17-19 Whitworth Street West
Manchester
M1 5WG

t: 0161 236 2394
e: manchester@curtins.com
w: www.curtins.com

Our reference: 077873-CUR-00-XX-RP-GE-040-P01

28th November 2022

Mr Aidan Jackson
The Guinness Partnership
Bower House
1 Stable Street
Hollinwood
Oldham
OL9 7LH

Dear Aidan,

Re: Phase 2 Geo-Environmental and Geotechnical Report for White Moss Road, Project 500 Sites

1.0 Introduction

Curtins Consulting were instructed by The Guinness Partnership to undertake a ground investigation of White Moss Road, Manchester M9 6DA. The site is one of six sites currently being investigated on behalf of The Guinness Partnership, as part of Project 500, Manchester City Council's program to deliver affordable homes in the northeast of the city.

The site is located south of White Moss Road and encompasses a vacant area of open public space with several trees occupying space to the east and south of the south. The sites topography is generally flat.

The ground investigation was undertaken to determine the ground conditions pertaining to the development site, and to aid contamination risk assessment and foundation design. It is understood that the site is to be developed for residential dwellings. At the time of writing, no proposed site plans were available for review.

2.0 Background Information

Residential development is proposed at a plot of land off White Moss Road. The site location plan is presented in *Figure 1*, overleaf.

Earliest mapping (1848) shows that the site was occupied by the Dam Head Farm and a large pond centre north, later accompanied by a smaller pond to the west which is not noted by 1909. Farm buildings were later constructed west of the pond. A spring is also shown at the south of site.

The surrounding area is generally undeveloped agricultural fields with several ponds noted within 250m of the site (though no longer indicated on mapping after 1909), a wooded area 157m south and a watercourse adjacent to the north of this. The Booth Hall Infirmary (a children's hospital from 1932) is located 221m south of the site. Through the 1930s to 50s continued residential development to the east of the site occurs. By1975 several small structures are located on site in the east. A large spoil mound is located 174m south of the site, no longer present on maps from 2006.

From 1975 Dam Head Farm and from the 1980s the small structures to the east and the large pond are no longer present on maps. Residential developments populate areas surrounding the site in all directions

Curtins Consulting Ltd registered in England No. 2054159
Registered Office: 51-55 Tithebarn Street, Liverpool, L2 2SB
Branch registered in Ireland No. 908625

including the associated White Moss Road adjacent to the northern boundary of site. Two electric substations are located 145m northwest and 176m east of the site and tanks are located 216m south of the site.

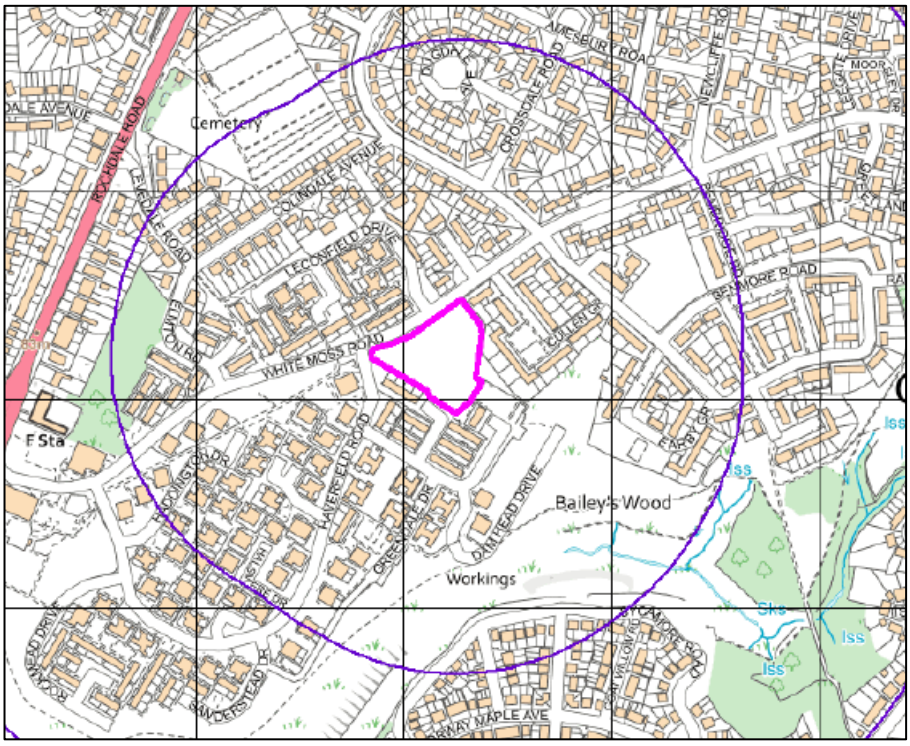


Figure 1 *– Site Location Plan (site boundary shown in pink and 250m buffer in purple). Crown Copyright. License Number 100022432.*

BGS mapping indicates the site is underlain by Glacial Till deposits (interbedded granular and cohesive soils), Manchester Marls Formation bedrock (majority of site) and Chester Formation bedrock (northwest corner). The BGS borehole scans recorded Made Ground overlying alternating layers of sand and clay.

The site is located within a Coal Mining reporting area. A review of available online data indicates the site is not located within the vicinity of recorded mine entries, or a development high risk area. The risk from shallow coal mining is therefore considered to be **Low**.

The site is underlain by a Secondary B Aquifer associated with the bedrock formation. The superficial deposits are designated as a Secondary Undifferentiated Aquifer. The site is not located within a Source Protection Zone (SPZ). There are no potable groundwater abstraction points within 1km. The nearest surface water feature is an issue 171m south of the site. There are no surface water abstractions within 1km. There are no discharge consents within 500m of the site.

The risk from UXO associated with WWII bombing to future intrusive investigation works is considered to be **Low**.

The risk from Made Ground posed to the site's end-users and construction workers is considered to be **Moderate / Low** due to the anticipated lack of contamination in the Made Ground. The risk posed to groundwater and surface water is considered to be **Very Low** due to anticipated low permeability superficial soils and the distance to the nearest surface water feature. The risk posed to site end-users from ground generating gases arising from organic / putrescible soils near the site is considered to be **Moderate**.

3.0 Curtins Ground Investigation (2022)

Ground investigation works were undertaken on the 8th August 2022.

The scope of the ground investigation was designed in general accordance with current UK guidance including:

- Land Contamination Risk Management (Ref. 1);
- BS 10175:2011 + A2:2017 Investigation of Potentially Contaminated Sites (Ref. 2);
- BS 5930:2015 + A1:2020 Code of Practice for Ground Investigations (Ref. 3); and
- BS EN1997: Part 2:2007 Eurocode 7 (Ref. 4).

3.1 Scope of Works

The site works consisted of eight window sample boreholes, WS01 to WS08, advanced to 5.45m bgl. In-situ testing, including Standard Penetration Tests (SPTs) were undertaken at, generally, 1m intervals within the superficial soils.

An exploratory hole plan is included at the end of this report, Ref. 077873-CUR-00-XX-DR-GE-80002-P01.

8 No. of soil samples, six from the Made Ground and two from the natural strata were taken and underwent environmental chemical testing, as detailed in Table 3.1. Analysis was undertaken to assess the contamination risk presented to site end users and construction works in this area of the site. Where asbestos was encountered, asbestos quantification was undertaken (2 locations).

Table 3.1 - *Environmental testing suite (Soils)*

Suite Ref.	Analyte	LOD
Soils Suite A	Asbestos Screen	-
	pH Value	0.01 pH Units
	2:1 Water Soluble Sulphate	0.01 g/l
	Soil Organic Matter (SOM)	0.1 $\%^{w}/_{w}$
	Arsenic, Chromium, Chromium VI, Copper, Lead, Selenium, Nickel	1 mg/kg
	Zinc	5 mg/kg
	Boron (water soluble)	1 mg/kg
	Cadmium	0.5 mg/kg
	Mercury	0.17 mg/kg
	Cyanide (total)	1 mg/kg
	Phenols (screen)	0.2 mg/kg
	PAHs (USEPA 16)	0.01 to 0.08 mg/kg
	TPH (Aro/Ali Split)	0.01 to 1.0 mg/kg

The following laboratory geotechnical testing was undertaken in accordance with methods outlines in BS1377: Part 1:2016 (Ref. 5), to enable a foundation assessment for the proposed residential development:

- 7 No. 4pt Atterberg Tests
- 7 No. 2:1 Water Soluble Sulphate; and
- 7 No. pH Value.

3.2 Ground Conditions

A summary of the ground conditions encountered during the site investigation works is presented in *Table 3.2,* below, with detailed information presented in the exploratory hole logs included at the end of this report. A summary of each strata is presented below.

Table 3.2 - *Summary of encountered ground conditions:*

Stratum	Depth to Top of Strata m bgl (m AOD)	Thickness (m)		Description
		Min	Max	
MADE GROUND	0.00	0.25	1.40	Surface cover of grass over MADE GROUND: dark brown very gravelly sand with occasional cobbles. **Overlying** MADE GROUND: Blackish brown very gravelly clayey sand with high ash content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of brick, concrete, sandstone. **Or** MADE GROUND: Grey gravelly slightly sandy cobbles of angular concrete. Gravel is subangular to subrounded fine to coarse of concrete and brick. **Or** MADE GROUND: Soft to firm blackish grey sandy clay with slight hydrocarbon odour.
GLACIAL TILL (Cohesive)	0.25 – 4.30 (98.05 – 89.87)	0.50	4.50	Soft or firm, locally stiff slightly sandy to sandy slightly gravelly to gravelly CLAY. Gravel is subangular to rounded fine to medium of sandstone and coal. Occasionally no gravel fraction was encountered.
GLACIAL TILL (Granular)	0.65 – 5.40 (98.45 – 89.27)	0.05[1]	0.85[1]	Orangish brown slightly gravely fine to medium SAND. Gravel is subangular to subrounded fine to coarse of sandstone. **or** Brown (speckled black) fine to coarse SAND.

1 - Base of strata not encountered.

3.3 Groundwater

Groundwater was recorded as seepages within five of the eight boreholes, WS01, WS02, WS06, WS07 and WS08 during the site investigation. A summary is detailed below within *Table 3.3a*.

Table 3.3a – *Water Strikes Noted During Site Investigation*

Borehole Ref.	Water Strikes		
	Strike Depth m bgl (m AOD)	Strata	Notes
WS01	4.80 (93.52)	Glacial Till	N/A
WS02	1.20 (95.85)	Glacial Till	N/A
	3.80 (93.25)	Glacial Till	N/A
WS06	2.60 (91.47)	Glacial Till	N/A
	4.80 (89.27)	Glacial Till	N/A
WS07	1.30 (96.72)	Glacial Till	N/A
WS08	4.40 (90.99)	Glacial Till	N/A

Groundwater, likely representing perched water within granular layers in the generally cohesive Glacial Till, was recorded during gas monitoring visits. The borehole response zones and recorded water levels are detailed in *Table 3.3b*.

Table 3.3b – *Monitoring Well Response Zones and Water Level Monitoring Results*

Borehole Ref.	Installation Strata	Response Zone m bgl (m AOD)	Depth to water level m bgl (m AOD)					
			24/08/22	01/09/22	21/09/22	28/09/22	14/10/22	28/10/22
WS02	Glacial Till	1.00 – 4.00 (96.05 – 93.05)	Dry	Dry	Dry	Dry	3.98 (93.07)	3.84 (93.21)
WS03	Glacial Till	1.00 – 4.00 (98.35 – 95.35)	-	Dry	Dry	Dry	Dry	Dry
WS05	Glacial Till	1.00 – 4.00 (97.32 – 94.32)	1.94 (96.38)	1.80 (96.52)	1.96 (96.36)	2.02 (96.30)	0.68(1) (97.64)	0.48(1) (97.84)
WS06	Glacial Till	1.00 – 3.00 (93.07 – 91.07)	2.75 (91.32)	Dry	Dry	Dry	2.67 (91.40)	2.62 (91.45)
WS07	Glacial Till	1.00 – 4.00 (97.02 – 94.02)	1.21 (96.81)	1.35 (96.67)	2.50 (95.52)	2.66 (95.36)	0.82(1) (97.20)	0.66(1) (97.36)

1 – Well noted as flooded (water level higher than the monitoring well response zone).

3.4 Obstructions

No obstructions were noted during the site investigation.

3.5 Observed Potential Contamination

Potential olfactory contamination was observed during the intrusive investigation works at WS07 (0.70-0.90mbgl) and WS01 (0.60-1.40mbgl), both for a slight hydrocarbon odour.

4.0 Ground Contamination Assessment

Six soil samples from the Made Ground and two from the natural strata were taken and analysed according to the testing Suite A outlined in *Table 3.1*. The laboratory chosen by Curtins to undertake the analysis was Envirolab, a UKAS and MCERTS accredited laboratory.

Soil samples were obtained to provide adequate and representative coverage for the proposed end use, accounting for the site's history.

Considering the sites proposed end-use for residential dwellings were compared against adopted '*Residential with homegrown'* Generic Assessment Criteria (GACs).

Soil Organic Matter (SOM) content has an influence on the volatilisation of organic contaminants (i.e. the higher the SOM, the lower the volatilisation rate and therefore inhalation exposure risk). Soil organic matter (SOM) value for the soils was 1.1% $^{w}/_{w}$ to 13.1% $^{w}/_{w}$. With consideration for a calculated geometric average, soil features determine an SOM of 3.64% $^{w}/_{w}$. As such, a comparison against Tier 1 thresholds for SOM of 1% $^{w}/_{w}$ for A '*Residential with homegrown produce'* end use has been adopted.

The full chemical testing results and adopted GAC's are listed in at the end of this report.

Exceedances were noted within the soil samples for PAHs and TPHs. Exceedances are detailed below within *Table 4.0*.

Table 4.0 – *Exceedances within Made Ground*

Exploratory Hole I.D.	Depth m bgl (m AOD)	Strata	Determinant	Concentration (mg/kg)	GAC (mg/kg)
WS01	0.75 (97.57)	MADE GROUND	TPH Aromatic >C12-C16	163	140
WS02	0.40 (96.65)	MADE GROUND	Benzo(a)pyrene	4.17	2.2
			Benzo(b) fluoranthene	4	2.6
			Dibenzo(ah) anthracene	0.79	0.24
WS03	0.50(98.85)	MADE GROUND	Benzo(a)pyrene	3.01	2.2
			Benzo(b) fluoranthene	3.22	2.6
			Dibenzo(ah) anthracene	0.56	0.24

No suspected asbestos containing materials (AMCs) were identified in the exploratory hole logs. However, asbestos was positively identified during laboratory screening in two sample locations. WS01 identified loose fibres of amosite (<0.001%) and WS03 identified chrysotile and crocidolite board at soil concentrations of 0.011%.

The elevated Total Petroleum Hydrocarbon (TPH) encountered in WS01 may be caused by the material used to backfill the historic ponds in this area. A hydrocarbon odour was also observed in WS01 and WS07. It's recommended that the ponds extents are further delineated to further characterise the nature of materials used to backfill and identify the extent of hydrocarbon contamination.

5.0 Geotechnical Laboratory Analysis

A programme of geotechnical testing was scheduled by Curtins to determine the ground model for the site, based on the ground conditions detailed in Section 3.1.

5.1 Geotechnical Testing and Engineering Properties

The program of geotechnical testing undertaken during this investigation is detailed in Section 3.1.

Where necessary, determination of characteristic parameters has been based on appropriate assessment of results derived from in-situ tests, laboratory analysis and published correlations, complemented with engineering judgement and consideration of the relevant limit state. The parameters are not considered to be absolute and should be referenced with the specific strata text in this section and reviewed when considering a specific area of the site.

5.1.1 Made Ground

A surface cover of grass was underlain by either: dark brown very gravelly sand with occasional cobbles, blackish brown very gravelly clayey sand with high ash content, or grey gravelly slightly sandy cobbles of angular concrete.

The underlying Made Ground comprises either soft to firm blackish grey sand clay, grey gravelly slightly sandy cobbles, dark brown slightly silty gravelly clay with occasional cobbles, or blackish brown gravelly sand.

The gravel fraction of the granular soils includes fine to coarse and angular to rounded brick, glass, sandstone, concrete, clinker and coal. Cobbles were angular brick and concrete.

Due to inherent variability in the Made Ground, and it's compressible nature, it is not considered to be a suitable bearing stratum for the proposed residential development, and therefore no geotechnical testing has been undertaken in this stratum.

5.1.2 Glacial Till

Glacial Till was recorded underlying the Made Ground in all exploratory hole locations.

The Glacial Till encountered comprises predominantly cohesive deposits, interbedded with granular layers at various depth horizons.

The cohesive deposits were described typically as a soft to firm, locally stiff, sandy gravelly clay. Granular deposits were typically described as a gravelly fine to coarse sand, recorded at depths of between 0.65 and 5.40m bgl, with a maximum thickness of 0.85m.

