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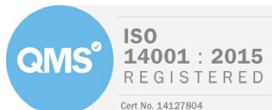
PHASE 2

GEO-ENVIRONMENTAL REPORT

job number	C4173/25/E/8277	date	22.12.2025
site address	Land adjacent to Low Road, Dewsbury Moor, Dewsbury, West Yorkshire, WF13 3PR		
written by	S. Hale	checked by	T. Merry
issued by	S. Hale		



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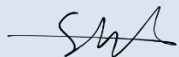
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2.	Borehole Records
3.	Dynamic Probing Records
4.	Gas Monitoring Sheets
5.	Laboratory Testing
6.	Fill Screening Values



Report on a Phase 2 Geo-environmental Investigation

Location:	Land adjacent to Low Road Dewsbury Moor, Dewsbury, West Yorkshire, WF13 3PR	
For:	APS Autocare Ltd	
Consultants:	Hinchliffe Architecture & Design Ltd	
Report No.	C4173/25/E/8277	Report date: December 2025

For and on behalf of **Rogers Geotechnical Services Ltd**

	
Steven Hale BSc FGS Geo-environmental Engineer	Tobias Merry MSci (Hons), FGS Geo-environmental Engineer

Report Summary¹

Item	Comments	Section
Development	Construction of a new vehicle testing and repair garage with associated car parking.	1.
Geology	Superficial geology – None recorded. Solid geology – Birstall Rock.	5.
Strata Conditions	Made ground overlying residual Birstall Rock.	6.
Groundwater	No groundwater encountered.	6.2
Foundation Design	Shallow trip or spread foundations recommended.	10.1
Effect of Sulphates	DS-1, AC-1s, DC-1	10.5
Contamination	No contamination detected during works.	11.

¹ This summary should not be relied upon to provide a comprehensive review. All of the information contained in this document should be considered.

1. Introduction

It is understood that the land at Low Road is to be developed by the construction of a new vehicle testing and repair garage with associated car parking. Consequently, a site investigation has been undertaken in accordance with the instruction from the client. This work was required in order to determine the nature of the underlying soils, to assess their engineering properties and to assist in the design of safe and economical foundations for the proposed development. This investigation also takes into consideration the risk of any contamination present. This report describes the work undertaken, presents the data obtained and discusses the ground conditions in relation to the proposed works.

2. Limitations

The recommendations made and opinions expressed in this report are based on the ground conditions revealed by the site works, together with an assessment of the site and of the laboratory test results. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example between borehole positions, these are for guidance only and no liability can be accepted for their accuracy.

This report has been prepared in accordance with our understanding of current best practice. However, new information or legislation, or changes to best practice may necessitate revision of the report after the date of issue.

3. Desk Study

A Phase 1 Desk Study has been undertaken by Rogers Geotechnical Services (RGS) and the results were presented as report number C4173/25/E/8276 in September 2025. This report has been used extensively during the current intrusive investigation.

4. Fieldworks

The fieldworks were undertaken on the 1st December 2025 and included the following:

- Four windowless sample boreholes.
- Standard penetration tests within one borehole.
- One dynamic probe.
- Four gas monitoring standpipes.

The investigatory locations are shown on the site plan which is presented in Appendix 1 to this report.

4.1 Windowless Sample Boreholes

These boreholes were sunk using a drive-in windowless sampler. The cores were undertaken in 1m lengths and reduced in diameter from 87mm for the first 1m through 77mm and 67mm for subsequent 1m increments. The recovered cores were sealed and returned to the laboratory for logging and subsequent testing. The soils were described in general accordance with BS5930: 2015 +A1: 2020 and full descriptions are given on the windowless sample records which are presented in Appendix 2. Also included on these records are the core diameters and percentages of core recovered.

4.2 Standard Penetration Tests

Standard penetration tests (SPT) were undertaken at regular depth increments within the windowless sample boreholes. The SPT was conducted in accordance with the procedures given in BS EN ISO 22476: Part 3: 2005 +A1: 2011, and the results are summarised on the borehole record. During this work an automatic trip hammer of 63.5kg falling through 750mm was employed to drive either a cone or split barrel sampler assembly into the ground and the recovered barrel samples were retained in air tight plastic containers.

4.3 Dynamic Probes

A single dynamic penetration test was undertaken adjacent to the centre of the site in accordance with the procedure given in BS EN ISO 22476: Part 2: 2005 +A1: 2011, using the super heavy penetrometer (DPSH). This probe consists of a 63.5kg mass falling through 750mm onto an anvil, which drives a 50mm diameter cone into the ground. The number of blows required to drive the cone through successive 100mm increments are recorded as the N_{100} values. The results of the dynamic penetration test are tabulated and presented as bar charts of N_{100} values versus depth in Appendix 3.

4.4 Gas Monitoring Standpipes

Gas monitoring standpipes were installed between 0.7m and 3.0m depth in all of the boreholes and the installation details are shown on the appropriate borehole records. In most cases, the monitoring standpipe consisted of a perforated pipe from the base of the borehole to 1.0m below surface, with a non-perforated pipe to ground level. It should be appreciated that due to borehole collapse, the install within WS03 consisted of 0.2m of plain pipe and 0.5m of perforated pipe to the base of the borehole. The response zones in all cases were filled with pea gravel, with a bentonite seal at the base and above, and the installation was capped with a stop box cover in a concrete surround.

5. Geology

The available published geological data for the site has been examined and the following table presents the anticipated geology.

Table 1: Geological Data for the Site

Strata Type	Strata Name ²	Parent Unit ³	Description ³
Superficial Geology	-	-	None recorded.
Solid Geology	Birstall Rock	Pennine Lower Coal Measures Formation	The Birstall Rock is a fine-grained, thickly bedded, cross bedded sandstone with common pebbles of ironstone, coal sandstone and mudstone, and common streaks of shaly coal.

6. Strata Conditions

In accordance with the geology of the area, the succession has been shown to include the following:

Table 2: Generalised Strata Profile

Depth m below ground level to underside of layer	Strata Type	Positions Encountered	Groundwater Strikes m below ground level
0.30 – 0.60	MADE GROUND (Brown clayey, silty, sandy GRAVEL)	WS01 & WS02	None
0.35 – 0.50	MADE GROUND (Soft, dark brown, slightly sandy, gravelly, silty CLAY)	WS02, WS03 & WS04	None
1.00	MADE GROUND (Soft, light brown mottled grey. Silty CLAY) [REWORKED]	WS01, WS03 & WS04	None
1.45	Soft becoming firm, light brown mottled grey, silty CLAY	WS04	None
+3.45	Stiff, brown, slightly sandy, gravelly, silty CLAY [RESIDUAL BIRSTALL ROCK]	All	None

'+' denotes that the strata extended below the termination depth of the investigated positions, thus the extent of the deposit is only proven to the depths indicated

6.1 General Strata

In general, the borehole records indicate that beneath a 1.0m thickness of made ground, soft to firm and stiff clays were revealed to termination depths within all borehole locations. It is anticipated that the brown, slightly sandy, gravelly clays encountered are representative of the residual Birstall Rock recorded to underlie the site.

6.2 Groundwater

² Sources: British Geological Survey (NERC) Map Sheet 77; Huddersfield; Solid and Drift Edition, and GeoIndex Onshore Viewer [online resource from www.bgs.ac.uk]

³ Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [online resource from www.bgs.ac.uk]

No groundwater strikes were observed during the site investigation. However, it should be appreciated that the normal rate of boring does not permit the recording of an equilibrium water level for any one strike, moreover, groundwater levels are subject to seasonal variation or changes on local drainage conditions.

7. Insitu Testing

7.1 Standard Penetration Tests

The standard penetration tests carried out are summarised in the following table:

Table 3: Summary of Standard Penetration Tests				
Strata	Depth Range (m)	SPT 'N' (Blows/300mm)		Comments
		Granular soils	Cohesive soils	
Silty CLAY	1.00m to 1.45m	-	11	Insitu testing indicates silty clay is present in a firm condition.
Slightly sandy, gravelly, silty CLAY	1.00m to 1.45m 2.00m to 2.45m 3.00m to 3.45m	-	8 – 20 17 – 28 50 – 61	Testing indicates soil is present in a firm to stiff insitu condition. Additionally, it shows refusal within the residual rock at 3.00m depth.

7.2 Dynamic Penetration Tests

A dynamic penetration test was undertaken to the centre of the site. A summary of the results is presented below:

Table 4: Summary of Dynamic Penetration Tests					
Position	Blows/100mm			Refusal type (Effective/ Abrupt) ⁴	Comments
	0 - 2	3 - 10	10+		
	Depth to which blow count range was observed (m)				
DP01	0.1 1.90	0.3	2.00	Abrupt	Variably low with occasional moderate blow counts until abrupt refusal within the bedrock at 2.00m depth.

7.3 Gas and Water Level Monitoring

The standpipes were monitored between the 4th and thr 18th December 2025. The results of the gas monitoring undertaken to date are tabulated below and full results are presented in Appendix 4.

⁴ Abrupt refusal: obstruction or bedrock encountered. Effective refusal: +25 blows/100mm.

