revision	
3003-DR-001	A	



APPENDIX B – SITE PHOTOGRAPHS



Photo 1 – Front of existing property



Photo 2 – Side access down eastern boundary



Photo 3 – Back garden from access down western boundary



Photo 4 – Rear of existing property

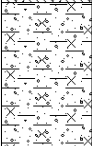
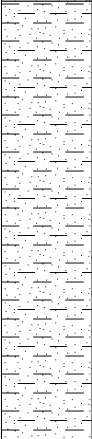


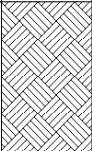
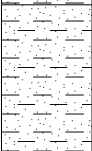
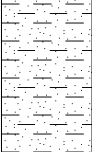
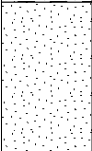
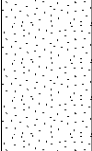
Photo 5 – rear access into existing property

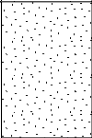


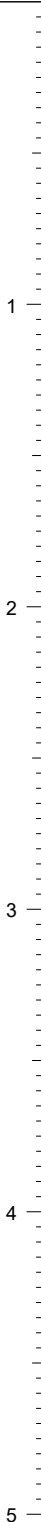
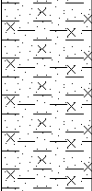
Photo 6 – Rear garden and existing property

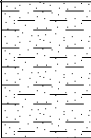
APPENDIX C – EXPLORATORY HOLE LOGS

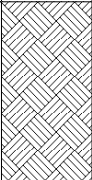
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Project Name: Pinfold Lane, Prestwich				Client: Wyvern Partnership				Date: 23/10/2023			
Location: Prestwich				Contractor: Regional Drilling				Co-ords: E380544.00 N405631.00			
Project No. : 3003				Crew Name: Regional Drilling				Drilling Equipment: Premier Compact 110			
Borehole Number WS01		Hole Type WLS		Level 109.20m AoD		Logged By AB		Scale 1:25		Page Number Sheet 1 of 1	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					0.30	108.90		Grass over loose black sandy slightly clayey SILT with rootlets. (TOPSOIL)		1	
					0.80	108.40		Black sandy slightly silty slightly gravelly CLAY. Gravel is subangular to rounded fine to medium of mixed lithologies. (SUB-SOIL)			
		1.00	SPT	N=6 (1,1/1,1,2,2)	1.00	108.20		Soft grey silty sandy CLAY. (GLACIAL TILL)			
		1.20		HVP=60.0				Firm brown sandy CLAY. (GLACIAL TILL)			
		1.80		HVP=50.0							
		2.00	SPT	N=11 (2,2/2,3,3,3)						2	
					2.45	106.75		End of Borehole at 2.450m		3	
										4	
										5	
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
1.00 2.45	200 100										
Remarks										GroundSolve Ltd Unit 1 Well House Barns Chester Road Bretton CH4 0DH	
Hole terminated at 2.00m to undertake falling head test.											
Groundwater encountered at 1.00m											

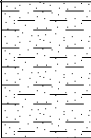
				Windowless Sample Record					WS02				
Project Name: Pinfold Lane, Prestwich				Client: Wyvern Partnership					Date: 23/10/2023				
Location: Prestwich				Contractor: Regional Drilling					Co-ords: E380542.00 N405639.00				
Project No. : 3003				Crew Name: Regional Drilling					Drilling Equipment: Premier Compact 110				
Borehole Number WS02		Hole Type WLS		Level 109.40m AoD		Logged By AB		Scale 1:25		Page Number Sheet 1 of 2			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description					
		Depth (m)	Type	Results									
		0.20	ES	HVP=60.0 N=7 (1,1/1,2,2,2)	0.50	108.90		Grass over soft dark brown sandy slightly silty CLAY with rootlets. (TOPSOIL)		1			
		0.80	B D					HVP=60.0	Soft to firm grey mottled brown sandy CLAY. (GLACIAL TILL)				
		0.80											
		0.90											
		1.00											
		1.40	D	HVP=60.0	1.20	108.20		Firm brown sandy slightly gravelly CLAY. (GLACIAL TILL)					
		1.40											
		2.00	SPT	N=11 (1,1/2,3,3,3)	2	106.40		Becomes very sandy 2.0m to 3.0m					
		2.50	D										
		3.00	SPT	N=14 (2,2/3,3,4,4)									
3		4.00	SPT	N=13 (2,2/3,3,4,4)	3.00	106.40		Medium dense brown fine to coarse SAND (GLACIAL TILL)		4			
5		5.00	SPT	N=16 (4,4/3,3,4,6)				No recovery between 4.00m to 5.00m due to water		5			
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation		
1.00	200												
2.00	100												
3.00	92												
4.00	87												
5.45	70												
Remarks										GroundSolve Ltd Unit 1 Well House Barns Chester Road Bretton CH4 0DH			
Groundwater encountered at 1.00m													

			Windowless Sample Record					WS02			
Project Name: Pinfold Lane, Prestwich				Client: Wyvern Partnership				Date: 23/10/2023			
Location: Prestwich				Contractor: Regional Drilling				Co-ords: E380542.00 N405639.00			
Project No. : 3003				Crew Name: Regional Drilling				Drilling Equipment: Premier Compact 110			
Borehole Number WS02		Hole Type WLS		Level 109.40m AoD		Logged By AB		Scale 1:25		Page Number Sheet 2 of 2	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					5.45	103.95		Medium dense brown fine to coarse SAND (GLACIAL TILL)			
								End of Borehole at 5.450m			
										6	
										7	
										8	
										9	
										10	
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
1.00	200										
2.00	100										
3.00	92										
4.00	87										
5.45	70										
Remarks										GroundSolve Ltd Unit 1 Well House Barns Chester Road Bretton CH4 0DH	
Groundwater encountered at 1.00m											

				Windowless Sample Record					WS03			
Project Name: Pinfold Lane, Prestwich				Client: Wyvern Partnership					Date: 23/10/2023			
Location: Prestwich				Contractor: Regional Drilling					Co-ords: E380534.00 N405634.00			
Project No. : 3003				Crew Name: Regional Drilling					Drilling Equipment: Premier Compact 110			
Borehole Number WS03		Hole Type WLS		Level 109.42m AoD		Logged By AB		Scale 1:25		Page Number Sheet 1 of 2		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description				
		Depth (m)	Type	Results								
		0.10	ES		0.30	109.12		Grass over soft dark brown sandy slightly silty CLAY with roots rootlets and wood chippings. (TOPSOIL)		1		
								Soft to firm grey sandy slightly silty CLAY. (GLACIAL TILL)				
		1.00	SPT	N=11 (1,2/2,3,3,3)	1.00	108.42		Firm brown mottled grey slightly sandy slightly gravelly CLAY. (GLACIAL TILL)				
		1.10	D	HVP=85.0								
		1.10										
		1.60		HVP=110.0								
		1.80	D									
		2.00	SPT	N=10 (1,1/2,2,3,3)								
		2.80										
		2.80	D	HVP=70.0								
3.00	SPT	N=21 (3,3/4,5,6,6)				No recovery between 3.0m to 3.90m due to water		3				
										4		
4.00	SPT	N=15 (2,2/3,3,4,5)				No recovery between 4.0m to 5.0m due to water						
										5		
5.00	SPT	N=17 (2,3/4,4,6)										
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	
1.00	200											
2.00	100											
3.00	92											
4.00	87											
5.45	70											
Remarks										GroundSolve Ltd Unit 1 Well House Barns Chester Road Bretton CH4 0DH		
Groundwater encountered at 1.00m												