The geotechnical test results recorded within the superficial deposits are summarised in *Table 5.1.2.*

Table 5.1.2 – *Summary of Glacial Till geotechnical test results*

Parameter		No. of tests	Minimum	Maximum	Average
pH		9	6.9	8	7.65
Water Soluble Sulphate (mg/l)		9	9.1	210	100
SPT 'N' Value Cohesive Granular		38 30 8	4 4 7	28 28 20	-
Moisture Content (%)		7	15	22	19
Atterberg Test	Liquid Limit (%)	7	28	37	32
	Plastic Limit (%)	7	16	19	17
	Plasticity Index (%)	7	8	20	13.5
	Modified Plasticity Index (%)	7	7.68	19.80	13.45

Cohesive Soils

A total of thirty SPT 'N' values were recorded in cohesive Glacial Till, ranging from between 4 and 28, where full penetration was met. The SPT 'N' results generally were variable, and do not indicate any notable increases or decreases with depth, as summarised in Figure 5.1.2a.

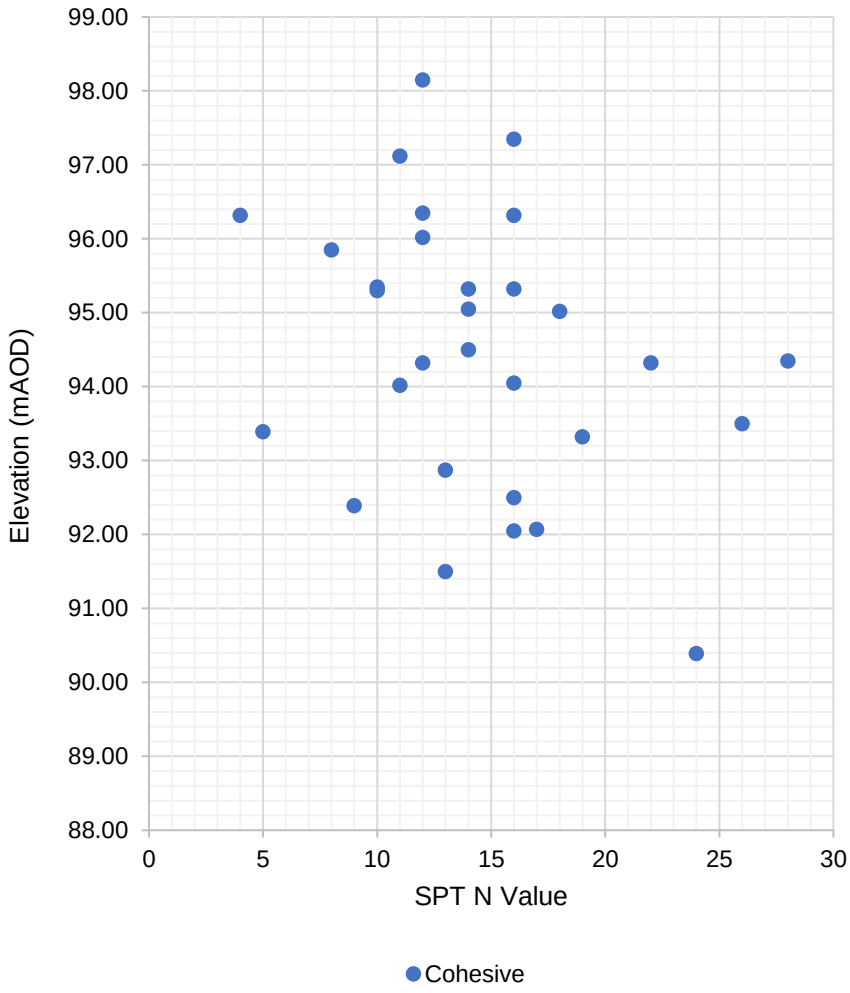


Figure 5.1.2a – *SPT 'N' Value versus Elevation (m AOD) – Cohesive Glacial Till*

Seven Atterberg tests were undertaken during the ground investigation. With exception of WS03 (3.00m bgl), which behaves as a medium plasticity clay, the soils behave as low plasticity clays. All samples of cohesive Glacial Till are classified as having a low volume change potential. The volume change potential of the cohesive soils has been determined in accordance with guidance from NHBC Standards Chapter 4.2 (Ref. 6).

The results of SPT can be correlated to an Undrained Shear Strength (c_u) when undertaken within cohesive deposits. For overconsolidated clays, Stroud (1974) reported good correlations between N and c_u, where:

$$\boldsymbol{cu = f1\ x\ SPT\ 'N'\ Value}$$

where values of f_1 are the conversion factor based on the plasticity of the clay.

Based on an average plasticity index of 13% and utilising an f_1 factor of 6 derived undrained shear strengths ranged between 24kPa and 168kPa.

The undrained shear strength of the cohesive Glacial Till does not appear to increase significantly with depth, as illustrated in *Figure 5.1.2b*. The graph illustrates that the clays are predominantly medium or high strength; however the large degree of scatter is also shown indicating high variability.

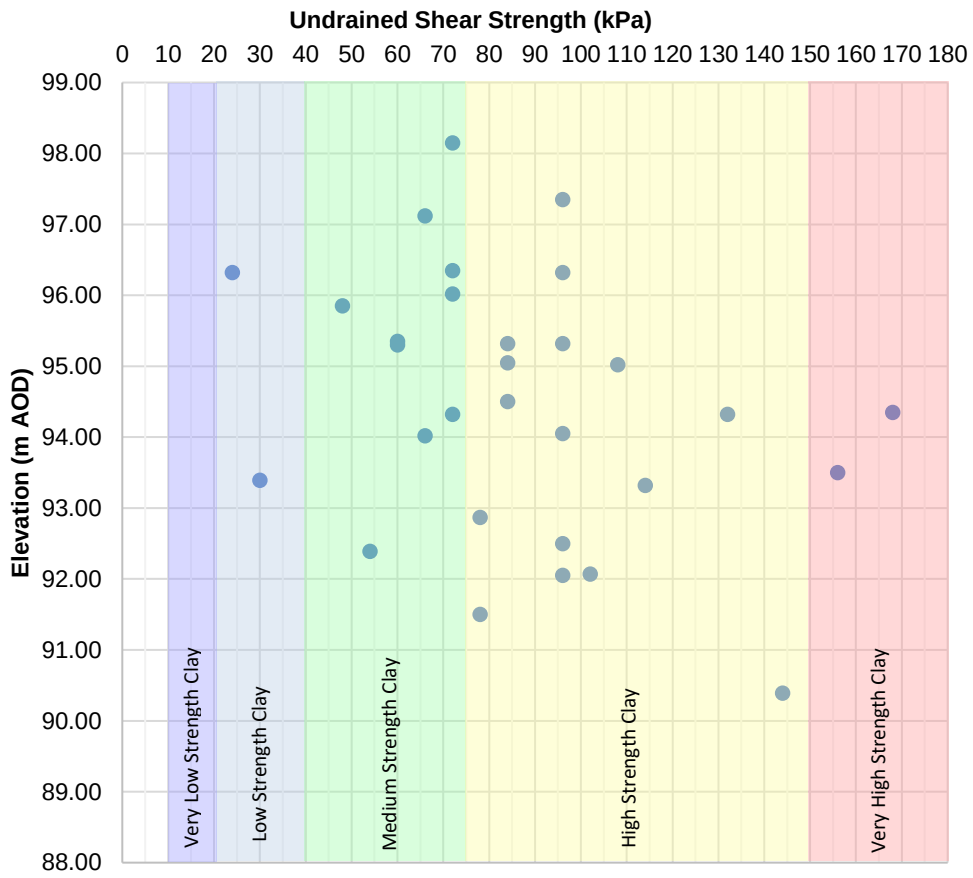


Figure 5.1.2b – *Derived Undrained Shear Strength versus Elevation Plot - Cohesive Glacial Till*

Moderately conservative characteristic unit weights of 17 - 20kN/m^3 for a medium strength clay above and below the water table, are deemed appropriate in accordance with BS8002 (Ref. 7).

The results of SPT can be correlated to the modulus of volume compressibility (m_v) when undertaken within cohesive deposits. For overconsolidated clays, Stroud (1974) reported correlations between N and m_v, where:

$$mv = \frac{1}{f2\ x\ SPT\ N}$$

where values of f_2 are a factor of the plasticity of the clay.

Based on an average plasticity index of 13% and utilising an f_2 factor of 0.6, m_v values typically range between 0.06 and 0.417m^2/MN (low to high compressibility), illustrated in *Figure 5.1.2c*.

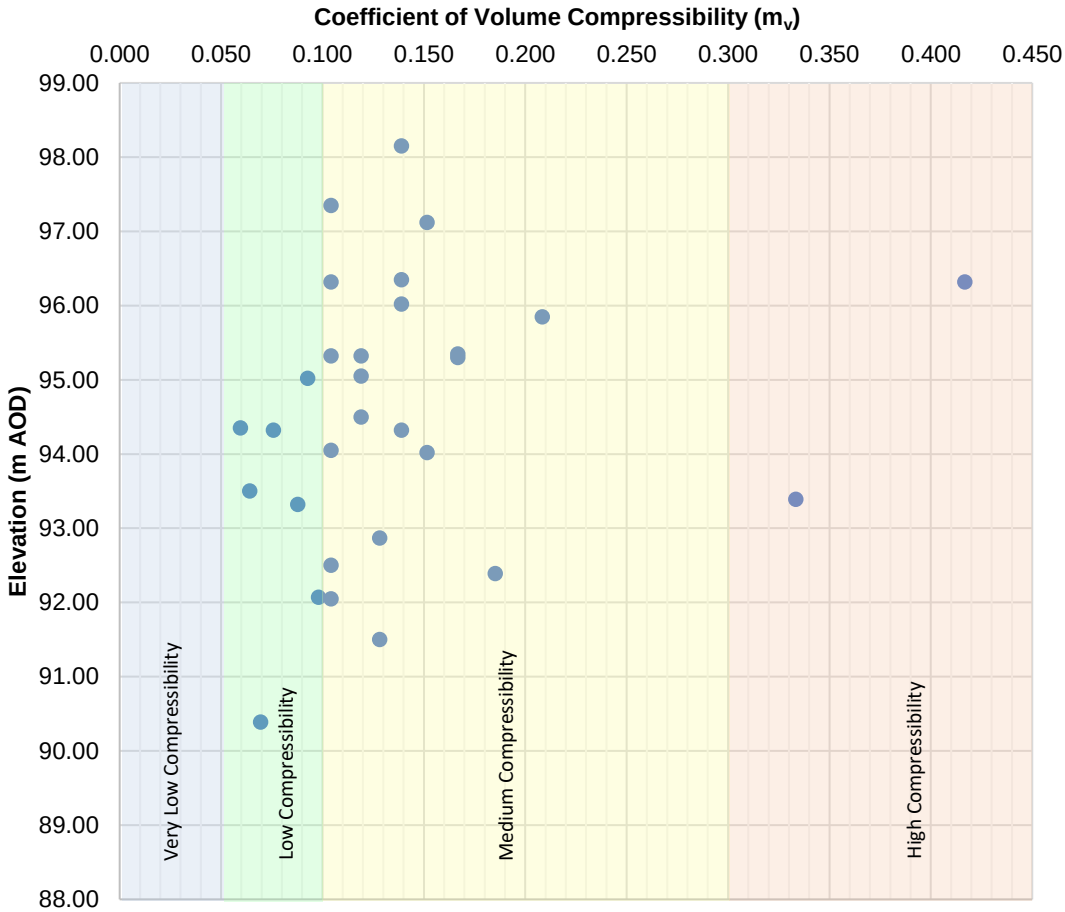


Figure 5.1.2c – *Coefficient of Volume Compressibility versus Elevation Plot - Cohesive Glacial Till*

The exploratory hole logs, and laboratory testing results indicate generally laterally consistent ground conditions across the site.

Granular Soils

A total of eight SPT 'N' values were recorded in granular Glacial Till which ranged between 7 (loose) and 20 (medium dense). Granular Glacial Till was recorded across the site interbedded with the cohesive Glacial Till material, with thicknesses in the region of 0.05m to 0.85m recorded. Therefore, due to the limited granular material encountered, no further geotechnical assessment was undertaken within these soils.

6.0 Ground Gas Risk Assessment

The conceptual site model concluded there was a Moderate risk from ground gas. There was potential for limited thicknesses of Made Ground, associated with potential infilling of the historic pond and historic farm buildings, containing organic /putrescible content as a potential source of ground gas generation. Noxious and asphyxiate gases were attributed to include, but not limited to, carbon dioxide, carbon monoxide, methane and hydrogen sulphide.

Five boreholes were installed with monitoring wells as detailed in *Table 3.3b*.

Six rounds of gas monitoring were undertaken between 24th August 2022 and 28th October 2022. The results log sheets are contained within *Appendix A6* and summarised in *Table 6.0.*

Barometric pressures ranging between 995mb and 1012mb were recorded during the monitoring period.

Table 6.0 – *Summary of Ground Gas Monitoring Results*

Exploratory Hole ID	Maximum Methane Concentration (%)	Maximum Carbon Dioxide Concentration (%)	Minimum Steady Oxygen Concentration (%)	Maximum Peak Gas Flow (l/hr)	Steady State Gas Flow (l/hr)
WS02	<0.1	5.6	2.4	-3.1	-1.7
WS03	<0.1	3.6	16.1	2.5	<0.1
WS05	<0.1	3.1	16.9	28.8	<0.1
WS06	<0.1	8.2	1.7	<0.1	<0.1
WS07	1.1	9.9	0.1	27.7	0.1

Methane (CH_4) recorded a maximum concentration of 1.1% $^v/_v$ within WS07 during the fifth visit. All other monitoring wells, across all monitoring visits, recorded methane concentrations <0.1% $^v/_v$ throughout the monitoring period.

Carbon Dioxide (CO_2) recorded a maximum concentration of 9.9% $^v/_v$ within WS07 during the second visit. Elevated concentrations (>5% $^v/_v$) were recorded in WS07 on all six monitoring visits, in addition to WS02 on the third and sixth visits and WS06 on the fourth visit.

Carbon monoxide (CO) hydrogen sulphide (H_2S) were recorded below the limit of detection of the monitoring instrument during all monitoring visits.

The maximum peak air flow rate was recorded in WS05, at 28.8 l/hr on the fifth visit, reducing to a steady state air flow rate of <0.1 l/hr within 30 seconds. The maximum steady state air flow rate was recorded in WS02, at -1.7 l/hr on the first visit. For the purposes of this assessment, the negative values are taken as absolute values, and it is assumed that a positive air flow rate of the same value may be achieved in natural ground conditions.

Two gas risk assessments have been undertaken, to account for the end use of the site.

Private residential dwellings, assumed to be built in accordance with the 'model' low-rise housing development and NHBC guidelines (Ref. 8), will be assessed in accordance with the NHBC Traffic Light Classification.

Hazardous gas flow rates (Q_{hg}) can be evaluated using peak air flow rates and maximum methane concentrations, and steady state air flow rates and steady state carbon dioxide concentrations.

For methane, the greatest peak air flow rate was recorded in WS05 on the fifth visit (28.8 l/hr). The greatest peak methane concentration was recorded in WS07 on the fifth visit (1.1 %v/v). On this basis, the calculated Q_{hg} for the site is taken as 0.317 l/hr.

For carbon dioxide, the greatest steady state air flow rate was recorded in WS02 on the sixth visit (-1.7 l/hr). The greatest steady state carbon dioxide concentration was recorded in WS07 on the second visit (9.9%v/v). On this basis, the calculated Q_{hg} for the site is taken as 0.168 l/hr.

Elevated methane concentrations were recorded above 1 % v/v in WS07 (fifth visit).

Elevated carbon dioxide concentrations were recorded above 5 % v/v in WS02 (third and sixth visit), WS06 (fourth visit) and WS07 (all six monitoring visits).

All monitoring wells were constructed in the Glacial Till. The exploratory hole logs indicate the Glacial Till is formed of similar materials across the site, with no observable increase in organic or putrescible content or changes in soil composition between these and other positions across the site. The worst case Q_{hg} value for methane has been taken as the gas screening value for the site.

The assessment indicates the site is classified as Amber 1, where designs confirm with the NHBC 'model' low rise house. Gas protection measures will be required for an Amber 1 classification.

Developments which differ significantly from the 'model' construction will be assessed in accordance with BS8485:2019. This includes low rise apartments.

The dataset obtained is considered to be representative of site conditions beneath the proposed development footprint. A range of data has been collated which captures significant temporal variation including barometric variability and various ground saturation states. As such, the gas risk assessment will utilise steady state flow rates and maximum gas concentrations when determining the maximum Q_{hg}.

The gas screening value (GSV) has been determined for recorded methane and carbon dioxide concentrations.

Evaluation of the 'borehole' scenario (highest hazardous gas flow rate that is realistically possible, i.e. in a single borehole) for methane records a maximum Q_{hg} of 0.0011 l/hr in WS07 on the fifth visit, where maximum steady state flow reading of 0.1 l/hr is used, and maximum gas concentrations of 1.1% v/v recorded.