Table 5: Gas Monitoring

Location	Date	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	Flow (l/h)	Barometric Pressure (mb)	Water Level (m)	Standpipe Depth (m)
WS01	04.12.2025	0.0	0.0	20.5	0.0	986 ↓	1.38	3.00
	11.12.2025	0.0	0.2	18.8	0.0	1005 ↑	1.26	
	18.12.2025	0.0	0.9	18.9	0.0	996 ↓	1.16	
WS02	04.12.2025	0.0	0.0	20.6	0.0	986 ↓	2.56	3.00
	11.12.2025	0.0	0.0	20.6	0.0	1005 ↑	1.17	
	18.12.2025	0.0	0.0	20.7	0.0	996 ↓	1.01	
WS03	11.12.2025	0.0	0.0	20.7	0.0	1005 ↑	Dry	0.70
	18.12.2025	0.0	0.3	20.6	0.0	996 ↓	Dry	
WS04	04.12.2025	0.0	0.0	20.5	0.0	986 ↓	1.59	3.00
	11.12.2025	0.0	0.0	20.7	0.0	1005 ↑	1.85	
	18.12.2025	0.0	0.0	20.8	0.0	996 ↓	1.46	

↑ - rising pressure ↓ - falling pressure ↔ -steady pressure

This work was undertaken using a GFM Series (Serial No 12168/201125) which was last calibrated on the 13th July 2025.

8. Laboratory Testing - Geotechnical

The following programme of laboratory testing has been undertaken on samples obtained during this investigation:

- Determination of water content BS EN ISO 17892-1:2014
- Determination of liquid and plastic limits BS EN ISO 17892-12:2018
- Soluble sulphate content BS 1377-3:2018+A1:2021: Pt3: 7.3
- pH value BS 1377-3:2018+A1:2021: Pt3: 12
- One-dimensional consolidation BS 1377-5:1990: Pt5: 3

The test results are presented in Appendix 5 and are summarised below:

Table 6: Summary of Geotechnical Test Results

Test type	Number of tests	Range of results		Comments
Water content determinations	5	6.8% to 15%		Generally reducing with depth and well below the plastic limit.
Index properties (4 Point)	5	LL PL PI	38% to 44% 21% to 24% 17% to 20%	Clay of intermediate plasticity. Consistency index 1.4 to 1.8 NHBC Class - Low
Soluble sulphate & pH	2	SO ₄ pH	0.09 & 0.23g/l 5.32 & 5.74	
One-dimensional consolidation	1	c _v m _v	0.93 m ² /yr 0.19 m ² /MN	Moderate rate of settlement. Medium compressibility.

In cohesive soil the approximate cohesion, c_u , and coefficient of consolidation, m_v , may be obtained from the equivalent SPT 'N' value using the following expressions (Stroud 1975).

$$c_u = f_1 N$$

$$m_v = \frac{1}{f_2 N}$$

where:

c = cohesion (kN/m²).

m_v = Coefficient of consolidation (m²/MN).

f_1 & f_2 = factors based on plasticity index.

N = SPT 'N₃₀₀' value.

For the cohesive soils revealed at this site the highest (worst case) plasticity index⁵ of 20% could be employed, which suggests an f_1 value of 5.4 and an f_2 value of 0.54.

8.1 Geotechnical Properties

The idealised geotechnical properties employed in design are summarised below.

Table 7: Summary of Geotechnical Properties

Property	Range of values		Comments
Volume change potential (NHBC)	Low		Slightly sandy, gravelly, silty CLAY.
Shear strength parameters (at proposed foundation level)	c_u	40kN/m ²	Stroud (1974) where $c_u = f_1 N$ and assuming an N of 8.
Consolidation characteristics	m_v	0.19m ² /MN	Assume m_v gradually reduced with increasing depth.
Concrete classification	DC1		Natural ground locations (Static water)

9. Laboratory Testing - Environmental

A suite of testing was conducted on samples from across the site and the following regime was undertaken.

- Metals – Cd, Cr^{VI}, Cu, Hg, Ni, Pb, V and Zn.
- Semi and Non-Metals - As, Se, Free CN⁻ and Phenols.
- Polycyclic aromatic hydrocarbons (PAHs).
- Petroleum hydrocarbons (TPHs).
- Others – pH, organic content and total/soluble SO₄²⁻.
- Asbestos.

This testing was undertaken by i2 Analytical Ltd and the results of all of the chemical testing are presented in Appendix 5 of this report.

10. Discussion of Ground Conditions - Geotechnical

It is understood that this site is to be developed by the construction of a new vehicle testing and repair garage with associated car parking. The precise structural details are not currently known; thus the discussion below is of a generalised nature.

8.1 Foundations

The results of this investigation indicate that made ground will be revealed to depths of 1.00m. Such soils are not deemed suitable to represent suitable bearing strata as they are present in a weak and variable condition such that excessive total and or differential settlement could occur under moderately light loadings.

⁵ See paragraph 6.2 'Index Property Tests'

It is considered that the clay encountered beneath the made ground will provide a suitable bearing stratum, provided that the foundations are placed 200mm into soil generally described as being present in at least a firm insitu condition. Within this investigation, suitable soils have been revealed from depths of 1.00m.

It is considered that strip or spread foundations constructed within this material, at a minimum depth of say 1.00m, could be designed assuming an allowable increase in stress given in the following table:

Table 7: Allowable Increase in Stress							
Foundation Type		Strip Footings			Spread/Pad Footings		
Foundation Breadth	B (m)	0.6	0.9	1.2	1.0	2.0	3.0
Foundation Depth	D (m)	1.0			1.0		
Allowable Increase in Stress	(kN/m ²)	90	85	80	100	95	90
Net Allowable Bearing Capacity ⁶	(kN/m ²)	110	105	100	120	115	110

The allowable increase in stress given above assumes a factor of safety of 3 against general shear failure, with cohesion of 40kN/m² at the foundation depths. Settlements at the above loading intensities should remain within tolerable limits for the type of structure proposed provided that the underlying soils are carefully inspected immediately once final trimming has taken place. Should any soft or weak material be encountered they should be locally removed and replaced with lean-mix concrete or compacted granular soil. In addition, if the excavations are required to stand open for any period of time then a blinding layer of lean-mix concrete should be placed in the excavation bases. This expedient will reduce softening or loosening of the sub-grade due to the ingress of surface water.

Should seepages of groundwater be encountered it is considered that they could be dealt with using a simple form of de-watering. Such a system could include the excavation of sumps from which the water could be pumped.

The stability of the excavation faces cannot be guaranteed thus temporary support to the excavation faces may become necessary unless the foundations are constructed using trench-fill techniques. In this method the foundation trenches should be excavated, inspected and backfilled with concrete as a continuous operation. Under no circumstances should operatives be allowed to enter unsupported excavations.

8.2 Volume Change Potential

It should be appreciated that the cohesive soils revealed at this site possess a low volume change potential under the guidance of the NHBC standards. Therefore, it will be necessary to ensure that the depths of the foundations are designed in accordance with the Chapter 4.2 of the NHBC standards⁷. The methodology provided in the guidance will require the identification of any trees, still present at, or recently removed from, the site and the distance from the proposed foundations. This may result in foundation depths greater than those given above and the requirement for heave protection to be employed against footings and below the underside of the floors and beams.

⁶ Assumes bulk density of material removed from footing excavations to be 20kN/m³

⁷ NHBC Standards, Chapter 4.2, *Building near trees*

8.3 Ground-floors

In light of the made ground and soft near surface soils, which were revealed to depths of up to 1m, it is not recommended that ground bearing ground floor slabs be employed. In this instance it would be necessary to suspend floors between foundation positions, such that the floor loads are transmitted via the foundations to competent soils at depth.

8.4 Access Roads, Drive-ways and Hard-standing

It is considered that any roads or hard-standing at the site could be constructed employing traditional pavement design. A design California Bearing Ratio (CBR) of 2% could be employed in the pavement design⁸. However, it is recommended that proof rolling of the sub-grade be undertaken to establish the suitability of the soils, to expose any soft or weak ground and to ensure the sub-grade is well compacted prior to construction. Any areas of soft or weak ground should be remediated by increasing the sub-base thickness. Alternatively, weak material could be locally removed and replaced with a compacted granular capping layer. If construction were to be undertaken during the winter or after periods of prolonged rainfall, it may be prudent to employ a geotextile and/or a geogrid between the sub-base and sub-grade.

8.5 Effect of Sulphates

In view of the nature of the underlying soils it is considered that the design sulphate class be assessed with reference to Table C1⁹, which is provided in BRE Special Digest 1, *Concrete in aggressive ground*: Part C. On the basis of this table and considering the soluble sulphate contents recorded, it can be shown that well compacted buried concrete should be designed in accordance with Class DS-1 requirements. Assuming static groundwater, the table also indicates that the aggressive chemical environment for concrete (ACEC) classification is AC-1s.

In order to evaluate the design chemical (DC) class for the buried concrete at this site reference should be made to Table D1¹⁰, which can be found in Part D, *Specifying concrete for general cast-in-situ use*, of BRE Special Digest 1. From this table it may be shown that for an intended working life of at least 50 years the concrete design class DC-1 is required.