				Windowless Sample Record				WS03			
Project Name: Pinfold Lane, Prestwich				Client: Wyvern Partnership				Date: 23/10/2023			
Location: Prestwich				Contractor: Regional Drilling				Co-ords: E380534.00 N405634.00			
Project No. : 3003				Crew Name: Regional Drilling				Drilling Equipment: Premier Compact 110			
Borehole Number WS03		Hole Type WLS		Level 109.42m AoD		Logged By AB		Scale 1:25		Page Number Sheet 2 of 2	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					5.45	103.97		Firm brown mottled grey slightly sandy slightly gravelly CLAY. (GLACIAL TILL)			
								End of Borehole at 5.450m			
										6	
										7	
										8	
										9	
										10	
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
1.00	200										
2.00	100										
3.00	92										
4.00	87										
5.45	70										
Remarks										GroundSolve Ltd Unit 1 Well House Barns Chester Road Bretton CH4 0DH	
Groundwater encountered at 1.00m											

				Windowless Sample Record				WS04			
Project Name: Pinfold Lane, Prestwich				Client: Wyvern Partnership				Date: 23/10/2023			
Location: Prestwich				Contractor: Regional Drilling				Co-ords: E380526.00 N405653.00			
Project No. : 3003				Crew Name: Regional Drilling				Drilling Equipment: Premier Compact 110			
Borehole Number WS04		Hole Type WLS		Level 109.65m AoD		Logged By AB		Scale 1:25		Page Number Sheet 1 of 2	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.15	ES		0.60	109.05		Grass over soft black slightly silty slightly sandy CLAY with rootlets. (TOPSOIL)		1	
		0.80	D SPT	HVP=100.0				Soft becoming firm grey sandy CLAY. (GLACIAL TILL)			
		0.90		N=8 (1,1/2,2,2,2)							
		1.00									
		1.60	D	HVP=50.0	Firm brown slightly sandy slightly gravelly CLAY. (GLACIAL TILL)		2				
		1.60									
		2.00	SPT	N=12 (2,2/2,3,3,4)	No recovery between 2.0m to 3.0m due to water		3				
		3.00	SPT	N=14 (3,4/4,3,3,4)							
		3.80	D		No recovery between 4.0m to 5.0m due to water		4				
		4.00						SPT	N=25 (4,5/5,6,7,7)		
5.00	SPT	N=30 (4,6/6,7,8,9)			5						
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
1.00	200										
2.00	100										
3.00	92										
4.00	87										
5.45	70										
Remarks										GroundSolve Ltd Unit 1 Well House Barns Chester Road Bretton CH4 0DH	
Groundwater encountered at 0.60m											

				Windowless Sample Record				WS04			
Project Name: Pinfold Lane, Prestwich				Client: Wyvern Partnership				Date: 23/10/2023			
Location: Prestwich				Contractor: Regional Drilling				Co-ords: E380526.00 N405653.00			
Project No. : 3003				Crew Name: Regional Drilling				Drilling Equipment: Premier Compact 110			
Borehole Number WS04		Hole Type WLS		Level 109.65m AoD		Logged By AB		Scale 1:25		Page Number Sheet 2 of 2	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					5.45	104.20		Firm brown slightly sandy slightly gravelly CLAY. (GLACIAL TILL)			
								End of Borehole at 5.450m			
										6	
										7	
										8	
										9	
										10	
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
1.00	200										
2.00	100										
3.00	92										
4.00	87										
5.45	70										
Remarks Groundwater encountered at 0.60m										GroundSolve Ltd Unit 1 Well House Barns Chester Road Bretton CH4 0DH	

Project Name: Pinfold Lane, Prestwich		Client: Wyvern Partnership		Date: 23/10/2023	
Location: Prestwich		Contractor: Regional Drilling		Co-ords: E380532.00 N405658.00	
Project No. : 3003		Crew Name: Regional Drilling		Drilling Equipment: Premier Compact 110	
Borehole Number WS05	Hole Type WLS	Level 109.75m AoD	Logged By AB	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES					Block paving on top of a thin layer of sand overlying soft black sandy slightly gravelly CLAY. Gravel is angular fine to coarse of brick. (MADE GROUND)	
		1.00	SPT	N=8 (1,1/1,2,2,3)	1.00	108.75		Firm grey mottled brown sandy slightly silty CLAY. (GLACIAL TILL)	1
		1.20 1.20	D	HVP=70.0					
		1.80		HVP=70.0					
		2.00	SPT	N=4 (2,1/1,1,1,1)	2.00	107.75		Loose brown fine to coarse SAND. (GLACIAL TILL)	2
					2.40	107.35		Firm becoming stiff brown slightly sandy slightly gravelly CLAY. (GLACIAL TILL)	
		2.80 2.80	D	HVP=70.0					
		3.00 3.10	SPT D	N=29 (5,6/6,7,8,8)					3
		4.00	SPT	N=50 (6,10/50 for 265mm)					4
					4.45	105.30			End of Borehole at 4.450m
								5	

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
1.00	200										
2.00	100										
3.00	92										
4.45	87										