Evaluation of the 'borehole' scenario (highest hazardous gas flow rate that is realistically possible, i.e. in a single borehole) for carbon dioxide records a maximum Q_{hg} of 0.0901 l/hr in WS02 on the sixth visit, where maximum steady state flow reading of 1.7 l/hr is used, and maximum gas concentrations of 5.6% v/v recorded.

Evaluation of the 'worst case check' (highest hazardous gas flow irrespective of monitoring location) for carbon dioxide also records 0.0909l/hr, whereas for methane a value of 0.0187 l/hr is calculated.

Elevated methane concentrations were recorded above 1 % v/v in WS07 (fifth visit).

Elevated carbon dioxide concentrations were recorded above 5 % v/v in WS02 (third and sixth visit), WS06 (fourth visit) and WS07 (all six monitoring visits).

All monitoring wells were constructed in the Glacial Till. The exploratory hole logs indicate the Glacial Till is formed of similar materials across the site, with no observable increase in organic or putrescible content or changes in soil composition between these and other positions across the site. The borehole Q_{hg} value for carbon dioxide has been taken as the gas screening value for the site, which is consistent with a Characteristic Situation 2 (CS-2) gas regime, where gas protection measures are required.

The potential risks from ground gases to the excavations are to be dealt with by the Contractor, in accordance with the Confined Space Regulations, during construction. Appropriate ground gas monitoring and safety measures should be in place during the works, as the potential presence of ground gases could pose a risk in any confined spaces of deep excavations.

7.0 Geotechnical Assessment and Recommendations

The recommendations provided within this section are based on a review of the encountered ground conditions across the site.

The ground conditions at site generally comprised Made Ground to a maximum depth of 1.40m bgl, underlain by Glacial Till. The Glacial Till was encountered at depths ranging between 0.25 and 1.40m bgl to the base of the boreholes (maximum depth of 5.45m bgl). The thickness of the Glacial Till was not proven by this investigation.

7.1 Foundation Assessment

It is understood the proposed development comprises several two storey residential houses and residential apartments. The loadings of the proposed houses and apartments were not available at the time of writing this report. The loads will pre-determine the suitability of foundations adopted, though are not anticipated to be high.

Based on the ground and groundwater conditions encountered during the Curtins ground investigation, it is considered that shallow foundations will be possible to support the proposed development.

Foundations will be required to be taken down below any Made Ground and be placed in the firm to stiff cohesive Glacial Till that exhibits an undrained shear strength in excess of 50kPa and cast at a minimum depth of 1.0m bgl. Localised over excavation may be required where there is deep Made Ground and to ensure the minimum undrained shear strength criteria of 50kPa is achieved. To prevent differential settlement foundations should be placed wholly in one material i.e. clay and over excavation through granular sand layers in the Glacial Till may be required to achieve this.

Assuming a 0.6m wide strip foundation at a depth of 1.0m bgl, an allowable bearing capacity of 75kPa is likely to be achievable (limited to less than 25mm settlement). Any changes to the foundation width, depth or founding strata will change this capacity. Should excavation depths become excessive and uneconomical to meet the minimum undrained shear strength of 50kPa, a ground improvement (e.g. vibro) or mini-pile solution may be required.

Specialist contractors should be consulted with regards to the design of an appropriate ground improvement or piling scheme to identify the most feasible and economic technique and options.

A qualified experienced engineer should inspect the founding stratum prior to casting.

Groundwater seepages may be encountered in shallow excavations associated with perched groundwater within the Made Ground or granular layers in the Glacial Till. Sump pumping is likely to be an effective dewatering technique.

Excavation instability associated with the Made Ground and superficial deposits cannot be discounted, especially in granular layers in the Glacial Till and in conjunction with groundwater ingress.

7.2 Ground Floor Slab

In accordance with the NHBC Standards (2022) ground bearing floor slabs may only be used where the depth of Made Ground is less than 600mm deep and properly compacted. Any unsuitable or soft soils should be excavated out and replaced with a granular fill, and the formation thoroughly proof rolled prior to casting. Where Made Ground is greater than 600mm thick, excavating and replacing the Made Ground to an engineering specification may enable a ground bearing solution, however approval from the warranty provider should be

obtained in advance. Alternatively ground improvement such as vibro would enable a ground bearing solution. A suspended floor slab would be required in conjunction with a piled solution.

7.3 Chemical Attack on Buried Concrete

The classification of the site in terms of concrete in aggressive ground is based on the guidance provided in Table C2 of the Building Research Establishment (BRE) Special Digest 1, 3rd edition of 2005. A summary of the results obtained during are summarised in *Table 7.3a*, and *Table 7.3b* details the classification.

Table 7.3a – *Aggressive Chemical Environment for Concrete (ACEC) Site Classification*

Stratum	Test Type	No. of Tests	Range
Made Ground	pH	6	6.84 – 7.82
	Water Soluble Sulphate (mg/l)	6	<10 - 470
Glacial Till (Cohesive)	pH	9	6.9 – 8
	Water Soluble Sulphate (mg/l)	9	9.4 – 210

Table 7.3b – *Aggressive Chemical Environment for Concrete (ACEC) Site Classification*

Stratum	Design Sulphate Class	ACEC Class (1)
Made Ground	DS-1	AC-1
Glacial Till	DS-1	AC-1

(1) ACEC assessment was based on the *mobile* groundwater condition in a *brownfield* scheme area

In these conditions it is considered that deterioration of buried concrete due to sulphate or acid attack is unlikely to occur. The preliminary design of buried concrete according to Table C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-1 (AC-1) conditions assuming mobile groundwater.

8.0 Conclusions

A **Moderate/Low** risk has been identified to site end-users from soil and dust inhalation, direct contact and ingestion of shallow site soils beneath the site due to the PAH exceedances recorded and presence of asbestos as loose fibres and board. A suitable thickness of clean and inert capping should be installed in all private gardens and areas of soft landscaping.

Due to elevated concentrations of TPH (which may be associated with pond infill) additional supplementary investigation is recommended in these areas, to further assess the nature of possible infill material and to determine the extent of hydrocarbon contamination. The scope of additional ground investigation can be confirmed once the development layouts are fixed.

Construction workers should be provided with appropriate personal protection equipment (PPE) with consideration of the environmental testing results presented.

Gas protection measures will be required for the proposed residential development.

Following additional investigation a Remediation Strategy should be produced.

The cohesive Glacial Till at depths greater than 1.0m bgl and with an undrained shear strength in excess of 50kPa are likely to achieve an allowable bearing capacity of 75kPa, with settlement within acceptable limits. Over excavation through deep Made Ground and granular sand layers in the Glacial Till, and to ensure the

minimum undrained shear strength of 50kPa is achieved may be required. Should excavation depths become excessive and uneconomical to meet the minimum undrained shear strength of 50kPa, a ground improvement (e.g. vibro) or mini-pile solution may be required.

In accordance with the NHBC Standards (2022) ground bearing floor slabs may only be used where the depth of Made Ground is less than 600mm deep and properly compacted. Any unsuitable or soft soils should be excavated out and replaced with a granular fill, and the formation thoroughly proof rolled prior to casting. Where Made Ground is greater than 600mm thick, excavating and replacing the Made Ground to an engineering specification may enable a ground bearing solution, however approval from the warranty provider should be obtained in advance. Alternatively ground improvement such as vibro would enable a ground bearing solution. A suspended floor slab would be required in conjunction with a piled solution.

A Design Sulphate class of DS-1 and ACEC Class of AC-1 are deemed suitable for the proposed development for Made Ground and Glacial Till.

If you have any queries with regard to this letter report, please do not hesitate to contact us.

Yours sincerely,

J Lord
Senior Geo-Environmental Engineer
For and on behalf of
Curtins Consulting Ltd

Author	Signature	Date
J Lord BSc (Hons) Senior Geo-Environmental Engineer		28 November 2022
Checked	**Signature**	**Date**
R Stringer BSc (Hons) CGeol EurGeol FGS Principal Geotechnical Engineer		28 November 2022
Authorised	**Signature**	**Date**
R Allen BSc (Hons) CGeol FGS Principal Geo-Environmental Engineer		28 November 2022

Rev	Description	Issued by	Checked	Date

References

1. Environmental Agency (2020) Land Contamination Risk Management (LCRM)
2. British Standards Institution (2011) Investigation of Potentially Contaminated Sites: Code of Practice (report no. BS10175:2011+A2:2017).
3. British Standards Institution BSI (2015+A1:2020) Code of Practice for Ground Investigations (report no. BS5930).
4. British Standards Institution (2006) Eurocode 7: Geotechnical Design (report no. BSEN1997).
5. British Standard (2016) Methods of test for soils for civil engineering purposes. General requirements and sample preparation (report no. BS1377-1).
6. NHBC Standards (2022) Chapter 4.2
7. British Standards Institution (BS 8002:2015) Code of Practice for Earth Retaining Structures.
8. NHBC (2007) Guidance of Evaluation of Development Proposals on sites where methane and carbon dioxide are present. Report Edition No. 4

Appendices

Appendix A1 – Drawings

Appendix A2 – Exploratory Hole Logs

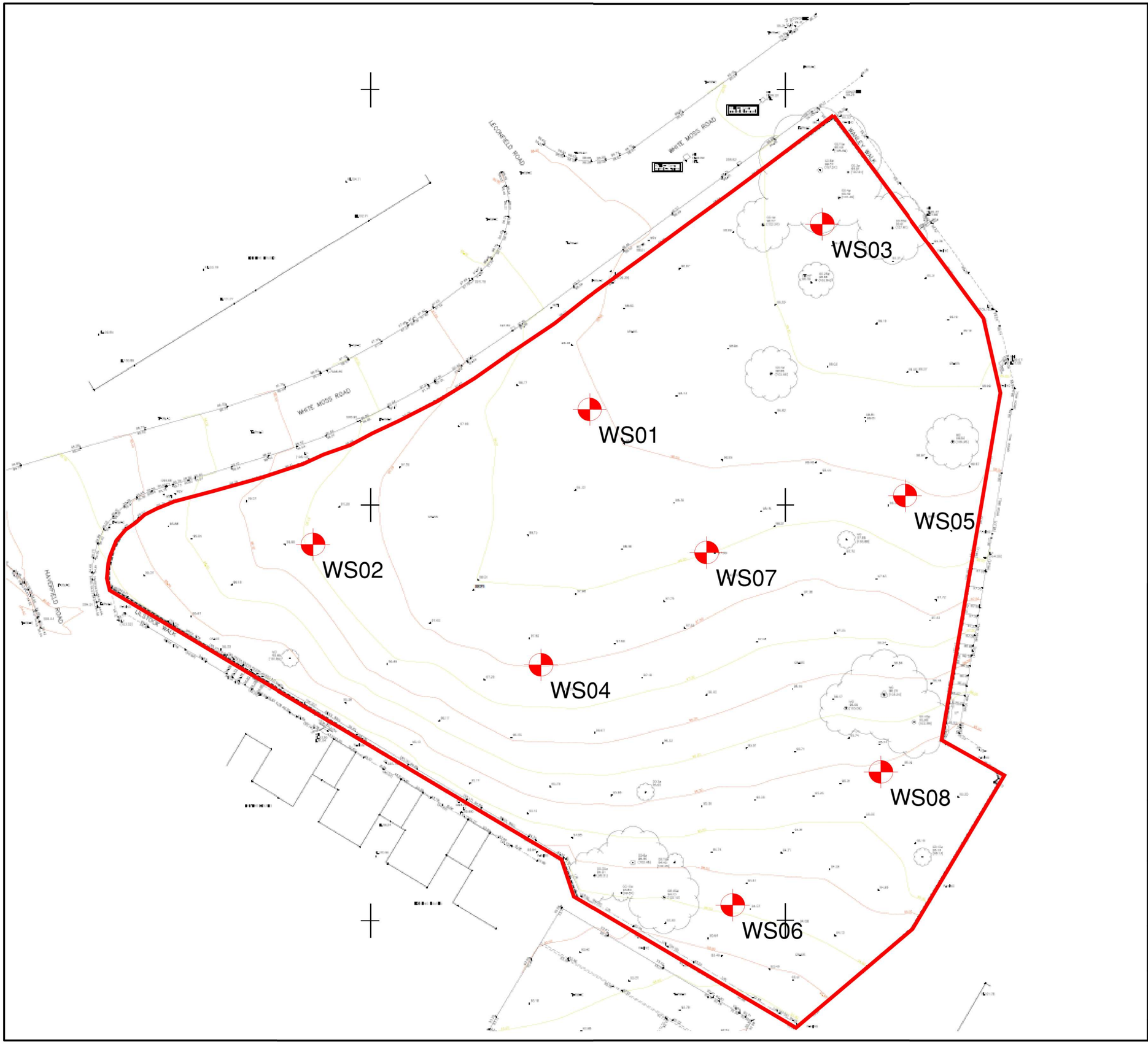
Appendix A3 – Geo-Environmental Laboratory Testing Results

Appendix A4 – Generic Assessment Criteria (GACs)

Appendix A5 – Geotechnical Laboratory Testing Results

Appendix A6 – Ground Gas Monitoring Results

Appendix A1 – Drawings



SITE INVESTIGATION

BOREHOLE LOCATIONS

Rev:	Description:	Date:	By:	Chkd:

curtins

Curtins Consulting Ltd,
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures - Civils - Environmental - Infrastructure - Transport Planning - Sustainability - Expert Advisory Services
Birmingham - Bristol - Cardiff - Douglas - Edinburgh - Kendal - Leeds - Liverpool - London - Manchester - Nottingham

Status:

INFORMATION

Project:

WHITE MOSS ROAD

Drg Title:

EXPLORATORY HOLE LOCATION PLAN

Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A3	**16/08/2022**	**JL**	**RA**

Drg No:	Rev:
077873-CUR-00-XX-DR-GE-80002	**P02**

© This drawing is the copyright of Curtins Consulting Ltd

Appendix A2 – Exploratory Hole Logs

Borehole Log

Borehole No.
WS01
Sheet 1 of 1

Project Name: Whitemoss Road	Project No. 077873.01	Co-ords: -	Hole Type WS
Location: Whitemoss Road, Blackley, M9 6DA		Level: 98.32	Scale 1:40
Client: Guinness Partnership		Dates: 08/08/2022 - 08/08/2022	Logged By JL

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.15	ES					MADE GROUND: Grass over dark brown very gravelly clayey SAND, with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of brick, concrete, glass and sandstone. Cobbles are angular of brick and concrete.
					0.60	97.72		MADE GROUND: Blackish brown very gravelly SAND, with high ash content. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded brick, concrete, sandstone. Hydrocarbon odour noted.
		1.20		N=21 (4,4/9,5,4,3)				
					1.40	96.92		Firm greyish brown gravelly CLAY. Gravel is fine to medium subangular to rounded of sandstone and coal
		2.00		N=4 (1,1/1,1,1,1)				
		3.00	D					
		3.00		N=14 (2,2/3,3,4,4)				
		4.00		N=22 (3,3/4,4,7,7)				
					4.60	93.72		Brown speckled black fine to coarse SAND
	▼	5.00		N=20 (5,5/6,6,4,4)				
					5.45	92.87		End of borehole at 5.45 m

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 4.80m bgl.

AGS

Borehole Log

Borehole No.
WS02
Sheet 1 of 1

Project Name: Whitemoss Road	Project No. 077873.01	Co-ords: -	Hole Type WS
Location: Whitemoss Road, Blackley, M9 6DA		Level: 97.05	Scale 1:40
Client: Guinness Partnership		Dates: 08/08/2022 - 08/08/2022	Logged By JL

Samples and In Situ Testing						
Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
0.40	ES		0.55	96.50		MADE GROUND: Grass over dark brown very gravelly clayey SAND, with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of brick, concrete, glass and sandstone. Cobbles are angular of brick and concrete.
			0.70	96.35		MADE GROUND: Blackish brown gravelly SAND, with high ash content. Sand if fine to coarse. Gravel is fine to coarse angular to subrounded of brick and concrete
1.20		N=8 (1,2/2,2,2,2)	1.25	95.80		Orangish brown slightly gravelly fine to medium SAND. Gravel is fine to coarse subangular to subrounded of sandstone
						Soft to firm brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse of subangular to subrounded of sandstone
2.00	D					*From 1.80 to 2.20m bgl increase in sand to very sandy*
2.00		N=14 (2,2/2,3,4,5)				
3.00		N=16 (3,3/3,4,5,4)				
			3.80	93.25		Brown slightly clayey fine to coarse SAND
4.00		N=12 (3,3/3,3,3,3)				
			4.30	92.75		Firm to stiff brown slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone
5.00		N=16 (3,3/3,5,4,4)				
			5.45	91.60		End of borehole at 5.45 m

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 1.20m and 3.80m bgl.