11. Discussion of Ground Conditions - Environmental

11.1 Discussion of Test Results

It is understood that the site is to be developed by the construction of a new vehicle testing and repair garage with associated car parking. Consequently, the site may be classified as a commercial end use.

⁸ Table 13/2 Design Manual for Roads and Bridges (1995), HA44/9: Volume 4 Section 1 Part 1, Highways Agency.

⁹ Table C1, *Aggressive Chemical Environment for Concrete (ACEC) classification for green field locations*

¹⁰ Table D1, *Selection of the DC Class and the number of APMs for concrete elements where the hydraulic gradient due to groundwater is 5 or less: for general in-situ use of concrete.*

11.1.1 Soil Samples

The results of the chemical testing undertaken on soil samples obtained during this investigation have been compared to the ATRISK soil screening values (SSVs) as compiled by WS Atkins plc. With respect to the results it should be appreciated that the soil organic matter (SOM) content for the samples tested was found to range between 1.0% and 5.0%. On this basis, it is considered that the screening values associated with 1% SOM should be adopted. These values have been derived in such a way as to adhere to the principles within the revised CLEA model and include the most current release of the SGVs. A list of subscribers is provided within the website¹¹ and these include many local authorities.

A comparison of the results of the testing, together with the data given above, can be found within Appendix 5. These results indicate the following:

Table 8: Summary of Contaminated Areas

Location	Depth (m)	Contaminants found to be exceeding SSVs (Commercial)
WS01	0.30	PAHs: Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-c,d)Pyrene, Dibenz(a,h)Anthracene & Benzo(g,h,i)perylene.
WS02	0.60	None.
WS04	0.50	PAHs: Chrysene, Indeno(1,2,3-c,d)Pyrene, Dibenz(a,h)Anthracene & Benzo(g,h,i)perylene.

Concentrations of chromium^{VI}, mercury, free cyanide, phenols (total) and total petroleum hydrocarbons (aliphatic C5 to C35; aromatic C5 to C21) were below the detection limits for the tests. Detectable levels of all other contaminants were recorded, but these fell below the associated Atrisk Soil Screening Values. In addition, no asbestos was detected within the soils samples tested.

It should be appreciated that the soil screening values for PAHs and TPHs (where appropriate) represents vapour saturation limits. The inhalation of vapour pathway contributes less than 10% of total exposure, which is unlikely to significantly affect the combined assessment criterion¹². In view of this, the ATRISK soil SSVs notes that the users may wish to consider using a combined assessment criterion if free product is not observed, the values for which are also provided on the summary of contamination analysis. It is therefore considered that the criteria for no free product should be adopted for the PAHs and TPHs at this site. The results of the contaminants found to exceed these screening values are tabulated below:

Table 9: Summary of Areas Contaminated by PAHs & TPHs

Location	Depth (m)	Contaminants found to be exceeding SSVs (Commercial)
WS01	0.30	None.
WS02	0.60	None.
WS04	0.50	None.

On the basis of the above information, the results of the investigation have concluded that the site is uncontaminated with regards to the intended end use.

¹¹ <http://www.atrisksoil.co.uk/pages/general/subscribers.asp>

¹² Ref: ATRISK soil, SSVs derived using CLEA v1.071 for 1% SOM, Commercial land use, 23.06.17.

11.1.2 Gas Concentrations

With respect to ground gas, the results of the monitoring visits indicated a maximum concentration of 0.0% methane, with concentrations of carbon dioxide ranging between 0.0% and 0.9%, in association with oxygen levels of between 18.8% and 20.8%. It should be appreciated that on non-contaminated sites there is generally about 20% by volume of oxygen, associated with low levels of carbon dioxide. In addition, a maximum flow rate of 0.0 litres per hour was recorded, as such, a n assumed value of 0.1% will be employed in the following calculations.

The principal driving force for initiating the movement of gas in the ground is a change in barometric pressure. The most onerous gas condition on a site is usually observed on days of low or falling barometric pressure, preferably below 1000mb. It has been noted that measurements undertaken solely during high pressure conditions may be of lesser value. At this site the readings undertaken to date were at atmospheric pressures of between 986mb and 1005mb.

In order to establish the gas screening value (GSV) for carbon dioxide or methane, the maximum gas concentration (expressed as a decimal) is multiplied by the borehole flow rate (l/hr). In this case 0.0% (0.000) methane was recorded along with 0.9% (0.009) carbon dioxide, in association with a maximum flow rate of 0.1 l/hr. This results in a negligible GSV for methane and a GSV of 0.0009 l/hr for carbon dioxide.

In accordance with Table 2 of BS8485: 2015, *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*, the site may be characterised as *Characteristic Situation Level 1*. It is therefore considered that there is a very low risk of harm to end users and site operatives and no special precautionary measures are required in accordance to Table 8.6, *Typical scope of gas protection measures*, of CIRIA report C665.

With regard to the number of monitoring visits required reference is made to Tables 5.5a and 5.5b of CIRIA report C665 (2007)¹³. Accepting that the proposed development is of high sensitivity and that the generation potential is very low, these tables suggest that 6 readings could be undertaken over a period of 3 months. However, C665 notes that *not all sites will require gas monitoring for the period and frequency indicated in Tables 5.5a and 5.5b*.

In this case, a total of 3 monitoring visits were undertaken over a three-week time period and for the purpose of this assessment, it is considered that the site can be provisionally classified as Characteristic Situation Level 1. It should be appreciated that two of the three ground gas monitoring to date was undertaken during periods of relatively low barometric pressure (i.e. below 1000mb). Therefore, it is recommended that the final monitoring visit is undertaken within the next month as recommended by the CIRIA report C665 (2007). However, it is considered that the worst-case scenario is already presented in the previous monitoring.

In light of the above, it is considered that following the additional monitoring visit, should there be no significant change in ground gas conditions, the site can be fully classified as Characteristic Situation Level 1.

¹³ Adapted from tables 5.5a and 5.5b of CIRIA C665, 2007, *Assessing risks posed by hazardous ground gas to buildings*, p60.

11.2 Site Specific Risk Assessment

11.2.1 Approach

The presence of contamination hazards and the risks associated with them should be assessed in accordance with industry practice and the 'suitable for use' approach. This has been conducted with reference to The Department for Environment, Food and Rural Affairs (DEFRA) and The Environment Agency¹⁴ advice on the assessment of risks arising from the presence of contamination in soils and using the source-pathway-receptor approach.¹⁵ This method dictates that there must be a risk of contaminant produced at a 'source' in sufficient concentration to cause harm and there must be a 'pathway' for the contaminant to reach an identifiable 'receptor' for the linkage to be proved and a contamination hazard to be considered present. Not all substances are contaminants and not all contaminants are considered to be a risk. Indeed DEFRA and The Environment Agency state that 'a contaminant is a substance which has the potential to cause harm, while a risk itself is considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.'¹⁶

11.2.2 Conceptual Ground Model and Risk Assessment

In view of the results of the chemical testing undertaken the conceptual site model is presented accordingly as Table 10.

The preliminary risk assessment has been evaluated with reference to the following ratings and definitions:

N/A -	A source-pathway-receptor linkage is not considered to exist and therefore a risk assessment is not required.
Low -	A pollution linkage is unlikely and/or the likelihood of harm occurring is low and of minor consequence.
Moderate -	The linkage exists but the likelihood of harm occurring is not considered to be significant although remedial action may be necessary
High -	The linkage exists and the available data indicates that significant harm may be caused and remedial action could be necessary.

The results of the risk assessment are presented in Table 10.

¹⁴ R&D Publication CLR 8, 'Assessment of Risks to Human Health from Land Contamination: An overview of the Development of Soil Guideline Values and Related Research'.

¹⁵ The pollution linkage approach was developed by 'Circular 2/2000 Contaminated Land: Implementation of Part II of The Environmental Protection Act 1990' which provides meanings for the terms contained in The Environmental Protection Act 1990 Part IIA, the primary legislation for addressing the issues of contaminated land.

¹⁶ See 'Circular 2/2000 Contaminated Land: Implementation of Part II of The Environmental Protection Act 1990', appendix A.