Remarks

Hole terminated after SPT at 4.00m.
Groundwater encountered at 0.50m

APPENDIX D – VARIABLE HEAD PERMEABILITY TESTS

FALLING HEAD TEST PERMEABILITY CALCULATION

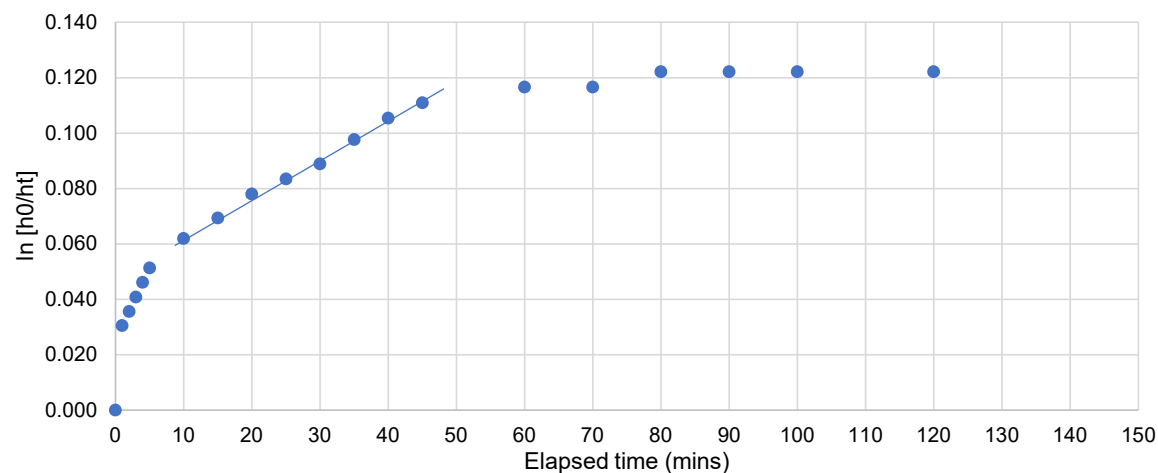
Variable Head Test Method, BS EN ISO 22282-2:2012

Project No.	3003
Project Name	Prestwich
Borehole	WS01
Date	23.10.23

BH Depth (m)	2.00
Casing Depth (m)	2.00
Casing Dia (m)	0.10
Casing Height (m)	2.20

L/D Ratio	0.00
Shape Factor	0.3142

Time (mins)	Depth to Water	ln (h ₀ /ht)
0.00	0	0.000
1.00	0.06	0.030
2.00	0.07	0.036
3.00	0.08	0.041
4.00	0.09	0.046
5.00	0.10	0.051
10.00	0.12	0.062
15.00	0.134	0.069
20.00	0.15	0.078
25.00	0.16	0.083
30.00	0.17	0.089
35.00	0.186	0.098
40.00	0.20	0.105
45.00	0.21	0.111
60.00	0.22	0.117
70.00	0.22	0.117
80.00	0.23	0.122
90.00	0.23	0.122
100.00	0.23	0.122
120.00	0.23	0.122
150.00	0.23	0.122
180.00	0.23	0.122
210.00	0.23	0.122



α (gradient)	0.00003
Area of BH (m ²)	0.00785

Infiltration Rate, k	7.777E-07 m/s
----------------------	---------------

Notes	Calculated between 10 minutes and 45 minutes
-------	--

APPENDIX E – CHEMICAL TEST RESULTS



Certificate of Analysis

Certificate Number 23-25476

Issued: 06-Nov-23

Client GroundSolve Limited
Unit 1
Well House Barns
Bretton
Flintshire
FAO Adam Fenwick
CH4 0DH

Our Reference 23-25476

Client Reference 3003

Order No (not supplied)

Contract Title Pinfold Lane, Prestwich

Description 3 Soil samples.

Date Received 27-Oct-23

Date Started 30-Oct-23

Date Completed 06-Nov-23

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read "K. Bridgewood".

Kirk Bridgewood
General Manager



2139

Summary of Chemical Analysis

Soil Samples

Our Ref 23-25476

Client Ref 3003

Contract Title Pinfold Lane, Prestwich

Lab No	2254426	2254427	2254428
.Sample ID	WS02	WS03	WS04
Depth	0.20	0.10	0.15
Other ID			
Sample Type	SOIL	SOIL	SOIL
Sampling Date	23/10/2023	23/10/2023	23/10/2023
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Metals						
Arsenic	DETSC 2301#	0.2	mg/kg	24	13	21
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	< 0.2	0.5	0.7
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	0.2	0.4
Chromium	DETSC 2301#	0.15	mg/kg	57	14	16
Chromium III	DETSC 2301*	0.15	mg/kg	57	14	16
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	110	37	62
Lead	DETSC 2301#	0.3	mg/kg	160	140	110
Mercury	DETSC 2325#	0.05	mg/kg	0.40	0.84	0.19
Nickel	DETSC 2301#	1	mg/kg	21	12	23
Selenium	DETSC 2301#	0.5	mg/kg	0.7	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	110	54	86
Inorganics						
pH	DETSC 2008#		pH	5.6	5.5	6.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.5	1.2	0.5
Organic matter	DETSC 2002#	0.1	%	5.6	8.7	6.0
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	< 10	16	84
Sulphide	DETSC 2024*	10	mg/kg	20	40	24
Sulphur (free)	DETSC 3049#	0.75	mg/kg	< 0.75	< 0.75	< 0.75
Petroleum Hydrocarbons						
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	0.31	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C35-C40	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C35-C40	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis Soil Samples

Our Ref 23-25476

Client Ref 3003

Contract Title Pinfold Lane, Prestwich

Lab No	2254426	2254427	2254428
Sample ID	WS02	WS03	WS04
Depth	0.20	0.10	0.15
Other ID			
Sample Type	SOIL	SOIL	SOIL
Sampling Date	23/10/2023	23/10/2023	23/10/2023
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
PAHs						
Naphthalene	DETSC 3303#	0.03	mg/kg	0.04	0.04	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.27	0.10	0.14
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	0.04	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	1.1	0.37	0.80
Anthracene	DETSC 3303	0.03	mg/kg	0.25	0.07	0.16
Fluoranthene	DETSC 3303#	0.03	mg/kg	1.6	0.48	1.6
Pyrene	DETSC 3303#	0.03	mg/kg	1.5	0.45	1.4
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.43	0.12	0.42
Chrysene	DETSC 3303	0.03	mg/kg	0.51	0.16	0.50
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.42	0.12	0.43
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.14	0.04	0.16
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.30	0.08	0.31
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.12	< 0.03	0.13
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	0.03	< 0.03	0.04
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.14	0.04	0.16
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	6.8	2.0	6.2
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.8	1.2	0.5

Summary of Asbestos Analysis Soil Samples

Our Ref 23-25476

Client Ref 3003

Contract Title Pinfold Lane, Prestwich

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2254426	WS02 0.20	SOIL	NAD	none	Ben Barsby
2254427	WS03 0.10	SOIL	NAD	none	Ben Barsby
2254428	WS04 0.15	SOIL	NAD	none	Ben Barsby

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 23-25476
 Client Ref 3003
 Contract Pinfold Lane, Prestwich

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Hold time exceeded for tests	Inappropriate container for tests
2254426	WS02 0.20 SOIL	23/10/23	GJ 250ml, GJ 60ml x2, PT 1L		
2254427	WS03 0.10 SOIL	23/10/23	GJ 250ml, GJ 60ml x2, PT 1L		
2254428	WS04 0.15 SOIL	23/10/23	GJ 250ml, GJ 60ml x2, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