Borehole Log

Borehole No.
WS03
Sheet 1 of 1

Project Name: Whitemoss Road	Project No. 077873.01	Co-ords: -	Hole Type WS
Location: Whitemoss Road, Blackley, M9 6DA		Level: 99.35	Scale 1:40
Client: Guinness Partnership		Dates: 08/08/2022 - 08/08/2022	Logged By JL

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.50	ES					MADE GROUND: Grass over dark brown slightly gravelly SAND, with frequent roots and rootlets. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of brick, concrete, clinker and sandstone
					0.90	98.45		Greyish brown slightly clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of sandstone and mudstone
		1.20		N=12 (3,3/3,3,3,3)	1.30	98.05		Soft to firm orangish brown very sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone
		2.00		N=16 (3,3/3,3,5,5)	1.80	97.55		Firm to stiff brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of sandstone
		3.00 3.00	D	N=12 (3,3/3,3,3,3)				
		4.00		N=10 (2,2/2,2,3,3)				
		5.00		N=28 (4,4/5,6,7,10)				
					5.40 5.45	93.95 93.90		Brown medium to coarse SAND End of borehole at 5.45 m

Remarks
Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered.

Borehole Log

Borehole No.
WS04
Sheet 1 of 1

Project Name: Whitemoss Road	Project No. 077873.01	Co-ords: -	Hole Type WS
Location: Whitemoss Road, Blackley, M9 6DA		Level: 96.50	Scale 1:40
Client: Guinness Partnership		Dates: 08/08/2022 - 08/08/2022	Logged By JL

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.35	96.15		MADE GROUND: Grass over greyish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular to rounded of brick concrete clinker sandstone and coal
					0.45	96.05		MADE GROUND: CONCRETE
					0.65	95.85		MADE GROUND: Grey gravelly slightly sandy COBBLES of angular concrete. Gravel is fine to coarse angular to subangular on concrete and brick
		0.80	ES					
		1.20		N=10 (1,2/2,2,3,3)	1.10	95.40		Brown slightly clayey slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to medium subangular to subrounded of sandstone and coal
								Firm to stiff brown slightly sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone and mudstone
		2.00		N=14 (2,2/2,4,4,4)				
		3.00		N=26 (3,5/4,8,7,7)				
		4.00	D					
		4.00		N=16 (3,4/4,4,4,4)				
		5.00		N=13 (3,3/3,4,3,3)				
					5.45	91.05		End of borehole at 5.45 m

Remarks
Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered.

Borehole Log

Borehole No.
WS05
Sheet 1 of 1

Project Name: Whitemoss Road	Project No. 077873.01	Co-ords: -	Hole Type WS
Location: Whitemoss Road, Blackley, M9 6DA		Level: 98.32	Scale 1:40
Client: Guinness Partnership		Dates: 08/08/2022 - 08/08/2022	Logged By JL

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.40	ES					MADE GROUND: Grass over dark brown slightly clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of brick and sandstone *Cobble of concrete at 0.60m bgl*
					0.95	97.37		Firm brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse subangular to subrounded of sandstone and coal
		1.20		N=11 (2,3/3,2,3,3)				
		1.50	D					
		2.00		N=16 (2,3/3,3,5,5)				
		3.00		N=16 (4,3/3,4,4,5)				*From 3.00 to 3.80m bgl clay becomes soft to firm*
		4.00		N=12 (3,2/2,2,4,4)				*From 4.50 to 5.45m bgl clay becomes firm to stiff*
		5.00		N=19 (4,4/4,5,5,5)				
					5.45	92.87		End of borehole at 5.45 m

Remarks
Service inspection pit hand excavated from GL to 1.20m. No groundwater encountered.

Borehole Log

Borehole No.
WS06
Sheet 1 of 1

Project Name: Whitemoss Road	Project No. 077873.01	Co-ords: -	Hole Type WS
Location: Whitemoss Road, Blackley, M9 6DA		Level: 94.07	Scale 1:40
Client: Guinness Partnership		Dates: 08/08/2022 - 08/08/2022	Logged By JL

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.25	93.82		MADE GROUND: Grass over dark brown clayey SAND, with occasional roots. Sand is fine to coarse
		0.50	ES					Firm orangish brown sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone and mudstone
		1.20		N=13 (2,2/3,3,4,3)				
		2.00	D					
		2.00		N=17 (2,2/4,4,5,4)				
	▼				2.60	91.47		Brown fine to medium SAND
		3.00		N=12 (3,4/4,3,2,3)				
		4.00		N=14 (4,3/3,4,4,3)				
					4.20	89.87		Firm brown sandy CLAY
	▼				4.80	89.27		Light brown slightly clayey fine to medium SAND
		5.00		N=20 (5,5/5,5,5,5)				
					5.45	88.62		End of borehole at 5.45 m

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 2.60m and 4.80m bgl.

AGS

Borehole Log

Borehole No.
WS07
Sheet 1 of 1

Project Name: Whitemoss Road	Project No. 077873.01	Co-ords: -	Hole Type WS
Location: Whitemoss Road, Blackley, M9 6DA		Level: 98.02	Scale 1:40
Client: Guinness Partnership		Dates: 08/08/2022 - 08/08/2022	Logged By JL

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								MADE GROUND: Grass over brown clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of brick, concrete and sandstone
		0.80	ES		0.70	97.32		MADE GROUND: Soft to firm blackish grey sandy CLAY. Slight hydrocarbon odour.
					0.90	97.12		Brown slightly gravelly SAND. Sand is fine to medium.
	▼	1.20		N=7 (5,4/3,1,1,2)	1.35	96.67		Firm brown slightly sandy CLAY.
		2.00		N=12 (3,3/3,3,3,3)				*From 2.20 to 2.60m bgl clay becomes firm to stiff*
		3.00		N=18 (4,4/4,5,4,5)				*From 3.40m bgl clay becomes stiff*
		4.00		N=11 (2,2/2,3,3,3)				
		5.00		N=20 (4,3/5,5,5,5)				
					5.20	92.82		Brown fine to coarse SAND.
					5.45	92.57		End of borehole at 5.45 m

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 1.30m bgl.

AGS

Borehole Log

Borehole No.
WS08
Sheet 1 of 1

Project Name: Whitemoss Road	Project No. 077873.01	Co-ords: -	Hole Type WS
Location: Whitemoss Road, Blackley, M9 6DA		Level: 95.39	Scale 1:40
Client: Guinness Partnership		Dates: 08/08/2022 - 08/08/2022	Logged By JL

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.75	ES					MADE GROUND: Grass over light brown very clayey slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of sandstone, brick and concrete
		1.20		N=23 (2,2/4,6,6,7)	1.40	93.99		Soft to firm brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse of subangular to subrounded of sandstone
		2.00		N=5 (1,1/1,1,2,1)				
		2.50	D					*From 2.40 to 2.80m bgl clay becomes soft*
		3.00		N=9 (1,1/1,2,3,3)				
								From 3.20 to 3.50m bgl clay becomes firm
					3.50	91.89		Brown medium to coarse SAND
		4.00		N=10 (2,2/2,3,2,3)				
	▼				4.45	90.94		Firm brown slightly sandy CLAY.
		5.00		N=24 (2,2/4,6,7,7)				
					5.45	89.94		End of borehole at 5.45 m

Remarks
Service inspection pit hand excavated from GL to 1.20m. Groundwater encountered at 4.40m bgl.

AGS

Appendix A3 – Geo-Environmental Laboratory Testing Results

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT
SUPPLEMENT TO TEST REPORT 22/07887/1

Amendments: Request for Additional Analysis

Envirolab Job Number: 22/07887
Issue Number: 2 **Date:** 22 August, 2022

Client: Curtins Consulting (Manchester)
Merchant Exchange
17-19 Whitworth Street
Manchester
UK
M1 5WG

Project Manager: Jonathan Lord
Project Name: P500 - Whitemoss Road
Project Ref: 077873.002
Order No: EBMA3485
Date Samples Received: 11/08/22
Date Instructions Received: 12/08/22
Date Analysis Completed: 22/08/22

Approved by:

Richard Wong
Client Manager

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME
UKAS TESTING 1247

Envirolab Job Number: 22/07887

Client Project Name: P500 - Whitemoss Road

Client Project Ref: 077873.002

Lab Sample ID	22/07887/1	22/07887/2	22/07887/3	22/07887/4	22/07887/5	22/07887/6	22/07887/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS03	WS04	WS05	WS06	WS07			
Depth to Top	0.75	0.40	0.50	0.80	0.40	0.50	0.80			
Depth To Bottom										
Date Sampled	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AB	6ABE	6AB	6A	6AE	6	6AE			
% Stones >10mm$_{A}$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH$_{D}^{M\#}$	7.60	7.82	7.57	7.47	6.94	7.18	7.37	pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_{D}^{M\#}$	0.47	0.03	<0.01	0.02	<0.01	0.02	0.08	g/l	0.01	A-T-026s
Cyanide (total)$_{A}^{M\#}$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC$_{A}$	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	0.2	A-T-050s
Organic Matter$_{D}^{M\#}$	7.1	13.1	8.6	2.2	4.4	1.1	6.3	% w/w	0.1	A-T-032 OM
Arsenic$_{D}^{M\#}$	15	19	15	8	6	3	8	mg/kg	1	A-T-024s
Boron (water soluble)$_{D}$	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.3	mg/kg	1	A-T-027s
Cadmium$_{D}^{M\#}$	2.0	2.5	1.4	1.0	1.3	1.4	1.5	mg/kg	0.5	A-T-024s
Copper$_{D}^{M\#}$	34	75	53	25	28	24	44	mg/kg	1	A-T-024s
Chromium$_{D}^{M\#}$	18	23	22	16	28	28	29	mg/kg	1	A-T-024s
Chromium (hexavalent)$_{D}$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-040s
Lead$_{D}^{M\#}$	90	196	84	62	68	14	123	mg/kg	1	A-T-024s
Mercury$_{D}$	0.62	<0.17	<0.17	<0.17	<0.17	<0.17	0.28	mg/kg	0.17	A-T-024s
Nickel$_{D}^{M\#}$	18	29	25	13	21	31	37	mg/kg	1	A-T-024s
Selenium$_{D}^{M\#}$	<1	<1	<1	<1	<1	<1	1	mg/kg	1	A-T-024s
Zinc$_{D}^{M\#}$	82	152	249	48	104	51	149	mg/kg	5	A-T-024s

Envirolab Job Number: 22/07887

Client Project Name: P500 - Whitemoss Road

Client Project Ref: 077873.002

Lab Sample ID	22/07887/1	22/07887/2	22/07887/3	22/07887/4	22/07887/5	22/07887/6	22/07887/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS03	WS04	WS05	WS06	WS07			
Depth to Top	0.75	0.40	0.50	0.80	0.40	0.50	0.80			
Depth To Bottom										
Date Sampled	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AB	6ABE	6AB	6A	6AE	6	6AE			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}$ #	Amosite	NAD	Chrysotile & Crocidolite	NAD	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope)$_{D}$	Loose fibres	-	Board	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	No	N/A	N/A	N/A	N/A			A-T-045
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing)$_{D}$	<0.001	-	0.011	-	-	-	-	% w/w	0.001	A-T-054

Envirolab Job Number: 22/07887

Client Project Name: P500 - Whitemoss Road

Client Project Ref: 077873.002

Lab Sample ID	22/07887/1	22/07887/2	22/07887/3	22/07887/4	22/07887/5	22/07887/6	22/07887/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS03	WS04	WS05	WS06	WS07			
Depth to Top	0.75	0.40	0.50	0.80	0.40	0.50	0.80			
Depth To Bottom										
Date Sampled	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AB	6ABE	6AB	6A	6AE	6	6AE			
PAH-16MS										
Acenaphthene$_{A}^{M\#}$	0.34	1.67	0.15	0.02	0.10	<0.01	0.13	mg/kg	0.01	A-T-019s
Acenaphthylene$_{A}^{M\#}$	0.03	0.09	0.11	<0.01	0.05	<0.01	0.01	mg/kg	0.01	A-T-019s
Anthracene$_{A}^{M\#}$	0.45	2.10	0.62	0.05	0.28	<0.02	0.27	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_{A}^{M\#}$	0.78	3.74	2.49	0.17	1.22	<0.04	0.62	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_{A}^{M\#}$	0.72	4.17	3.01	0.17	1.24	<0.04	0.53	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_{A}^{M\#}$	0.78	4.00	3.22	0.19	1.30	<0.05	0.62	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_{A}^{M\#}$	0.45	2.95	1.95	0.11	0.66	<0.05	0.28	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_{A}^{M\#}$	0.32	1.61	1.31	<0.07	0.50	<0.07	0.23	mg/kg	0.07	A-T-019s
Chrysene$_{A}^{M\#}$	0.88	3.89	2.64	0.20	1.30	<0.06	0.72	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_{A}^{M\#}$	0.12	0.79	0.56	<0.04	0.17	<0.04	0.06	mg/kg	0.04	A-T-019s
Fluoranthene$_{A}^{M\#}$	2.04	9.01	5.15	0.36	2.52	<0.08	1.68	mg/kg	0.08	A-T-019s
Fluorene$_{A}^{M\#}$	0.29	1.20	0.10	<0.01	0.06	<0.01	0.10	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_{A}^{M\#}$	0.54	3.71	2.66	0.12	0.86	<0.03	0.33	mg/kg	0.03	A-T-019s
Naphthalene $_{A}^{M\#}$	0.12	1.84	0.07	<0.03	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene$_{A}^{M\#}$	1.77	8.29	1.89	0.17	0.92	<0.03	0.99	mg/kg	0.03	A-T-019s
Pyrene$_{A}^{M\#}$	2.10	8.13	4.71	0.34	2.26	<0.07	1.44	mg/kg	0.07	A-T-019s
Total PAH-16MS$_{A}^{M\#}$	11.7	57.2	30.6	1.90	13.4	<0.08	8.01	mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/07887

Client Project Name: P500 - Whitemoss Road

Client Project Ref: 077873.002

Lab Sample ID	22/07887/1	22/07887/2	22/07887/3	22/07887/4	22/07887/5	22/07887/6	22/07887/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS03	WS04	WS05	WS06	WS07			
Depth to Top	0.75	0.40	0.50	0.80	0.40	0.50	0.80			
Depth To Bottom										
Date Sampled	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AB	6ABE	6AB	6A	6AE	6	6AE			
TPH CWG with Clean Up										
Ali >C5-C6$_{A}^{\#}$	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	0.01	A-T-022s
Ali >C6-C8$_{A}^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10$_{A}$	16	2	2	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12$_{A}^{M\#}$	70	5	1	<1	<1	<1	1	mg/kg	1	A-T-055s
Ali >C12-C16$_{A}^{M\#}$	204	14	3	2	<1	<1	4	mg/kg	1	A-T-055s
Ali >C16-C21$_{A}^{M\#}$	334	31	4	2	1	<1	6	mg/kg	1	A-T-055s
Ali >C21-C35$_{A}^{M\#}$	1600	113	45	7	13	1	277	mg/kg	1	A-T-055s
Total Aliphatics$_{A}$	1970	145	54	10	12	1	228	mg/kg	1	Calc-As Recd
Aro >C5-C7$_{A}^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8$_{A}^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10$_{A}$	14	2	2	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C10-C12$_{A}$	27	7	2	<1	<1	<1	1	mg/kg	1	A-T-055s
Aro >C12-C16$_{A}$	163	33	8	1	2	<1	8	mg/kg	1	A-T-055s
Aro >C16-C21$_{A}^{M\#}$	245	139	31	3	13	<1	30	mg/kg	1	A-T-055s
Aro >C21-C35$_{A}^{M\#}$	114	268	129	14	62	<1	225	mg/kg	1	A-T-055s
Total Aromatics$_{A}$	498	396	167	16	65	<1	209	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35)$_{A}$	2470	541	221	26	77	1	437	mg/kg	1	Calc-As Recd
BTEX - Benzene$_{A}^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene$_{A}^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_{A}^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_{A}^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_{A}^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE$_{A}^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 22/07887

Client Project Name: P500 - Whitemoss Road

Client Project Ref: 077873.002

Lab Sample ID	22/07887/8							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS08									
Depth to Top	0.75									
Depth To Bottom										
Date Sampled	08-Aug-22									
Sample Type	Soil - ES									
Sample Matrix Code	6AE									
% Stones >10mm$_{A}$	<0.1							% w/w	0.1	A-T-044
pH$_{D}^{M\#}$	6.84							pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_{D}^{M\#}$	<0.01							g/l	0.01	A-T-026s
Cyanide (total)$_{A}^{M\#}$	<1							mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC$_{A}$	2.0							mg/kg	0.2	A-T-050s
Organic Matter$_{D}^{M\#}$	7.4							% w/w	0.1	A-T-032 OM
Arsenic$_{D}^{M\#}$	13							mg/kg	1	A-T-024s
Boron (water soluble)$_{D}$	<1.0							mg/kg	1	A-T-027s
Cadmium$_{D}^{M\#}$	1.7							mg/kg	0.5	A-T-024s
Copper$_{D}^{M\#}$	64							mg/kg	1	A-T-024s
Chromium$_{D}^{M\#}$	25							mg/kg	1	A-T-024s
Chromium (hexavalent)$_{D}$	<1							mg/kg	1	A-T-040s
Lead$_{D}^{M\#}$	99							mg/kg	1	A-T-024s
Mercury$_{D}$	0.21							mg/kg	0.17	A-T-024s
Nickel$_{D}^{M\#}$	19							mg/kg	1	A-T-024s
Selenium$_{D}^{M\#}$	1							mg/kg	1	A-T-024s
Zinc$_{D}^{M\#}$	102							mg/kg	5	A-T-024s