Table 10: Conceptual Site Model and Site-Specific Risk Assessment

Conceptual Site Model			Site Specific Risk Assessment	
Pathways	Receptor	Linkage Present?	Risk Rating	Actions Required
Direct contact/dermal absorption/soil ingestion	Operative	Yes – contact with soil likely during works, however, no contamination detected during works.	Low	No further action required.
	End User	Yes – end users may come into contact with soil, however, no contamination detected during works.	Low	
	Neighbours	Yes – a populated residential area surrounds the site, however, no contamination detected during works.	Low	
Inhalation of Dust/Vapours	Operative	Yes – dust may be produced during works, however, no contamination detected during works.	Low	No further action required.
	End User	Yes – end users may produce dust, however, no contamination detected during works.	Low	
	Neighbours	Yes – residential properties located adjacent to the site, however, no contamination detected during works.	Low	
Ingestion of fruit/vegetables and/or waters	Operative	No – no edible plants or contained water sources in the area of the proposed new works.	N/A	No further action required.
	End User	No – there are no soft landscaped areas present as part of the proposed developments.	N/A	
	Neighbours	Yes – residential properties adjoin the site, however, no contamination detected during works.	Low	
Migration of hazardous gases via permeable strata or shallow mining activity	Operative	No – low concentrations of methane and carbon dioxide have been found to be present at the site (assuming <i>Characteristic Situation Level 1</i>).	Low	Low concentrations of harmful gases (methane and carbon dioxide) were detected at the site. If ground gas conditions remain the same, no special precautionary measures are deemed to be required.
	End User		Low	
	Neighbours		N/A	

Spillage/loss/run off direct to receiving water	Controlled Waters	Yes – known controlled waters within 250m, however, no contamination detected during works.	Low	No further action required.
Migration via permeable unsaturated strata	Controlled Waters	Yes – secondary A aquifer is present beneath the site, however, no contamination detected during works.	Low	
Run off via drainage/sewers etc	Controlled Waters	Yes – old services may be present on site, however, no contamination detected during works.	Low	
Direct contact with contaminated soils	Plants	No – there are no soft landscaped areas present as part of the proposed developments.	N/A	No further action required.
Uptake via root system			N/A	
Direct contact with contaminated soils	Building Materials	Yes – elevated levels of PAHs revealed at the site may represent a risk to building materials or plastic water pipes. Moreover, testing indicates that the aggressive chemical environment for concrete classification is AC-1s.	Moderate (plastic services)	Please see section 11.3.1 for information on good building practice.
Direct contact with contaminated groundwater			Low (buried concrete)	
Exposure to Radon	Operative	Yes – the is present in a radon affected area.	Moderate	Between 3% and 5% of properties are at or above the action level. Basic radon protection measures required.
	End User			
UXO Risk	Operative	No – it is considered that the activities of the end users are unlikely to affect any UXO devices that may be present below the site.	Low	No further action required.
	End User			

11.3 Indicative Remediation Strategy

In view of the site specific risk assessment it is considered that it will not be necessary to undertake any specific remediation at this site. It should be appreciated, however, that careful inspection of the subgrade should be made during the groundworks. Should areas of contamination be detected then further testing may become necessary. This strategy should be reassessed once gas monitoring has been concluded.

11.3.1 General Approach to Construction

In order to fulfil the objectives defined above it is likely that the following remedial strategy could be utilised. It is recommended that a pragmatic approach be undertaken, with observational techniques being employed at each stage of the work.

Ground-works

During the ground-works phase of the development, protection to the site operatives is required. The risk to site operatives is considered under the Health and Safety at Work Act 1974, together with regulations made under the act, which includes the Control of Substances Hazardous to Health (COSHH) regulations. Therefore the risks to site personnel must be considered under the Construction Design and Management (CDM) regulations at the planning stage and be included in the contractor's Health and Safety Plan and site specific Method Statements. These documents should include the following main elements.

- Site operatives at all levels should be made aware of the fundamental principles of identifying potentially contaminated soils and the hazards of working with such soils not identified by the ground investigation.
- Personal hygiene facilities, including washing and messing, must be provided and site operatives encouraged to use them.
- Where work is undertaken in dry weather the site should be dampened down to avoid dust. In addition, dust masks must be provided to all site operatives for use at all times.
- Where vehicles are transferring soil to landfill site they should be covered to prevent any potential contamination of the surrounding area by dust.
- Any stockpiles of soil should be sheeted over to prevent excessive amounts of airborne dust.
- Where work is undertaken in wet weather, vehicle and wheel washing facilities are required to ensure that the vehicles leaving the site do not transfer any potential contamination to surrounding areas.

On completion of the ground-works a careful site inspection of the sub-grade would be required. Should visual or olfactory evidence of contamination be revealed then further testing may become necessary.

Construction

During the construction phase of the development the following items are required to protect the structure from the potential contaminants revealed at this site.

- Beneath, pavements and hard-standings clean inert granular sub-base should be employed.
- For buried concrete the results of the sulphate and pH testing indicate that the design sulphate class for the site should be DS-1.

11.4 Fill Materials

It should also be appreciated that any fill material, either site-won or imported, to be employed at the site should be subjected to the following assessment to determine its suitability.

Fill materials should be initially screened, by a suitably qualified engineer to establish that:

- It is a suitable growing media if it is to be employed as such, including compliance with BS3882 (2015)
- It is free from obvious contamination i.e. visual or olfactory evidence
- It has not come from areas where Japanese Knotweed or other invasive or injurious plants are suspected to be growing
- It is not a statutory nuisance, such as being odorous
- It is free from unsuitable material i.e. whole bricks, brick ties, timber or glass.

It should also be appreciated that any fill should be subjected to validation testing to assess its suitability. The following table has been taken from YALPAG¹⁷ documentation and may be used as a guide. Depending on the origin and nature of the material, not all fill will require the sampling frequency and testing indicated, although this should be in agreement with any regulatory bodies (such as the Local Authority).

Table 12: Validation Sampling and Testing		
Fill Type	Frequency	Minimum Determinands
Virgin Quarried Material	1 or 2 depending on the type of stone utilised, to confirm the inert nature of the material.	Standard metals/metalloids (should include as a minimum As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn)
Crushed Hardcore, Stone, Brick	Minimum 1 per 500m ³	Standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, total TPH. Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).
Greenfield/ Manufactured Soils	Minimum 3 Dependent on source and receptor, between 1 per 50m ³ and 1 per 250m ³	Standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, pH and soil organic matter (SOM) (or calculated from total organic carbon (TOC)).
Brownfield/ Screened Soils	Minimum 6 Dependent on source and receptor, between 1 per 50m ³ and 1 per 100m ³	Standard metals/ metalloids (as above), PAH (16 USEPA speciation), TPH (CWG banded), asbestos, pH and SOM (or calculated from TOC). Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE)..

The screening values for the above regime should also be agreed with any regulatory bodies; however, the following is recommended in the first instance.

¹⁷ YALPAG Technical Guidance for Developers, Landowners and Consultants – Verification Requirements for Cover Systems V4 .1 Appendix 1a, June 2021

Table 13: Fill Screening Values

Contaminant	Screening Value (Commercial) (mg/kg)				Reference
	1% SOM		6% SOM		
As	635		635		Atrisk ^{SOIL} SSVs
Cd	410		410		Atrisk ^{SOIL} SSVs
Cr(VI)	19.7	49.1	19.7	49.1	Atrisk ^{SOIL} SSVs
Cu	106000		106000		Atrisk ^{SOIL} SSVs
Hg	350		405		Atrisk ^{SOIL} SSVs
Ni	1770		1770		Atrisk ^{SOIL} SSVs
Pb	2310		2310		Atrisk ^{SOIL} SSVs
V	7490		7490		Atrisk ^{SOIL} SSVs
Zn	1100000		1100000		Atrisk ^{SOIL} SSVs

Please see summary sheet within Appendix 6 for full screening values including PAHs & TPHs.

The above screening values should be considered with respect to the Soil Organic Matter (SOM) of the subject material i.e. 1% SOM would be typical for granular fill and 6% SOM for topsoil. Testing should comply with UKAS and MCERTS, where applicable, and undertaken by an accredited laboratory.

Where the material has been derived from a commercial company, certificates or other industry quality protocol compliance i.e. WRAP should be obtained. However, it will be necessary to ensure that this documentation specifically related to the material being imported, it is no more than two months old and complies with the screening and frequency requirements given above.

Suitable fill materials should be either placed immediately or sufficiently quarantined to prevent cross-contamination. If it is necessary, the quarantined material should be placed on appropriate sheeting and covered to prevent it becoming mixed with contaminated soils or dust, or penetrated by mobile contaminants.

11.5 Verification Report

It is not anticipated that it will be necessary to produce a verification report for submission to any statutory authorities. However, should any fill be imported to site it may be necessary to produce a report characterising the suitability of the clean material. Such a report would include the derivation of the material, comments from a visual screen, the test results of chemical screening, delivery tickets where appropriate and the conditions by which the clean material has been stored and handled on site.

The report detailed above should be produced by a suitably qualified engineer. The number of verification areas for the development should be confirmed with any statutory authorities for the site.

12. Recommendations for Further Work

- This report should be forwarded to the relevant authorities as soon as practicable to ensure they have sufficient time to review and discuss any issues.
- Completion and reporting of gas monitoring.
- Discussions with ground work contractors about the installation of radon protective measures.
- Discussions with ground work contractors in relation to the requirement for testing of materials to be disposed off-site (Waste Acceptance Criteria) and the suitability of imported materials.
- Discussions with service providers regarding suitable materials for pipe work given the nature of chemical determinands found within the soils on site.
- Detailed design of the sub-structure.

Clearly Rogers Geotechnical Services Ltd would be happy to offer advice with respect to the above and assist where necessary.