APPENDIX F – SUMMARY OF CHEMICAL TEST RESULTS

Residential with gardens (1% SOM)

Metals & Non-Metals	WS02	WS03	WS04	Adopted Guideline (mg/kg)	Source	Exceedances
	0.2	0.1	0.15			
Arsenic	24	13	21	37	C4SL	0
Boron, water soluble	< 0.2	0.5	0.7	290	S4UL	0
Cadmium	0.6	0.2	0.4	22	C4SL	0
Chromium III	57	14	16	910	S4UL	0
Chromium, Hexavalent	< 1.0	< 1.0	< 1.0	21	C4SL	0
Copper	110	37	62	2400	S4UL	0
Lead	160	140	110	200	C4SL	0
Mercury	0.4	0.84	0.19	1.2	S4UL	0
Nickel	21	12	23	130	S4UL	0
Phenol - Monohydric	0.8	1.2	0.5	120	S4UL	0
Selenium	0.7	< 0.5	< 0.5	250	S4UL	0
Zinc	110	54	86	3700	S4UL	0

Petroleum Hydrocarbons	WS01	WS02	WS03	Adopted Guideline (mg/kg)	Source	Exceedances
	0.5	0.5	0.25			
Benzene	< 0.01	< 0.01	< 0.01	0.87	C4SL	0
Toluene	< 0.01	< 0.01	< 0.01	130	S4UL	0
Ethylbenzene	< 0.01	< 0.01	< 0.01	47	S4UL	0
Xylene	< 0.01	< 0.01	< 0.01	130	S4UL	0
Aliphatic C5-C6	< 0.01	< 0.01	< 0.01	42	S4UL	0
Aliphatic C6-C8	< 0.01	< 0.01	< 0.01	100	S4UL	0
Aliphatic C8-C10	0.31	< 0.01	< 0.01	27	S4UL	0
Aliphatic C10-C12	< 1.5	< 1.5	< 1.5	130	S4UL	0
Aliphatic C12-C16	< 1.2	< 1.2	< 1.2	1100	S4UL	0
Aliphatic C16-C35	< 3.4	< 3.4	< 3.4	65000	S4UL	0
Aliphatic C35-C40	< 3.4	< 3.4	< 3.4	65000	S4UL	0
Aromatic C5-C7	< 0.01	< 0.01	< 0.01	70	S4UL	0
Aromatic C7-C8	< 0.01	< 0.01	< 0.01	130	S4UL	0
Aromatic C8-C10	< 0.01	< 0.01	< 0.01	34	S4UL	0
Aromatic C10-C12	< 0.9	< 0.9	< 0.9	74	S4UL	0
Aromatic C12-C16	< 0.5	< 0.5	< 0.5	140	S4UL	0
Aromatic C16-C21	< 0.6	< 0.6	< 0.6	260	S4UL	0
Aromatic C21-C35	< 1.4	< 1.4	< 1.4	1100	S4UL	0
Aromatic C35-C40	< 1.4	< 1.4	< 1.4	1100	S4UL	0

Polyaromatic Hydrocarbons (PAH)	WS01	WS02	WS03	Adopted Guideline (mg/kg)	Source	Exceedances
	0.5	0.5	0.25			
Acenaphthene	0.27	0.1	0.14	210	S4UL	0
Acenaphthylene	< 0.03	< 0.03	< 0.03	170	S4UL	0
Anthracene	0.25	0.07	0.16	2400	S4UL	0
Benzo(a)anthracene	0.43	0.12	0.42	7.2	S4UL	0
Benzo(a)pyrene	0.3	0.08	0.31	5	C4SL	0
Benzo(b)fluoranthene	0.42	0.12	0.43	2.6	S4UL	0
Benzo(g,h,i)perylene	0.14	0.04	0.16	320	S4UL	0
Benzo(k)fluoranthene	0.14	0.04	0.16	77	S4UL	0
Chrysene	0.51	0.16	0.5	15	S4UL	0
Dibenzo(a,h)anthracene	0.03	< 0.03	0.04	0.24	S4UL	0
Fluoranthene	1.6	0.48	1.6	280	S4UL	0
Fluorene	< 0.03	0.04	< 0.03	170	S4UL	0
Indeno(1,2,3-c,d)pyrene	0.12	< 0.03	0.13	27	S4UL	0
Naphthalene	0.04	0.04	< 0.03	2.3	S4UL	0
Phenanthrene	1.1	0.37	0.8	95	S4UL	0
Pyrene	1.5	0.45	1.4	620	S4UL	0

Other Contaminants / Testing	WS01	WS02	WS03	Adopted Guideline (mg/kg)	Source	Exceedances
	0.5	0.5	0.25			
Organic Matter	5.6	8.7	6	-	-	-
pH	5.6	5.5	6.7	-	-	-
Sulphide	20	40	24	-	-	-
Cyanide, Total	0.5	1.2	0.5	-	-	-
Sulphur (free)	< 0.75	< 0.75	< 0.75	-	-	-
Sulphate Aqueous Extract as SO4	< 10	16	84	-	-	-

APPENDIX G – GEOTECHNICAL TEST RESULTS



LABORATORY REPORT



Contract Number: PSL23/9171

Report Date: 10 November 2023

Client's Reference: 3003

Client Name: Groundsolve Ltd

Unit 1 Well House Barns
Chester Road
Bretton
Flintshire
CH4 0DH

For the attention of: Aaron Bell

Project Name: Pinfold Lane, Prestwich

Date Received: 27/10/2023

Date Commenced: 27/10/2023

Date Completed: 09/11/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)


M Fennell
(Senior Technician)

5 – 7 Hexthorpe Road,
Hexthorpe,
Doncaster,
DN4 0AR
Tel: 01302 768098
Email: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

Pinfold Lane, Prestwich

Contract No:

PSL23/9171

Client Ref:

3003

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



Pinfold Lane, Prestwich

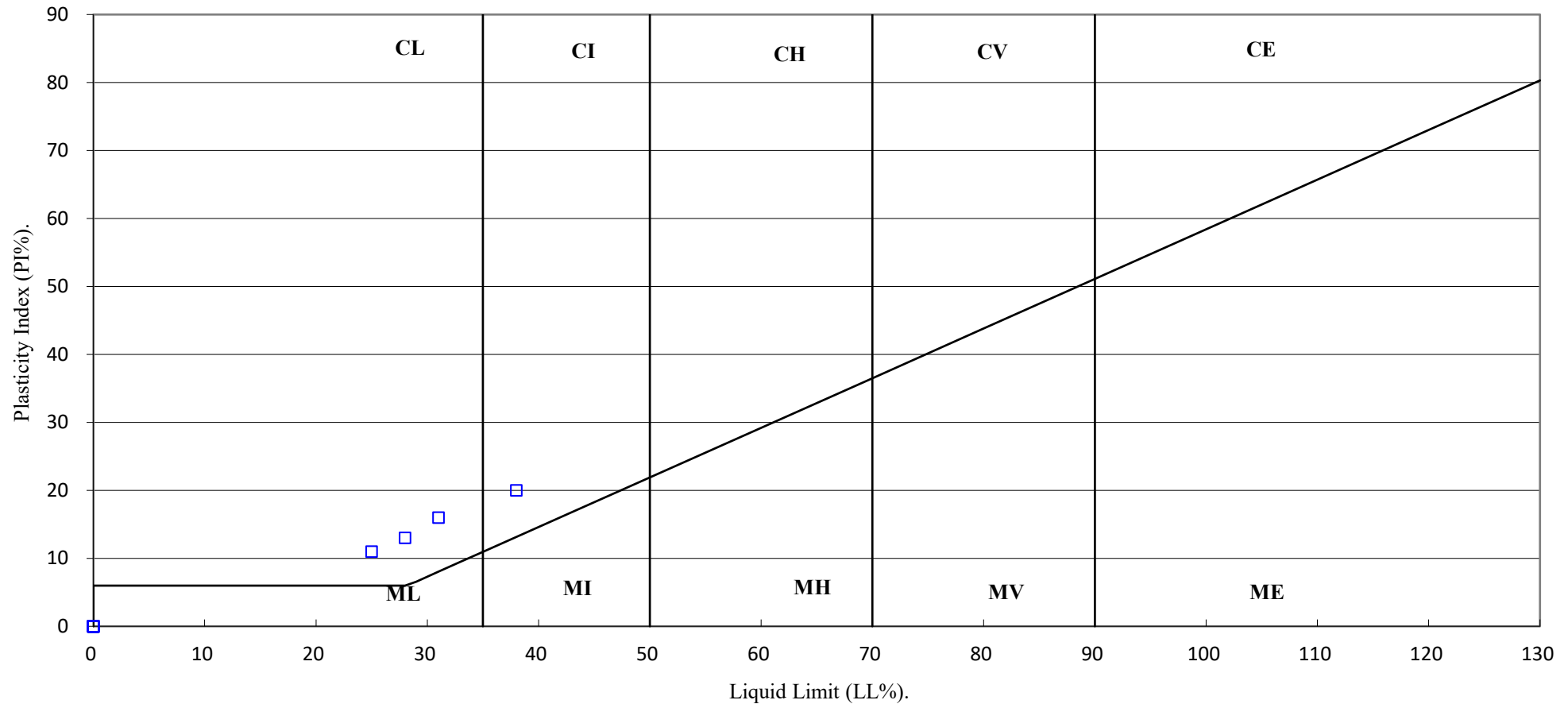
Contract No:

PSL23/9171

Client Ref:

3003

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



Pinfold Lane, Prestwich

Contract No:

PSL23/9171

Client Ref:

3003



4161



7 - 11 Harding Street
Leicester
LE1 4DH

Professional Soils Laboratory

5/7 Hexthorpe Road
Hexthorpe
Doncaster
DN4 0AR

Analytical Test Report: L23/06890/PSL - 23-39097

Your Project Reference:	PSL23/9171 3003, Pinfold Lane Prestwich		
Your Order Number:	PSL23/9171	Samples Received / Instructed:	09/11/2023 / 09/11/2023
Report Issue Number:	1	Sample Tested:	09/11 to 16/11/2023
Samples Analysed:	2 soil samples	Report issued:	16/11/2023

Signed

James Gane
Analytical Services Manager
CTS Group

Notes:**General**

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30°C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue: 30.10.2023

Issued by: J. Gane

Issue No: 4

Rev No: 5



L23/06890/PSL - 23-39097

**Project Reference - PSL23/9171 3003, Pinfold Lane
Prestwich**

Analytical Test Results - Chemical Analysis

Lab Reference			325936	325937
Client Sample ID			-	-
Client Sample Location			WS02	WS04
Client Sample Type			B	D
Client Sample Number			-	-
Depth - Top (m)			0.80	0.60
Depth - Bottom (m)			0.80	0.60
Date of Sampling			-	-
Time of Sampling			-	-
Sample Matrix			Clay	Clay
Determinant	Units	Accreditation		
Water soluble sulphate (as SO ₄)	(mg/l)	u	72	11
pH Value	pH Units	MCERTS	5.9	6.9



7 - 11 Harding Street
Leicester
LE1 4DH

L23/06890/PSL - 23-39097

Project Reference - PSL23/9171 3003, Pinfold Lane Prestwich

Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
325936	-	WS02	B	-	Greyish brown slightly gravelly sandy clay	-	-	100
325937	-	WS04	D	-	Brown sandy silty clay	-	-	100



L23/06890/PSL - 23-39097

Project Reference - PSL23/9171 3003, Pinfold Lane Prestwich

Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
325936	-	WS02	B	-	
325937	-	WS04	D	-	



7 - 11 Harding Street
Leicester
LE1 4DH

L23/06890/PSL - 23-39097

Project Reference - PSL23/9171 3003, Pinfold Lane Prestwich

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preparation	Test Details
ANIONSS	MS - CL - Anions by Aquakem (2:1Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis



L23/06890/PSL - 23-39097

Project Reference - PSL23/9171 3003, Pinfold Lane Prestwich

Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided

C - Received in inappropriate container

H - Contains headspace

T - Temperature on receipt exceeds storage temperature

R - Sample(s) received with less than 96 hours for testing to commence/complete, any result formally classed as deviating will be marked with an X against the applicable test (i.e. RX)

Observations whilst in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
325936	-	WS02	B	-		A
325937	-	WS04	D	-		A

APPENDIX H – GUIDANCE FOR CLASSIFICATION OF SOIL FOR OFF SITE DISPOSAL AT A LANDFILL SITE

Guidance for Classification of Soil for Off Site Disposal at a Landfill Site

Many site developments create a portion of excess soils and Made Ground which if not re-usable, are required to be disposed off-site at a suitably licensed landfill site. The regulations and associated guidance published by the Environment Agency is relatively complex and lengthy. This guidance provides a summary of the following documents which should be referred to when assessing soil (and common constituents found within Made Ground on remediation sites) for off-site disposal:

- Guidance for Waste destined for disposal in landfills: Interpretation of the Waste Acceptance Requirements of the Landfill (England and Wales) Regulations 2002 (as amended) (EA, 2004);
- Guidance on Sampling and Testing of Wastes to Meet Landfill Waste Acceptance Procedures (EA, April 2005);
- WM3 - Hazardous Waste: Interpretation of the Definition and Classification of Hazardous Wastes (EA, May 2015);
- European Regulation No 1272/2008 on Classification, Labelling and Packaging of substances 2015 (CLP 2015);
- Guidance on Waste Destined for Disposal in Landfill (EA, June 2006);
- Treatment of Non-hazardous wastes for Landfill (EA, February 2007).