Envirolab Job Number: 22/07887

Client Project Name: P500 - Whitemoss Road

Client Project Ref: 077873.002

Lab Sample ID	**22/07887/8**							**Units**	**Limit of Detection**	**Method ref**
Client Sample No										
Client Sample ID	**WS08**									
Depth to Top	**0.75**									
Depth To Bottom										
Date Sampled	**08-Aug-22**									
Sample Type	**Soil - ES**									
Sample Matrix Code	**6AE**									
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}$#	**NAD**									**A-T-045**
Asbestos Matrix (visual)$_{D}$	**-**									**A-T-045**
Asbestos Matrix (microscope)$_{D}$	**-**									**A-T-045**
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	**N/A**									**A-T-045**

Envirolab Job Number: 22/07887

Client Project Name: P500 - Whitemoss Road

Client Project Ref: 077873.002

Lab Sample ID	22/07887/8							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS08									
Depth to Top	0.75									
Depth To Bottom										
Date Sampled	08-Aug-22									
Sample Type	Soil - ES									
Sample Matrix Code	6AE									
PAH-16MS										
Acenaphthene$_{A}^{M\#}$	0.09							mg/kg	0.01	A-T-019s
Acenaphthylene$_{A}^{M\#}$	0.02							mg/kg	0.01	A-T-019s
Anthracene$_{A}^{M\#}$	0.20							mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_{A}^{M\#}$	0.57							mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_{A}^{M\#}$	0.55							mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_{A}^{M\#}$	0.61							mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_{A}^{M\#}$	0.33							mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_{A}^{M\#}$	0.25							mg/kg	0.07	A-T-019s
Chrysene$_{A}^{M\#}$	0.62							mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_{A}^{M\#}$	0.08							mg/kg	0.04	A-T-019s
Fluoranthene$_{A}^{M\#}$	1.20							mg/kg	0.08	A-T-019s
Fluorene$_{A}^{M\#}$	0.08							mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_{A}^{M\#}$	0.39							mg/kg	0.03	A-T-019s
Naphthalene $_{A}^{M\#}$	0.10							mg/kg	0.03	A-T-019s
Phenanthrene$_{A}^{M\#}$	0.79							mg/kg	0.03	A-T-019s
Pyrene$_{A}^{M\#}$	1.11							mg/kg	0.07	A-T-019s
Total PAH-16MS$_{A}^{M\#}$	6.99							mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/07887

Client Project Name: P500 - Whitemoss Road

Client Project Ref: 077873.002

Lab Sample ID	22/07887/8							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS08									
Depth to Top	0.75									
Depth To Bottom										
Date Sampled	08-Aug-22									
Sample Type	Soil - ES									
Sample Matrix Code	6AE									
TPH CWG with Clean Up										
Ali >C5-C6$_{A}^{\#}$	<0.02							mg/kg	0.01	A-T-022s
Ali >C6-C8$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
Ali >C8-C10$_{A}$	<1							mg/kg	1	A-T-055s
Ali >C10-C12$_{A}^{M\#}$	<1							mg/kg	1	A-T-055s
Ali >C12-C16$_{A}^{M\#}$	1							mg/kg	1	A-T-055s
Ali >C16-C21$_{A}^{M\#}$	2							mg/kg	1	A-T-055s
Ali >C21-C35$_{A}^{M\#}$	22							mg/kg	1	A-T-055s
Total Aliphatics$_{A}$	23							mg/kg	1	Calc-As Recd
Aro >C5-C7$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
Aro >C7-C8$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
Aro >C8-C10$_{A}$	<1							mg/kg	1	A-T-055s
Aro >C10-C12$_{A}$	<1							mg/kg	1	A-T-055s
Aro >C12-C16$_{A}$	4							mg/kg	1	A-T-055s
Aro >C16-C21$_{A}^{M\#}$	17							mg/kg	1	A-T-055s
Aro >C21-C35$_{A}^{M\#}$	60							mg/kg	1	A-T-055s
Total Aromatics$_{A}$	75							mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35)$_{A}$	98							mg/kg	1	Calc-As Recd
BTEX - Benzene$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
BTEX - Toluene$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
BTEX - o Xylene$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s
MTBE$_{A}^{\#}$	<0.01							mg/kg	0.01	A-T-022s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

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

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

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

Key:

IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Curtins Consulting (Manchester), Merchant Exchange, 17-19 Whitworth Street , Manchester, UK, M1 5WG

Project: P500 - Whitemoss Road

Clients Project No: 077873.002

Project No: 22/07887

Date Received: 12/08/2022 (am)

Cool Box Temperatures (°C): 20.6

NO DEVIATIONS IDENTIFIED with respect to sampling dates or containers received.

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples 5 ± 3°C), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/07887/1	22/07887/2	22/07887/3	22/07887/4	22/07887/5	22/07887/6	22/07887/7	22/07887/8
Client Sample No								
Client Sample ID/Depth	WS01 0.75m	WS02 0.40m	WS03 0.50m	WS04 0.80m	WS05 0.40m	WS06 0.50m	WS07 0.80m	WS08 0.75m
Date Sampled	08/08/22	08/08/22	08/08/22	08/08/22	08/08/22	08/08/22	08/08/22	08/08/22
A-T-019s	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022
A-T-022s	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022
A-T-024s	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022
A-T-026s	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022
A-T-027s	17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022
A-T-031s	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022
A-T-032 OM	17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022
A-T-040s	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022
A-T-042sTCN	19/08/2022	19/08/2022	19/08/2022	19/08/2022	19/08/2022	19/08/2022	19/08/2022	19/08/2022
A-T-044	17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022	17/08/2022
A-T-045	15/08/2022	15/08/2022	15/08/2022	15/08/2022	15/08/2022	15/08/2022	15/08/2022	15/08/2022
A-T-050s	16/08/2022	16/08/2022	16/08/2022	16/08/2022	16/08/2022	16/08/2022	16/08/2022	16/08/2022
A-T-054	22/08/2022		22/08/2022					
A-T-055s	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022
Calc-As Recd	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022	18/08/2022

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

End of Report

Appendix A4 – Generic Assessment Criteria (GACs)

Adopted Soil Generic Assessment Criteria
Sandy loam with 6% SOM

Contaminants	Residential with home grown produce	Residential without home grown produce	Allotments	Commercial	Public open space near residential housing POS_{resi}	Public park POS_{park}
Metals						
Beryllium	*1.7*	*1.7*	*35*	*12*	*2.2*	*63*
Boron	*290*	*11,000*	*45*	*240,000*	*21,000*	*46,000*
Cadmium	**10**[13] 22	**85**[13] 150	**1.8** 3.9	**230** 410	*120* 220	*560* 880
Chromium III	*910*	*910*	*18,000*	*8,600*	*1,500*	*33,000*
Chromium VI	*6* 21	*6* 21	*1.8* 170	*33* 49	*7.7* 21	*220* 250
Lead	200	310	80	2,300	630	1,300
Mercury *(elemental)*	**1**	**1**	**26**	**26**	*16*	**26**[8] [*30*]
Mercury (inorganic)	**170**	**240**	**80**	**3600**	*120*	*240*
Nickel	*130*[10]	*180*[10]	*53*[11]	*980*[10]	*230*	*800*
Vanadium	*410*	*1200*	*91*	*9000*	*2000*	*5000*
Copper	*2400*	*7100*	*520*	*68000*	*12000*	*44000*
Zinc	*3700*	*40000*	*620*	*730000*	*81000*	*170000*
Semi-Metals and non-metals						
Arsenic	**32**[12] 37	**35**[12] 40	**43**[12] 49	**640**[12] 640	*79* 79	*170* 170
Antimony		***550***		***7500***	***1500***	***3300***
Selenium	**350**	**600**	**120**	**13000**	*1100*	*1800*
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
Aliphatic risk banded hydrocarbons - TPHCWG method						
$EC_{>5}$ - EC_6	*160*	*160*	*3900*	*12000*	*600000*	*180000*
$EC_{>6}$ - EC_8	*530*	*530*	*13000*	*40000*	*620000*	*320000*
$EC_{>8}$ - EC_{10}	*150*	*150*	*1700*	*11000*	*13000*	*21000*
EC_{10}-EC_{12}	*760*	*770*	*7300*	*47000*	*13000*	*24000*
EC_{12}-EC_{16}	*4300*	*4400*	*13000*	*90000*	*13000*	*26000*
$EC_{>16}$ - EC_{35}	*110000*	*110000*	*270000*	*1800000*	*250000*	*490000*
$EC_{>35}$ - EC_{44}	*110000*	*110000*	*270000*	*1800000*	*250000*	*490000*
Aromatic risk banded hydrocarbons - TPHCWG method						
$EC_{>5}$ - EC_7	*300*	*1400*	*57*	*86000*	*56000*	*92000*
$EC_{>7}$ - EC_8	*660*	*3900*	*120*	*180000*	*56000*	*100000*
$EC_{>8}$ - EC_{10}	*190*	*270*	*51*	*17000*	*5000*	*9300*
EC_{10} - EC_{12}	*380*	*1200*	*74*	*34000*	*5000*	*10000*
EC_{12} - EC_{16}	*660*	*2500*	*130*	*38000*	*5000*	*10000*
$EC_{>16}$ - EC_{21}	*930*	*1900*	*260*	*28000*	*3800*	*7800*
$EC_{>21}$ - EC_{35}	*1700*	*1900*	*1600*	*28000*	*3800*	*7900*
$EC_{>35}$ - EC_{44}	*1700*	*1900*	*1600*	*28000*	*3800*	*7900*
Aliph + Arom EC >44-70	*1900*	*1900*	*3000*	*28000*	3800	7900
Aromatic						
Benzene	**0.33** 0.87	**1.0** 3.3	**0.07** 0.18	**95** 98	*73* 140	*110* 230
Ethyl benzene	**350**	**840**	**90**	**2800**[8] [66000]	**2800**[8] [*25000*]	**2800**[8] [*27000*]
Toluene	**610**	**2700**	**120**	**4400**[8] [190000]	**4400**[8] [*56000*]	**4400**[8] [*100000*]
Xylene[9]	**230**	**290**	**160**	**2600**[8] [32000]	**2600**[8] [*43000*]	**2600**[8] [*31000*]
Phenol	**420**	**520**	**280**	**3200**[14] (38000)	**3200**[14] (*10000*)	**3200**[14] (*9300*)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	*13*	*13*	*24*	*1100*	*4900*	*3000*
Acenaphthylene	*920*	*6000*	*160*	*100000*	*15000*	*30000*
Acenaphthene	*1100*	*6000*	*200*	*100000*	*15000*	*30000*
Fluorene	*860*	*4500*	*160*	*71000*	*9900*	*20000*
Phenanthrene	*440*	*1500*	*90*	*23000*	*3100*	*6300*
Anthracene	*11000*	*37000*	*2200*	*540000*	*74000*	*150000*
Fluoranthene	*890*	*1600*	*290*	*23000*	*3100*	*6400*
Pyrene	*2000*	*3800*	*620*	*54000*	*7400*	*15000*
Benz(a)anthracene	*13*	*15*	*13*	*180*	*29*	*62*
Chrysene	*27*	*32*	*19*	*350*	*57*	*120*
Benzo(b)fluoranthene	*3.7*	*4.0*	*3.9*	*45*	*7.2*	*16.0*
Benzo(k)fluoranthene	*100*	*110*	*130*	*1200*	*190*	*440*
Benzo(a)pyrene	*3.0* 5.0	*3.2* 5.3	*3.5* 5.7	*36* 77	*5.7* 10	*13* 21
Indeno(123cd)pyrene	*41*	*46*	*39*	*510*	*82*	*180*
Dibenzo(ah)anthracene	*0.3*	*0.32*	*0.43*	*3.6*	*0.58*	*1.4*
Benzo(ghi)perylene	*350*	*360*	*640*	*4000*	*640*	*1600*
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	*0.0014*	*0.0015*	*0.0018*	*0.12*	*3.5*	*5.4*
Trichloroethene (TCE)	*0.075*	*0.08*	*0.21*	*5.7*	*120*	*120*
1,1,1,2 Tetrachlorethane	*6.4*	*8.2*	*4.4*	*560*	*1400*	*2100*
Tetrachlorethene (PCE)	*0.90*	*0.92*	*3.6*	*95*	*1400*	*1500*
1,1,1 Trichlorethane	*39*	*40*	*240*	*3000*	*140000*	*100000*

Notes

1. All values above are in mg/kg
2. **Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters**, *numbers in italics are S4ULs*, ***numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters*** and underlined numbers are C4SLs
3. Soil organic matter (SOM) is assumed to be 6% - DEFAULT VALUE
4. Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
5. For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
6. For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
7. For classrooms consider increasing the dust loading fator in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m^{-3}
8. Based on vapour saturation limt as suggested by EA / [ ] model value
9. Lowest of o-, m- and p-xylene
10. Based on comparison of inhalation exposure with inhalation TDI
11. Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
12. Based on a comparison of oral and dermal soil exposure with oral Index Dose only
13. Averaged over and based on lifetime exposure
14. Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
15. NA: Not applicable

Adopted Soil Generic Assessment Criteria
Sandy loam with 2.5% SOM

Contaminants	Residential with home grown produce	Residential without home grown produce	Allotments	Commercial	Public open space near residential housing POS_{resi}	Public park POS_{park}
Metals						
Beryllium	*1.7*	*1.7*	*35*	*12*	*2.2*	*63*
Boron	*290*	*11,000*	*45*	*240,000*	*21,000*	*46,000*
Cadmium	**10**[13] 22	**85**[13] 150	**1.8** 3.9	**230** 410	*120* 220	*560* 880
Chromium III	*910*	*910*	*18,000*	*8,600*	*1,500*	*33,000*
Chromium VI	*6* 21	*6* 21	*1.8* 170	*33* 49	*7.7* 21	*220* 250
Lead	200	310	80	2,300	630	1,300
Mercury *(elemental)*	**1**	**1**	**26**	**26**	*16*	**26**[8] [*30*]
Mercury (inorganic)	**170**	**240**	**80**	**3600**	*120*	*240*
Nickel	*130*[10]	*180*[10]	*53*[11]	*980*[10]	*230*	*800*
Vanadium	*410*	*1200*	*91*	*9000*	*2000*	*5000*
Copper	*2400*	*7100*	*520*	*68000*	*12000*	*44000*
Zinc	*3700*	*40000*	*620*	*730000*	*81000*	*170000*
Semi-Metals and non-metals						
Arsenic	**32**[12] 37	**35**[12] 40	**43**[12] 49	**640**[12] 640	*79* 79	*170* 170
Antimony		***550***		***7500***	***1500***	***3300***
Selenium	**350**	**600**	**120**	**13000**	*1100*	*1800*
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
Aliphatic risk banded hydrocarbons - TPHCWG method						
$EC_{>5}$ - EC_6	*78*	*78*	*1700*	*5900*	*590000*	*130000*
$EC_{>6}$ - EC_8	*230*	*230*	*5600*	*17000*	*610000*	*220000*
$EC_{>8}$ - EC_{10}	*65*	*65*	*770*	*4800*	*13000*	*18000*
EC_{10}-EC_{12}	*330*	*330*	*4400*	*23000*	*13000*	*23000*
EC_{12}-EC_{16}	*2400*	*2400*	*13000*	*82000*	*13000*	*25000*
$EC_{>16}$ - EC_{35}	*92000*	*92000*	*270000*	*1700000*	*250000*	*480000*
$EC>_{35}$ - EC_{44}	*92000*	*92000*	*270000*	*1700000*	*250000*	*480000*
Aromatic risk banded hydrocarbons - TPHCWG method						
$EC>_5$ - EC_7	*140*	*690*	*27*	*46000*	*56000*	*84000*
$EC>_7$ - EC_8	*290*	*1800*	*51*	*110000*	*56000*	*95000*
$EC_{>8}$ - EC_{10}	*83*	*110*	*21*	*8100*	*5000*	*8500*
EC_{10} - EC_{12}	*180*	*590*	*31*	*28000*	*5000*	*9700*
EC_{12} - EC_{16}	*330*	*2300*	*57*	*37000*	*5100*	*10000*
$EC_{>16}$ - EC_{21}	*540*	*1900*	*110*	*28000*	*3800*	*7700*
$EC_{>21}$ - EC_{35}	*1500*	*1900*	*820*	*28000*	*3800*	*7800*
$EC>_{35}$ - EC_{44}	*1500*	*1900*	*820*	*28000*	*3800*	*7800*
Aliph + Arom EC >44-70	*1800*	*1900*	*2100*	*28000*	3800	7800
Aromatic						
Benzene	**0.16**	**0.49**	**0.035**	**50**	*72*	*100*
Ethyl benzene	**150**	**380**	**39**	**1200**[8] [35000]	**1200**[8] [*24000*]	**1200**[8] [*22000*]
Toluene	**270**	**1300**	**51**	**1900**[8] [110000]	**1900**[8] [*56000*]	**1900**[8] [*95000*]
Xylene[9]	**98**	**120**	**70**	**1200**[8] [14000]	**1200**[8] [*42000*]	**1200**[8] [*23000*]
Phenol	**290**	**420**	**140**	**1500**[14] (35000)	**1500**[14] (*10000*)	**1500**[14] (*8300*)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	*5.6*	*5.6*	*10*	*460*	*4900*	*1900*
Acenaphthylene	*420*	*4600*	*69*	*97000*	*15000*	*30000*
Acenaphthene	*510*	*4700*	*85*	*97000*	*15000*	*30000*
Fluorene	*400*	*3800*	*67*	*68000*	*9900*	*20000*
Phenanthrene	*220*	*1500*	*38*	*22000*	*3100*	*6200*
Anthracene	*5400*	*35000*	*950*	*540000*	*74000*	*150000*
Fluoranthene	*560*	*1600*	*130*	*23000*	*3100*	*6300*
Pyrene	*1200*	*3800*	*270*	*54000*	*7400*	*15000*
Benz(a)anthracene	*11*	*14*	*6.5*	*170*	*29*	*56*
Chrysene	*22*	*31*	*9.4*	*350*	*57*	*110*
Benzo(b)fluoranthene	*3.3*	*4.0*	*2.1*	*44*	*7.2*	*15*
Benzo(k)fluoranthene	*93*	*110*	*75*	*1200*	*190*	*410*
Benzo(a)pyrene	*2.7*	*3.2*	*2*	*35*	*5.7*	*12*
Indeno(123cd)pyrene	*36*	*46*	*21*	*510*	*82*	*170*
Dibenzo(ah)anthracene	*0.28*	*0.32*	*0.27*	*3.6*	*0.57*	*1.3*
Benzo(ghi)perylene	*340*	*360*	*470*	*4000*	*640*	*1500*
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	*0.00087*	*0.001*	*0.001*	*0.077*	*3.5*	*5*
Trichloroethene (TCE)	*0.034*	*0.036*	*0.091*	*2.6*	*120*	*91*
1,1,1,2 Tetrachlorethane	*2.8*	*3.5*	*1.9*	*250*	*1400*	*1800*
Tetrachlorethene (PCE)	*0.39*	*0.4*	*1.5*	*42*	*1400*	*1100*
1,1,1 Trichlorethane	*18*	*18*	*110*	*1300*	*140000*	*76000*