13. References

- British Geological Survey (NERC) (2025), BGS, Keyworth.
 - GeolIndex Onshore Viewer
 - Lexicon of Named Rock Units:
 - (<http://www.bgs.ac.uk/lexicon/>)
- British Standards Institution (1990) BS1377: *British standard methods of test for soils for civil engineering purposes*, B.S.I., London.
- British Standard Institution (2005 +A1: 2011) BS EN ISO 22476-2: *Geotechnical investigation and testing – Field testing, Part 2: Dynamic Probing*, B.S.I., London.
- British Standard Institution (2005 +A1: 2011) BS EN ISO 22476-3: *Geotechnical investigation and testing – Field testing, Part 3: Standard penetration test*, B.S.I., London.
- British Standards Institution (2015 +A1: 2020) BS 5930: *Code of practice for ground investigations*, B.S.I., London.
- British Standards Institution (2011), BS 10175: *Investigation of potentially contaminated sites – Code of Practice*, British Standards Institute.
- British Standards Institution (2015 +A1:2019) BS8485: *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*, B.S.I., London.
- British Standards Institution (2013), BS 8576 *Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds*.
- British Standards Institution (2017) BS EN ISO 14688: *Geotechnical investigation and testing – Identification and classification of soil*, B.S.I., London.
- Building Research Establishment (BRE) Special Digest 1 (2005), Third Edition: *Concrete in aggressive ground*, BRE Press, Garston.
 - Part C: *Assessing the aggressive chemical environment*.
 - Part D: *Specifying concrete for general cast-in-situ use*.
- Department for Environment, Food and Rural Affairs and the Environment Agency (2009) DEFRA Science Report – Final SC050021/SR2, *Human Health toxicological assessment of contaminants in soil*. Environment Agency, Bristol.
- Department for Environment, Food and Rural Affairs and the Environment Agency (2009) DEFRA Science Report – SC050021/SR3, *Updated technical background to the CLEA model*. Environment Agency, Bristol.
- Department for Environment, Food and Rural Affairs (2014) SP1010: *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document*.
- Wilson S, Oliver S, Mallet H, Hutchings H, Card G, *Assessing risks posed by ground gasses to buildings*, CIRIA Report C665.

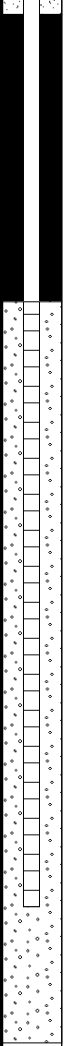
Appendix 1

Site Plan

Appendix 2

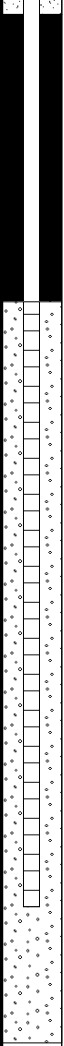
Borehole Records

						<h1>Borehole Log</h1>				Borehole No. WS01	
Project Name: Land adjacent to Low Road						Project No. C4173_25_E_8277		Co-ords:		Sheet 1 of 1 Hole Type WLS	
Location: Dewsbury Road, Dewsbury, West Yorkshire, WF13 3PR						Level:		Scale 1:25		Logged By SH	
Client: APS Autocare Ltd						Dates: 01/12/2025					

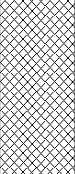
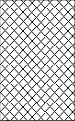
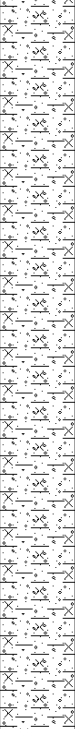
Well	Water Strikes	Samples and In Situ Testing					Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Dia. (mm)	TCR (%)	Results					
		0.30	D	87	60		0.50		MADE GROUND (Soft, dark brown, slightly sandy, gravelly, silty CLAY. Sand is fine to coarse. Gravel is angular to sub-angular and fine to coarse of ash, brick, glass and sandstone).		
		1.00 - 1.45	D				1.00		MADE GROUND (Soft, light brown mottled grey, silty CLAY). [REWORKED]		
		1.00	SPT			N=20 (3,3/4,4,6,6)				1	
		1.50	D	77	95				Stiff, brown, slightly sandy, gravelly, silty CLAY. Sand is fine to coarse. Gravel is angular to sub-angular and fine to coarse of sandstone. [RESIDUAL BIRSTALL ROCK]		
		2.00	SPT			N=26 (4,6/6,6,6,8)				2	
		2.50	D	67	80						
		3.00	SPT			51 (10,12/51 for 200mm)	3.45			3	
		End of Borehole at 3.45m									4
											5

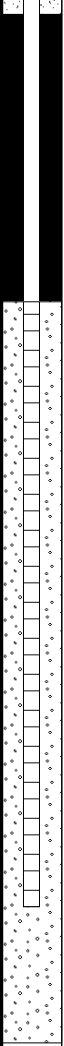
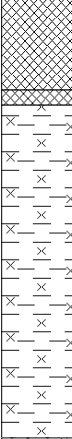
Remarks 1. Position scanned for services using CAT and Genny.											
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						<h1>Borehole Log</h1>				Borehole No. WS02	
Project Name: Land adjacent to Low Road						Project No. C4173_25_E_8277		Co-ords:		Sheet 1 of 1 Hole Type WLS	
Location: Dewsbury Road, Dewsbury, West Yorkshire, WF13 3PR						Level:		Scale 1:25		Logged By SH	
Client: APS Autocare Ltd						Dates: 01/12/2025					

Well	Water Strikes	Samples and In Situ Testing					Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Dia. (mm)	TCR (%)	Results					
		0.60	D	87	60		0.50		MADE GROUND (Soft, dark brown, slightly sandy, gravelly, silty CLAY. Sand is fine to coarse. Gravel is angular to sub-angular and fine to coarse of brick, glass and sandstone).		
		1.00	SPT			N=8 (1,2/2,2,2,2)	1.00		MADE GROUND (Soft, light brown mottled grey, silty CLAY). [REWORKED]		
		1.40	D						Stiff, brown, slightly sandy, gravelly, silty CLAY. Sand is fine to coarse. Gravel is angular to sub-angular and fine to coarse of sandstone. [RESIDUAL BIRSTALL ROCK]	1	
		1.50	D	77	90						
		2.00	SPT			N=25 (3,3/3,6,6,10)				2	
					67	100					
		3.00	SPT			N=61 (6,10/11,14,16,20)				3	
							3.45				
									End of Borehole at 3.45m		
										4	
									5		

Remarks 1. Position scanned for services using CAT and Genny.											
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							<h1>Borehole Log</h1>			Borehole No. WS03 Sheet 1 of 1		
Project Name: Land adjacent to Low Road							Project No. C4173_25_E_8277		Co-ords:		Hole Type WLS	
Location: Dewsbury Road, Dewsbury, West Yorkshire, WF13 3PR							Level:		Scale 1:25		Logged By SH	
Client: APS Autocare Ltd							Dates: 01/12/2025					
Well	Water Strikes	Samples and In Situ Testing					Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Dia. (mm)	TCR (%)	Results						
		1.00	SPT	87	40	N=13 (2,2/2,3,4,4)	0.60		  	MADE GROUND (Brown, clayey, silty, sandy, angular to sub-angular and fine to coarse GRAVEL of brick, sandstone and various other lithologies). MADE GROUND (Soft, light brown mottled grey, silty CLAY). [REWORKED] Stiff, brown, slightly sandy, gravelly, silty CLAY. Sand is fine to coarse. Gravel is angular to sub-angular and fine to coarse of sandstone. [RESIDUAL BIRSTALL ROCK]	1	
		1.50	D	77	100		1.00				2	
		2.00	SPT			N=17 (2,3/4,4,4,5)					3	
		3.00	SPT	67	100	N=50 (25,25/10,10,10,20)	3.45				4	
										End of Borehole at 3.45m	5	
Remarks 1. Position scanned for services using CAT and Genny.												

						<h1>Borehole Log</h1>				Borehole No. WS04	
Project Name: Land adjacent to Low Road						Project No. C4173_25_E_8277		Co-ords:		Sheet 1 of 1 Hole Type WLS	
Location: Dewsbury Road, Dewsbury, West Yorkshire, WF13 3PR						Level:		Scale 1:25		Logged By SH	
Client: APS Autocare Ltd						Dates: 01/12/2025					
Well	Water Strikes	Samples and In Situ Testing					Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Dia. (mm)	TCR (%)	Results					
		0.50	D	87	50	N=11 (1,1/2,2,3,4)	0.30 0.35		MADE GROUND (Brown, clayey, silty, sandy, angular to sub-angular and fine to coarse GRAVEL of brick, sandstone and various other lithologies). MADE GROUND (Soft, dark brown, slightly sandy, gravelly, silty CLAY. Sand is fine to coarse. Gravel is angular to sub-angular and fine to coarse of brick and sandstone). Soft becoming firm, light brown mottled grey, silty CLAY.	1	
	1.00 - 1.45 1.00	D SPT									
	1.50	D	77	100	N=28 (4,5/7,6,7,8)	1.45		Stiff, brown, slightly sandy, gravelly, silty CLAY. Sand is fine to coarse. Gravel is angular to sub-angular and fine to coarse of sandstone. [RESIDUAL BIRSTALL ROCK]	2		
	2.00	SPT									
	3.00	SPT			N=50 (25,25/10,10,10,20)	3.45		End of Borehole at 3.45m	3		
Remarks 1. Position scanned for services using CAT and Genny.											

Appendix 3

Dynamic Probing Records

		<h1>Probe Log</h1>		Probe No. DP01 Sheet 1 of 1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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Appendix 4

Gas Monitoring Sheets

Post Fieldworks Discrete Well Monitoring Site Record																																																																																																																																																										
Job No:	C/4173/25/E/8277				Client:	APS Autocare Ltd				Visit:	1	Of	4	 <div> Rogers Geotechnical Services Ltd , Offices 1 & 2 Barncliffe Business Park, Shelley, Huddersfield, HD8 8LU Tel: 01484 604 354 enquiries@rogersgeotech.co.uk </div>																																																																																																																																												
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Min.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.9	18.9	0.0	0.0	0.0	0.0	1.01																																																																																																																																											
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Appendix 5

Laboratory Testing

**Environmental
Geotechnical
Specialists**

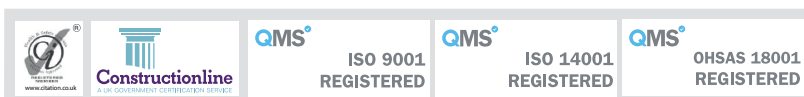


LABORATORY REPORT

GEOTECHNICAL
ENVIRONMENTAL

job number C/4173/25/E/8277	client ref
site address Land adjacent to Low Road, Dewsbury Moor, Dewsbury, West Yorkshire, WF13 3PR	client address APS Autocare Ltd. Unit 1, Off School Street, Dewsbury, West Yorkshire, WF13 3HX
consultant	
date scheduled 05/12/2025	date issued 19/12/2025
issued by S. Hale	job title Laboratory Manage

Rogers Geotechnical Services Ltd Telephone 01484 607 977
Email harry.letch@rogersgeotech.co.uk www.rogersgeotech.co.uk Unit
Unit 1 Manor Croft Works
Skelmanthorpe
HD89DS



Environmental
Geotechnical
Specialists



GEOTECHNICAL LAB RESULTS

GEOTECHNICAL
ENVIRONMENTAL

[illegible]



Rogers Geotechnical Services Ltd.
Offices 1&2,
Barncliffe Business Park,
Near Bank, Shelley,
Huddersfield,
HD8 8LU

Classification of Index Properties

C4173_25_E_8277

Project Name: Land adjacent to Low Road

BS EN ISO 17892-12 2018+A2:2022

Fig. 2
Sheet. 1

Location:

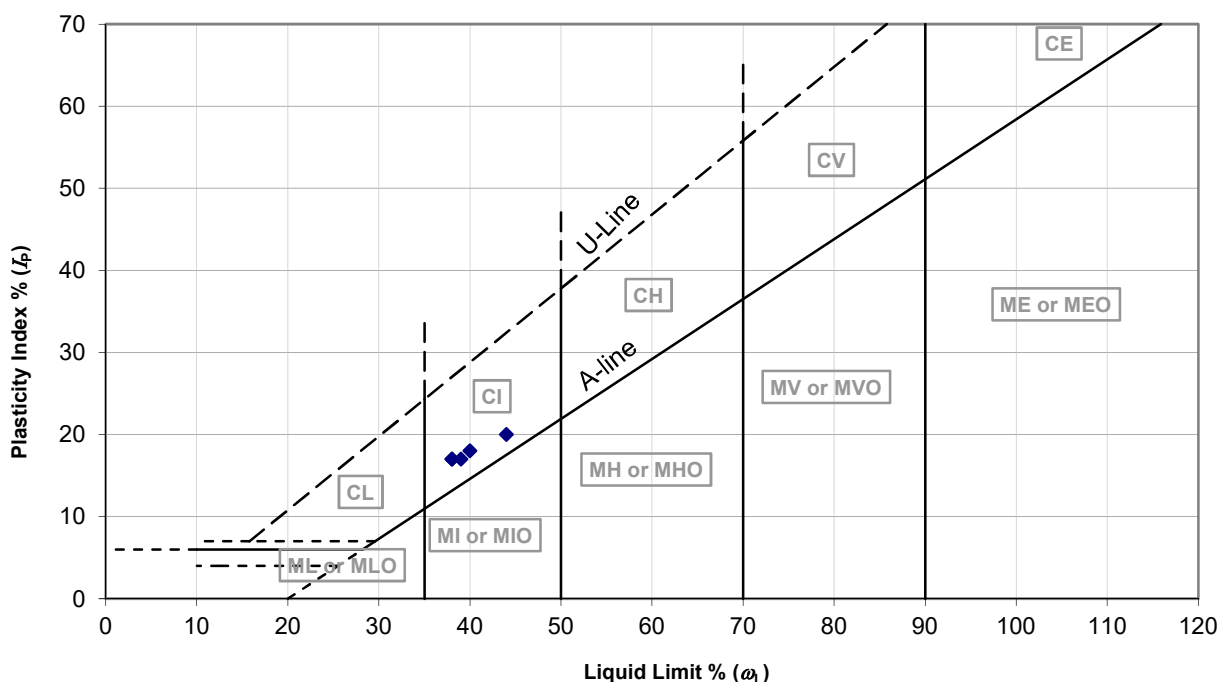
Input By: Harry

Client: APS Autocare Ltd

Check By: EC

Location	Depth (m)	Water Content (ω) (%)	Liquid Limit (ω_L) (%)	Plastic Limit (ω_P) (%)	Plasticity Index (I_P) (%)	Retained by 0.425mm (%)	Modified (ω) (ω') (%)	Modified (I_P) (I_P') (%)	Liquidity/ Consistency		Casagrande Class	N.H.B.C Class (%)
									(I_L) (%)	(I_C) (%)		
WS01	1.50	15	39	22	17	1	15	17	-0.4	1.4	C I	LOW
WS01	2.50	9.9	38	21	17	4	10	16	-0.7	1.7	C I	LOW
WS02	1.50	6.8	38	21	17	3	7	16	-0.8	1.8	C I	LOW
WS03	1.50	13	40	22	18	4	14	17	-0.5	1.5	C I	LOW
WS04	1.50	14	44	24	20	2	14	20	-0.5	1.5	C I	LOW

Interpretation graph based on BS EN ISO 14688-2:2018 any interpretations are expressed outside of our UKAS Accreditation.



[illegible]

<p align="center">DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES</p> <p align="center">Tested in accordance with BS EN ISO 17892-5:2017</p> <p align="center">TEST REPORT</p>

Project location	<i>Low Road</i>	Sample depth (m)	<i>1.40</i>
Project reference	<i>C4173/25/E/8277</i>	Sample type	<i>Undisturbed</i>
Borehole number	<i>WS02</i>	Specimen orientation	<i>Vertical</i>
Sample number	<i>D2</i>	Specimen depth (m)	<i>1.40</i>
Sample description	<i>Stiff greyish brown slightly gravelly CLAY.</i>		
Preparation method	<i>Prepared from a sample tube in accordance with BS EN ISO 17892-5:2017 Clause 6.2.3</i>		
Particle density (Mg/m ³)	<i>2.65 (Assumed)</i>	Swelling pressure (kPa)	

INITIAL CONDITIONS	
Height (mm)	<i>20</i>
Diameter (mm)	<i>50.47</i>
Moisture content (measured) (%)	<i>15</i>
Bulk density (Mg/m ³)	<i>2.11</i>
Dry density (Mg/m ³)	<i>1.83</i>
Voids ratio	<i>0.449</i>
Degree of saturation (%)	<i>90</i>

Comments / variations from procedures:

<p align="center">DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES</p> <p align="center">Tested in accordance with BS EN ISO 17892-5:2017</p> <p align="center">TEST REPORT</p>
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Project location	<i>Low Road</i>		
Project reference	<i>C4173/25/E/8277</i>	Sample depth (m)	<i>1.40</i>
Borehole number	<i>WS02</i>	Sample type	<i>Undisturbed</i>
Sample number	<i>D2</i>	Specimen orientation	<i>Vertical</i>
Tested	<i>HJL</i>	Checked	<i>EC</i>
Date	<i>16/12/2025</i>	Date	<i>16/12/2025</i>
Approved	<i>HJL</i>		
Date	<i>19/12/2025</i>		

Average laboratory temperature (°C)		16	Method of time fitting	<i>Log time</i>
Pressure stage	Coefficient of consolidation	Coefficient of volume compressibility	Coefficient of secondary compression	
(kPa)	c_v (m ² /year)	m_v (m ² /MN)	c_{sec} (-)	
<i>0 - 20</i>	<i>15</i>	<i>0.65</i>	<i>0.00051</i>	
<i>20 - 40</i>	<i>0.93</i>	<i>0.19</i>	<i>0.00054</i>	
<i>40 - 80</i>	<i>Sample Swell</i>	<i>Sample Swell</i>	<i>-</i>	
<i>80 - 100</i>	<i>40</i>	<i>0.51</i>	<i>0.0023</i>	
<i>100 - 150</i>	<i>4.7</i>	<i>0.13</i>	<i>0.000066</i>	
<i>150 - 200</i>	<i>3.1</i>	<i>0.072</i>	<i>0.000064</i>	
<i>200 - 20</i>	<i>-</i>	<i>-</i>	<i>-</i>	

<p>DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES</p> <p>Tested in accordance with BS EN ISO 17892-5:2017</p> <p>TEST REPORT</p>
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Project location	<i>Low Road</i>	Sample depth (m)	<i>1.40</i>
Project reference	<i>C4173/25/E/8277</i>	Sample type	<i>Undisturbed</i>
Borehole number	<i>WS02</i>	Specimen orientation	<i>Vertical</i>
Sample number	<i>D2</i>		

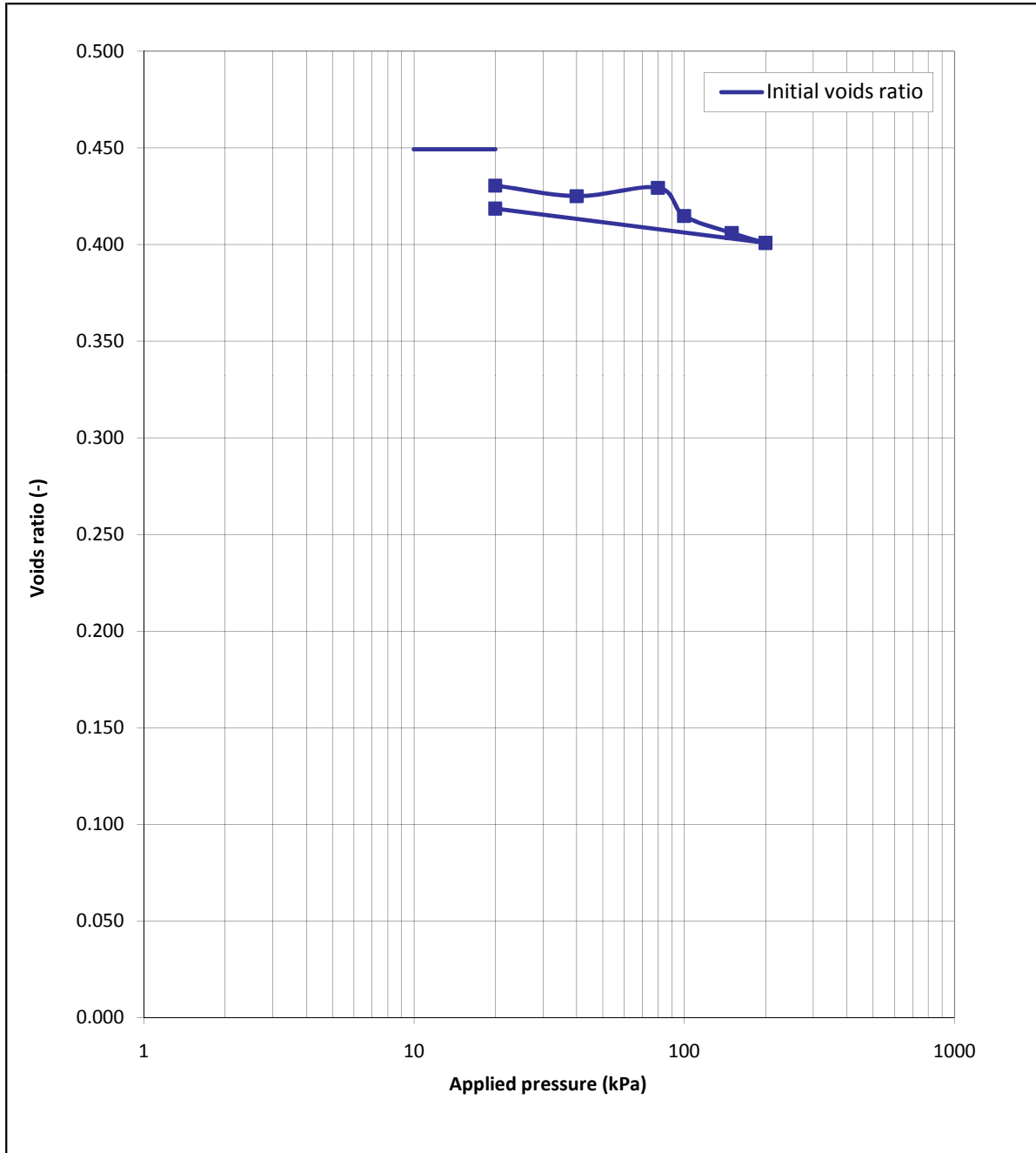
Tested	<i>HJL</i>	Checked	<i>EC</i>	Approved	<i>HJL</i>
Date	<i>16/12/2025</i>	Date	<i>16/12/2025</i>	Date	<i>19/12/2025</i>

DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance BS EN ISO 17892-5:2017

TEST REPORT

Project location	<i>Low Road</i>	Sample depth (m)	<i>1.40</i>
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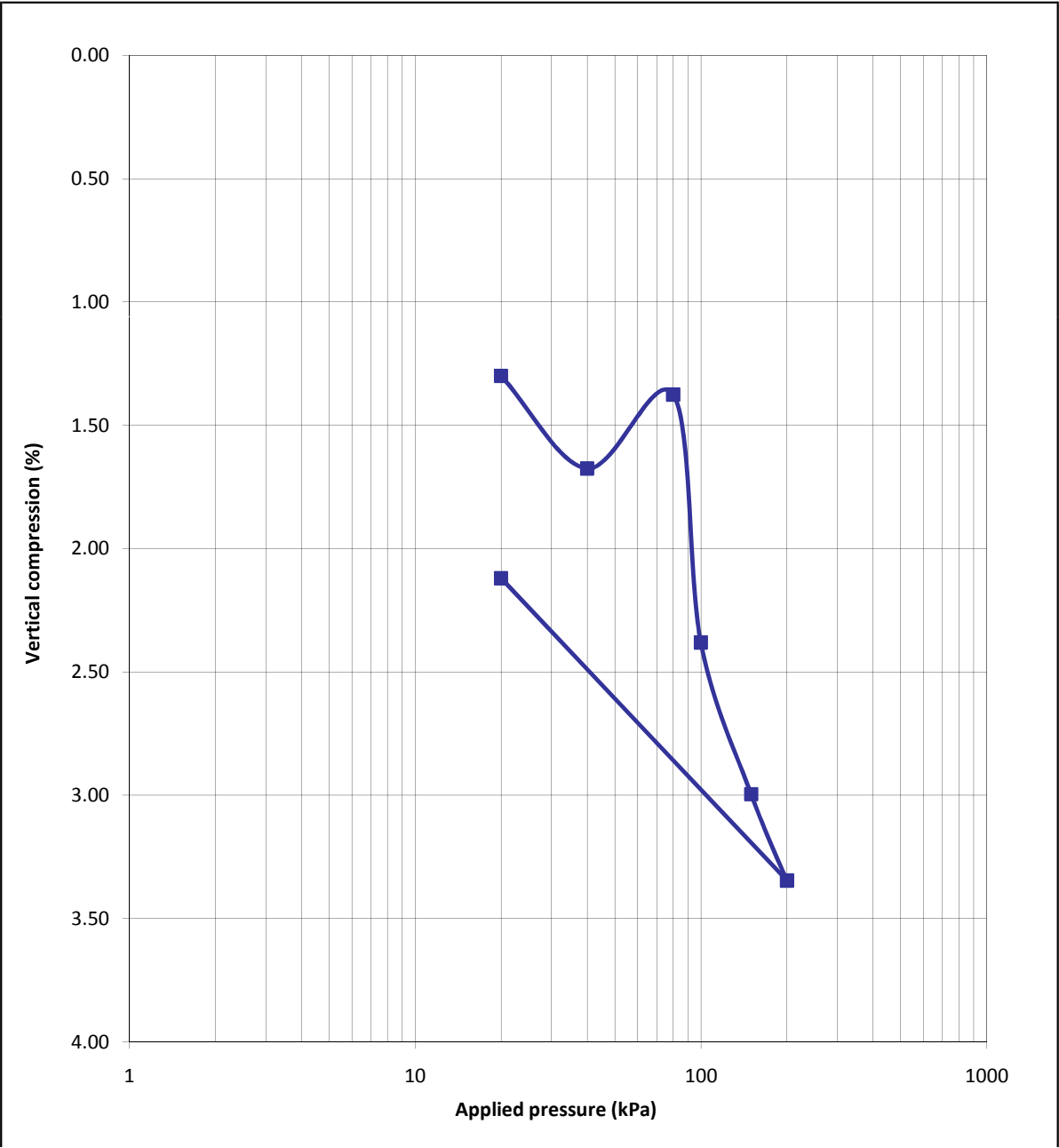


DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS EN ISO 17892-5:2017

TEST REPORT

Project location	<i>Low Road</i>			Sample depth (m)	<i>1.40</i>
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Tested	<i>HJL</i>	Checked	<i>EC</i>	Approved	<i>HJL</i>
Date	<i>16/12/2025</i>	Date	<i>16/12/2025</i>	Date	<i>19/12/2025</i>



<p>DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES</p> <p>Tested in accordance with BS EN ISO 17892-5:2017</p> <p>TEST REPORT</p>
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Tested	<i>HJL</i>	Checked	<i>EC</i>	Approved	<i>HJL</i>
Date	<i>16/12/2025</i>	Date	<i>16/12/2025</i>	Date	<i>19/12/2025</i>

Rogers Geotechnical Services Ltd
Offices 1&2 Barncliffe Business Pk
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t: 01484 604354

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

t: 01923 225404

f: 01923 237404

e: info-i2analytical@normecgroup.com

Analytical Report Number : 25-066046

Project / Site name:	Low Road	Samples received on:	05/12/2025
Your job number:	C4173 25 E 8277	Samples instructed on/ Analysis started on:	08/12/2025
Your order number:		Analysis completed by:	15/12/2025
Report Issue Number:	1	Report issued on:	15/12/2025
Samples Analysed:	3 soil samples		



Signed:

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting
air	- once the analysis is complete

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

Retention period for records and reports is minimum 6 years from the date of issue of the final report.
Some records may be kept for longer according to other legal/best practice requirements.

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

Analytical Report Number: 25-066046

Project / Site name: Low Road

Lab Sample Number	773833	773834	773835
Sample Reference	WS01	WS02	WS04
Sample Number	None Supplied	None Supplied	None Supplied
Water Matrix	N/A	N/A	N/A
Depth (m)	0.30	0.60	0.50
Date Sampled	04/12/2025	04/12/2025	04/12/2025
Time Taken	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status

Stone Content	%	0.1	NONE	9.3	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	20	14	23
Total mass of sample received	kg	0.1	NONE	1	1	1

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	PDO	PDO	PDO
Analysis completed	N/A	N/A	N/A	13/12/2025	13/12/2025	13/12/2025

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7.9	5.6	5.3
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	%	0.005	MCERTS	0.064	0.092	0.142
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	81	600	320
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	40.6	302	160
Organic Matter (automated)	%	0.1	MCERTS	3.1	1	5

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	0.08	< 0.05	0.29
Acenaphthylene	mg/kg	0.05	MCERTS	0.1	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.09	< 0.05	0.22
Fluorene	mg/kg	0.05	MCERTS	0.08	< 0.05	0.15
Phenanthrene	mg/kg	0.05	MCERTS	1.4	0.06	1.7
Anthracene	mg/kg	0.05	MCERTS	0.28	< 0.05	0.2
Fluoranthene	mg/kg	0.05	MCERTS	3.8	0.09	2.1
Pyrene	mg/kg	0.05	MCERTS	3.6	0.09	1.8
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.1	< 0.05	0.86
Chrysene	mg/kg	0.05	MCERTS	2.2	< 0.05	1.1
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	2.8	< 0.05	1.1
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	1.1	< 0.05	0.4
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.2	< 0.05	0.75
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.2	< 0.05	0.43
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.2	< 0.05	0.13
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.4	< 0.05	0.47

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	22.6	< 0.80	11.8
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Analytical Report Number: 25-066046

Project / Site name: Low Road

Lab Sample Number	773833	773834	773835
Sample Reference	WS01	WS02	WS04
Sample Number	None Supplied	None Supplied	None Supplied
Water Matrix	N/A	N/A	N/A
Depth (m)	0.30	0.60	0.50
Date Sampled	04/12/2025	04/12/2025	04/12/2025
Time Taken	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	23	3.9	29
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	< 0.2	0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	U/S ^{U/S} g
Chromium (hexavalent) by IC	mg/kg	1.8	NONE	-	-	< 1.80
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	26	24	22
Copper (aqua regia extractable)	mg/kg	1	MCERTS	39	26	34
Lead (aqua regia extractable)	mg/kg	1	MCERTS	180	19	60
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	26	29	24
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.3	< 1.0	1.7
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	37	24	33
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	150	80	77

Petroleum Hydrocarbons

TPHCWG - Aliphatic >EC5 - EC6 _{HS_1D_AL}	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC6 - EC8 _{HS_1D_AL}	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC8 - EC10 _{HS_1D_AL}	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL}	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
TPHCWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL}	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0
TPHCWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0
TPHCWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0
TPHCWG - Aliphatic >EC5 - EC35 _{EH_CU+HS_1D_AL}	mg/kg	10	NONE	< 10	< 10	< 10

TPHCWG - Aromatic >EC5 - EC7 _{HS_1D_AR}	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 _{HS_1D_AR}	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 _{HS_1D_AR}	mg/kg	0.02	MCERTS	< 0.020	< 0.020	< 0.020
TPHCWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR}	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR}	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0
TPHCWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	< 10	< 10	< 10
TPHCWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	18	< 10	12
TPHCWG - Aromatic >EC5 - EC35 _{EH_CU+HS_1D_AR}	mg/kg	10	NONE	18	< 10	12

VOCs

MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0

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

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
773833	WS01	None Supplied	0.3	Brown clay with stones and vegetation
773834	WS02	None Supplied	0.6	Brown clay
773835	WS04	None Supplied	0.5	Brown sandy clay

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Project / Site name: Low Road

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)

Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
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.	L019B	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID in soil	Determination of total petroleum hydrocarbons in soil by GC-FID with carbon banding aliphatic and aromatic	In-house method	L076B	D	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil (Summed Bands)	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic (Summed Bands).	Calculation	L076B/L088-PL	D/W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	MCERTS
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	MCERTS
Total petroleum hydrocarbons with carbon banding by HS-GC/MS in soil	Determination of total petroleum hydrocarbons in soil by HS-GC/MS with carbon banding aliphatic and aromatic	In-house method	L088-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099-PL	D	MCERTS

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Project / Site name: Low Road

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)

Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Soil Descriptions	Textural classification	In-house method	L019B	W	NONE
Hexavalent chromium in soil by Ion Chromatography	Determination of hexavalent chromium in alkaline soil extract by use of ion chromatography with spectrophotometric detection	In-house method	L130B	W	NONE

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

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

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

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

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

Quality control parameter failure associated with individual result applies to calculated sum of individuals.

The result for sum should be interpreted with caution

*U/S g- Unsuitable for analysis due to high colour intensity.

Appendix 6

Fill Screening Values

Atkins ATRISK Soil Screening Values (SSVs) - Commercial Landuse

Tox Data Report No.	Compound	Commercial (mg/kg)				Reference
	<i>Metals</i>	1% SOM		6% SOM		
3	Cadmium	410		410		C
4	Chromium VI	19.7	49.1	19.7	49.1	B/C
	Copper	106000		106000		A+
7	Mercury	350.00		405.00		A/D
8	Nickel	1770		1770		A+
	Lead	2310		2310		C
	Zinc	1100000		1100000		A+
	Vanadium	7490		7490		A+
	<i>Semi and Non Metals</i>					
1	Arsenic	635		635		C
10	Selenium	13000		13000		A
	Free Cyanide	373		373		A
9	Phenols (total)	685		3170		A
	<i>Poly Aromatic Hydrocarbons</i>	Free product	No free product	Free product	No free product	
20	Naphthalene	75	90.1	432	1050	A+
	Acenaphthene	156.8	83600	106000		A+
	Fluorene	66500		72000		A+
	Anthracene	535000		544000		A+
	Fluoranthene	72200		72600		A+
	Pyrene	54100		54400		A+
	Benzo(a)anthracene	1.71	131	10.3	142	A
2	Chrysene	0.44	14000	2.64	14300	A
2	Benzo(b)fluoranthene	1.22	142	7.29	144	A
2	Benzo(k)fluoranthene	0.686	1430	4.12	1440	A
2	Benzo(a)pyrene	26.1	76.3	26.2	76.3	B/C
2	Dibenz(a,h)anthracene	0.00393	14.3	0.0236	14.4	A*
2	Indeno(1,2,3-cd)pyrene	0.0614	142	0.368	144	A*
2	Benzo(g,h,i)perylene	0.0187	1440	0.112	1450	A*
	<i>Petroleum Hydrocarbons</i>					
	Aliphatic C5-C6	327	4490	1100	29400	A+
	Aliphatic C6-C8	157	10400	769	98200	A+
	Aliphatic C8-C10	82.4	1370	476	14800	A+
	Aliphatic C10-C12	49.9	7900	297	69500	A+
	Aliphatic C12-C16	20.9	34000	126	139000	A+
	Aliphatic C16-C21	3620000		3620000		A+
	Aliphatic C21-C35	3620000		3620000		A+
	Aromatic C5-C7 (Benzene)	12.5		98		A+
	Aromatic C7-C8 (Toluene)	834	27900	4360	183000	A+
	Aromatic C8-C10	613	2210	3600	20800	A+
	Aromatic C10-C12	369	12300	2190	53800	A+
	Aromatic C12-C16	155	41300	65400		A+
	Aromatic C16-C21	28400		28400		A+
	Aromatic C21-C35	28400		28400		A+
	<i>Others</i>					
Asbestos						
A = WS ATKINS PLC, ATRISK SOIL SCREENING VALUES BASED ON 1% SOIL ORGANIC MATTER						
A+ = Values updated June 2017.						
A* Atrisk's SSV is lower than Chemtest's detectable limit for this compound.						
B = health criterion values, which are available from toxicological reviews published in the C4SL project methodology report.						
C = Category 4 Screening Levels (C4SLs) based on 1% soil organic matter.						
D - Value provided is based on Methyl Mercury. Should elemental mercury be observed or a source be known then a limit of 7.95 should be used.						