It is important to distinguish between the waste classification system and the designation of materials as “suitable for use” on site. A material may be retained on site for an appropriate end use if that end-use is clearly designated and that a site-specific risk assessment ensures that it does not pose a risk to human health or controlled waters. However, if this material is excavated and sent for disposal, the material is then subject to waste management regulations and the two systems cannot be directly correlated. It is therefore important to note that classifying a material as hazardous (should it be excavated and become a waste) does not necessarily indicate that it might not be suitable to be kept on site for re-use. Separate guidance in the form of a Code of Practice (CL:AIRE Version 2, 2011) has been developed jointly between the development industry and the Environment Agency to provide best practice when assessing whether materials are wastes or not, and for determining when waste can cease to be waste for a particular use.

In accordance with the current waste regulations (or Landfill Directive, as they are more commonly known), from 30th October 2007 all waste materials produced from construction sites have to be pre-treated prior to disposal. Pre-treatment includes waste minimisation, recovery (e.g., separation of demolition waste to be used as hardcore) and separation of materials into different waste categories (e.g., separate inert waste from hazardous waste etc). Mixing of different waste types shall be avoided and intentional mixing of inert materials with hazardous waste to ‘dilute it’ and hence change its waste classification, is illegal.

The current waste regulations (based on the EU landfill directive) introduced a two-tier classification system for waste materials, defining them as either being hazardous or non-hazardous. Landfills are licensed to take wastes based on a three-tier classification system with the non-hazardous waste divided into two sub-categories:

- Non-Hazardous - inert;
- Non-Hazardous - non-hazardous;
- Hazardous.

Waste materials are categorised with a six-figure numeric code in the European Waste Catalogue. Commonly found construction and demolition wastes including excavated soil from contaminated sites and Made Ground with their waste codes are summarised below (this is not a comprehensive list):

Waste Code	What is it?	Likely Waste Category–		
		Inert Waste	Non-Hazardous	Hazardous Waste
17 01 01 Concrete	Concrete, possibly with reinforcement (from Construction & Demolition)	✓		
17 01 02 Bricks		✓		
17 01 06* Mixtures of concrete, bricks, tiles & ceramics containing dangerous substances	These are not normally considered hazardous but if they are contaminated (e.g., by asbestos) then could be hazardous – see comment above			✓
17 01 07 Mixtures of concrete, bricks, tiles & ceramics other than those in 17 01 06	This is mixed inerts c.f. 17 09 04	✓		
17 05 03* soils and stones containing dangerous substances				✓
17 05 04 soils and stones other than those mentioned in 17 05 03	Soil and stones only (excluding top soil, peat, soil and stones from contaminated sites)	✓		
17 06 05* Construction materials containing asbestos	e.g., corrugated asbestos sheeting			✓
17 08 02 Gypsum-based construction materials other than those mentioned in 17 08 01	Plaster & plasterboard (although specific disposal requirements are required for high sulphate waste – see EA guidance ‘Understanding the Landfill Directive’ version 1.0 March 2010.		✓	
17 09 01* Construction & demolition wastes containing mercury				✓
17 09 02* Construction & demolition wastes containing PCBs	Waste with more than 50 mg/kg of PCB’s are hazardous			✓

Waste Code	What is it?	Likely Waste Category–		
		Inert Waste	Non-Hazardous	Hazardous Waste
17 09 03* Other mixed construction & demolition wastes containing dangerous substances	Broad range of potentially (see notes below – if asterix the waste is hazardous) hazardous wastes			✓
17 09 04 Mixed construction & demolition wastes other than those mentioned in 17 09 01, 17 09 02 & 17 09 03	Mixed inerts with soil, tarmac, cables, vegetation, plaster, etc. (this waste can only be considered inert if it passes the waste acceptance criteria identified in the regulations).	✓	✓	

Note: all wastes with an asterix code are hazardous regardless of whether they are mirror or absolute entries in the EWC list the decision to with regard to composition must come before applying the code for mirror entries.

Some materials are classified as Inert Waste based in its origin (e.g., 17 01 01 Concrete, or glass) without any requirement for laboratory chemical analysis.

However, most soils will require laboratory testing to confirm whether they are classified as Hazardous Waste. The protocol for assessing these materials and the appropriate threshold values is complicated and are set out in the Environment Agency’s “Technical Guidance WM3 Hazardous Waste – Interpretation of the Definition and Classification of Hazardous Waste” (2015). If the test results for the waste indicates that it is not hazardous then further analysis of the waste is required to determine whether it is Inert Waste. If the waste does not meet the criteria for either Hazardous or Inert, then it is by default classified as Non-hazardous Waste.

As an alternative location to landfills for off-site disposal of inert and non-hazardous waste, there are a number of sites which have Waste Permit Exemptions that can accept certain categories of inert and non-hazardous wastes. Additionally, some quarries can accept certain types of wastes to be used for quarry restoration material. For both alternatives to disposal at landfill sites the material still requires chemical testing as these sites have site specific acceptance criteria for wastes. It should also be noted that these types of sites do not incur landfill tax which in the 2018/19 tax year is £2.80 for inactive waste (inert and some types of non-hazardous waste) and £88.95/Tonne for active waste (some types of non-hazardous waste and hazardous waste. Note that the Inland Revenue uses a different classification scheme for waste for tax purposes to the European Waste Classification scheme.

Waste Categorisation

The process of determining the category of wastes is a three-stage process:

- Stage 1 – is the waste either Hazardous or Inert by definition without the requirement for chemical analysis (if it is then Stages 2 and 3 are not required);
- Stage 2 - Waste characterisation;
- Stage 3 - WAC classification.

Waste characterisation determines if a waste is hazardous or not. Excavated soil is characterised using a system based on the contaminants present and their hazardous properties. The system uses total concentrations of the contaminants. Thresholds (as a percentage of the waste) have been set for the various hazardous properties.

Fourteen hazardous properties together with other scenarios where material could cause a hazard have been defined:

- Hazardous properties: explosive, oxidising, highly flammable/flammable, irritant, harmful, toxic, carcinogenic, corrosive, infectious, toxic for reproduction, mutagenic and ecotoxic;
- Substances which can release toxic/very toxic gases in contact with water, acid or air;
- Substances which, after disposal, can yield another substance, e.g., a leachate, which possesses any of the above hazardous properties.

Some of the hazardous properties are sub-divided e.g., there are three categories of carcinogenic, mutagenic and toxic for reproduction substances. The hazardous properties were originally defined in the European Hazardous Waste Directive 91/689/EC. Should a waste contain a contaminant with one or more of the listed hazardous properties at a concentration equal to or above the threshold value for the particular property, then the waste is hazardous. The hazardous properties of a wide range of chemicals are sourced from CLP 2015.

There are many reasons why waste soil is classified as being hazardous, but the majority of reasons can be divided into the following four groups:

- Hydrocarbons – this is probably the most common reason for the hazardous classification of soils. For most soils hydrocarbon analysis will be required for both Polycyclic Aromatic Hydrocarbons (PAH) and speciated Petroleum Hydrocarbons (PHCs) but depending on the site's history other groups of organic contaminants may also be included in any analysis suite for soil samples;
- Metals – Particularly sites from former metal processing or mining sites and also some types of ash have metal concentrations that are sufficiently high to characterise materials requiring disposal as hazardous waste.
- Asbestos;
- Anions – e.g., sulphate in plasterboard (there are special disposal requirements for high sulphate waste and specific WAC requirements); it is possible that sulphate salts of metals and semi-metals could make the waste hazardous – the sulphate concentration could possibly be significant under H12, H13 and H14.

The characterisation of wastes with significant metal concentrations involves some processing of the analysis data. The chemical analysis results for inorganic substances are generally reported as total concentrations e.g., total lead, total arsenic, total sulphate etc. However, CLP 2015 deals with the hazardous properties of actual compounds e.g., lead sulphate, arsenic pentoxide, nickel carbonate. Therefore, the total metal results have to be converted into assessed chemical analysis results for the compound most likely to be present in the soil samples. For example, if the sample contains high total lead concentrations and high sulphate concentrations, then the lead is likely to be present

in the soil as lead sulphate. The most likely compounds can often be determined from a desk study or previous site uses. If the site has been derelict for a number of years, consideration should be given as to whether water soluble compounds should or should not be chosen, as rainfall could have removed them from the soil (this does not apply if the soil has been taken from below under a concrete slab etc). Chemical knowledge and common sense needs to be used in choosing a suitable compound.

If no data is available, then a worst-case scenario has to be assumed and the most hazardous compound likely to be present has to be chosen. For example, metal chromates (lead chromate, nickel chromate) are often the most hazardous compounds formed by many metals, but if the chromium concentrations in the soil are low, chromates are unlikely to be present. It should also be noted that for many of the hazard categories, the cumulative hazard from different compounds is added (e.g., add the concentrations of the copper, lead and zinc compounds together to assess the Hazard Category H14 Ecotoxicity).

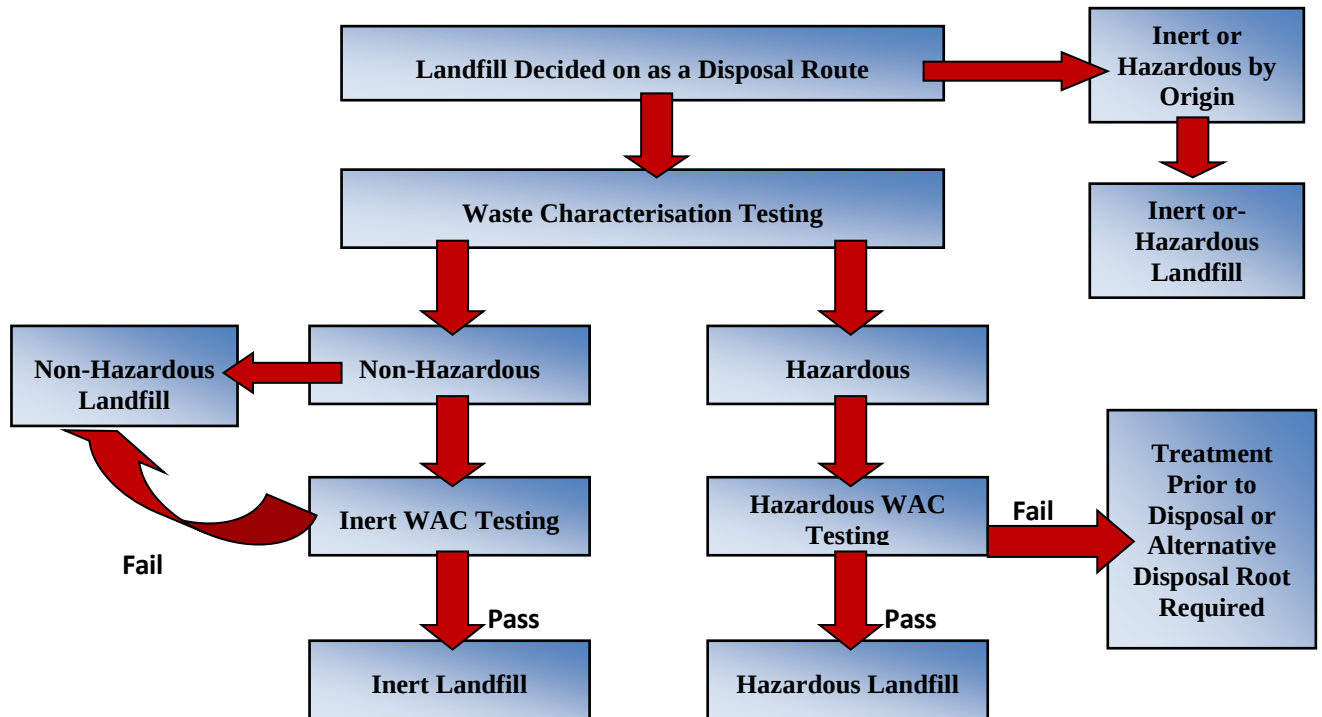
If the results of the above assessment determine that the waste is hazardous, it must then be analysed for the Waste Acceptance Criteria (WAC) analysis contained within appropriate Environmental Permitting Regulations (this comprises mainly leachate but also analysis for TOC and Loss on ignition). WAC limit values have been set for the listed determinands. If any of the determinands exceed their limit value, the waste must be pre-treated to reduce concentrations to below the limit values before the waste may be disposed of at a landfill site licensed to take hazardous waste.

For waste classified as not being hazardous, then there are two options available. Currently, waste correctly characterised as not being hazardous may be disposed of without WAC testing to a non-hazardous landfill. Alternatively, WAC testing for Inert Waste can be carried out (this is similar to the list for hazardous waste with the addition of PAH's, BTEX and Mineral Oil). If the results pass the Inert WAC criteria it can be disposed of at an Inert Waste Landfill. If any of the WAC test results exceed the Inert WAC criteria the waste has to be disposed at a non- hazardous landfill. There are WAC limits for non-hazardous waste set for pH and TOC. If these two criteria are not met then the waste must be pre-treated to so that it meets the criteria before it can be disposed.

If materials fail the WAC criteria it may be possible to pre-treat the waste on-site or be taken to a soil treatment centre for pre-treatment to reduce the soil's hazardous properties (e.g., by bioremediation of hydrocarbons).

It should be noted that in order to dispose of Hazardous Waste, the site must register as a producer of Hazardous Waste with the Environment Agency. When disposing of waste materials to landfill sites the appropriate Duty of Care Waste Transfer procedures must be followed.

Landfilled Waste Decision Tree



Landfill Tax

It should be noted that HM Revenue and Customs (HMRC) classify wastes for tax purposes using a different scheme to the threefold landfill EU Landfill Directive scheme (i.e., the hazardous, non-hazardous and inert). HMRC have a two-fold system for landfill tax. The Standard Landfill Tax is currently £88.95/T and applies to all wastes unless they qualify for the reduced rate of landfill tax of £2.80/T. The wastes that qualify for the reduced rate of Landfill Tax are set out in The Landfill Tax (Qualifying Material) Order 2011 with supplementary information on the interpretation of these regulations in HMRS "Notice LFT1 – A General Guide to Landfill Tax" (May 2012) and HMRC Briefing Notes 15/12 and 18/12.

APPENDIX I – UNFORESEEN GROUND CONTAMINATION

Unforeseen Ground Contamination

There is the potential for areas of previously unexpected contamination to be present, as is the case with any “brownfield” site. Any significant quantities of asbestos, significant ashy soils, unusual, brightly coloured or significantly oily or odorous material should be considered in this category. If unexpected contamination is found the following procedures should be adhered to:

1. All site works at the position of the suspected contamination will cease.
2. A suitably trained geo-environmental specialist should assess the visual and olfactory observations of the condition of the ground and the extent of contamination, and the Client and the Local Authority should be informed of the discovery. Should the contamination be likely to affect controlled waters the Environment Agency shall also be informed.
3. The suspected contaminated material will be investigated and tested appropriately in accordance with the assessed risks. The investigation works will be carried out in the presence of a suitably qualified geo-environmental engineer. The investigation works shall commence to recover samples for testing and, using visual and olfactory observations of the condition of the ground, delineate the area over which contaminated materials are present.
4. The unexpected, contaminated material will either be left in situ or be stockpiled whilst testing is carried out and suitable assessments completed to determine whether the material can be re-used on site or requires to be disposed as appropriate.
5. Where the material is left in situ awaiting results it will be reburied or covered with plastic sheeting.
6. Where the potentially contaminated material is to be temporarily stockpiled it will either be placed either on a prepared surface of clayey Alluvium, or on 2000-gauge Visqueen sheeting (or other impermeable surface) and covered to prevent dust and odour emissions.
7. Any areas where unexpected visual or olfactory ground contamination will be surveyed, a photographic record kept, and testing results incorporated into the Verification Report.
8. A photographic recorded will be made of relevant observations.
9. The testing suite will be determined by the independent geo-environmental specialist on the basis of visual and olfactory observations.
10. Test results will be compared against current assessment criteria suitable for the future use of the area of the site affected.
11. The results of the investigation and testing of any suspect unexpected contamination will be used to determine the relevant actions. After consultation with the Local Authority and if necessary the Environment Agency, materials should either be:
 - re-used in areas where test results indicate that it meets compliance targets so it can be reused without treatment; or
 - treatment of material on site to meet compliance targets so it can be reused; or

- removal from site to a treatment centre or to a suitably licensed landfill or permitted treatment facility.

12. Verification Report will be produced for the work.

Asbestos

Asbestos cement products and asbestos fibres have not been encountered in the soils at the site but based on the age of the Made Ground material containing asbestos could be expected to be encountered. If non-notifiable asbestos (e.g., chrysotile asbestos cement board) is encountered in excavations then it will be dealt with in accordance with the Control of Asbestos Regulations 2012 (CAR 2012) and the HSE's ACoP for asbestos (2013). Finding non-notifiable asbestos is a very common occurrence on brownfield sites and is a relatively low risk activity and can be dealt with as a matter of routine. Therefore, it is not proposed that the Council will be notified but an appropriate record will be kept of confirmatory testing and disposal. This will be included in remediation verification reports.

If suspect notifiable asbestos is encountered then the Council and the HSE will be notified. An appropriate action plan will be agreed with the Council and the HSE in accordance with CAR 2012. The action plan will include the preparation of the Risk Assessment and Plan of Work in accordance with CAR and other statutory requirements including:

- Site mobilisation;
- Excavation methodology;
- Handling, movement and storage on-site of excavation arisings;
- Any processing of excavation arisings containing ACMs;
- Movement and placement of arisings to final destination;
- Placing of cover system over soils with and ACMs remaining on-site;
- Off-site disposal of ACMs;
- Licences;
- PPE & RPE; and,
- Dust and fibre monitoring.

Potential mitigation measures that would be required include:

- Ensuring works are carried out by suitably trained and experienced personnel with working with asbestos;
- Site investigation and risk assessment;
- Removal or treatment of asbestos hotspots;
- Use of PPE and RPE by construction workers; and,

- Compliance monitoring.

Unexpected Tanks

No buried underground fuel storage tanks have been encountered during the site investigation works; however, there remains a low risk that tanks are present on-site. Should an underground tank be encountered, operations should cease in the area. Additionally, there may be pipework associated with these tanks which could have oily residues. The following procedures are to be adhered to if tanks and pipework are identified:

1. All site works at the position of the tanks/pipework should stop.
2. A description of the tank should be made by the geo-environmental engineer including; condition and surround, along with visual and olfactory observations should any contents in the tank be apparent. A photographic record will also be made of relevant observations.
3. The tank's position and depth should be determined and marked on a plan of the site.
4. The independent geo-environmental engineer will inform Client and the Local Authority.
5. During the presence of the independent geo-environmental engineer, investigation works should be undertaken to obtain samples of any liquid or sludge contents and to establish dimensions of the tank.
6. Testing will be determined on the basis of visual and olfactory observations by independent geo-environmental engineer.
7. Test results will be compared against current assessment criteria and proposals for disposal of any contents determined in agreement with the appropriate Regulatory Parties.
8. Emptying the tank and disposal of contents to a suitable licenced disposal facility.
9. Degassing and removal of the tank by a suitably qualified contractor will be required, and a Naked Flame Certificate should be provided.
10. Once the tank has been emptied in accordance with the above proposals, it is to be removed for disposal to a licensed waste management facility. Copies of the relevant waste consignment notes are to be kept and included in the Verification Report.
11. Excavation and remediation of any contaminated soils around the tank will be carried out.
12. Samples of the base and sides of the resultant hole will be sampled and supervised by the independent geo-environmental engineer to confirm whether risks to human health or controlled waters.