Notes

1. All values above are in mg/kg
2. **Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters**, *numbers in italics are S4ULs*, ***numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters*** and underlined numbers are C4SLs
3. Soil organic matter (SOM) is assumed to be 2.5% - DEFAULT VALUE
4. Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
5. For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
6. For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
7. For classrooms consider increasing the dust loading fator in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m^{-3}
8. Based on vapour saturation limt as suggested by EA / [ ] model value
9. Lowest of o-, m- and p-xylene
10. Based on comparison of inhalation exposure with inhalation TDI
11. Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
12. Based on a comparison of oral and dermal soil exposure with oral Index Dose only
13. Averaged over and based on lifetime exposure
14. Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
15. NA: Not applicable

Adopted Soil Generic Assessment Criteria
Sandy loam with 1% SOM

Contaminants	Residential with home grown produce	Residential without home grown produce	Allotments	Commercial	Public open space near residential housing POS_{resi}	Public park POS_{park}
Metals						
Beryllium	*1.7*	*1.7*	*35*	*12*	*2.2*	*63*
Boron	*290*	*11,000*	*45*	*240,000*	*21,000*	*46,000*
Cadmium	**10**[13] 22	**85**[13] 150	**1.8** 3.9	**230** 410	*120* 220	*560* 880
Chromium III	*910*	*910*	*18,000*	*8,600*	*1,500*	*33,000*
Chromium VI	*6* 21	*6* 21	*1.8* 170	*33* 49	*7.7* 21	*220* 250
Lead	200	310	80	2,300	630	1,300
Mercury *(elemental)*	**1**	**1**	**26**	**26**	*16*	**26**[8] *[30]*
Mercury (inorganic)	**170**	**240**	**80**	**3600**	*120*	*240*
Nickel	*130*[10]	*180*[10]	*53*[11]	*980*[10]	*230*	*800*
Vanadium	*410*	*1200*	*91*	*9000*	*2000*	*5000*
Copper	*2400*	*7100*	*520*	*68000*	*12000*	*44000*
Zinc	*3700*	*40000*	*620*	*730000*	*81000*	*170000*
Semi-Metals and non-metals						
Arsenic	**32**[12] 37	**35**[12] 40	**43**[12] 49	**640**[12] 640	*79* 79	*170* 170
Antimony		***550***		***7500***	***1500***	***3300***
Selenium	**350**	**600**	**120**	**13000**	*1100*	*1800*
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
Aliphatic risk banded hydrocarbons - TPHCWG method						
$EC_{>5}$ - EC_6	*42*	*42*	*730*	*3200*	*570000*	*95000*
$EC_{>6}$ - EC_8	*100*	*100*	*2300*	*7800*	*600000*	*150000*
$EC_{>8}$ - EC_{10}	*27*	*27*	*320*	*2000*	*13000*	*14000*
EC_{10}-EC_{12}	*130*	*130*	*2200*	*9700*	*13000*	*21000*
EC_{12}-EC_{16}	*1100*	*1100*	*11000*	*59000*	*13000*	*25000*
$EC_{>16}$ - EC_{35}	*65000*	*65000*	*260000*	*1600000*	*250000*	*450000*
$EC>_{35}$ - EC_{44}	*65000*	*65000*	*260000*	*1600000*	*250000*	*450000*
Aromatic risk banded hydrocarbons - TPHCWG method						
$EC>_5$ - EC_7	*70*	*370*	*13*	*26000*	*56000*	*76000*
$EC>_7$ - EC_8	*130*	*860*	*22*	*56000*	*56000*	*87000*
$EC_{>8}$ - EC_{10}	*34*	*47*	*8.6*	*3500*	*5000*	*7200*
EC_{10} - EC_{12}	*74*	*250*	*13*	*16000*	*5000*	*9200*
EC_{12} - EC_{16}	*140*	*1800*	*23*	*36000*	*5100*	*10000*
$EC_{>16}$ - EC_{21}	*260*	*1900*	*46*	*28000*	*3800*	*7600*
$EC_{>21}$ - EC_{35}	*1100*	*1900*	*370*	*28000*	*3800*	*7800*
$EC>_{35}$ - EC_{44}	*1100*	*1900*	*370*	*28000*	*3800*	*7800*
Aliph + Arom EC >44-70	*1600*	*1900*	*1200*	*28000*	3800	7800
Aromatic						
Benzene	**0.08**	**0.3**	**0.017**	**28**	*72*	*90*
Ethyl benzene	**65**	**170**	**16**	**520**[8] [17000]	**520**[8] *[24000]*	**520**[8] *[17000]*
Toluene	**120**	**610**	**22**	**860**[8] [59000]	**860**[8] *[56000]*	**860**[8] *[87000]*
Xylene[9]	**41**	**53**	**28**	**480**[8] [69000]	**480**[8] *[41000]*	**480**[8] *[17000]*
Phenol	**180**	**310**	**66**	**760**[14] (31000)	**760**[14] *(10000)*	**760**[14] *(7600)*
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	*2.3*	*2.3*	*4.1*	*190*	*4900*	*1200*
Acenaphthylene	*170*	*2900*	*28*	*83000*	*15000*	*29000*
Acenaphthene	*210*	*3000*	*34*	*84000*	*15000*	*29000*
Fluorene	*170*	*2800*	*27*	*63000*	*9900*	*20000*
Phenanthrene	*95*	*1300*	*15*	*22000*	*3100*	*6200*
Anthracene	*2400*	*31000*	*380*	*520000*	*74000*	*150000*
Fluoranthene	*280*	*1500*	*52*	*23000*	*3100*	*6300*
Pyrene	*620*	*3700*	*110*	*54000*	*7400*	*15000*
Benz(a)anthracene	*7.2*	*11*	*2.9*	*170*	*29*	*49*
Chrysene	*15*	*30*	*4.1*	*350*	*57*	*93*
Benzo(b)fluoranthene	*2.6*	*3.9*	*0.99*	*44*	*7.1*	*13*
Benzo(k)fluoranthene	*77*	*110*	*37*	*1200*	*190*	*370*
Benzo(a)pyrene	*2.2*	*3.2*	*0.97*	*35*	*5.7*	*11*
Indeno(123cd)pyrene	*27*	*45*	*9.5*	*500*	*82*	*150*
Dibenzo(ah)anthracene	*0.24*	*0.31*	*0.14*	*3.5*	*0.57*	*1.1*
Benzo(ghi)perylene	*320*	*360*	*290*	*3900*	*640*	*1400*
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	*0.00064*	*0.00077*	*0.00055*	*0.059*	*3.5*	*4.8*
Trichloroethene (TCE)	*0.016*	*0.017*	*0.041*	*1.2*	*120*	*70*
1,1,1,2 Tetrachlorethane	*1.2*	*1.5*	*0.79*	*110*	*1400*	*1500*
Tetrachlorethene (PCE)	*0.18*	*0.18*	*0.65*	*19*	*1400*	*810*
1,1,1 Trichlorethane	*8.8*	*9*	*48*	*660*	*140000*	*57000*

Notes

1. All values above are in mg/kg
2. **Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters**, *numbers in italics are S4ULs*, ***numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters*** and underlined numbers are C4SLs
3. Soil organic matter (SOM) is assumed to be 1% - DEFAULT VALUE
4. Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
5. For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
6. For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
7. For classrooms consider increasing the dust loading fator in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m^{-3}
8. Based on vapour saturation limt as suggested by EA / [ ] model value
9. Lowest of o-, m- and p-xylene
10. Based on comparison of inhalation exposure with inhalation TDI
11. Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
12. Based on a comparison of oral and dermal soil exposure with oral Index Dose only
13. Averaged over and based on lifetime exposure
14. Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
15. NA: Not applicable

Appendix A5 – Geotechnical Laboratory Testing Results

Jonathan Lord
Curtins
17-19 Whitworth Street West
Manchester
M1 5WG

e: jonathan.lord@curtins.com

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 22-80495

Project / Site name:	P500 Whitemoss Road	**Samples received on:**	22/08/2022
Your job number:	B077873	**Samples instructed on/ Analysis started on:**	26/08/2022
Your order number:	EBMA 3524	**Analysis completed by:**	08/09/2022
Report Issue Number:	1	**Report issued on:**	09/09/2022
Samples Analysed:	7 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

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.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 22-80495
Project / Site name: P500 Whitemoss Road
Your Order No: EBMA 3524

Lab Sample Number				2403892	2403893	2403894	2403895	2403896
Sample Reference				WS01	WS02	WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.00	2.00	3.00	4.00	1.50
Date Sampled				08/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
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	17	15	11	17	14
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.4	0.3	0.3

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.6	7.9	8	8	7.8
Total Sulphate as SO4	%	0.005	MCERTS	0.021	0.01	0.033	0.06	0.014
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.053	0.017	0.14	0.21	0.021
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	5.6	1.7	2.2	5.6	1
Total Sulphur	%	0.005	MCERTS	0.029	0.012	0.089	0.074	0.01
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	6.5	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	19	11	39	36	17
Magnesium (leachate equivalent)	mg/l	2.5	NONE	9.7	5.5	19	18	8.3

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

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 22-80495
Project / Site name: P500 Whitemoss Road
Your Order No: EBMA 3524

Lab Sample Number				2403897	2403898
Sample Reference				WS06	WS08
Sample Number				None Supplied	None Supplied
Depth (m)				2.00	2.50
Date Sampled				08/08/2022	08/08/2022
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	16
Total mass of sample received	kg	0.001	NONE	0.5	0.4

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8	6.9
Total Sulphate as SO4	%	0.005	MCERTS	0.022	0.022
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.028	0.0094
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	0.8	8.5
Total Sulphur	%	0.005	MCERTS	0.048	0.021
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	3

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	19	< 5.0
Magnesium (leachate equivalent)	mg/l	2.5	NONE	9.4	< 2.5

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

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 22-80495
Project / Site name: P500 Whitemoss Road

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2403892	WS01	None Supplied	3	Brown clay and loam.
2403893	WS02	None Supplied	2	Brown clay and sand.
2403894	WS03	None Supplied	3	Brown clay and loam.
2403895	WS04	None Supplied	4	Brown clay and sand.
2403896	WS05	None Supplied	1.5	Brown clay and loam.
2403897	WS06	None Supplied	2	Brown clay and loam.
2403898	WS08	None Supplied	2.5	Brown clay and loam.

Analytical Report Number : 22-80495
Project / Site name: P500 Whitemoss Road

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
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 Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS

For method numbers ending in 'UK' 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.

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

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

4041

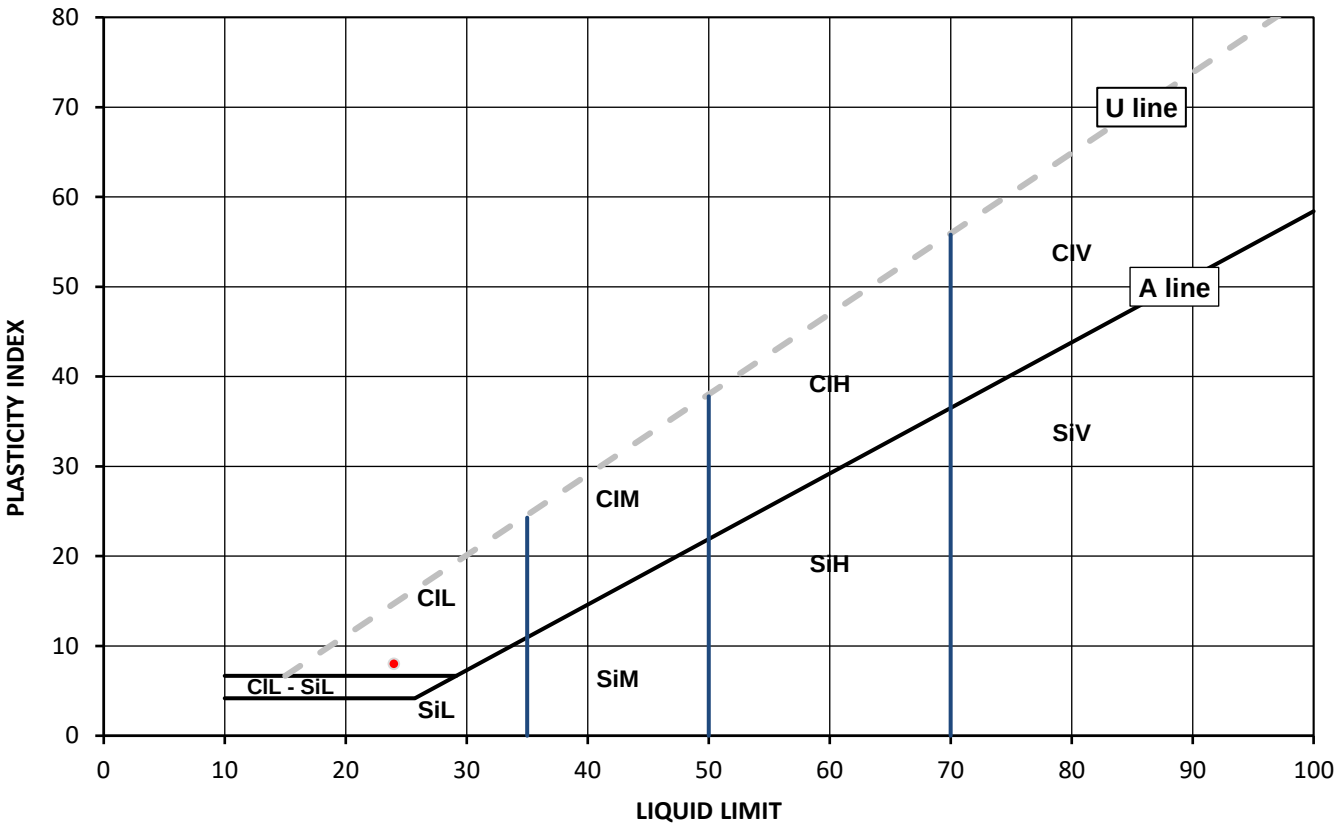
Client:	Curtins	Client Reference:	B077873
Client Address:	17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-80494
		Date Sampled:	08/08/2022
		Date Received:	22/08/2022
Contact:	Jonathan Lord	Date Tested:	05/09/2022
Site Address:	P500 Whitemoss Road	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	2403885	Depth Top [m]:	3.00
Hole No.:	WS01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy silty CLAY		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	24	16	8	96



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

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

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed: Monika Siewior

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

Date Reported: 12/09/2022

GF 236.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

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

4041

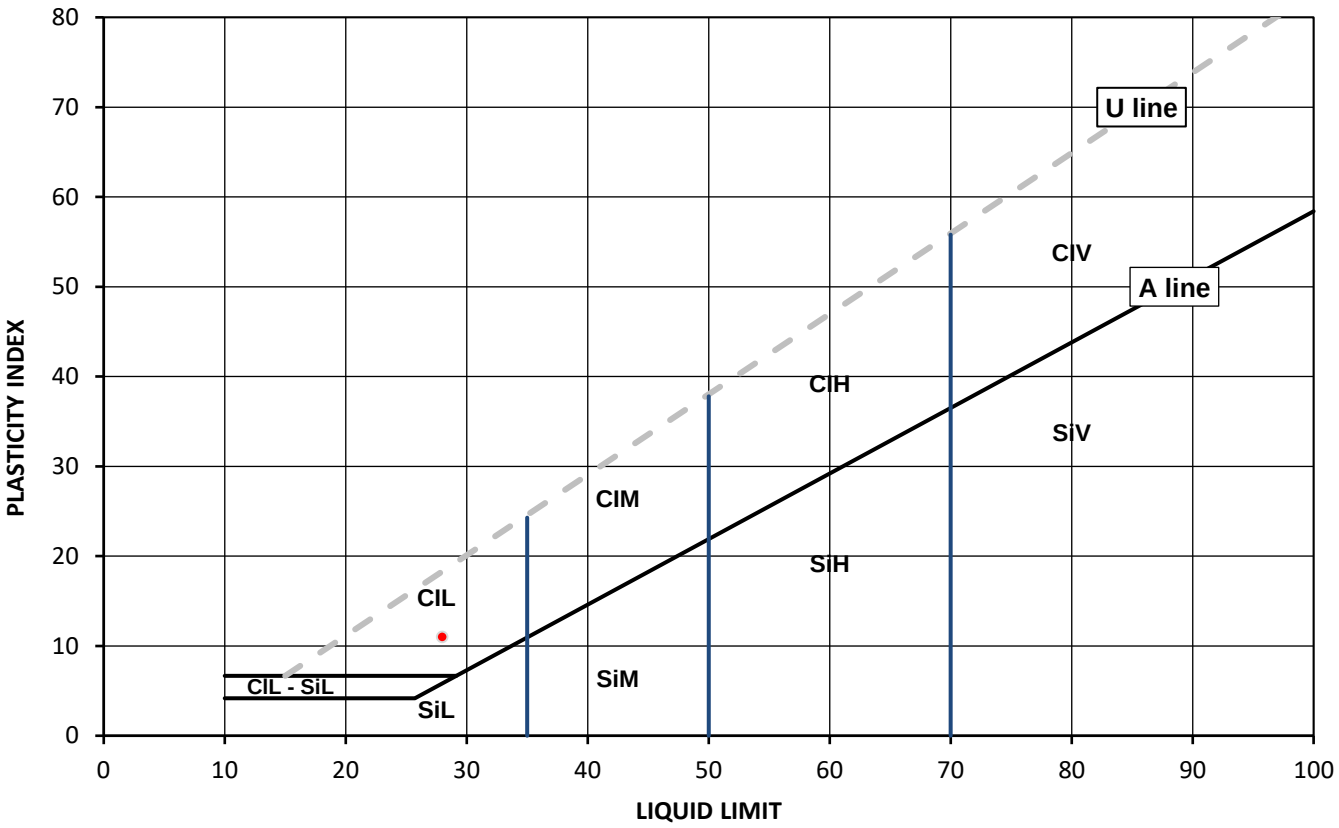
Client:	Curtins	Client Reference:	B077873
Client Address:	17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-80494
		Date Sampled:	08/08/2022
		Date Received:	22/08/2022
Contact:	Jonathan Lord	Date Tested:	05/09/2022
Site Address:	P500 Whitemoss Road	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	2403886	Depth Top [m]:	2.00
Hole No.:	WS02	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown very sandy CLAY		
Sample Preparation:	Tested in natural condition		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
21	28	17	11	100



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

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

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed: Monika Siewior

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

Date Reported: 12/09/2022

GF 236.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

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

4041

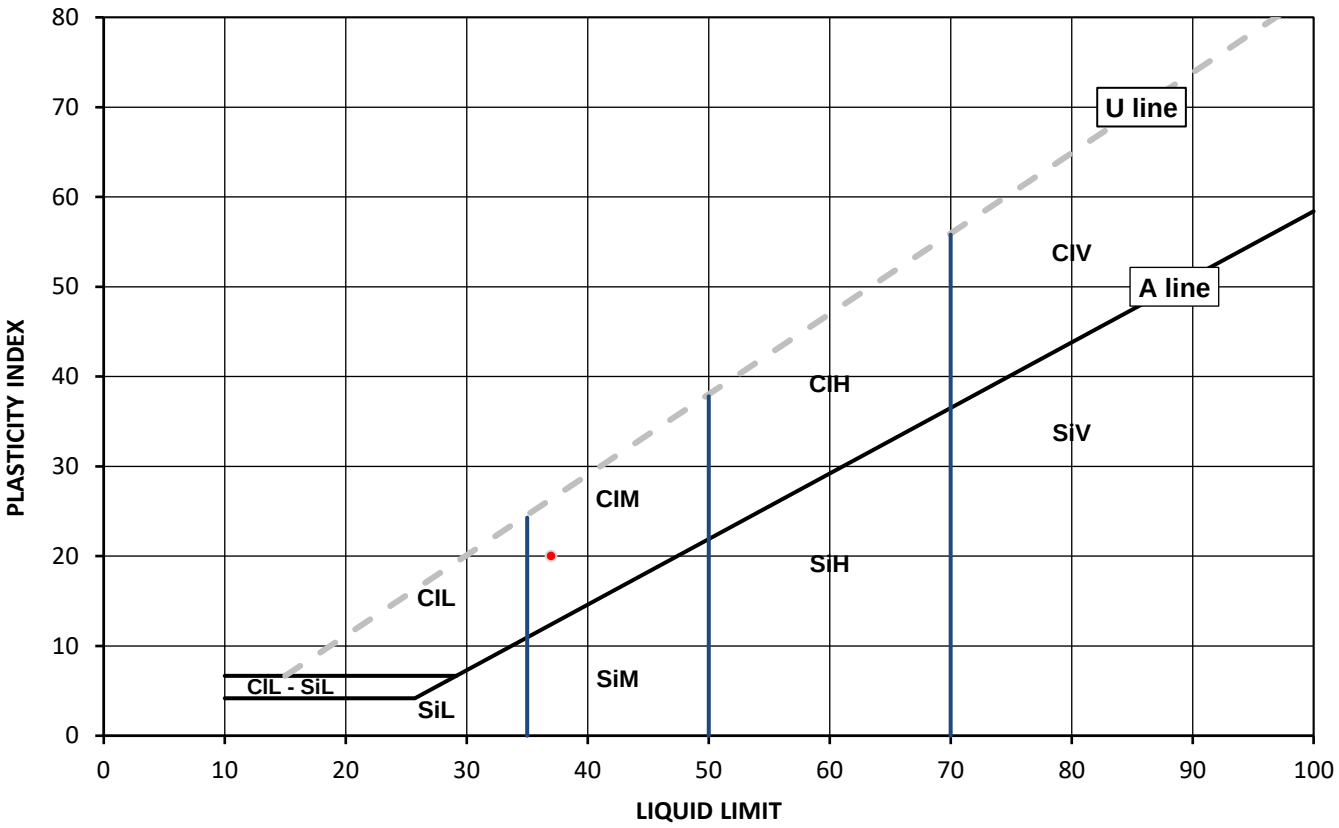
Client:	Curtins	Client Reference:	B077873
Client Address:	17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-80494
		Date Sampled:	08/08/2022
		Date Received:	22/08/2022
Contact:	Jonathan Lord	Date Tested:	05/09/2022
Site Address:	P500 Whitemoss Road	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	2403887	Depth Top [m]:	3.00
Hole No.:	WS03	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly sandy CLAY		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	37	17	20	99



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

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

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed: Monika Siewior

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

Date Reported: 12/09/2022

GF 236.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

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

4041

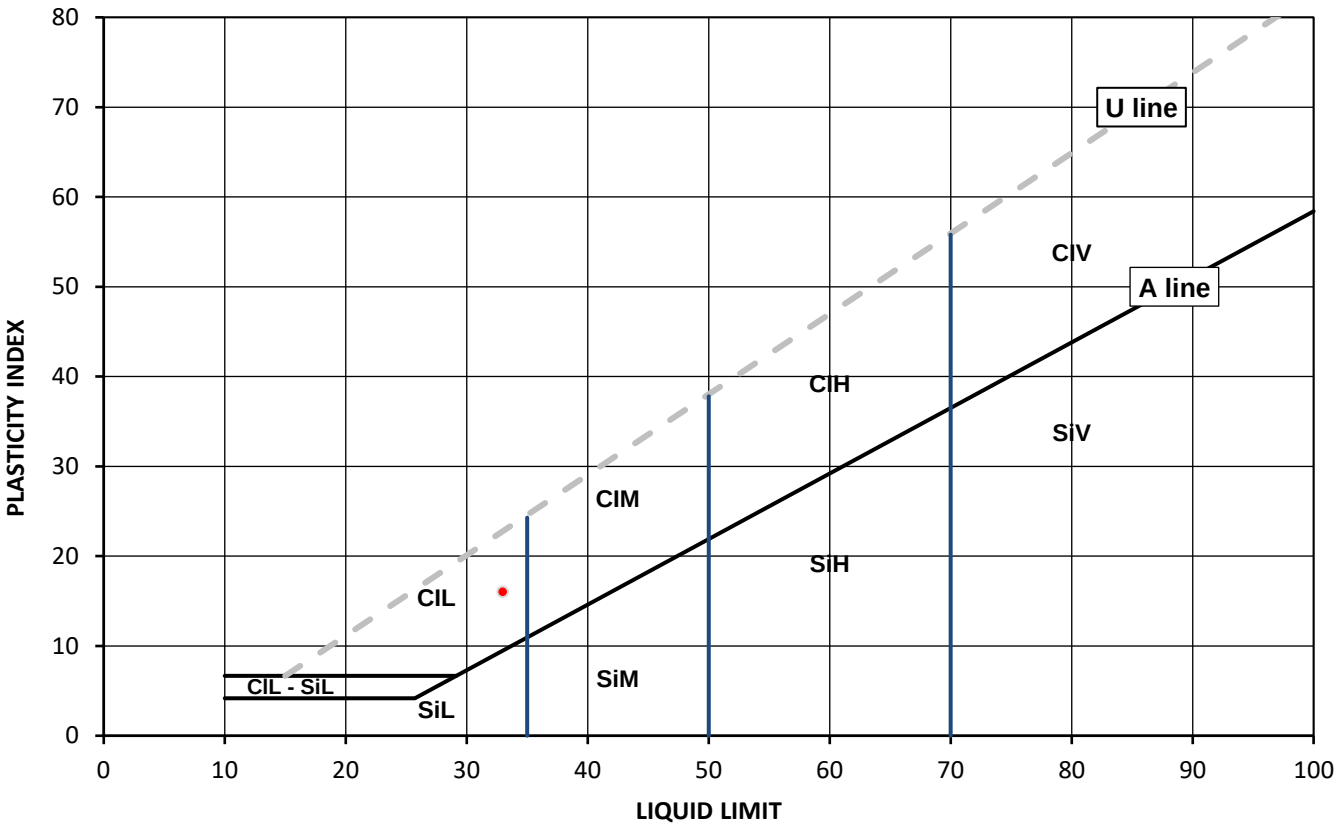
Client:	Curtins	Client Reference:	B077873
Client Address:	17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-80494
		Date Sampled:	08/08/2022
		Date Received:	22/08/2022
Contact:	Jonathan Lord	Date Tested:	05/09/2022
Site Address:	P500 Whitemoss Road	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	2403888	Depth Top [m]:	4.00
Hole No.:	WS03	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown very sandy CLAY		
Sample Preparation:	Tested in natural condition		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
20	33	17	16	100



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

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

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed: Monika Siewior

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

Date Reported: 12/09/2022

GF 236.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

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

4041

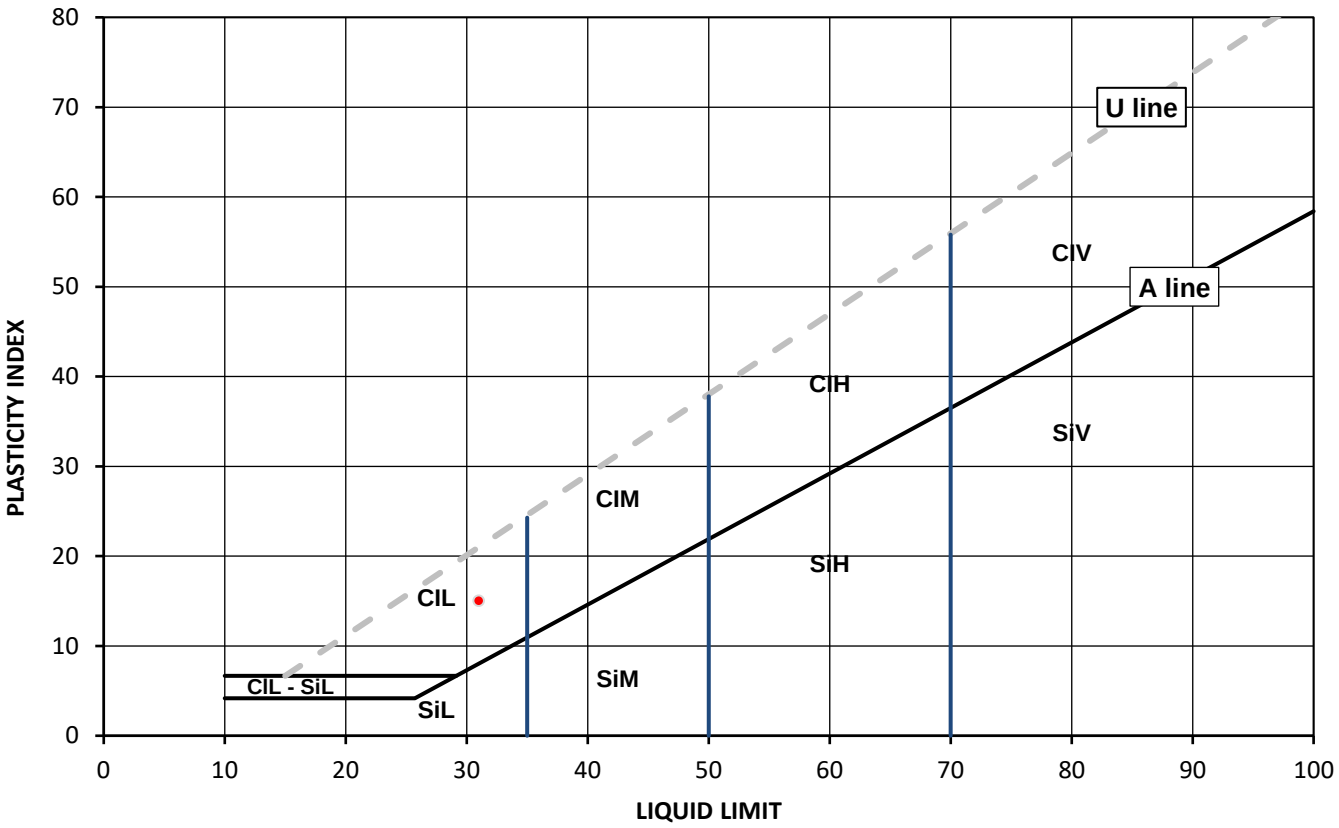
Client:	Curtins	Client Reference:	B077873
Client Address:	17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-80494
		Date Sampled:	08/08/2022
		Date Received:	22/08/2022
Contact:	Jonathan Lord	Date Tested:	05/09/2022
Site Address:	P500 Whitemoss Road	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	2403889	Depth Top [m]:	1.50
Hole No.:	WS05	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brownish grey slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
20	31	16	15	99



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

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

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed: Monika Siewior

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

Date Reported: 12/09/2022

GF 236.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

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

4041

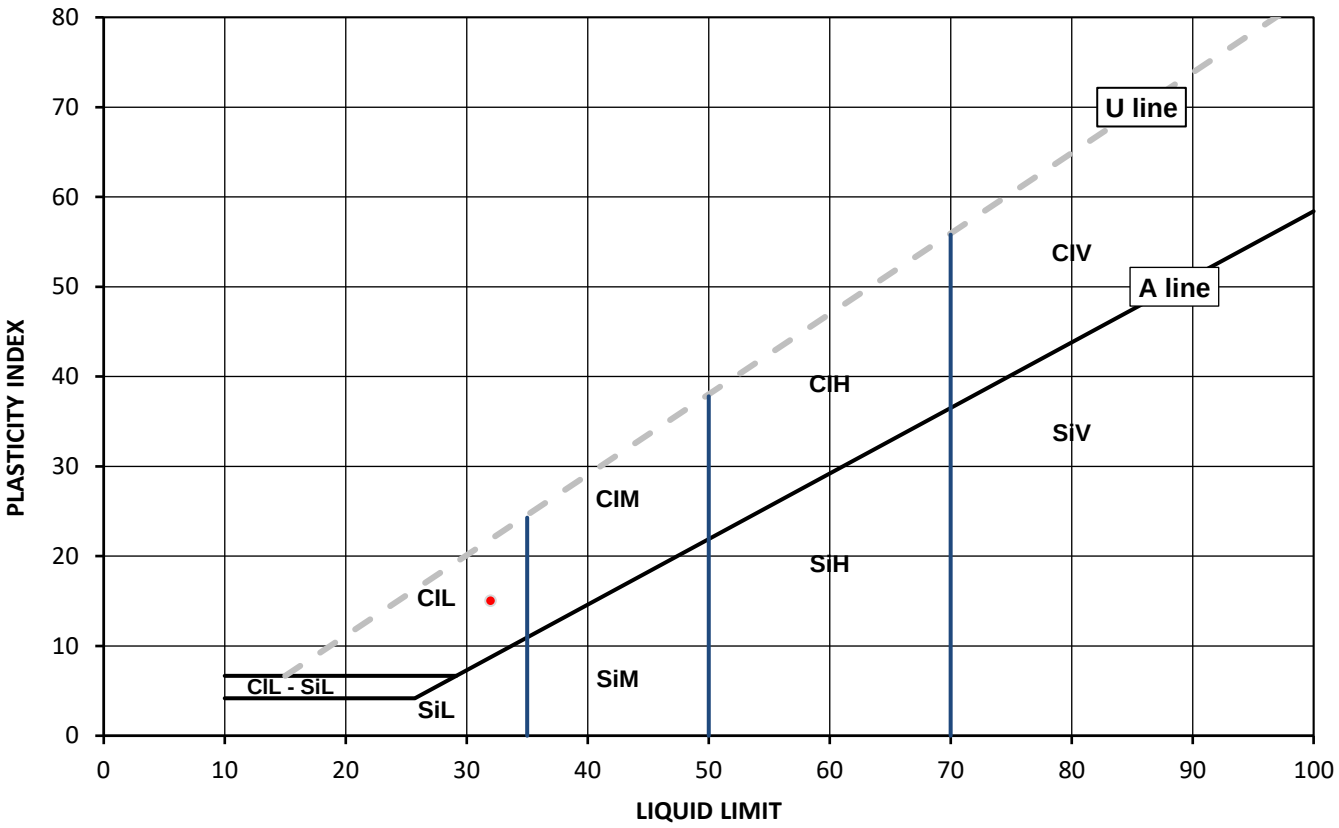
Client:	Curtins	Client Reference:	B077873
Client Address:	17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-80494
		Date Sampled:	08/08/2022
		Date Received:	22/08/2022
Contact:	Jonathan Lord	Date Tested:	05/09/2022
Site Address:	P500 Whitemoss Road	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	2403890	Depth Top [m]:	2.00
Hole No.:	WS06	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown very sandy CLAY		
Sample Preparation:	Tested in natural condition		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
15	32	17	15	100



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

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

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed: Monika Siewior

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

Date Reported: 12/09/2022

GF 236.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with:BS 1377-2:1990:Clause 4.3 and 5

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

4041

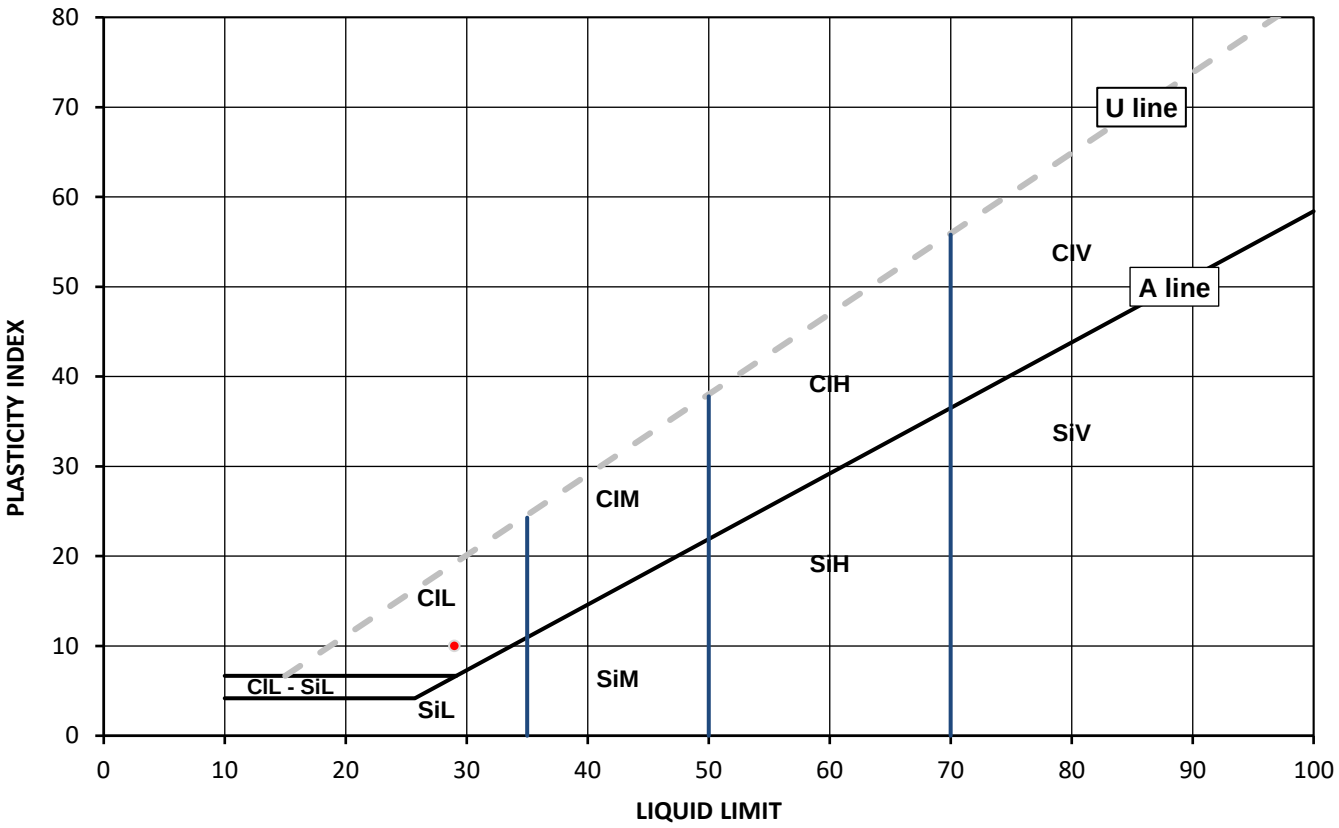
Client:	Curtins	Client Reference:	B077873
Client Address:	17-19 Whitworth Street West, Manchester, M1 5WG	Job Number:	22-80494
		Date Sampled:	08/08/2022
		Date Received:	22/08/2022
Contact:	Jonathan Lord	Date Tested:	05/09/2022
Site Address:	P500 Whitemoss Road	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	2403891	Depth Top [m]:	2.50
Hole No.:	WS08	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brownish grey slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
22	29	19	10	98



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

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

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed: Monika Siewior

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

Date Reported: 12/09/2022

GF 236.12

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

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

4041

Client: Curtins

Client Address: 17-19 Whitworth Street West, Manchester, M1 5WG

Contact: Jonathan Lord

Site Address: P500 Whitemoss Road

Client Reference: B077873
Job Number: 22-80494
Date Sampled: 08/08/2022
Date Received: 22/08/2022
Date Tested: 05/09/2022
Sampled By: Not Given

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

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W]	Water Content BS EN ISO 17892-2 [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m				%	%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3	%		
2403885	WS01	Not Given	3.00	Not Given	D	Brown slightly gravelly very sandy silty CLAY	Atterberg 4 Point	18		96	24	16	8						
2403886	WS02	Not Given	2.00	Not Given	D	Brown very sandy CLAY	Atterberg 4 Point	21		100	28	17	11						
2403887	WS03	Not Given	3.00	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	18		99	37	17	20						
2403888	WS03	Not Given	4.00	Not Given	D	Brown very sandy CLAY	Atterberg 4 Point	20		100	33	17	16						
2403889	WS05	Not Given	1.50	Not Given	D	Brownish grey slightly gravelly very sandy CLAY	Atterberg 4 Point	20		99	31	16	15						
2403890	WS06	Not Given	2.00	Not Given	D	Brown very sandy CLAY	Atterberg 4 Point	15		100	32	17	15						
2403891	WS08	Not Given	2.50	Not Given	D	Brownish grey slightly gravelly very sandy CLAY	Atterberg 4 Point	22		98	29	19	10						

Note: # Non accredited; NP - Non plastic

Comments:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:

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

Date Reported: 12/09/2022

GF 238.14

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

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

4041

Client: Curtins

Client Address: 17-19 Whitworth Street West, Manchester, M1 5WG

Contact: Jonathan Lord

Site Address: P500 Whitemoss Road

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

Client Reference: B077873
Job Number: 22-80494
Date Sampled: 08/08/2022
Date Received: 22/08/2022
Date Tested: 05/09/2022
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type			%				
2403885	WS01	Not Given	3.00	Not Given	D	Brown slightly gravelly very sandy silty CLAY		18	Sample was quartered, oven dried at 109 °C			
2403886	WS02	Not Given	2.00	Not Given	D	Brown very sandy CLAY		21	Sample was quartered, oven dried at 109 °C			
2403887	WS03	Not Given	3.00	Not Given	D	Brown slightly gravelly sandy CLAY		18	Sample was quartered, oven dried at 109 °C			
2403888	WS03	Not Given	4.00	Not Given	D	Brown very sandy CLAY		20	Sample was quartered, oven dried at 109 °C			
2403889	WS05	Not Given	1.50	Not Given	D	Brownish grey slightly gravelly very sandy CLAY		20	Sample was quartered, oven dried at 109 °C			
2403890	WS06	Not Given	2.00	Not Given	D	Brown very sandy CLAY		15	Sample was quartered, oven dried at 109 °C			
2403891	WS08	Not Given	2.50	Not Given	D	Brownish grey slightly gravelly very sandy CLAY		22	Sample was quartered, oven dried at 109 °C			

Comments:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed: Monika Siewior

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

Date Reported: 12/09/2022

GF 099.16

Appendix A6 – Ground Gas Monitoring Results

Curtins
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
Tel: 0161 236 2394
Fax: 0161 228 7902

GAS MONITORING LOG SHEET

Project:	Whitemoss Road, P500	**Date:**	24/08/2022
Job Number:	B077873	**Visit:**	1
Client:	Guiness Partnership	**Weather:**	Sunny
Barometric State:	Steady	**Ground Conditions:**	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS02	1001	0.0	0.0	0.0	0.0	3.2	3.2	16.7	0	0	Dry	3.90	
WS03	1001												1
WS05	1001	0.0	0.0	0.0	0.0	1.8	1.8	19.4	0	0	1.94	3.90	
WS06	1001	0.0	0.0	0.0	0.0	2.7	2.7	10.6	0	0	2.75	2.77	
WS07	1001	0.0	0.0	0.0	0.0	9.9	9.9	0.9	0	0	1.21	3.90	
MAX		0.0	0.0	0.0	0.0	9.9	9.9	19.4	0	0			

Notes

1 Could not open install.

Logged by

RBJ

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

Curtins
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
Tel: 0161 236 2394
Fax: 0161 228 7902

GAS MONITORING LOG SHEET

Project:	Whitemoss Road, P500	**Date:**	01/09/2022
Job Number:	B077873	**Visit:**	2
Client:	Guiness Partnership	**Weather:**	Sunny
Barometric State:	Steady	**Ground Conditions:**	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	PID	Note
		Max	SS	Max	SS	Max	SS							
WS02	1009	0.0	0.0	0.0	0.0	4.0	4.0	14.90	0	0	Dry	3.89	1.00	
WS03	1009	0.0	0.0	0.0	0.0	3.1	3.1	17.90	0	0	Dry	3.95	1.00	
WS05	1009	0.0	0.0	0.0	0.0	2.7	2.7	18.30	0	0	1.8	3.91	1.00	
WS06	1009	0.0	0.0	0.0	0.0	2.4	2.4	15.80	0	0	Dry	2.75	1.00	
WS07	1009	0.0	0.0	0.0	0.0	9.9	9.9	0.70	0	0	1.35	3.92	1.00	
MAX		0.0	0.0	0.0	0.0	9.9	9.9	18.3	0	0				

Logged by

JP

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

Curtins
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
Tel: 0161 236 2394
Fax: 0161 228 7902

GAS MONITORING LOG SHEET

Project:	Whitemoss Road, P500	**Date:**	21/09/22
Job Number:	B077873	**Visit:**	3
Client:	Guiness Partnership	**Weather:**	Sunny and overcast
Barometric State:	Steady	**Ground Conditions:**	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	PID	Note
		Max	SS	Max	SS	Max	SS							
WS02	1012	0.0	0.0	0.0	0.0	5.1	5.1	3.9	0	0	Dry	3.79	1.00	
WS03	1011	0.0	0.0	0.0	0.0	3.6	3.6	17.1	0	0	Dry	3.96	1.00	
WS05	1012	0.0	0.0	0.0	0.0	2.3	2.3	18.5	0	0	1.96	3.92	1.00	
WS06	1012	0.0	0.0	0.0	0.0	2.4	2.4	16.7	0	0	Dry	1.74	1.00	
WS07	1012	0.0	0.0	0.0	0.0	9.7	9.7	0.3	0	0	2.50	3.92	1.00	
MAX		0.0	0.0	0.0	0.0	9.7	9.7	18.5	0	0				

Notes

Logged by

JP

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

Curtins
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
Tel: 0161 236 2394
Fax: 0161 228 7902

GAS MONITORING LOG SHEET

Project:	Whitemoss Road, P500	**Date:**	28/09/22
Job Number:	B077873	**Visit:**	4
Client:	Guiness Partnership	**Weather:**	Sunny
Barometric State:	Falling	**Ground Conditions:**	Wet

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS02	1001	0.9	0.0	0.0	0.0	3.8	3.8	13.3	0	0	Dry	3.89	1
WS03	1001	0.0	0.0	0.0	0.0	3.5	3.5	17.5	0	0	Dry	3.95	
WS05	1001	0.0	0.0	0.0	0.0	2.1	2.1	18.8	0	0	2.02	3.91	
WS06	1000	0.0	0.0	0.0	0.0	8.2	8.2	3.3	0	0	Dry	2.75	
WS07	1000	0.4	0.0	0.0	0.0	9.1	9.1	0.6	0	0	2.66	3.92	1
MAX		0.9	0.0	0.0	0.0	9.1	9.1	18.8	0	0			

Notes

1 Steady state gas flow rate reached after 1 second.

Logged by

TW

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

Curtins
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
Tel: 0161 236 2394
Fax: 0161 228 7902

GAS MONITORING LOG SHEET

Project:	Whitemoss Road, P500	**Date:**	14/10/22
Job Number:	B077873	**Visit:**	5
Client:	Guiness Partnership	**Weather:**	Sunny
Barometric State:	Falling	**Ground Conditions:**	Damp

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS02	996	0.7	0.0	0.0	0.0	4.1	4.1	3.7	0	0	3.98	3.94	
WS03	996	2.5	0.0	0.0	0.0	3.1	3.1	16.1	0	0	Dry	3.96	
WS05	995	28.8	0.0	0.0	0.0	3.1	3.1	16.9	0	0	0.68	3.94	1
WS06											2.67	2.78	2
WS07	995	13.0	0.1	1.1	1.1	8.9	8.9	0.1	0	0	0.82	3.93	3,4
MAX		28.8	0.1	1.1	1.1	8.9	8.9	16.9	0	0			

Notes

Logged by JP

1 Flow rate stabilised after 31 seconds
2 Bung was left off and monitoring well cover has gone, covered with rocks to avoid a trip hazard
3 Flow rate stabilised after 3 minutes and 36 seconds
4 PID result of 1.5

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

Curtins
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
Tel: 0161 236 2394
Fax: 0161 228 7902

GAS MONITORING LOG SHEET

Project:	Whitemoss Road, P500	**Date:**	28/10/22
Job Number:	B077873	**Visit:**	6
Client:	Guiness Partnership	**Weather:**	Sunny and Overcast
Barometric State:	Raising	**Ground Conditions:**	Damp

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS02	998	3.1	1.7	0.0	0.0	5.6	5.3	2.4	0	0	3.84	3.88	
WS03	999	0.0	0.0	0.0	0.0	3.6	3.6	16.1	0	0	Dry	3.96	
WS05	999	0.0	0.0	0.0	0.0	2.1	1.6	16.9	0	0	0.48	3.92	
WS06	1000	0.0	0.0	0.0	0.0	4.7	4.4	1.7	0	0	2.62	2.76	
WS07	999	27.7	0.0	0.0	0.0	6.8	6.8	9.2	0	0	0.66	3.92	1
MAX		27.7	1.7	0.0	0.0	6.8	6.8	16.9	0	0			

Notes

1 Gas flow too 241 seconds to stabilise

Logged by

JP

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated