

**Supplementary
Ground Investigation**

Client: Lidl Great Britain Ltd

Lidl Rochdale Kingsway

Report No: 1477.03.01

December 2025





Executive Summary

Remada Ltd was commissioned by Lidl Great Britain Ltd to conduct a Supplementary Ground Investigation at Rochdale Kingsway, Wallis Avenue, OL16 4PS. This report follows a Phase 1 Preliminary Risk Assessment (Remada report reference 1477.01 dated August 2018).

Summary of Phase 1 Desk Study

The site has not previously been developed but was used as a storage area for a neighbouring construction site between 2016-2018.

Published geological maps record that the site is underlain by Peat with Hummocky (moundy) Glacial Deposits and/or Glaciofluvial Deposits beneath. The superficial deposits are designated as predominately a Secondary Undifferentiated with Secondary (A) Aquifer along the northern boundary of the site. The bedrock directly underlying the site is formed of the Pennine Lower Coal Measures Formation, designated as a Secondary (A) Aquifer

A Coal Authority search records no worked seams at depth beneath the site and probable unrecorded shallow workings as "none".

Intrusive Investigation

The investigation comprised the drilling of six (6 No) window sample holes (WS01 – WS05), and execution of four (4 No) CBR tests on 3rd November 2025.

Boreholes WS01-WS05 were over the footprint of the store. Made Ground was encountered to a maximum depth of 1.40m bgl. Below the Made Ground natural deposits of Interbedded cohesive and granular strata were encountered to the base of each exploratory hole location (7.0m bgl). Peat was encountered within the northernmost boreholes (WS04 and WS05) at depths of between 0.80-1.30m and 1.90-3.0m bgl respectively. During the BWB investigation, Peat was encountered in exploratory hole locations BH04, TP08 and TP10 at depths of between 1.40m and 3.20m. Additionally, BH03 recorded bands of soft clay below 4.30m.

SPT N values were recorded as being between 5 and 50 at 1.0m bgl and between 6 and 20 at 2.0m bgl

Groundwater was encountered at 0.45m bgl in WS02 and at 1.50m bgl in WS04. Groundwater levels were also recorded in the monitoring wells installed in three of the window sample holes at depths of between 0.0 and 6.0m bgl.

Human Health Assessment

The results of soil chemical analysis were compared to Human Health Generic Assessment Criteria for commercial land use. None of the analytes tested were detected at concentrations that exceeded the human health GAC protective of on-site workers.

Water Resources Assessment

The results of the soil chemical analysis undertaken has identified that concentrations of metals and inorganic contaminants are within the range of typical made ground. Detectable concentrations of TPH and PAHs were encountered in some samples. However, the contaminants identified are of low solubility and mobility and as such are unlikely to present a risk to groundwater beneath the site. In addition, it should be noted that the site will be predominantly covered with the building and areas of hardstanding. Therefore, the risk of leaching of contaminants as a result of infiltration of groundwater is likely to be limited. Therefore, the risk to groundwater from contaminants within the made ground at the site is considered to be low and does not warrant further consideration.

Waste Classification and Acceptance

In general, the results of the chemical analysis indicates that the material would be classified as non-hazardous waste. Waste Acceptance Criteria (WAC) analysis was undertaken on a sample of Made Ground. The assessment of the sample indicates that the sample met the requirements for disposal in an Inert landfill.

While Waste Acceptance Criteria (WAC) analysis has not been undertaken on the sample from WS05, the TOC for this sample exceeded the TOC limit for disposal in an inert landfill. Therefore, it is considered that the waste should be classified as non-hazardous.

Geotechnical Assessment

Based on the encountered ground conditions, it is anticipated that the foundation solution for the for the northern zone of the store footprint would differ to the remainder of the footprint due to the presence of shallow PEAT deposits. In the



central and southern zone of the store footprint, ground conditions generally comprise either medium-dense SAND or firm to very stiff CLAY for which shallow pads or a raft could be utilized however differential settlement is a concern and It is recommended that specialist advice is sought from a ground improvement contractor with regard to the suitability of this technique in these ground conditions and the anticipated achievable bearing capacities.

CBR values estimated from the DCP tests indicated that, near surface the CBR values were variable with values of between 0.9 and >100% recorded

A Design Sulphate Class DS-2 is considered appropriate for buried concrete and an ACEC Class of AC-2s is considered appropriate for the location.

Ground Gas

The results of four rounds of gas monitoring visits placed the site into Characteristic Situation 2 and therefore ground gas protection measures will not be required within the proposed buildings.

No Radon protection measures shall be required.



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Issue No	Date	Prepared By	Technical Review	Authorised
01	10.12.25	M Bell 	P Searing 	G Jones 



1 INTRODUCTION

Remada Ltd was commissioned by Lidl Great Britain Ltd (hereafter 'the Client') to undertake a Supplementary Ground Investigation for a proposed new store at Rochdale Kingsway, Wallis Avenue, OL16 4PS at the location indicated in **Figure 1**.

1.1 Objectives

The objectives of this assessment are as follows:

- to examine whether there have been any potentially contaminative uses on the site or nearby land;
- to develop a conceptual model of the site to identify plausible pollutant linkages;
- to assess ground conditions in relation to the proposed development in relation to construction design issues including the presence, nature, likely severity and extent of soil and groundwater contamination, which may be present, its potential environmental impact and likely requirement for further work; and
- Provide preliminary foundation design recommendations for the proposed development.

1.2 Scope of Work

The scope and layout of this investigation and report is generally in accordance with BS10175:2011+A2 2017 and the Environment Agency's Land Contamination Risk Management guidance for land contamination reports.

The scope of work comprised:

- 5 No window sample boreholes to target depths of 7m including SPTs;
- 3 No combined groundwater and gas monitoring standpipes installed with window sample boreholes;
- 4 No California Bearing Ratio (CBR) tests;
- Suite of geotechnical classification and strength tests;
- 3 No soil sample suites for chemical analysis of CLEA metals, asbestos, speciated hydrocarbons, cyanide and phenols to delineate any potential soil contamination;
- 1 No WAC tests.
- 4 No ground gas and groundwater monitoring visits to satisfy planning requirements; and
- Combined Factual & Interpretative Geoenvironmental Report.

The investigation methodology is presented in Section 3, Findings in Section 4 and the Exploratory Locations are indicated in **Figure 2**

1.3 Proposed Development

It is understood that the proposed site use for the majority of the site will be a Lidl retail store with associated car park and soft landscaping. This development will comprise a site area of 8644m² fronting onto Wallis Avenue as shown in **Figure 3**.

1.4 Previous Reports

The following reports have been previously prepared for the site:

- Phase 1 Site Investigation & Preliminary Risk Assessment. Remada Ltd Report ref: 1477.01.01, issued in November 2025.
- Coal Mining Risk Assessment. Remada Ltd Report Red: 1477.02.01, Issued In December 2025.

The following Phase 2 report has been provided to Remada covering the wider site area.

- Wilson Bowden Developments Ltd Phase 2 Geo-Environmental Assessment. PUK-BWB-ZZ-XX-RP-YE-0002-Ph2 by BWB consulting dated February 2023



1.5 Limitations

The comments given in this report and the opinions expressed are based on the information reviewed and observations during site work. However, there may be conditions pertaining to the site that have not been disclosed by this assessment and therefore could not be taken into account.



2 SUMMARY OF PREVIOUS REPORTS

2.1 Phase 1

The Executive Summary and Conceptual Site Model presented within the Phase 1 Desk Study are reproduced below:

Site Setting

*The site occupies a roughly rectangular plot of land to the north of Sir Isaac Newton Way (A6193) and west of Michael Faraday Avenue, as indicated in **Figure 2**. At present the consists of undeveloped wasteland with a single track bisecting the central area of the site in an approximate south-west to north-east orientation. The track extends off-site westward with vegetation in the surrounding area. The northern boundary is marked by Wallis Avenue. The southern boundary is marked by Sir Isaac Newton Way (A6193), and the eastern boundary is marked by Michael Faraday Avenue.*

*It is understood that the proposed use for the site will be a Lidl retail store with associated car park and soft landscaping. A proposed indicative site layout plan is presented as **Figure 3**, with the site being accessed from Wallis Avenue along the north-eastern boundary. The proposed store footprint is indicated to be in the western areas of the site, with the remaining areas being a combination of car parking, HGV access and soft landscaping.*

Site History

The earliest available mapping from 1851 records the site to be unoccupied mainly forming part of a larger field with two field boundaries bisecting the western corners of the site. A footpath is mapped in the central area of site, and a pond is mapped along the southern boundary which extends off-site. In 1910, the pond along the southern boundary and field boundary bisecting the south-western corner of site are no longer mapped. Between 1955 and 1958 a small area of rough grassland and boulders are mapped adjacent to the western boundary. In 1988, the rough grassland and boulders and field boundary bisecting the north-western corner of site are no longer mapped. In 2025 a small pond is mapped in the south-western area of the site. A single track bisecting the central area of the site is mapped in an approximate south-west to north-east orientation.

Between 2016-2018 Google Earth Satellite Imagery maps a large spoil heap and construction storage area across the majority of the site.

Geology / Hydrogeology

Published geological maps record that the site is underlain by Peat with Hummocky (moundy) Glacial Deposits and/or Glaciofluvial Deposits beneath. The superficial deposits are designated as predominately a Secondary Undifferentiated with Secondary (A) Aquifer along the northern boundary of the site. The bedrock directly underlying the site is formed of the Pennine Lower Coal Measures Formation, designated as a Secondary (A) Aquifer.

Mining

The site is located within an area which may affected by coal mining activity and is located within a Coal Authority designated Coal Mining Reporting Area.

Radon

The site is located in Lower Probability Radon Area as less than 1% of properties are above the Action Level but no radon protective measures are necessary.



Potential Source Areas	Potential Contaminant of Concern	Pathways	Potential Receptor	Exposure Route (Human unless otherwise stated)	Potential Identified Linkage (unmitigated)	Findings of Ground investigation	Risk (Un-mitigated)	Proposed Remediation (Mitigation) Measures	Residual Risk Estimation	
On-site Sources Made Ground Off-site Sources Historic scrap yard Historic mills Historic works Historic garage Infilled pond Kingsway West Industrial Park Railway	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, Va, Zn, <i>Boron, TPH /PAH,</i>	Disturbance due to construction plant causing direct contact, dusts, vapours.	Occupants of the development / building fabric	Direct Soil Ingestion	No	Not Applicable (N/A)	N/A	N/A	N/A	
				Indoor Dust ingestion	Yes	To be assessed (TBA)	Potential risk	TBA	TBA	
				Skin Contact with Soils	Yes	As above	Potential risk	TBA	TBA	
				Skin Contact with Dust	Yes	As above	Potential risk	TBA	TBA	
		Direct Contact with occupants of the proposed development	Inhalation of Outdoor Dust	Yes	As above	Potential risk	TBA	TBA		
				Ingestion of home grown produce	No	Commercial end-use - devoid of garden	None	None	None	
				Inhalation of Outdoor Vapours	Yes	TBA	Potential risk	TBA	TBA	
				Inhalation of Indoor Vapours	Yes	As above	Potential risk	TBA	TBA	
				Inhalation of ground gas	Yes	As above	Potential risk	TBA	TBA	
				Inhalation of radon gas	No	Lower Probability Area	Negligible	None	Negligible	
				Ingestion via permeated water supply pipework	Yes	TBA	Potential risk	TBA	TBA	
				Leachate	Direct contact with Secondary Undifferentiated and Secondary (A) Aquifer in Superficial Deposits	Yes	As above	Potential risk	TBA	TBA

Table 1: Outline Conceptual Site Model

Direct contact with subsurface soil and/or groundwater during redevelopment works are not assessed as part of the CSM. It is considered that risks to workers will be managed as part of any the redevelopment works at the site through the application of health and safety procedures, where required.



2.2 Intrusive Investigation

BWB carried out a site Investigation in October 2022, which included six (6 No.) trial pits to a maximum of depth of 3.6m bgl and four (4 No.) cable percussion boreholes to a maximum depth of 15.45m bgl across the current site area. In brief the findings were:

- *Made Ground was recorded beneath the site in all exploratory holes except BH03, with thickness ranging from between 0.40m and 1.80m bgl, where fully penetrated. The Made Ground was not fully penetrated in TP09 and TP13 at depths of 0.5 and 0.4m bgl respectively.*
- *Peat was encountered predominately outside the Lidl site boundary with an isolated area recorded in the north-east of the site. BH04 recorded a thin band of peat at 1.40m bgl and in TP10 black sandy peat was recorded from 1.40m bgl to 1.70m bgl.*
- *Superficial deposits of Hummocky (moundy) Glacial Deposits and Glaciofluvial Deposits are present beneath the Peat across the site.*
- *Granular Glacial Deposits were encountered in the majority of exploratory holes, with the exception of TP09, TP10 and TP13, , to a maximum depth of 15.45m bgl. It was typically described as medium dense to dense dark/light brown sand, with bands of soft brown/brownish grey clay/silt. SPT N60 values within the granular Glacial Deposits ranged from 7 to 50 (one refusal in BH06).*
- *The cohesive Glacial Deposits were encountered in the majority of exploratory holes with the exception of BH04, TP09, TP11 and TP13. The Glacial Deposits encountered a thickness ranging from 0.2m to 4.0m. It was typically described as soft to firm brownish grey silty clay, becoming a stiff reddish brown clayey silt or stiff brown clay at depth. SPT N60 values within the cohesive Glacial Deposits ranged from 4 to 24.*
- *BWB recorded that the Pennine Lower Coal Measures bedrock was not encountered during the investigation.*
- *Groundwater strikes were recorded throughout the ground investigation with the exception of BH03 to BH05 and TP15. In BH06 a groundwater strike was recorded at 9.70m bgl in the granular deposits rising to 6.0m bgl after 20 minutes. Within the trial pits, groundwater strikes were recorded at depths ranging from 0.10m to 1.20m bgl.*
- *No exceedances of contaminants for a commercial end use were recorded.*
- *Gas monitoring recorded not elevated levels of Carbon Dioxide or Methane but due to the presence of peat classified the site as CS3.*
- *Poor ground conditions across the site mean that shallow foundations would not be acceptable and structures will need to be piled, including floor slabs. Ground improvement may be possible, though likely rigid inclusions or controlled modulus columns rather than vibro stone columns. Re-use of soils in earthworks is possible with materials classifying as Class 1/2, peat will be required to be removed and used in landscaping whilst Made Ground may need to be processed before re-use. Improvement of soils is likely to be necessary both for earthworks and roads and hardstanding*
- *The design sulphate and ACEC class for the Made Ground, Peat and Glacial Deposits is DS-2 and AC-1s.*

3 SITE WALKOVER

The opportunity was taken to inspect the proposed Lidl store site on 3rd November 2025 by Megan Bell of Remada Ltd during the intrusive works, as recorded in the photographs below. There were no visual or olfactory indicators of contamination.



Photo 1: A view towards the northern boundary and site entrance.



Photo 2: A view towards the western boundary of the site.



Photo 3: A view towards the southern boundary facing Sir Isaac Newton Way.



Photo 4: A view towards the eastern boundary of the site.



Photo 5: A view of the single track in the central area of the site facing towards the western boundary.



Photo 6: A view towards the north-eastern corner of the site.



Photo 7: A view of the waterlogged central area of the site.



4 ENVIRONMENTAL & GEOTECHNICAL INVESTIGATION METHODOLOGY

4.1 Investigation Strategy

We are in receipt of a Phase 2 Geo-Environmental Assessment report carried out by BWB, ref PUK BWB-ZZ-XX-RP-YE-0002-PH2, dated February 2023 which covers the proposed Lidl land area and an additional third-party area. It is understood that Lidl required a subsequent investigation for their development area to confirm the BWB findings. Five (5 No.) window sample holes were required beneath the proposed store footprint to a depth of 7m or refusal. Four (4 No) CBR tests were conducted in the proposed car park. Four (4 No) ground gas monitoring visits were scheduled for the site to provide the minimum required by C665.

The investigation comprised the drilling of five (5 No) window sample holes (WS01 – WS05) and execution of four (4 No) CBR at locations indicated in **Figure 2** on 3rd November 2025.

Exploratory locations were selected to enable an investigation of ground conditions beneath the proposed retail store. The site had previously comprised a large spoil heap and construction storage area across the majority of the site. As such, Made Ground was anticipated to be present on site.

All exploratory holes were logged by a suitably qualified Geo-environmental Engineer in general accordance with the recommendations of BS5930:2015+A1:2020. Detailed descriptions, together with relevant comments, are given in the **Exploratory Hole Logs**.

The weather conditions at the site during the fieldwork period were generally cloudy with intermittent showers and damp, standing water was noted in the central area of site and towards the eastern boundary as noted in photo 7 above.

4.2 Intrusive Investigation

4.2.1 Window Sample Holes

All window samples were advanced to a target depth of 7m. However, a refusal was encountered within WS01 at 1.00m, which resulted in the borehole being redrilled approximately 5m north (WS01A), however, this also refused at 1.00m. In addition, borehole WS05 was terminated at 5.00m due to a collapse.

Combined Groundwater and Ground Gas monitoring standpipes were installed in WS02, WS03, and WS04.

4.3 In-Situ Testing

4.3.1 Standard Penetration Tests

Standard Penetration Tests (SPTs) in the window samples were carried out at 1.0m intervals as recorded on the borehole logs to assess the relative density and consistency of soils.

SPTs were conducted in accordance with BS EN ISO 22476-3 and the recorded SPT N-values are summarised on the borehole logs.

The SPT N-values have been corrected based on the Energy Ratio of 66% for the SPT hammer on the window sampling rig. The SPT Hammer Energy Test Report, undertaken in accordance with BS EN ISO 22476-3:2005 is presented in **Appendix A**.

4.3.2 Hand Shear Vane

Hand shear vane tests were undertaken using an Impact SL810 and in general accordance with the manufacturer's instructions on selected samples of cohesive soils.

4.3.3 Dynamic Cone Penetrometer (DCP) Tests

Four DCP tests were conducted in order to determine California Bearing Ratio (CBR) values for near surface soils, at the locations in **Figure 2**. A known mass is dropped through a known distance to drive a cone into the ground. The penetration distance per blow is recorded in order to enable the CBR value to be calculated. Test results are presented in **Appendix B**.



4.4 Soil Sampling

4.4.1 Environmental

Made Ground and natural soils were selected by visual and olfactory means for subsequent analysis. Samples for chemical laboratory testing purposes were collected in amber glass jars, amber glass vials and plastic tubs and retained in a cool box for transport to the laboratory.

4.4.2 Geotechnical

Geotechnical samples were collected at depths indicated window sample logs with samples retrieved from within a sleeve line. The disturbed samples were placed in sealed and correctly labelled plastic tubs or bags as appropriate. All geotechnical samples were dispatched to the laboratory for testing with a completed chain of custody.

4.5 Gas & Groundwater

4.5.1 Installations

Combined ground gas and groundwater monitoring standpipes were installed in selected wells with a 50mm diameter slotted HDPE pipe and packed with gravel surround as recorded on the exploratory logs. Wells were completed with 1.0m of plain HDPE pipe and bentonite seal, with a gas bung and tap being installed at the top of the pipe.

4.5.2 Monitoring

Ground gas monitoring was undertaken using a GasData GFM436 gas analyser for the parameters reported below. Groundwater levels were measured with a GeoSense OWP30 oil water interface probe.

Permanent ground gas monitoring involved the measurement of the following in the prescribed order:

- Pressure difference between the monitoring well and the atmosphere,
- Peak and steady flow rates of gas into or out of the monitoring well;
- Peak and steady concentrations of carbon dioxide, methane, oxygen (minimum and steady recorded), carbon monoxide, hydrogen sulphide; and
- Depth to groundwater.

Four ground gas monitoring visits were undertaken as a minimum required for a commercial development in accordance with CIRIA C665. Ground gas concentrations were recorded on 11th, 20th, 24th November and 4th December 2025 at WS02, WS03 and WS04 and the results are presented in **Table 2**. The corresponding Calibration Certificate for the GFM436 gas analyser is presented in **Appendix C**.

4.6 Quality Assurance and Quality Control

All samples were submitted to a United Kingdom Accredited Laboratory (UKAS) under a completed chain of custody. The laboratory carried out its own QA/QC programme to ensure that the quality of the analytical data conformed to the appropriate test method protocols.

4.7 Laboratory Analysis & Testing

4.7.1 Chemical Analysis – Soil

Three (3 No) soil samples were scheduled for the analysis of asbestos, arsenic, barium, beryllium, cadmium, chromium (III & VI), copper, mercury, nickel, lead, selenium, zinc, fraction of organic carbon, Total Petroleum Hydrocarbons (TPHCWG), Polyaromatic Hydrocarbons (PAH), BTEX compounds (benzene, toluene, ethylbenzene and xylene) and phenols.

In addition, one (1 No.) soil sample subjected to Waste Acceptance Criteria (WAC) testing.

The results of laboratory chemical analyses are presented in **Appendix D**.

4.7.2 Geotechnical

Samples recovered from the boreholes were submitted to an accredited laboratory for the following tests in general accordance with BS1377:1990:



- 5 No Natural Moisture Contents
- 5 No Plasticity Indices
- 3 No Particle Size Distribution tests
- 1 No Sedimentation test
- 4 No BRE SD1 suites; and

The results of the geotechnical testing are presented in **Appendix E**.



5 GEOTECHNICAL & ENVIRONMENTAL INVESTIGATION FINDINGS

5.1 Ground Conditions

A brief description of the published geology is provided together with a summary of the ground conditions encountered during the intrusive investigation. Exploratory logs are presented at the end of the report.

5.1.1 Published Geology

The superficial deposits underlying the site are indicated to comprise of Peat with Hummocky (Moundy) Glacial Deposits and/or Glaciofluvial Deposits beneath. The BGS describes Peat as typically comprising '*partially decomposed mass of semi-carbonized vegetation which has grown under waterlogged, anaerobic conditions, usually in bogs or swamps.*' The BGS describes the Glaciofluvial deposits as typically comprising '*sand and gravel*', while no description is given for the Hummocky Deposits.

The bedrock directly underlying the site is formed of the Pennine Lower Coal Measures Formation. The BGS describes this Formation as typically comprising '*Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.*'

The superficial deposits are designated as predominately a Secondary Undifferentiated with a Secondary (A) Aquifer recorded along the northern boundary of the site. The bedrock is designated as a Secondary (A) Aquifer. The site is not located within a Source Protection Zone.

5.1.2 Made Ground

Made Ground was encountered within all six (6 No.) exploratory holes to depths between 0.40 (WS01A) and 1.40m (WS05) bgl, with an average thickness of 0.83m. The Made Ground was recorded as comprised of either a sandy gravelly CLAY, a sandy locally clayey GRAVEL with occasional cobbles or a clayey gravelly PEAT. Gravel was recorded as comprising of brick, coal, sandstone, wood, glass, asphalt and plastic .

5.1.3 Natural Deposits

Natural deposits were encountered underlying the Made Ground within all six (6 No.) window sample boreholes.

The natural deposits generally comprised of interbedded layers of medium dense to dense silty/clayey locally gravelly SAND and firm to very stiff silty sandy to very sandy locally gravelly CLAY (except WS01 and WS01A). The gravel comprised of angular to rounded sandstone, mudstone and rare coal.

WS01 and WS01A natural deposits of greyish brown sandy GRAVEL with rare cobbles and sandy cobbly GRAVEL. Gravel comprised of subangular to subrounded fine to coarse sandstone and mudstone. Cobbles comprised of subrounded to rounded sandstone.

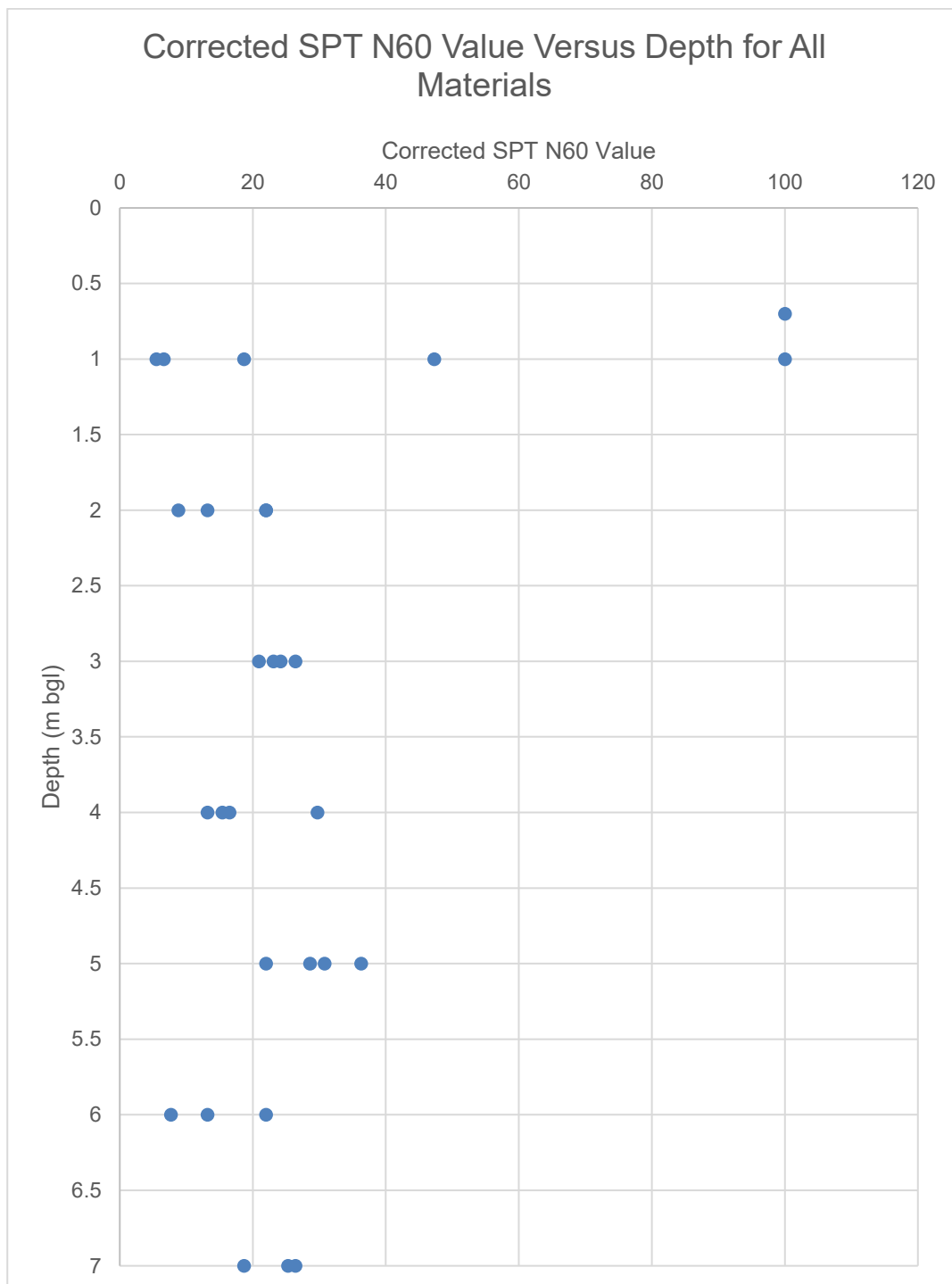
PEAT was encountered at varying depths within the two northern exploratory holes (WS04 and WS05) and depths of between 0.80-1.30m and 1.90-3.00m respectively. The material was described as spongy dark brown fibrous peat.

Natural deposits were encountered to the base of all exploratory holes to a of maximum depth of 7.00m (WS02-WS04)

5.2 In-situ Testing

5.2.1 Standard Penetration Tests (SPTs)

In-situ SPTs were undertaken to assist with the interpretation of strata encountered. The results of corrected N-values versus depth are plotted in the graph below. Where the corrected N-value >100, the plotted value = 100.



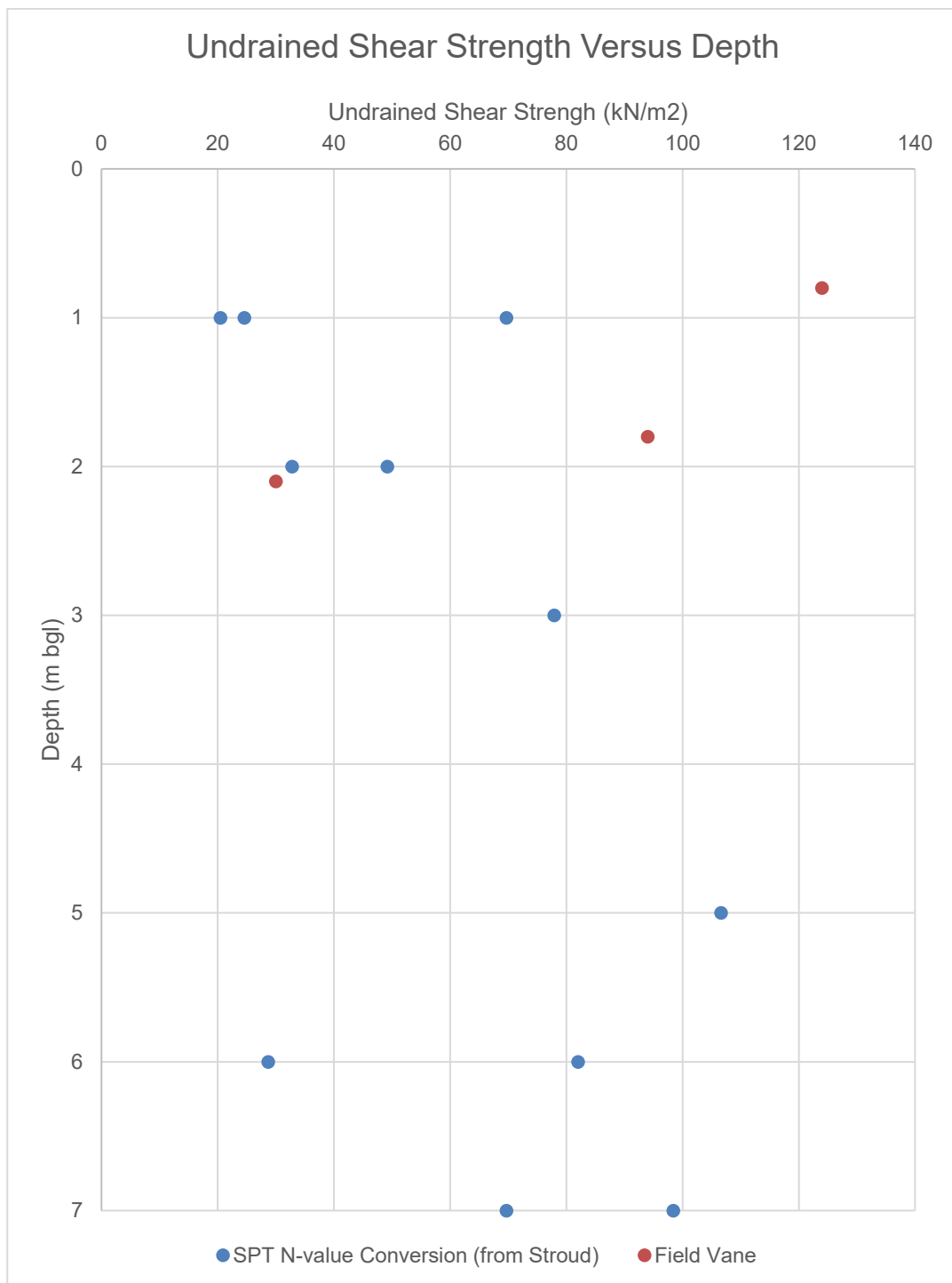
Graph 1: Plot of Corrected SPT N-Values Versus Depth

Undrained shear strengths have been estimated from SPT N values using the relationship developed by Stroud (*The standard penetration test in incentive clays and soft rocks*) and summarised in Tomlinson where:

$$\text{Mass shear strength} = f_1 \times N$$

Where f_1 is based on the plasticity index.

A Plasticity Index of 39% has been assumed (based on geotechnical laboratory testing) which equates to an f_1 factor of 4.1.



Graph 2: Plot of Mass Shear Strength Versus Depth With Remada's Design Lines

SEE NOTE BELOW – RE SETTLEMENT

The Coefficient of Consolidation, M_v , of the cohesive soils can be estimated from the correlation between Plasticity Indices (PI) and SPT N values (Ref. 12) described by Equation 2.

$$M_v = 1 / (f_2 \times \text{SPT } N) \quad \text{Equation 2}$$

Where:

M_v is the coefficient of consolidation

f_2 is the Stroud Factor determined from Figure 1.5

SPT N is Characteristic Standard Penetration Test Result

5.2.2 Hand Shear Vane

The results ranged between 30kPa (in WS04 at 2.10m bgl) and 124kPa (in WS02 at 0.80m). The hand shear vane test results have been plotted along with the results interpreted from the SPT N values in **Graph 2**.

5.2.3 CBR Tests

The results of the four DCP tests within the proposed car park area produced values of between 0.9% and 88.2% within the upper 500mm.

5.3 Soil Observations

Made Ground was recovered at all locations as a heterogeneous material containing a variety of man-made materials including brick, plastic, glass and tarmacadam. There were no visible or olfactory indicators of contamination within the sampled soils.

5.4 Groundwater Observations

Groundwater was encountered at 0.45m bgl in WS02 and at 1.50m bgl in WS04. Groundwater levels were also recorded in the monitoring wells installed in three of the window sample holes at depths of between 0.0 and 6.0m bgl.

5.5 Chemical Analysis

5.5.1 Soils

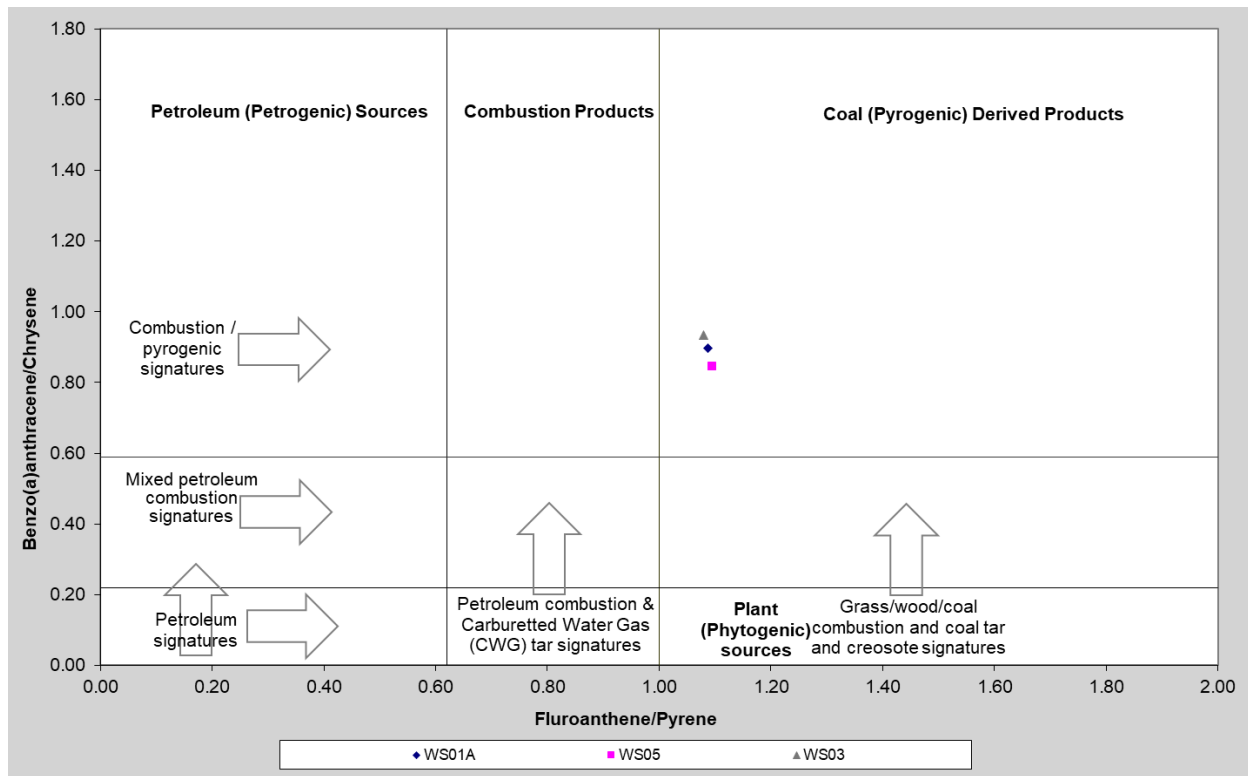
Results of the soil chemical analysis are presented in **Table 3** and summarised as follows.

The average FOC and pH were 0.02 and 7.5 respectively. Asbestos was not detected in the samples analysed. Detectable concentrations of metals were identified, although these are generally within the range that would typically be expected for Made Ground.

Concentrations of TPH were detected above method detection limit (MDL) in one of the samples analysed (from WS05). The hydrocarbons were heavy end hydrocarbons within the range C16 to C35 carbon range.

Concentrations of PAHs were generally low (<2 mg/kg). A maximum concentration of 13.4 mg/kg was encountered in WS05 at 0.8m.

In addition, the PAH concentrations have been plotted on a double ratio plot to provide an indication of the likely source of the PAHs. All of the samples that had detections of the three PAHs used have been plotted and all are indicated to be pyrogenic related PAHs which could be associated with urban background sources.



Graph 3: PAH Double Ratio Plot

5.6 Geotechnical Testing

Results of the geotechnical testing are summarised below.

5.6.1 Plasticity Testing

Plasticity testing was undertaken on five (5 No.) samples of cohesive soils recovered from the window sample boreholes, with the results ranging between 34% and 44%. These indicate the soils to be of both intermediate plasticity (CI) and high (CH) plasticity, and medium to high volume change potential as summarised in **Table 4** below:

Location	Depth (m)	Plasticity Index (%)	Passing .425mm (%)	Modified Plasticity Index	Volume Change Potential
WS04	2.0 – 2.5	37	97	35.9	Medium
WS02	1.5 – 2.0	40	100	40.0	High
WS03	6.7	40	99	39.6	Medium
WS04	2.6	34	98	33.3	Medium
WS04	1.8	44	97	42.7	High

Table 4: Plasticity Indices and Volume Change Potentials of the Cohesive Strata

5.6.2 Particle Size Distribution (PSD) Analysis

The PSD tests revealed the following:

- Natural deposits in WS02 at 2.4 – 3.0m comprised brown silty clayey slightly gravelly SAND.
- Natural deposits in WS03 at 2.0 – 3.0m comprised brown silty clayey gravelly SAND.
- Natural deposits in WS04 at 2.0 – 2.5m comprised brown silty sandy CLAY.



5.6.3 BRE SD1 Analysis

The water-soluble sulphate contents varied from 23 to 969 mg/l in the four soil samples analysed with pH varying from 5 to 8.4. The total sulphur content varied from <0.005 to 0.231% and total sulphate varied from 0.008 to 0.414%.

5.7 Ground Gas Monitoring Results

The results of the ground gas and groundwater monitoring programme are summarised below:

- Methane concentrations in all monitoring wells were recorded at less than the instrument detection limit (<0.1% v/v);
- A maximum steady state concentration of Carbon Dioxide was recorded as 8.7% v/v in WS03 on 20th November 2025. Detectable concentrations of carbon dioxide were recorded in all the monitoring wells;
- A minimum steady stated concentration of Oxygen was recorded 0.2 % v/v in WS02 on 11th November 2025;
- Ground gas flow rates were recorded at a maximum of less than the instrument's detection limit (0.1l/h).
- Groundwater was encountered within all monitoring wells across the monitoring programme between 0.0 and 6.0 bgl; and,
- Atmospheric pressure at the time of sampling varied between a high of 999 millibar (mbar) on 20th November 2025 and a low of 974 mbar on 24th November 2025. The monitoring visits were undertaken during periods of rising, and falling pressure trends over the preceding forty-eight hours.



6 GENERIC QUANTITATIVE RISK ASSESSMENT

6.1 Comparison of Soil Analysis Results with Human Health GAC

A comparison of soil chemical analysis with GAC is presented as **Table 3**.

TPH, PAH & BTEX

None of the analytes tested were detected at concentrations that exceeded the human health GAC for commercial end use.

Metals & Inorganics Excluding Asbestos

None of the analytes tested were detected at concentrations that exceeded the human health GAC for commercial end use.

Asbestos

There was no asbestos detected in the samples selected for analysis.

6.2 Controlled Waters Risk Assessment

6.3 Human Health Risk Assessment

In order to provide an up to date assessment of the risks to human health, Remada has adopted the most recent Generic Assessment Criteria (GAC) published by LQM/CIEH (S4ULs) and CL:AIRE/EIC/AGS for the assessment of potential risks to human health. The derivation of GAC, methodology, input parameters and technical guidance (CLEA) may be obtained upon request.

The proposed site layout retail store and car park is presented in **Figure 3**.

Default parameters have been adopted for sandy loam of pH 7 and commercial land use. FOC ranged from 0.015 to 0.04 giving a Soil Organic Matter (SOM) content range of between 2.59 to 6.90% with an average result of 4%. In order to present a conservative assessment, the SOM content of 2.5% has been adopted for the assessment.

The depth to potential sources of contamination for indoor air pathways has been assumed to be 0.5m below building foundation level. The source has been conservatively assumed to be at ground level for outdoor air and direct contact pathways.

For commercial land use the CLEA version 1.06 critical receptor is conservatively modelled as a female working adult with an exposure duration of 49 years. In accordance with the default parameters, it was assumed that employees spend most of their time indoors and that 80% of outdoor area is covered by hardstanding. As such, the potential exposure pathways have been assumed to be:

- Direct Soil and Indoor Dust Ingestion;
- Skin contact with soils and dusts;
- Inhalation of indoor and outdoor dusts and vapours.

Where GAC values for individual TPH fractions are not exceeded, the potential additive effect has been assessed by calculating overall TPH hazard index for each sample.

6.3.1 Sensitivity – Groundwater

The site is not indicated to be within a Groundwater Source Protection Zone. The superficial deposits are designated as a Secondary Undifferentiated Aquifer, where it is not possible to designate it as 'A' or 'B'.

The Pennine Lower Coal Measures Formation bedrock underlying the site is designated as a Secondary 'A' Aquifer. There are two (2 No.) groundwater abstractions points recorded within 1km of the site, the nearest listing is located 656m south.

6.3.2 Sensitivity – Surface Waters

There is an unnamed surface water feature present on the site. There are five (5 No.) surface water abstraction points recorded within 1km of the site, the nearest is located 342m west.

6.3.3 Risk Assessment

The results of the soil chemical analysis undertaken has identified that concentrations of metals and inorganic contaminants are within the range that would be expected for 'typical' made ground. Detectable concentrations of TPH and PAHs were encountered in some samples. However, the contaminants identified are of low solubility and mobility and as such are unlikely to present a risk to groundwater beneath the site.

Post-development, the site will continue to be predominantly covered by a retail building and areas of hardstanding. Consequently, the risk of leaching of contaminants as a result of infiltration of groundwater is limited. Therefore, the risk to controlled waters from contaminants within the made ground at the site is considered to be low and does not warrant further consideration at this stage.

6.4 Ground Gas Assessment

In order to understand the gassing regime at the site, a Characteristic Situation (as defined in CIRIA C665 and BS8576:2013) is determined for the site. CIRIA C665 and BS8576 provides definitions for each Characteristic Situation based on Gas Screening Values (GSV) which are calculated as follows:

- $GSV = \text{Gas Concentration (\% v/v)} \times \text{Measured Borehole Flow Rate (l/hr)}$

BS8576 makes a distinction between the GSV and the Hazardous Gas Flow Rate (Q_{hg}) which is also calculated using the above calculation. BS8576 states that Q_{hg} is calculated for each individual borehole for each monitoring visit, whereas the GSV is taken as the representative value for the site or site zone.

As a worst case assessment, the GSV for the site is therefore taken as the maximum steady-state carbon dioxide/methane concentration recorded in the boreholes which is multiplied by the maximum flow rate recorded during the same monitoring event.

- Methane GSV = $0.1\% \times 0.1 \text{ l/hr} = 0.0001 \text{ l/hr}$ (methane concentration taken as equal to the instrument detection limit of 0.1%).
- Carbon Dioxide GSV = $8.7\% \times 0.1 \text{ l/hr} = 0.0087 \text{ l/hr}$

The calculated GSV of less than 0.07 l/hr for methane and carbon dioxide places the site into Characteristic Situation 1. BS 8485:2015+A1:2019 states that for Characteristic Situation 1 the methane concentration would typically be less than 1% and carbon dioxide less than 5% and that if concentrations are above these limits then consideration should be given to placing the site into Characteristic Situation 2. As the concentrations of carbon dioxide were above these typical limits it is considered that the Characteristic Situation 2 classification should be given to the site.

For a commercial building of this type (Type C) at a site classified as Characteristic Situation 2 the required minimum gas protection score for a low risk site in accordance with BS 8485:2015+A1:2019 is 2.5. Appropriate forms of floor and substructure designs are listed Table 5 of BS 8485:2015+A1:2019; it is likely that structural barriers, ventilation and a ground gas membrane would comprise suitable mitigation measures.

6.5 Revised Conceptual Site Model

A revised Conceptual Site Model is presented as **Table 5** below.

6.6 Waste Classification & Waste Acceptance

Waste classification has been undertaken following guidance set out in WM3 EA Technical Guidance 'Guidance on the classification and assessment of waste', 1st Edition, Version 1.2GB, October 2021. The results of this assessment determine the appropriate List of Waste (LoW) Code and whether the waste should be classified as hazardous or non-hazardous. Classification is undertaken using the results of solid (total) analyses and not on the results of the WAC analyses.

Once the waste has been classified as either hazardous or non-hazardous then the WAC testing determines if the waste meets the requirements for disposal in the required landfill. Therefore, If the waste is classified as hazardous waste, then the waste would also need to meet the hazardous waste WAC requirements to be disposed of in a



hazardous waste landfill. However, if the final destination of the waste is not to landfill then WAC analysis is not required.

The WAC testing also allows for a distinction to be made between inert and non-hazardous waste. Waste that does not fall within the hazardous waste category and meets the requirements for disposal in an inert landfill can therefore be disposed of in an inert landfill. However, waste that does not meet the requirements for inert landfill will need to be disposed of in a non-hazardous landfill. In certain circumstances hazardous waste can be disposed of in a designated cell within a non-hazardous landfill. In this case the waste would need to meet more stringent leachate requirements for stable non-reactive hazardous waste.

6.6.1 Waste Classification

pH

With respect to Ph there is no limit for inert waste but for non-hazardous waste pH >6.

TOC

The assessment has included determination of the fraction of organic carbon (foc) which can be converted to TOC by multiplying the result by 100. A TOC limit of 3% is placed on waste destined for disposal in an inert landfill. Soil sampled from WS05 at a depth of 0.8m produced a TOC of 4%. As such material from this location would have to go to a non-hazardous landfill

Asbestos

Asbestos was not detected.

Metals

A full assessment of metal concentrations has not been undertaken however the results of the chemical analysis indicate that the made ground would be classified as non-hazardous waste.

PAHs and Hydrocarbons

The levels of PAHs and hydrocarbons were found to be less than the hazardous waste threshold of 0.1%.

6.6.2 Waste Acceptance

Waste Acceptance Criteria (WAC) analysis was undertaken on a sample of Made Ground. The assessment of the sample indicates that the sample met the requirements for disposal in an Inert landfill.

6.7 Health & Safety Considerations

To ensure direct exposure of construction workers involved in the site redevelopment to any impacted contaminated shallow soils is minimised, the guidance stated in HSG 66 "Protection of Workers and the General Public During Redevelopment of Contaminated Land" should be followed.



Potential Source Areas	Potential Contaminant of Concern	Pathways	Potential Receptor	Exposure Route (Human unless otherwise stated)	Potential Identified Linkage (unmitigated)	Findings of Ground investigation	Risk (Un-mitigated)	Proposed Remediation (Mitigation) Measures	Residual Risk Estimation
<u>On-site Sources</u> Made Ground <u>Off-site Sources</u> Historic scrap yard Historic mills Historic works Historic garage Infilled pond Kingsway West Industrial Park Railway	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, Va, Zn, <i>Boron, TPH /PAH,</i>	Disturbance due to construction plant causing direct contact, dusts, vapours.	Occupants of the development / building fabric	Direct Soil Ingestion	No	Not Applicable (N/A)	N/A	N/A	N/A
				Indoor Dust ingestion	Yes	No exceedance of GAC.	Very Low	Hardstanding to cover retail site minimising direct contact.	Negligible
				Skin Contact with Soils	Yes	As above	As above	As above	As above
		Skin Contact with Dust		Yes	As above	As above	As above	As above	
		Inhalation of Outdoor Dust	Yes	As above	As above	As above	As above		
		Inhalation of Outdoor Vapours	Yes	As above	As above	As above	As above		
		Adjacent residents during construction	Inhalation of Indoor Vapours	Yes	As above	As above	As above	As above	
			Inhalation of ground gas	Yes	CS2 based on elevated CO2 levels	Low	Ground gas protection measures	Negligible	
			Inhalation of radon gas	No	Lower Probability Area	Negligible	None	Negligible	
		Permeation of water supply pipework	Ingestion via permeated water supply pipework	Yes	Concentrations within typical range of made ground (< GAC)	Low	Hardstanding to prevent precipitation infiltration and leaching.	Negligible	
		Leachate	Direct contact with Secondary Undifferentiated and Secondary (A) Aquifer in Superficial Deposits	Yes	As above	As above	As above	As above	

Table 5: Refined Conceptual Site Model

Direct contact with subsurface soil and/or groundwater during redevelopment works are not assessed as part of the CSM. It is considered that risks to workers will be managed as part of any the redevelopment works at the site through the application of health and safety procedures, where required.



7 GEOTECHNICAL SITE ASSESSMENT

7.1 Geotechnical Considerations

An indicative site layout has been made available to Remada, illustrating the proposed store footprint to be in the eastern area of the site (**Figure 3**).

Topographically, the site is at approximately 146m aOD over the store area.

Boreholes WS01-WS05 were over the footprint of the store. Made Ground was encountered to a maximum depth of 1.40m bgl. Below the Made Ground natural deposits of Interbedded cohesive and granular strata were encountered to the base of each exploratory hole location (7.0m bgl). Peat was encountered within the northernmost boreholes (WS04 and WS05) at depths of between 0.80-1.30m and 1.90-3.0m bgl, respectively. During the BWB investigation, Peat was encountered in exploratory hole locations BH04, TP08 and TP10 at depths of between 1.40m and 3.20m. Additionally, BH03 recorded bands of soft clay below 4.30m.

SPT N values were recorded as being between 5 and 50 at 1.0m bgl and between 6 and 20 at 2.0m bgl

Groundwater was encountered at 0.45m bgl in WS02 and at 1.50m bgl in WS04. Groundwater levels were also recorded in the monitoring wells installed in three of the window sample holes at depths of between 0.0 and 6.0m bgl.

Details of the proposed permanent and variable design loads (actions) are not currently known, although an indicative column load of 400kN has been provided.

7.2 Foundations

Based on the encountered ground conditions, it is anticipated that the foundation solution for the for the northern zone of the store footprint would differ to the remainder of the footprint due to the presence of shallow PEAT deposits. In the central and southern zone of the store footprint, ground conditions generally comprise either medium-dense SAND or firm to very stiff CLAY for which shallow pads or a raft could be utilized however differential settlement is a concern and It is recommended that specialist advice is sought from a ground improvement contractor with regard to the suitability of this technique in these ground conditions and the anticipated achievable bearing capacities.

In the northern area of the proposed store footprint, as delineated on **Figure 3**, shallow pads or a raft foundation would not be suitable due to shallow PEAT deposits and bands of soft CLAY. This would lead to the potential for unacceptable total and differential settlement beneath the proposed store footprint. Vibro stone columns are not considered appropriate due to the Peat and as such Controlled Modulus Columns (CMCs) should be used in this area.

It is recommended that specialist advice is sought from a ground improvement contractor with regard to the suitability of this technique in these ground conditions and the anticipated achievable bearing capacities. If either of these techniques is selected, it is recommended that appropriate insitu testing is specified in order to assess the performance of these foundations.

For the remainder of the building footprint, preliminary calculations indicate that for a shallow traditional pad foundation (up to 2.0m wide) at a minimum of 1.0m depth, bearing within the firm cohesive materials (with a minimum undrained shear strength of 60kN/m²) or medium dense granular materials, a design bearing resistance of 90kN/m² will be appropriate in order to satisfy the ultimate and serviceable limit states in accordance with BS EN 1997-1: 2004. This is only applicable for foundations with loads that are applied vertically and centrally. To satisfy the serviceable limit state, settlement has been limited to 25mm. Foundations will need to fully penetrate any made ground, including fill material used to raise site levels and extend a minimum of 150mm into the bearing stratum. In addition due to the presence of both cohesive and granular materials at the foundation level all foundations should be reinforced to take into account differential settlement.

7.3 Shrinkage and Swelling

All samples of CLAY were reported as being INTERMEDIATE and HIGH plasticity with between 97% and 100% passing a 0.425mm sieve. The modified plasticity index equates to a Medium to High Volume Change Potential.



BRE 412 states that where the natural moisture content is less than 0.4 times the Liquid Limit ($w < 0.4 w_L$) it is indicative of desiccation. Soil desiccation has potentially occurred WS02 between 1.5-2.0m, WS03 at 6.70m, WS04 between 2.0-2.5m and at WS04 at 2.60m

The minimum foundation depths outside the zone of tree influence as specified by the NHBC have been reproduced in **Table 8** below, however:

Volume Change Potential	A) Minimum foundation depth (m) (allowing for restricted new planting)	B) Minimum foundation depth (m) (where planting is outside the zone of influence of trees)
High	1.50	1.0
Medium	1.25	0.9
Low	0.9	0.75

Table 8: NHBC 2023 Table 4 Minimum Foundation Depths

7.4 Floor Slab

Ground bearing floor slab or raft foundation bearing on improved ground of minimum specified bearing capacity or suspended on piled foundations dependent upon the zone of building footprint.

7.5 Imported Fill

All imported fill material should comply with an earthworks specification to be prepared by the engineer and not contain concentrations of contaminants at greater than the Generic Assessment Criteria (GAC) presented in **Table 3**.

7.6 Excavations and Temporary Works

Side slopes within the Made Ground and the peat are unlikely to remain stable even in the short term without support or without being battered back to a safe slope gradient. A detailed inspection of the side slopes should be made during excavation and a risk assessment carried out to fully assess the support measures required.

Groundwater was encountered within boreholes WS02 and WS04 at 0.45 and 1.50m respectively, during the ground investigation. Within the monitoring wells groundwater was encountered between ground level and 6.0m during the monitoring program.

7.7 External Car Park Construction

CBR values estimated from the DCP tests indicated that, near surface the CBR values were variable with values of between 0.9 and >100% recorded. Poorly compacted made ground backfill resulting from the demolition works should be excavated, processed as necessary to produce a 6F2 material and replaced in compacted layers in accordance with an engineering specification.

7.8 Protection of Buried Concrete

In accordance with BRE SD1 for buried concrete in a brownfield site with mobile groundwater, analysis of selected samples for water soluble sulphate returned values of up to 969 mg/l and pH >5. A total potential sulphate value of 0.693% was also calculated from the total sulphur results. Therefore, a Design Sulphate Class DS-2 is considered appropriate for buried concrete and an ACEC Class of AC-2s is considered appropriate for the location.

7.9 General Construction Advice

Topsoil should be stripped from proposed zones of construction.

All formations should be cleaned, and subsequently inspected, by a suitably qualified engineer prior to placing concrete. Should any soft, compressible or otherwise unsuitable materials be encountered they should be removed and replaced by blinding concrete.

Foundation concrete, or alternatively, a blinding layer of concrete, should be placed immediately after excavation



and inspection in order to protect the formation against softening and disturbance.

Generally, all formations should be placed wholly within the same material type, unless specific geotechnical inspection and assessment have been undertaken.

Where applicable ground beneath the proposed building footprint and potentially car parking may require to be stripped to reveal localised areas of made ground and structures. Excavations should be backfilled with suitably re-compacted materials to achieve formation level.

During foundation excavation works arisings should be constantly monitored for the presence of contamination.

It should be noted that an area of flooded ground was observed within the central area of the site.



8 CONCLUSIONS & RECOMMENDATIONS

8.1 Conclusions

The following conclusions have been made based on the findings of this investigation.

8.1.1 Phase 2 Site Investigation

The site has not been previously developed but was used as a storage area for a neighbouring construction site between 2016-2018.

Boreholes WS01-WS05 were over the footprint of the store. Made Ground was encountered to a maximum depth of 1.40m bgl. Below the Made Ground natural deposits of Interbedded cohesive and granular strata were encountered to the base of each exploratory hole location (7.0m bgl). Peat was encountered within the northernmost boreholes (WS04 and WS05) at depths of between 0.80-1.30m and 1.90-3.0m bgl respectively. During the BWB investigation, Peat was encountered in exploratory hole locations BH04, TP08 and TP10 at depths of between 1.40m and 3.20m. Additionally, BH03 recorded bands of soft clay below 4.30m.

SPT N values were recorded as being between 5 and 50 at 1.0m bgl and between 6 and 20 at 2.0m bgl

Groundwater was encountered at 0.45m bgl in WS02 and at 1.50m bgl in WS04. Groundwater levels were also recorded in the monitoring wells installed in three of the window sample holes at depths of between 0.0 and 6.0m bgl.

8.1.2 Human Health Risk Assessment

The results of soil chemical analysis were compared to Human Health Generic Assessment Criteria for commercial land use. None of the analytes tested were detected at concentrations that exceeded the human health GAC protective of on-site workers.

8.1.3 Water Resources Risk Assessment

The results of the soil chemical analysis undertaken has identified that concentrations of metals and inorganic contaminants are within the range of typical made ground. Detectable concentrations of TPH and PAHs were encountered in some samples. However, the contaminants identified are of low solubility and mobility and as such are unlikely to present a risk to groundwater beneath the site. In addition, it should be noted that the site will be predominantly covered with the building and areas of hardstanding. Therefore, the risk of leaching of contaminants as a result of infiltration of groundwater is likely to be limited. Therefore, the risk to groundwater from contaminants within the made ground at the site is considered to be low and does not warrant further consideration.

8.1.4 Waste Classification and Acceptance

In general, the results of the chemical analysis indicates that the material would be classified as non-hazardous waste. Waste Acceptance Criteria (WAC) analysis was undertaken on a sample of Made Ground. The assessment of the sample indicates that the sample met the requirements for disposal in an Inert landfill.

While Waste Acceptance Criteria (WAC) analysis has not been undertaken on the sample from WS05, the TOC for this sample exceeded the TOC limit for disposal in an inert landfill. Therefore, it is considered that the waste should be classified as non-hazardous.

8.2 Recommendations

Based on the encountered ground conditions, it is anticipated that the foundation solution for the for the northern zone of the store footprint would differ to the remainder of the footprint due to the presence of shallow PEAT deposits. In the central and southern zone of the store footprint, ground conditions generally comprise either medium-dense SAND or firm to very stiff CLAY for which shallow pads or a raft could be utilized however differential settlement is a concern and It is recommended that specialist advice is sought from a ground improvement contractor with regard to the suitability of this technique in these ground conditions and the anticipated achievable bearing capacities.

CBR values estimated from the DCP tests indicated that, near surface the CBR values were variable with values of between 0.9 and >100% recorded.



A Design Sulphate Class DS-2 is considered appropriate for buried concrete and an ACEC Class of AC-2s is considered appropriate for the location.

8.3 Ground Gas

The results of four rounds of gas monitoring visits placed the site into Characteristic Situation 1 and therefore ground gas protection measures will not be required within the proposed buildings.

The site is in a lower probability Radon area and as such no Radon protection measures are required.



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STUDY LIMITATIONS

IMPORTANT. This section should be read before reliance is placed on any of the information, opinions, advice, recommendations or conclusions contained in this report.

1. This report has been prepared by Remada, Ltd with all reasonable skill, care and diligence within the terms of the Appointment and with the resources and manpower agreed with (the 'Client'). Remada does not accept responsibility for any matters outside the agreed scope.

2. This report has been prepared for the sole benefit of the Client unless agreed otherwise in writing.

3. Unless stated otherwise, no consultations with authorities or funders or other interested third parties have been carried out. Remada is unable to give categorical assurance that the findings will be accepted by these third parties as such bodies may have published, more stringent objectives. Further work may be required by these parties.

4. All work carried out in preparing this report has used, and is based on, Remada's professional knowledge and understanding of current relevant legislation. Changes in legislation or regulatory guidance may cause the opinion or advice contained in this report to become inappropriate or incorrect. In giving opinions and advice pending changes in legislation, of which Remada is aware, have been considered. Following delivery of the report Remada has no obligation to advise the Client or any other party of such changes or their repercussions.

5. This report is only valid when used in its entirety. Any information or advice included in the report should not be relied upon until considered in the context of the whole report.

6. Whilst this report and the opinions made are to the best of Remada's belief, Remada cannot guarantee the accuracy or completeness of any information provided by third parties.

7. This report has been prepared based on the information reasonably available during the project programme. All information relevant to the scope may not have received.

8. This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of changes in the condition of the site since the time of the investigation.

9. The content of this report represents the professional opinion of experienced environmental consultants. Remada does not provide specialist legal or other professional advice. The advice of other professionals may be required.

10. Where intrusive investigation techniques have been employed they have been designed to provide a reasonable level of assurance on the conditions. Given the discrete nature of sampling, no investigation technique is capable of identifying all conditions present in all areas. In some cases the investigation is further limited by site operations, underground obstructions and above ground structures. Unless otherwise stated, areas beyond the boundary of the site have not been investigated.

11. If below ground intrusive investigations have been conducted as part of the scope, service tracing for safe location of exploratory holes has been carried out. The location of underground services shown on any drawing in this report has been determined by visual observations and electromagnetic techniques. No guarantee can be given that all services have been identified. Additional services, structures or other below ground obstructions, not indicated on the drawing, may be present on site.

12. Unless otherwise stated the report provides no comment on the nature of building materials, operational integrity of the facility or on any regulatory compliance issues.

13. Unless otherwise stated, samples from the site (soil, groundwater, building fabric or other samples) have NOT been analysed or assessed for waste classification purposes.



TABLES (not presented within text).

Table 2: Gas Groundwater Monitoring Data

GAS & GROUNDWATER MONITORING DATA																	REMADA GEO CONSULTANTS																								
SITE		Rochdale																																							
PROJECT No.		1477.03															Atmospheric & Ground Conditions																								
Visit 1 of 4		Atmospheric Pressure Variations During Visit															Ground Surface Conditions																								
Carried Out by:		Steve Aston															985																								
Date:		11.11.2025															Wet																								
Instrument Details		GFM436 14048															Atmospheric Pressure Trend Over Previous 48hrs															Weather Conditions									
																	Falling															Raining, cold									
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (%v/v)		CH ₄ Steady LEL (%)	CO ₂ (%v/v)		O ₂ (%v/v)		H ₂ S (ppm)		CO (ppm)		Duration (secs) [*]	Flow Rate (l/hr)	Relative Pressure (mb)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m Aod)	Depth of Pipe (m bgl)	Comments																		
			Peak	Steady		Peak	Steady	Minimum	Steady	Peak	Steady	Peak	Steady				Peak	Steady						Peak	Steady																
WS02	146.330	50	0.0	0.0	0.0	2.0	2.0	0.2	0.2	0.0	0.0	0.0	0.0	60	-5.3		NR	NR	984	1.050	145.280	5.180																			
WS03	146.070	50	0.0	0.0	0.0	8.1	8.1	7.5	7.5	0.0	0.0	0.0	0.0	60	0.0		NR	NR	984	6.000	140.070	6.360																			
WS04	146.550	50	0.0	0.0	0.0	0.3	0.3	19.1	19.1	0.0	0.0	0.0	0.0	60	0.0		NR	NR	986	0.400	146.150	6.040																			

NR = Not Recorded

[^] For measurement of gas concentrations

> = Above LEL

WST = Water Sample Taken

GL = Ground Level

GAS & GROUNDWATER MONITORING DATA																													
SITE		Rochdale																											
PROJECT No.		1477.03																	Atmospheric & Ground Conditions										
Visit 2 of 4				Atmospheric Pressure Variations During Visit													Ground Surface Conditions												
Carried Out by:		Steve Aston		998													Frosty												
Date:		20.11.2025		Atmospheric Pressure Trend Over Previous 48hrs													Weather Conditions												
Instrument Details		GFM436 14048		Raising													Clear, cold, frosty												
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (%v/v)		CO ₂ (%v/v)		O ₂ (%v/v)		H ₂ S (ppm)		CO (ppm)		Duration (secs) [*]	Flow Rate (l/hr)	Relative Pressure (mb)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m Aod)	Depth of Pipe (m bgl)	Comments							
Peak	Steady	Peak	Steady	Minimum	Steady	Peak	Steady	Peak	Steady	Peak	Steady																		
WS02	146.330	50	0.0	0.0	0.0	7.4	7.4	1.5	1.5	0.0	0.0	0.0	0.0	60	-0.9		NR	NR	998	0.400	145.930	5.180							
WS03	146.070	50	0.0	0.0	0.0	8.7	8.7	0.4	0.4	0.0	0.0	0.0	0.0	60	0.0		NR	NR	998	1.300	144.770	6.370							
WS04	146.550	50	0.0	0.0	0.0	1.1	1.1	11.8	11.8	0.0	0.0	0.0	0.0	60	-4.5		NR	NR	999	0.600	145.950	6.050							



Notes: NR = Not Recorded

[^] For measurement of gas concentrations

> = Above LEL

WST = Water Sample Taken

GL = Ground Level

GAS & GROUNDWATER MONITORING DATA																	REMADA GEO CONSULTANTS													
SITE		Rochdale																												
PROJECT No.		1477.03																												
Visit 3 of 4																	Atmospheric Pressure Variations During Visit							Ground Surface Conditions						
Carried Out by:		Steve Aston															974							Wet						
Date:		24.11.2025															Atmospheric Pressure Trend Over Previous 48hrs							Weather Conditions						
Instrument Details		GFM436 14048															Raising							Cold						
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (%v/v)		CH ₄ Steady LEL (%)	CO ₂ (%v/v)		O ₂ (%v/v)		H ₂ S (ppm)		CO (ppm)		Duration (secs) ^a	Flow Rate (l/hr)	Relative Pressure (mb)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m Aod)	Depth of Pipe (m bgl)	Comments							
WS02	146.330	50	0.0	0.0	0.0	0.3	0.3	18.2	18.2	0.0	0.0	0.0	0.0	60	0.0		NR	NR	974	0.000	146.330	5.180	Filled with water							
WS03	146.070	50	0.0	0.0	0.0	0.3	0.3	18.0	18.0	0.0	0.0	0.0	0.0	60	0.0		NR	NR	974	1.200	144.870	6.300								
WS04	146.550	50	0.0	0.0	0.0	0.4	0.4	18.2	18.2	0.0	0.0	0.0	0.0	60	0.0		NR	NR	975	0.500	146.050	6.050								

Notes: NR = Not Recorded

[^] For measurement of gas concentrations

> = Above LEL

WST = Water Sample Taken

GL = Ground Level

GAS & GROUNDWATER MONITORING DATA																	REMADA GEO CONSULTANTS																												
SITE		Rochdale																																											
PROJECT No.		1477.03					Atmospheric & Ground Conditions																																						
Visit 4 of 4		Atmospheric Pressure Variations During Visit																		Ground Surface Conditions																									
Carried Out by:																										Steve Aston					982-988mb													Dry	
Date:		04.12.2025					Atmospheric Pressure Trend Over Previous 48hrs																		Weather Conditions																				
Instrument Details		GFM436 14048																																											
Well No.		Cover Height (m AOD)		Well Diameter (mm)		CH ₄ (%v/v)		CH ₄ Steady LEL (%)		CO ₂ (%v/v)		O ₂ (%v/v)		H ₂ S (ppm)		CO (ppm)		Duration (secs) [^]		Flow Rate (l/hr)		Relative Pressure (mb)		PID (ppm)		Atmospheric Pressure (mb)		Water Level (m bgl)		Water Level (m AOD)		Depth of Pipe (m bgl)		Comments											
WS02		146.330		50		0.0		0.0		0.0		0.2		0.2		18.7		18.7		0.0		0.0		0.0		0.0		0.0		0.0		NR		NR		988		0.000		146.330		5.180		Filled with water	
WS03		146.070		50		0.0		0.0		0.0		0.4		0.4		18.7		18.7		0.0		0.0		0.0		0.0		0.0		0.0		NR		NR		982		0.600		145.470		6.320			
WS04		146.550		50		0.0		0.0		0.0		0.3		0.3		18.9		18.9		0.0		0.0		0.0		0.0		0.0		NR		NR		982		0.300		146.250		6.050					

Notes: NR = Not Recorded

[^] For measurement of gas concentrations

> = Above LEL

WST = Water Sample Taken

GL = Ground Level

Table 2: Gas and Groundwater Monitoring Data

Table 3: Comparison of Soil Chemical Analyses with GAC

Lab Sample Number:				Commercial GAC 2.5% SOM	740924	740925	740926
Sample Reference:					WS01A	WS05	WS03
Top Depth (m):					0.20	0.80	0.20
Basal Depth (m):					None Supplied	None Supplied	None Supplied
Strata/Material Type					MADE GROUND	MADE GROUND	MADE GROUND
Date Sampled:					03/11/2025	03/11/2025	03/11/2025
Determinand	Units	Limit of detection	Accreditation Status	[mg/kg unless stated]			
Stones	%	0.01	NONE		25.80	< 0.1	18.20
Moisture	%	0.01	NONE	-	12	23	12
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	Not-detected	Not-detected
Asbestos % by hand picking/weighting	%				-	-	-
Asbestos Containing Material Types Detected (ACM)	Type				-	-	-
pH	pH Units	N/A	MCERTS	-	7.9	7	8
Arsenic	mg/kg	1.00	MCERTS	640	6.8	16	6.9
Beryllium	mg/kg	0.06	MCERTS	12	0.64	1	0.71
Boron	mg/kg	0.20	MCERTS	240000	0.6	1.2	0.2
Cadmium	mg/kg	0.20	MCERTS	190	0.3	0.3	0.4
Chromium (Hexavalent)	mg/kg	1.80	MCERTS	33	< 1.8	< 1.80	< 1.8
Chromium (Trivalent)	mg/kg	1.00	NONE	8600	17	21	19
Chromium (aqua regia extractable)	mg/kg	1.00	MCERTS	-	17	21	19
Copper	mg/kg	1.00	MCERTS	68000	36	48	46
Lead	mg/kg	1.00	MCERTS	2330	43	130	52
Mercury	mg/kg	0.30	MCERTS	58 ^{ms} (25.8)	< 0.3	0.4	< 0.3
Nickel	mg/kg	1.00	MCERTS	980	18	23	21
Selenium	mg/kg	1.00	MCERTS	12000	< 1.0	1.7	< 1.0
Vanadium	mg/kg	1.00	MCERTS	9000	20	34	23
Zinc	mg/kg	1.00	MCERTS	730000	290	96	380
Total Cyanide	mg/kg	1.00	MCERTS	-	< 1.0	< 1.0	< 1.0
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	-	0.016	0.04	0.015
Calculated TOC from FOC		-	-	-	1.60	4.00	1.50
Calculated SOM from FOC		-	-	-	2.76	6.90	2.59
Aliphatic TPH >C5-C6	mg/kg	0.01	NONE	5900sol (558)	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	mg/kg	0.01	NONE	17000sol (322)	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	mg/kg	0.01	NONE	4800vap (190)	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C10-C12	mg/kg	1.00	MCERTS	23000vap (118)	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	mg/kg	2.00	MCERTS	82000sol (59)	< 2.0	< 2.0	< 2.0
Aliphatic TPH >C16-C21	mg/kg	8.00	MCERTS	1700000	< 8.0	< 8.0	< 8.0
Aliphatic TPH >C21-C35	mg/kg	8.00	MCERTS		< 8.0	< 8.0	< 8.0
Total Aliphatic Hydrocarbons:	mg/kg	10.00	NONE	-	< 10	< 10	< 10
Aromatic TPH >C5-C7	mg/kg	0.01	NONE	46000sol (2260)	< 0.010	< 0.010	< 0.010
Aromatic TPH >C7-C8	mg/kg	0.01	NONE	110000sol (1920)	< 0.010	< 0.010	< 0.010
Aromatic TPH >C8-C10	mg/kg	0.02	NONE	8100vap (1500)	< 0.020	< 0.020	< 0.020
Aromatic TPH >C10-C12	mg/kg	1.00	MCERTS	28000sol (899)	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	mg/kg	2.00	MCERTS	37000	< 2.0	< 2.0	< 2.0
Aromatic TPH >C16-C21	mg/kg	10.00	MCERTS	28000	< 10	12	< 10
Aromatic TPH >C21-C35	mg/kg	10.00	MCERTS	28000	< 10	35	< 10
Total Aromatic Hydrocarbons	mg/kg	10.00	NONE	-	< 10	47	< 10
Calculated Sum TPH (sum Aliphatic + sum Aromatic)					<20	57	<20
Naphthalene	mg/kg	0.05	MCERTS	460sol (183)	0.07	0.13	0.08
Acenaphthylene	mg/kg	0.05	MCERTS	97000sol (212)	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	97000sol (141)	< 0.05	0.16	< 0.05
Fluorene	mg/kg	0.05	MCERTS	68000	< 0.05	0.11	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	22000	0.42	1.4	0.48
Anthracene	mg/kg	0.05	MCERTS	540000	0.1	0.29	0.11
Fluoranthene	mg/kg	0.05	MCERTS	23000	0.99	2.3	0.81
Pyrene	mg/kg	0.05	MCERTS	54000	0.91	2.1	0.75
Benzo[a]anthracene	mg/kg	0.05	MCERTS	170	0.61	1.1	0.43
Chrysene	mg/kg	0.05	MCERTS	350	0.68	1.3	0.46
Benzo[b]fluoranthene	mg/kg	0.05	ISO 17025	45	0.76	1.5	0.55
Benzo[k]fluoranthene	mg/kg	0.05	ISO 17025	1200	0.34	0.64	0.24
Benzo[a]pyrene	mg/kg	0.05	MCERTS	35	0.64	1.1	0.46
Indeno(1,2,3-c,d)Pyrene	mg/kg	0.05	MCERTS	510	0.28	0.54	0.22
Dibenz[a,h]Anthracene	mg/kg	0.05	MCERTS	3.6	0.07	0.16	0.06
Benzo[g,h,i]perylene	mg/kg	0.05	MCERTS	4000	0.35	0.6	0.28
Coronene	mg/kg	0.05	NONE		< 0.05	-	-
Total Of 16 PAH's	mg/kg	0.8	ISO 17025	-	6.24	13.4	4.94
Total Of 17 PAH's	mg/kg	0.85	ISO 17025		6.24	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5.00	MCERTS	130000000	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5.00	MCERTS	47000*	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5.00	MCERTS	11000000vap (1920000)*	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5.00	MCERTS	13000000vap (1220000)*	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	8.00	MCERTS	14000000sol (1350000)*	< 8.0	< 8.0	< 8.0
o-Xylene	µg/kg	5.00	MCERTS	15000000sol (1120000)*	< 5.0	< 5.0	< 5.0
Total Phenols	mg/kg	1.00	MCERTS	690dir (30000)	< 1.0	< 1.0	< 1.0

	Determinand concentration below the GAC
	Determinand concentration in exceedance of GAC
	Determinand concentration in exceedance of the vapour/solubility saturation limit.

NC: No published criteria, US: Unsuitable sample.

vap: Screening criteria presented exceed the vapour saturation limit, which is presented in brackets.

sol: Screening criteria presented exceed the solubility saturation limit, which is presented in brackets.

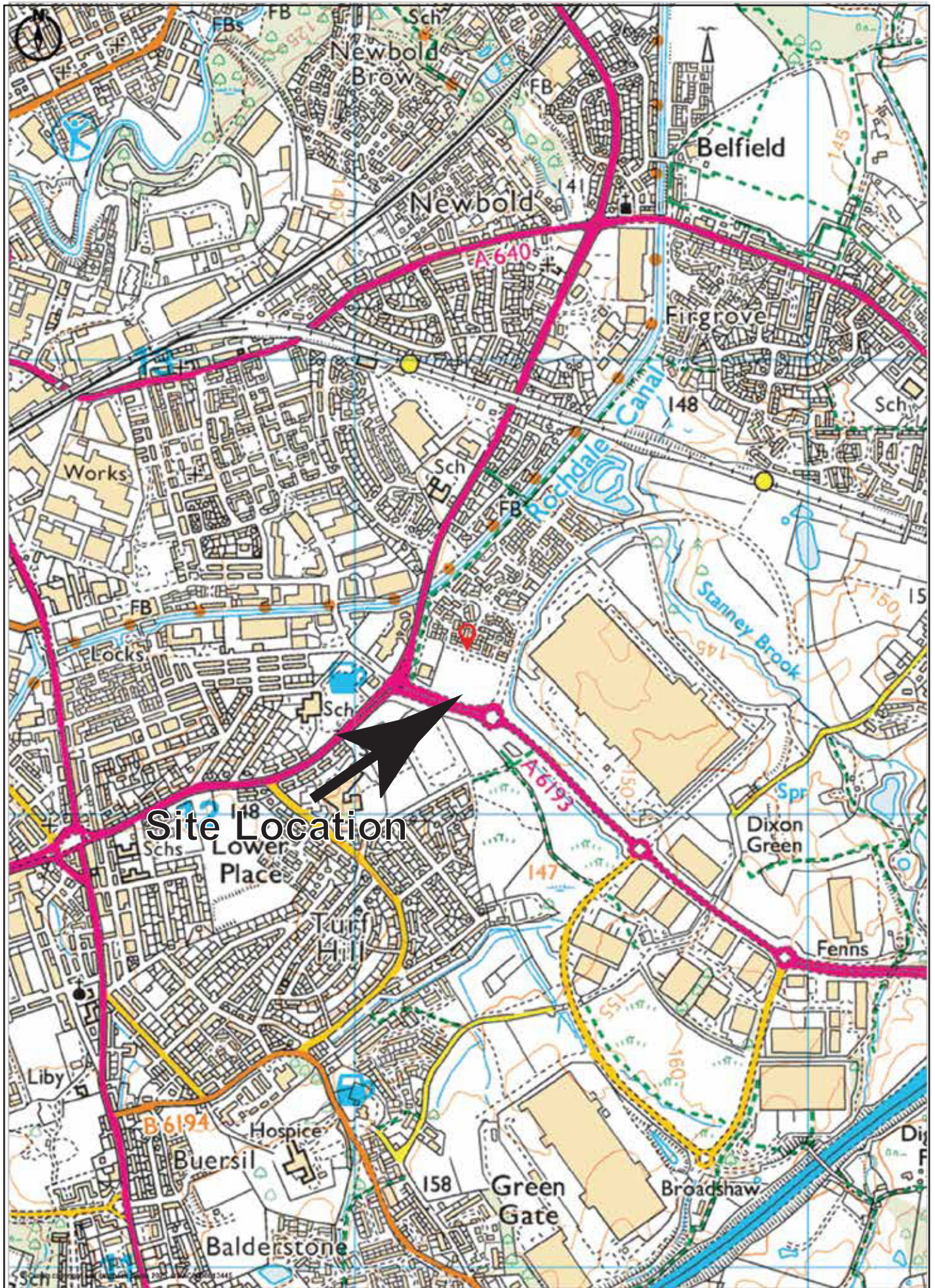
dir: Screening criteria based on threshold protective of direct skin contact (guideline in brackets based on health effects following long term exposure provided for illustration only).

(1): For assessment based on the use of the surrogate marker approach the GAC for Coal Tar must be used instead of benzo[a]pyrene.

* Value presented in mg/kg



FIGURES



Site Location

Notes Promap LANDMARK INFORMATION © Crown Copyright and database rights 2025. OS AC0000813445 Plotted Scale - 1:15000. Paper Size – A4	Revision	Approved	Date	Project Title	Scale	Drawn	Size
				Wallis Avenue, Rochdale	as shown	MB	A4
				Drawing Title	Date	Job No.	Figure No.
				Site Location Plan	29.10.25	1477	01
				Client			
				Lidl Great Britain Ltd			



- Legend
- Approximate extent of site boundary
 - WS01 Window Sample & Installation
 - WS02 Window Sample
 - CBR1 CBR Test

Notes

Existing site layout reproduced from AJP Survey Consultants Ltd's Topographical Survey Drawing No. EG454/TOO dated April 2023

Revision	Approved	Date
Project Title		
Wallis Avenue, Rochdale		
Drawing Title		
Existing Site Layout and Exploratory Hole Locations		
Client		
Lidl Great Britain Ltd		
Scale	Drawn	Size
NTS	MB	A4
Date	Job No.	Figure No.
04.11.25	1477	02





Revision	Approved	Date
Project Title		
Wallis Avenue, Rochdale		
Drawing Title		
Proposed Site Layout and Exploratory Hole Locations		
Client		
Lidl Great Britain Ltd		
Scale	Drawn	Size
NTS	MB	A4
Date	Job No.	Figure No.
04.11.25	1477	03



EXPLORATORY HOLE LOGS

Key to exploratory hole symbols and abbreviations

SAMPLE TYPES

ACM - Asbestos sample	AMAL - Amalgamated sample	B - Bulk disturbed sample
BLK - Block sample	C - Core sample	CBR - CBR test sample
D - Disturbed sample	ES - Environmental sample	EW - Environmental water sample
G - Gas sample	J - Jar sample	L - Liner sample
TW - Pushed thin wall sample	U - Undisturbed sample	UT - Undisturbed thin wall sample
W - Water sample		

IN-SITU TESTS

HV - Hand shear vane	HV(r) - Hand shear vane residual	PID - Photo ionisation detector
PP - Hand penetrometer	SPT - Standard penetration test	SPT(C) - SPT using cone

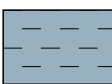
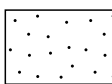
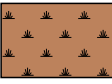
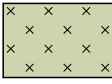
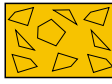
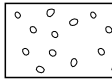
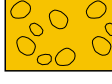
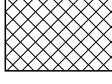
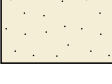
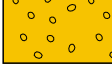
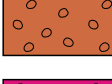
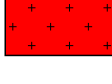
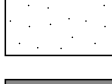
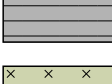
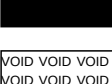
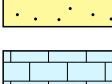
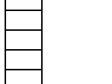
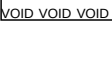
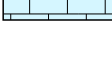
GROUNDWATER

 Groundwater strike	 Groundwater rest level
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ROTARY CORE DETAILS

TCR - Total core recovery (%)	SCR - Solid core recovery (%)	RQD - Rock quality designation (%)
FI - Fracture index	NI - Non-intact core	AZCL - Assumed zone of core loss

LEGEND

 Topsoil	 Clay	 Chalk	 Sand backfill
 Peat	 Silt	 Breccia	 Gravel backfill
 Made ground [cohesive]	 Sand	 Conglomerate	 Arisings
 Concrete	 Gravel	 Metamorphic	 Bentonite
 Wood	 Cobbles	 Igneous	 Concrete
 Brick	 Boulders		 Grout
 Bituminous material	 Mudstone		 Plain pipe
 Gypsum	 Siltstone		
 Coal	 Sandstone		 Slotted pipe
 Void	 Limestone		



Dynamic (Windowless) Sampler

WS01
Sheet 1 of 1

Hole Type WLS	Easting 391226.00	Northing 412280.00	Ground Level (m) 146.47	Scale 1:35
Project Name Wallis Avenue	Project No. 1477.03	Start Date 2025-11-03	End Date 2025-11-03	

Client Lidl Great Britain Ltd	Consultant Remada Ltd	Contractor
----------------------------------	--------------------------	------------

Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
		0.30	D		146.27	(0.20) 0.20		MADE GROUND: Firm dark brown sandy gravelly clay. Gravel is subangular to subrounded fine to coarse mudstone, brick and sandstone.	
						(0.40)		MADE GROUND: Firm dark brown sandy gravelly clay. Gravel is subangular to subrounded fine to coarse brick, mudstone and sandstone.	0.5
					145.87	0.60		Dense light greyish brown sandy GRAVEL with rare cobbles. Gravel is subangular to subrounded fine to coarse sandstone and mudstone. Cobbles are subrounded sandstone.	1.0
		1.00	SPT	N=50 for 100mm (12,13/30,20 for 25mm) N60=55	145.47	1.00		End of Borehole at 1.00m	
									1.5
									2.0
									2.5
									3.0
									3.5
									4.0
									4.5
									5.0
									5.5
									6.0
									6.5
									7.0

Remarks 1) Borehole CAT scanned prior to drilling. 2) No groundwater encountered during drilling. 3) Terminated due to SPT refusal (N > 50). 4) Borehole backfilled with arising upon completion.	Method, Plant, Stability, Dimensions 0.00 - 1.00m WLS Tracked Rig	Logger M Bell
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Dynamic (Windowless) Sampler

WS01A
Sheet 1 of 1

Hole Type WLS	Easting 391230.00	Northing 412287.00	Ground Level (m) 146.47	Scale 1:35
Project Name Wallis Avenue	Project No. 1477.03	Start Date 2025-11-03	End Date 2025-11-03	

Client Lidl Great Britain Ltd	Consultant Remada Ltd	Contractor
----------------------------------	--------------------------	------------

Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
		0.20	ES			(0.40)		MADE GROUND: Dark brown clayey sandy gravel with occasional cobbles. Gravel is subangular to subrounded fine to coarse brick, coal and sandstone. Cobbles are subrounded mudstone.	
		0.20	WAC		146.07	0.40			
		0.60	D			(0.30)		Dense greyish brown sandy cobbly GRAVEL. Gravel is subangular to subrounded fine to coarse sandstone and mudstone. Cobbles are rounded sandstone.	0.5
		0.70	SPT	N=50 for 120mm (25 for 60mm/32,18 for 45mm) N60=55	145.77	0.70			
								End of Borehole at 0.70m	
									1.0
									1.5
									2.0
									2.5
									3.0
									3.5
									4.0
									4.5
									5.0
									5.5
									6.0
									6.5
									7.0

Remarks 1) Borehole CAT scanned prior to drilling. 2) No groundwater encountered during drilling. 3) Terminated due to SPT refusal (N > 50). 4) Borehole backfilled with arising upon completion.	Method, Plant, Stability, Dimensions 0.00 - 0.70m WLS Tracked Rig	Logger M Bell
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Dynamic (Windowless) Sampler

WS02

Sheet 1 of 1

Hole Type WLS	Easting 391244.00	Northing 412275.00	Ground Level (m) 146.41	Scale 1:35
Project Name Wallis Avenue	Project No. 1477.03	Start Date 2025-11-03	End Date 2025-11-03	

Client Lidl Great Britain Ltd	Consultant Remada Ltd	Contractor
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.30	ES		146.01	(0.40)		MADE GROUND: Dark brown sandy gravelly clay. Gravel is subangular to subrounded fine to coarse brick and sandstone.
						0.40		MADE GROUND: Light brown sandy gravel with occasional cobbles. Gravel is subangular to subrounded fine to coarse sandstone. Cobbles are subangular to subrounded sandstone and brick.
		0.80	HV	124 (kPa)	145.61	0.80		
		1.00	SPT	N=17 (1,3/3,4,5,5) N60=19	145.41	1.00		No Recovery.
						(0.50)		
		1.50-1.90	B		144.91	1.50		Stiff brown mottled grey and black silty CLAY.
						(0.40)		
		1.80	HV	94 (kPa)	144.51	1.90		
		2.00	SPT	N=20 (3,5/4,5,5,6) N60=22	144.41	2.00		Medium dense orangish brown clayey SAND.
						(0.40)		No Recovery.
		2.40-3.00	B		144.01	2.40		Medium dense orangish brown silty clayey slightly gravelly SAND. Gravel is subangular to subrounded fine to medium sandstone.
						(0.60)		Pockets of dark brown subangular to subrounded fine to coarse sandstone and coal. (2.40 - 3.00m)
		3.00	SPT	N=22 (5,5/5,4,6,7) N60=24	143.41	3.00		No Recovery.
						(0.50)		
					142.91	3.50		Medium dense orangish brown silty clayey SAND.
						(0.50)		
		4.00	SPT	N=12 (2,2/2,2,4,4) N60=13	142.41	4.00		No Recovery.
						(0.70)		
					141.71	4.70		Very stiff dark brown mottled grey silty very sandy CLAY with rare gravel. Gravel is subrounded fine mudstone.
		5.00	SPT	N=26 (4,5/5,6,7,8) N60=29				
						(2.30)		
		5.80	D					Firm (6.00m)
		6.00	SPT	N=7 (2,2/2,2,1,2) N60=8				Poor recovery. (5.00 - 7.00m)
		7.00	SPT	N=17 (3,4/3,4,5,5) N60=19	139.41	7.00		

Remarks 1) Borehole CAT scanned prior to drilling. 2) Groundwater encountered at 0.45m bgl during drilling. 3) Installation to 6.0m bgl; 1.0m plain pipe, 5.0m slotted pipe.	Method, Plant, Stability, Dimensions 0.00 - 7.00m WLS Tracked Rig	Logger M Bell
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Dynamic (Windowless) Sampler

WS03
Sheet 1 of 1

Hole Type WLS	Easting 391248.00	Northing 412299.00	Ground Level (m) 146.07	Scale 1:35
Project Name Wallis Avenue	Project No. 1477.03	Start Date 2025-11-03	End Date 2025-11-03	

Client Lidl Great Britain Ltd	Consultant Remada Ltd	Contractor
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.30	ES		145.87	(0.20) 0.20		MADE GROUND: Firm dark brown sandy gravelly clay. Gravel is subrounded fine to coarse sandstone and rare brick.
						(0.80)		MADE GROUND: Firm dark brown sandy gravelly clay with rare cobbles. Gravel is subangular to subrounded fine to coarse coal, sandstone and rare brick. Cobbles are subangular to subrounded sandstone and tarmacadam.
		1.00	SPT	N=43 (10,15/13,12,8,10) N60=47	145.07	1.00		Dense dark brown silty clayey gravelly SAND. Gravel is subrounded fine to medium sandstone.
					144.77	1.30		Stiff brown mottled grey and black silty sandy CLAY.
		1.70	D		144.47	1.60		Medium dense reddish orange silty clayey gravelly SAND. Gravel is subangular to subrounded sandstone and mudstone.
		2.00 2.00-3.00	SPT B	N=20 (4,4/5,4,5,6) N60=22				
		3.00	SPT	N=21 (3,3/4,5,6,6) N60=23		(3.10)		
		4.00	SPT	N=14 (2,3/3,2,4,5) N60=15				
					141.37	4.70		Firm reddish brown silty sandy CLAY.
		5.00	SPT	N=28 (6,6/7,7,7,7) N60=31	141.17	4.90		Medium dense reddish brown clayey gravelly SAND. Gravel is subrounded fine to medium mudstone.
		6.00	SPT	N=12 (2,2/2,3,4,3) N60=13		(1.40)		
		6.70	D			(0.70)		
		7.00	SPT	N=24 (2,4/5,5,6,8) N60=26	139.07	7.00		End of Borehole at 7.00m

Remarks 1) Borehole CAT scanned prior to drilling. 2) No groundwater encountered during drilling. 3) Installation to 7.0m bgl; 1.0m plain pipe, 6.0m slotted pipe.	Method, Plant, Stability, Dimensions 0.00 - 7.00m WLS Tracked Rig	Logger M Bell
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Dynamic (Windowless) Sampler

WS04
Sheet 1 of 1

Hole Type WLS	Easting 391264.00	Northing 412318.00	Ground Level (m) 146.55	Scale 1:35
Project Name Wallis Avenue	Project No. 1477.03	Start Date 2025-11-03	End Date 2025-11-03	

Client Lidl Great Britain Ltd	Consultant Remada Ltd	Contractor
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.10	D		146.35	(0.20) 0.20		MADE GROUND: Dark brown sandy gravelly clay with rootlets. Gravel is subangular to subrounded fine to coarse brick and coal.
		0.40	ES			(0.60)		MADE GROUND: Light brown sandy cobbly gravel. Gravel is angular to subrounded fine to coarse brick, coal, sandstone and plastic. Cobbles are subangular to subrounded brick and sandstone.
					145.75	0.80		Spongy dark brown fibrous PEAT. Distinct organic odour.
		1.00	SPT	N=6 (1,0/2,1,2,1) N60=7		(0.50)		
		1.10	D		145.25	1.30 (0.10)		Firm dark brown silty sandy CLAY.
					145.15	1.40 (0.20)	NR NR NR NR NR NR	No Recovery.
					144.95	1.60		Firm brown mottled grey silty sandy CLAY.
		1.80	D					Soft and dark grey and mottled brown. (2.00m)
		2.00	SPT	N=12 (1,3/2,4,3,3) N60=13				
		2.00-2.50	B					
		2.10	HV	30 (kPa)		(1.10)		
		2.30	D					Rare gravel of subrounded fine coal. (2.30m)
		2.60	D		143.85	2.70		Medium dense reddish orange clayey SAND.
		3.00	SPT	N=24 (4,4/5,5,7,7) N60=26				
		4.00	SPT	N=27 (4,5/6,6,7,8) N60=30		(2.80)		
		4.00-5.00	B					Dark brown. (4.30 - 4.40m)
		5.00	SPT	N=20 (6,7/6,4,5,5) N60=22				
		5.60	D		141.05	5.50 (0.25)		Soft dark grey silty sandy CLAY
					140.80	5.75 (0.25)		Medium dense reddish orange silty clayey SAND.
		6.00	SPT	N=20 (3,4/5,5,5,5) N60=22	140.55	6.00 (0.10)		Stiff grey silty sandy CLAY.
					140.45	6.10		Medium dense brown clayey SAND.
		6.50	D			(0.90)		
		7.00	SPT	N=23 (5,5/5,6,6,6) N60=25	139.55	7.00		End of Borehole at 7.00m

Remarks 1) Borehole CAT scanned prior to drilling. 2) Groundwater encountered at 1.5m bgl during drilling. 3) Installation to 7.0m bgl; 1.0m plain pipe, 6.0m slotted pipe.	Method, Plant, Stability, Dimensions 0.00 - 7.00m WLS Tracked Rig	Logger M Bell
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Dynamic (Windowless) Sampler

WS05
Sheet 1 of 1

Hole Type WLS	Easting 391246.00	Northing 412321.00	Ground Level (m) 146.66	Scale 1:35
Project Name Wallis Avenue	Project No. 1477.03	Start Date 2025-11-03	End Date 2025-11-03	

Client Lidl Great Britain Ltd	Consultant Remada Ltd	Contractor
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata	
		Depth (m)	Type/ Ref	Results			Legend	Description
		0.40	D			(0.70)		MADE GROUND: Dark greyish brown sandy gravelly clay with rare cobbles. Gravel is subangular to subrounded fine to coarse brick, coal and sandstone. Cobbles are subangular brick.
		0.80	ES		145.96	0.70		
		1.00	SPT	N=5 (1,1/1,1,1,2) N60=6		(0.70)		MADE GROUND: Dark brown clayey gravelly peat. Gravel is subangular fine to coarse wood, glass and sandstone. <i>Large wood fragments. (0.70 - 1.40m)</i>
					145.26	1.40		
						(0.40)		Firm dark grey silty sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded sandstone.
		2.00			144.86	1.80		
		2.00-3.00	SPT B	N=8 (2,2/2,2,2,2) N60=9	144.76	(0.10) 1.90		Firm reddish brown sandy slightly gravelly CLAY. Gravel is subrounded fine to medium coal.
						(1.10)		Spongy dark brown fibrous PEAT. Distinct organic odour.
		3.00	SPT	N=19 (2,3/3,4,6,6) N60=21	143.66	3.00	NR NR NR NR NR NR NR NR NR NR NR NR	No Recovery
					143.26	3.40		
					143.16	(0.10) 3.50		Firm light grey silty sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse coal.
								Medium dense light grey silty clayey SAND.
		4.00	SPT	N=15 (1,1/2,4,4,5) N60=17		(1.50)		<i>Dark grey band. (4.00 - 4.40m)</i>
		4.80	D					
		5.00	SPT	N=33 (3,4/4,7,12,10) N60=36	141.66	5.00		<i>Dense</i>
								<i>End of Borehole at 5.00m</i>

Remarks 1) Borehole CAT scanned prior to drilling. 2) No groundwater encountered during drilling. 3) Terminated due to borehole collapse. 4) Borehole backfilled with arisings upon completion.	Method, Plant, Stability, Dimensions 0.00 - 5.00m WLS Tracked Rig	Logger M Bell
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APPENDIX A

SPT Hammer Energy Test Certificate

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: DART300
Test Date: 11/07/2025
Report Date: 11/07/2025
File Name: DART300.spt
Test Operator: MT



Instrumented Rod Data

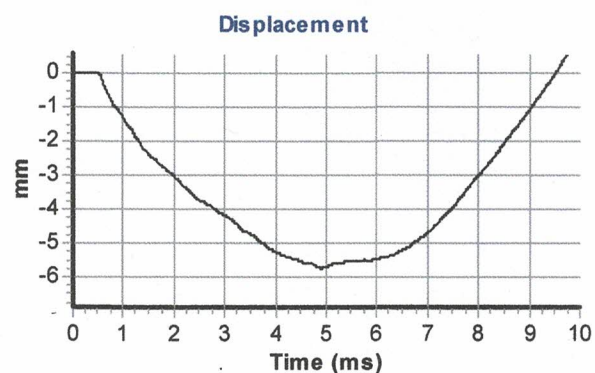
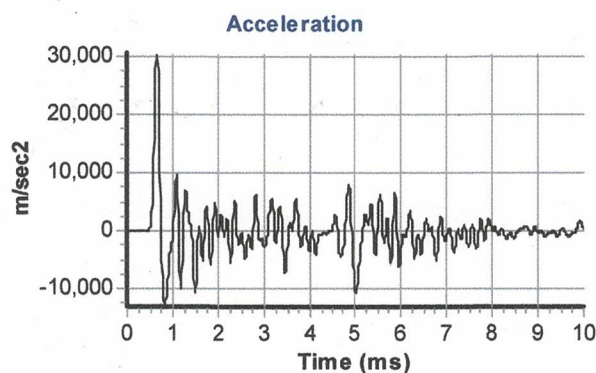
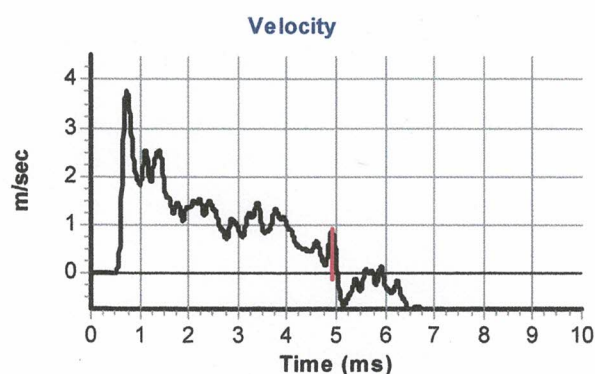
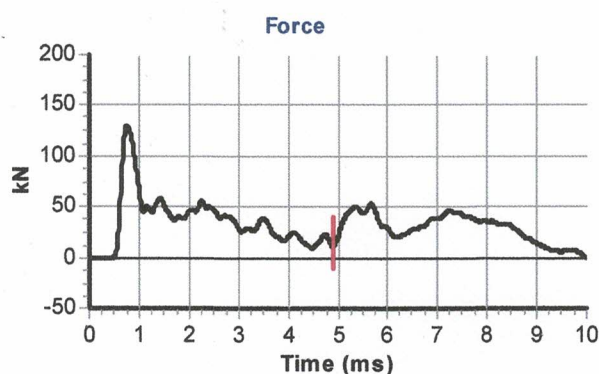
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Rod Length l_r (m): 1.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

REGIONAL DRILLING LIMITED - 95085



Calculations

Area of Rod A (mm²): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 313

Energy Ratio E_r (%): **66**

Signed: M.TONER
Title: FITTER



APPENDIX B

Dynamic Cone Penetrometer (DCP) Test Results

TRL Dynamic Cone Penetrometer Test Results



Client:	Lidl Great Britain Ltd	Site Location:	Rochdale	Test No:	CBR1	Location:	391272 412284
Project No:	1477.03	Date:	03.11.2025	Start Depth:	Surface	Test Strata:	Made Ground - clayey gravelly sand
$\text{Log10(CBR)} = 2.480 - 1.057 \times \text{Log10(mm/blow)}$						Weather:	Damp and cloudy

No of Blows	Depth Reading mm	Penetration/ Blow mm	CBR %	Estimated CBR %
0	105	0		
1	185	80.0	2.9	
2	230	45.0	5.4	
3	319	89.0	2.6	
4	389	70.0	3.4	
5	402	13.0	20.1	
6	429	27.0	9.3	
7	441	12.0	21.8	
8	445	4.0	69.8	
9	470	25.0	10.1	
10	526	56.0	4.3	
11	545	19.0	13.4	
12	563	18.0	14.2	
13	583	20.0	12.7	
14	601	18.0	14.2	
15	616	15.0	17.3	
16	634	18.0	14.2	
17	654	20.0	12.7	
18	673	19.0	13.4	
19	688	15.0	17.3	
20	705	17.0	15.1	
21	718	13.0	20.1	
22	731	13.0	20.1	
23	745	14.0	18.6	
24	760	15.0	17.3	
25	774	14.0	18.6	
26	789	15.0	17.3	
27	804	15.0	17.3	
28	823	19.0	13.4	
29	841	18.0	14.2	
30	860	19.0	13.4	
31	874	14.0	18.6	
32	883	9.0	29.6	
33	895	12.0	21.8	
34	918	23.0	11.0	
35	945	27.0	9.3	

Notes:

Tested by

: M Bell
Date: 14.11.25

Checked by: P Searing
Date: 10.12.25

TRL Dynamic Cone Penetrometer Test Results



Client:	Lidl Great Britain Ltd	Site Location:	Rochdale	Test No:	CBR2	Location:	391293 412299
Project No:	1477.03	Date:	03.11.2025	Start Depth:	Surface	Test Strata:	Made Ground - gravelly sandy clay
$\text{Log10(CBR)} = 2.480 - 1.057 \times \text{Log10(mm/blow)}$						Weather:	Damp and cloudy

No of Blows	Depth Reading mm	Penetration/ Blow mm	CBR %	Estimated CBR %
0	75	0		
1	121	46.0	5.3	
2	146	25.0	10.1	
3	181	35.0	7.0	
4	203	22.0	11.5	
5	220	17.0	15.1	
6	244	24.0	10.5	
7	273	29.0	8.6	
8	331	58.0	4.1	
9	362	31.0	8.0	
10	384	22.0	11.5	
11	481	97.0	2.4	
12	570	89.0	2.6	
13	581	11.0	23.9	
14	592	11.0	23.9	
15	593	1.0	302.0	
20	627	6.8	39.8	
21	678	51.0	4.7	
22	697	19.0	13.4	
23	734	37.0	6.6	
24	758	24.0	10.5	
25	790	32.0	7.7	
26	801	11.0	23.9	
27	813	12.0	21.8	
28	842	29.0	8.6	
29	860	18.0	14.2	
30	880	20.0	12.7	
31	915	35.0	7.0	
32	925	10.0	26.5	

Notes:

Tested by

: M Bell
Date: 14.11.25

Checked by: P Searing
Date: 10.12.25

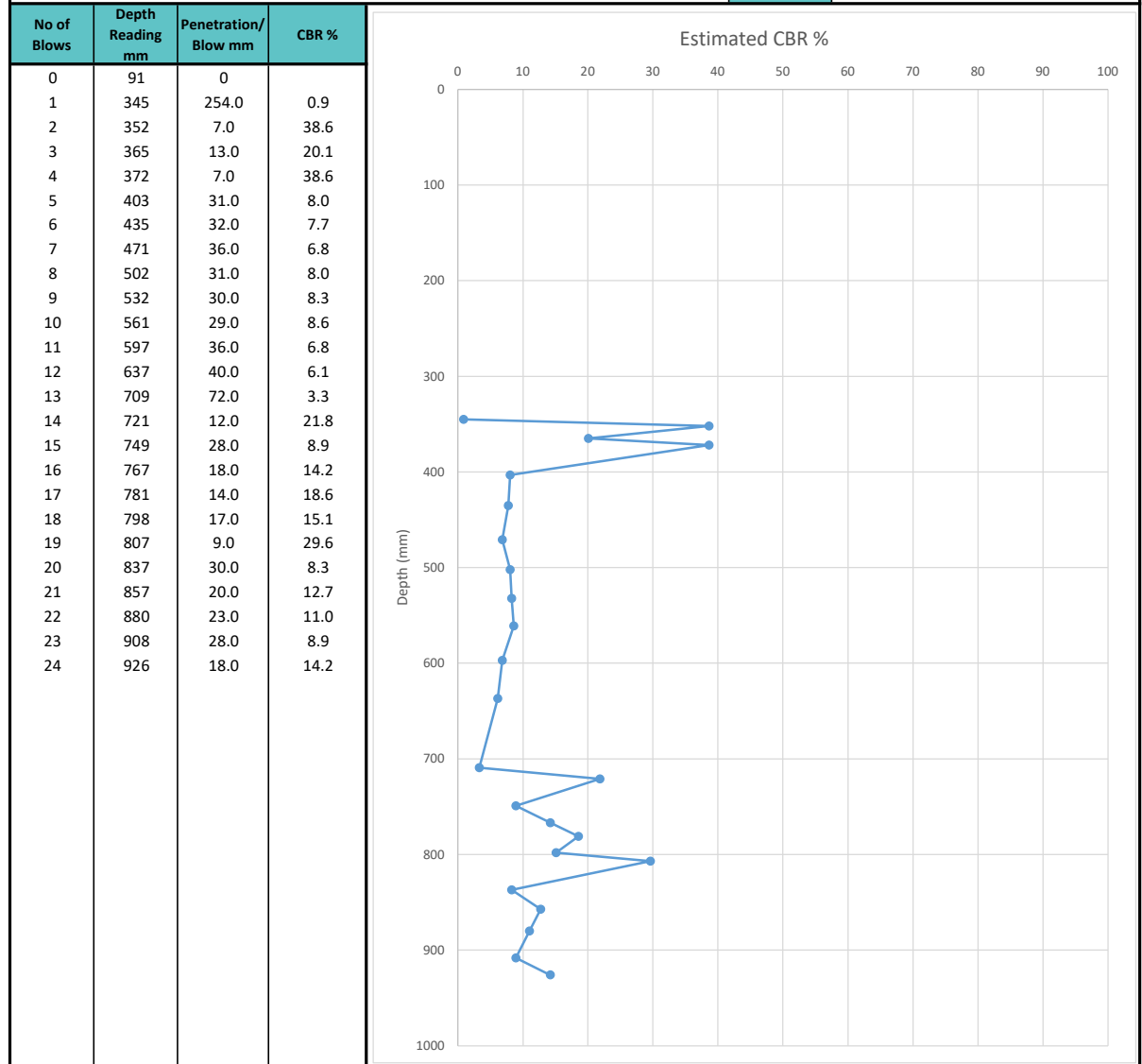
TRL Dynamic Cone Penetrometer Test Results



Client:	Lidl Great Britain Ltd	Site Location:	Rochdale	Test No:	CBR3	Location:	391311 412311
Project No:	1477.03	Date:	03.11.2025	Start Depth:	Surface	Test Strata:	Top Soil - clayey gravelly sand.

$$\text{Log10(CBR)} = 2.480 - 1.057 \times \text{Log10(mm/blow)}$$

Weather: Damp and cloudy



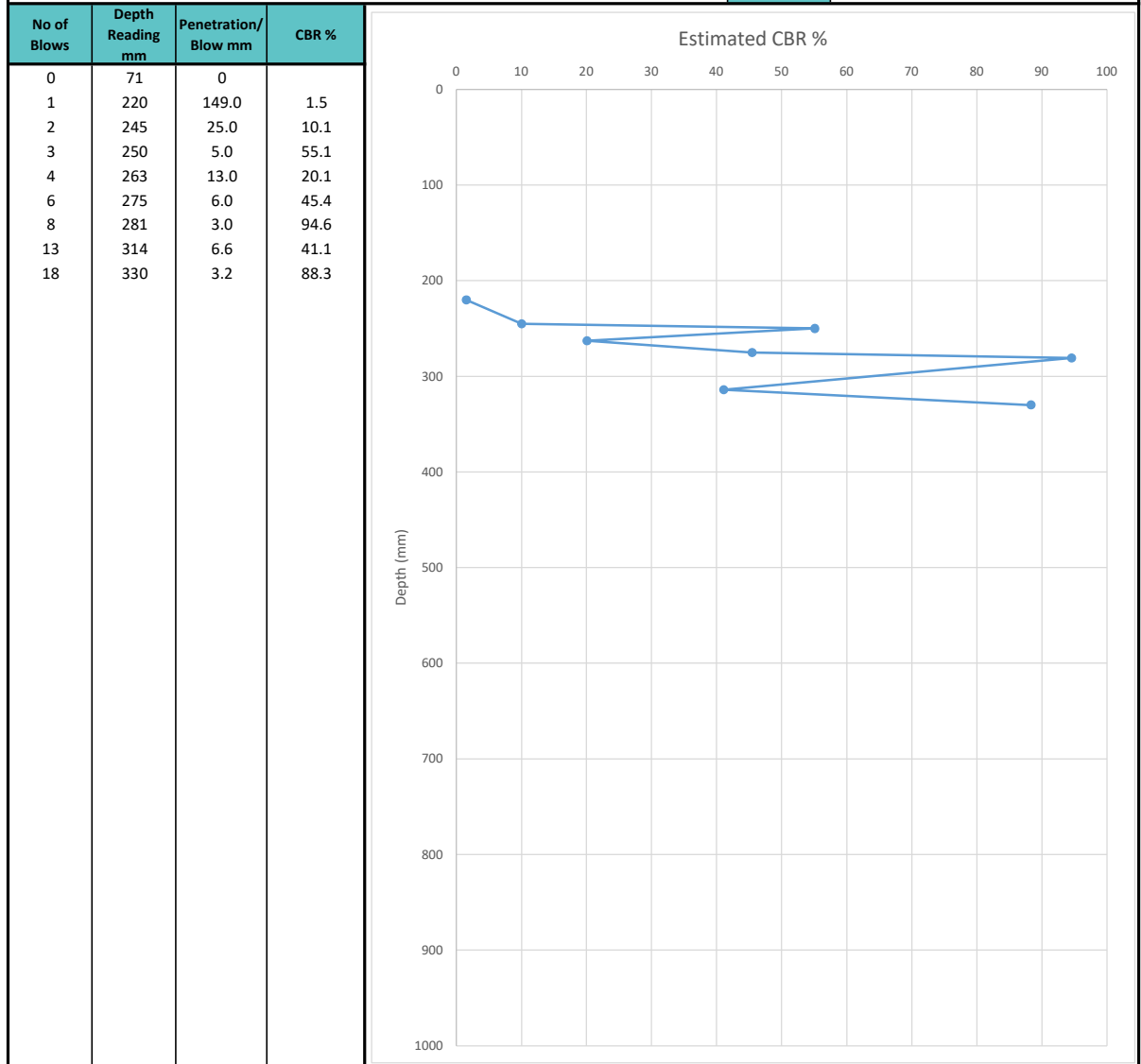
Notes:

Tested by: M Bell
 Date: 14.11.25
 Checked by: P Searing
 Date: 10.12.25

TRL Dynamic Cone Penetrometer Test Results



Client:	Lidl Great Britain Ltd	Site Location:	Rochdale	Test No:	CBR4	Location:	391265 412331
Project No:	1477.03	Date:	03.11.2025	Start Depth:	Surface	Test Strata:	Made Ground - sandy gravelly clay
$Log10(CBR) = 2.480 - 1.057 \times Log10(mm/blow)$						Weather:	Damp and cloudy



Notes: Refusal at 330mm

Tested by:	M Bell	Checked by:	P Searing
Date:	14.11.25	Date:	10.12.25



APPENDIX C

Gas Analyser Calibration Certificate

TEST DATE AND CONDITIONS			
Date		11/04/2025	
Atmospheric Pressure		1005	mB
Ambient Temperature		21.3	°C
EnviroNics Serial No.		9370	

**GFM436 Final Inspection & Calibration
Check Certificate**

GAS DATA LTD

Unit D

Earlplace Business Park

Fletchamstead Highway

Coventry

CV4 9XL

Tel 02476303311

Fax 02476307711



GAS DATA
LISTEN • ANALYSE • INFORM

Customer	Remada Ltd
Certificate Number	126129
Order Number	342447

Serial Number	14048
Software Version	G436-00.0029/0010

Recalibration DUE Date
11/04/26

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	500	Accept > 200 cc/min	Pump Flow @ -200mB	300	Accept > 200 cc/min
Clock Set / Running	✓		Labels Fitted	✓	

Gas Checks						
Sensor	CH ₄		CO ₂		O ₂	
	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %
	Readings %		Readings %		Readings %	
	59.8	60	39.5	40	20.9	20.9
	Accept ±3.0		Accept ±3.0		Accept ±0.5	
	5.0	5	5.0	5	6.0	6
	Accept ±0.3		Accept ±0.3		Accept ±0.3	
Zero Reading 100% N2	0.0	0	0.0	0	0.0	0
	Accept ±0.0		Accept ±0.0		Accept ±0.1	

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings (ppm)			
Gas Type	Range (ppm)		Zero Reading		Instrument Gas Reading	
H2S	5000	1500	0	Accept ±0.0	1500	Accept ±5.0%
CO	2000	1000	0	Accept ±0.0	1003	Accept ±5.0%
Hexane	2.0%	2.0%	0	Accept ±0.0	1.99	Accept ±10.0%

Cross Gas Effects									
Applied Gas (ppm)		Instrument Readings (ppm)							
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:	HEX		
H2S	1500	1500		0		0			
CO	1000	90		1003		0			
Hexane	2.0%	0		0		1.99			

Pressure Checks			
Atmospheric Pressure [AP] (mB)			
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports		1005	Accept ± 2.0
AP Port (Internal)	+800 mB	800	Accept ± 5.0
	+1200mb	1200	Accept ± 5.0

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading (l/h)	Instrument Reading (l/h)		Applied Pressure (Pa)	Instrument Reading (Pa)	
-30	-30.1	Accept ± 3.0	-391	-397	Accept ± 50
-3	-3.0	Accept ± 1.0	-17	-18	Accept ± 6.0
0	0.0	Accept ± 0.0	0	0	Accept ± 0.5
3	3.0	Accept ± 0.5	15	16	Accept ± 3.0
30	30.0	Accept ± 3.0	344	344	Accept ± 50
60	60.2	Accept ± 6.0	1081	1098	Accept ± 130
90	91.6	Accept ± 9.0	2141	2238	Accept ± 250

Temperature Checks		
Calibration Temperature	Instrument Temperature Reading $^{\circ}\text{C}$	
Applied Temperature $^{\circ}\text{C}$		
-10	-10.0	Accept ± 2.0
0	0.0	Accept ± 1.0
30	30.0	Accept ± 1.0
60	60.0	Accept ± 1.0
100	100.0	Accept ± 1.0

Technician:
<i>Jack Rutland</i>

Date Tested:
<i>11/04/2025</i>

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

Gas Data Ltd is certified to BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018.

TEST DATE AND CONDITIONS			
Date	11.4.25		
Atmospheric Pressure	1005	mB	
Ambient Temperature	21.3	°C	
Envionics Serial No.	5089		

GAS DATA LTD Unit D Earlplace Business Park Fletchamstead Highway Coventry CV4 9XL UK +44 (0) 24 7630 3311	 GAS DATA LISTEN · ANALYSE · INFORM
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GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS			
SO Number	Instrument Type	Instrument Serial Number + SW Version	Job Number(s)
342447	GFM436	14048 G436-29/10	126129

Calibration Technician *J. Williams*

Date 11.4.25

Inspection Technician *J. Williams*

Date 15-6-23

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable (NA)	INSTRUMENT PACKING LIST		Tick if included
Function Tests	Dust Caps Fitted	P	Instrument		✓
	Keyboard Test (All Keys)	P	Leather Case		✓
	Backlight	P	Instrument Strap		✓
	Clock Set / Running	P	AC Battery Charger (UK)		✓
	Comms Test	P	AC Battery Charger (EURO)		X
	Pump Flow Test (In & Out)	P	AC Battery Charger (US)		X
	Overall Leak Test (30mB)	n/a	AC Battery Charger (AUS)		X
	Battery Charge Test	P	Gas Sample Pipe - (new issue)		✓
	Service Date set to?	11/04/26	Flow Sample Pipe - (new issue)		✓
Channel Tests	Data Logging Enabled?	P	Hard Carry Case		✓
	Verify CH4/LEL/Hexane/PID	P	Spares Pot		✓
	Verify CO2	P	Allen Key		✓
	Verify O2	P	Temperature Probe		X
	Verify H2S	P	Vane Anemometer		X
	Verify CO	P	USB Cable		X
	Verify LEL	P	USB Memory stick		X
	Verify 1 st Option Gas	N/A	SM V5 Software	Ver 6.05	X
	Verify Atmospheric pressure	P	Internal Filter Pack	Qty	X
	Verify differential pressure	P	External Filter Pack	Qty	X
	Verify flow	P	Field Guide		✓
	Verify temperature probe input	P	Extra Items: USED TUBING. TAG.		
	Verify vane anemometer input	P			
	Jobcard(s) completed and signed	P	Comments: N/A		
DataBase Checks	Jobcard(s) booked off database	P			
	Calibration certificate completed	P			
	Complete & print QI record	n/a			
	No. of Calibration label fitted	GDC 13791			
Label Checks	MCERTS label displayed	P			
	Warranty label fitted	P			
	H2S Range from Sales Order	5000 ppm			
	H2S Range from Cal Cert	5000 ppm			
H2S Range	Over-range value correct?	P			
	No. of High Range CH4/CO2	SIPLEX110 - 56779			
	No. of Low Range CH4/CO2/O2	" - 69849			
	No. of H2S	" 6037295			
	No. of CO	" - 69834			
QA Cylinders Used	No. of Optional Cylinder	N/A			



APPENDIX D

Laboratory Chemical Analysis

Remada Ltd
Forward House
17 High Street
Henley-in-Arden
Warwickshire
B955AA

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

t:
e: megan.bell@remada.co.uk

t: 01923 225404
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e: info-i2analytical@normecgroup.com

Analytical Report Number : 25-060051

Project / Site name:	Rochdale	Samples received on:	05/11/2025
Your job number:	1477 03	Samples instructed on/ Analysis started on:	05/11/2025
Your order number:	1477 03	Analysis completed by:	17/11/2025
Report Issue Number:	1	Report issued on:	17/11/2025
Samples Analysed:	3 soil samples - 1 leachate sample		

Joanna Biolik

Signed:

Joanna Biolik
Senior 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
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: 25-060051

Project / Site name: Rochdale

Your Order No: 1477 03

Lab Sample Number	740924	740925	740926
Sample Reference	WS01A	WS05	WS03
Sample Number	None Supplied	None Supplied	None Supplied
Water Matrix	N/A	N/A	N/A
Depth (m)	0.20	0.80	0.20
Date Sampled	03/11/2025	03/11/2025	03/11/2025
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	25.8	< 0.1	18.2
Moisture Content	%	0.01	NONE	12	23	12
Total mass of sample received	kg	0.1	NONE	2	1.2	1.6

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	JWU	JWU	JWU
Analysis completed	N/A	N/A	N/A	14/11/2025	14/11/2025	14/11/2025

General Inorganics

pH (L005B)	pH Units	N/A	MCERTS	8.3	-	-
pH (L099)	pH Units	N/A	MCERTS	7.9	7	8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.016	0.04	0.015
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.6	-	-
Loss on Ignition @ 450°C	%	0.2	MCERTS	3.3	-	-
Acid Neutralisation Capacity	+/- mmol/kg	-9999	NONE	9.7	-	-

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	0.07	0.13	0.08
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.16	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.11	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.42	1.4	0.48
Anthracene	mg/kg	0.05	MCERTS	0.1	0.29	0.11
Fluoranthene	mg/kg	0.05	MCERTS	0.99	2.3	0.81
Pyrene	mg/kg	0.05	MCERTS	0.91	2.1	0.75
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.61	1.1	0.43
Chrysene	mg/kg	0.05	MCERTS	0.68	1.3	0.46
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.76	1.5	0.55
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.34	0.64	0.24
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.64	1.1	0.46
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.28	0.54	0.22
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.07	0.16	0.06
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.35	0.6	0.28
Coronene	mg/kg	0.05	NONE	< 0.05	-	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	6.24	13.4	4.94
Total WAC-17 PAHs	mg/kg	0.85	NONE	6.24	-	-

Analytical Report Number: 25-060051

Project / Site name: Rochdale

Your Order No: 1477 03

Lab Sample Number	740924	740925	740926
Sample Reference	WS01A	WS05	WS03
Sample Number	None Supplied	None Supplied	None Supplied
Water Matrix	N/A	N/A	N/A
Depth (m)	0.20	0.80	0.20
Date Sampled	03/11/2025	03/11/2025	03/11/2025
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	6.8	16	6.9
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.64	1	0.71
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6	1.2	0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	0.3	0.4
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	U/S ^{*U/S g}	< 1.8
Chromium (III)	mg/kg	1	NONE	17	U/S ^{*U/S g}	19
Chromium (hexavalent) by IC	mg/kg	1.8	NONE	-	< 1.80	-
Chromium (III) by IC	mg/kg	1	NONE	-	21	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	21	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	36	48	46
Lead (aqua regia extractable)	mg/kg	1	MCERTS	43	130	52
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.4	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	23	21
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.7	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	20	34	23
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	290	96	380

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	12	< 10
TPHCWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	< 10	35	< 10
TPHCWG - Aromatic >EC5 - EC35 _{EH_CU+HS_1D_AR}	mg/kg	10	NONE	< 10	47	< 10

Mineral Oil (EC10 - EC40) _{EH_CU_1D_AL}	mg/kg	10	NONE	< 10	-	-
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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

Total BTEX	µg/kg	10	MCERTS	< 10	-	-
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Analytical Report Number: 25-060051

Project / Site name: Rochdale

Your Order No: 1477 03

Lab Sample Number	740924	740925	740926
Sample Reference	WS01A	WS05	WS03
Sample Number	None Supplied	None Supplied	None Supplied
Water Matrix	N/A	N/A	N/A
Depth (m)	0.20	0.80	0.20
Date Sampled	03/11/2025	03/11/2025	03/11/2025
Time Taken	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status

PCBs by GC-MS

PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	-	-
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	-	-
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	-	-
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	-	-
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	-	-
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	-	-
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	-	-
Total PCBs	mg/kg	0.007	MCERTS	< 0.007	-	-

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

Analytical Report Number: 25-060051

Project / Site name: Rochdale

Your Order No: 1477 03

Lab Sample Number				740924
Sample Reference				WS01A
Sample Number				None Supplied
Water Matrix				N/A
Depth (m)				0.20
Date Sampled				03/11/2025
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	Units	Test Limit of detection	Test Accreditation Status	

10:1 WAC Leachate

Arsenic	mg/l	0.001	ISO 17025	< 0.00100
Barium	mg/l	0.00005	ISO 17025	0.0253
Cadmium	mg/l	0.0001	ISO 17025	< 0.000100
Chromium	mg/l	0.0004	ISO 17025	< 0.00040
Copper	mg/l	0.0007	ISO 17025	0.019
Mercury	mg/l	0.0005	ISO 17025	< 0.000500
Molybdenum	mg/l	0.0004	ISO 17025	0.00282
Nickel	mg/l	0.0003	ISO 17025	0.00056
Lead	mg/l	0.001	ISO 17025	0.0022
Antimony	mg/l	0.0017	ISO 17025	< 0.0017
Selenium	mg/l	0.004	ISO 17025	< 0.0040
Zinc	mg/l	0.0004	ISO 17025	0.008
Chloride	mg/l	0.15	ISO 17025	2
Fluoride	mg/l	0.05	ISO 17025	0.46
Sulphate	mg/l	0.045	ISO 17025	4.6
Total dissolved solids	mg/l	6	ISO 17025	65
Total monohydric phenols	mg/l	0.01	ISO 17025	< 0.010
Dissolved organic carbon	mg/l	0.1	NONE	10.4

10:1 WAC Leachate

Arsenic	mg/kg	0.01	NONE	< 0.0100
Barium	mg/kg	0.0005	NONE	0.253
Cadmium	mg/kg	0.001	NONE	< 0.00100
Chromium	mg/kg	0.004	NONE	< 0.0040
Copper	mg/kg	0.007	NONE	0.19
Mercury	mg/kg	0.005	NONE	< 0.00500
Molybdenum	mg/kg	0.004	NONE	0.0282
Nickel	mg/kg	0.003	NONE	0.0056
Lead	mg/kg	0.01	NONE	0.022
Antimony	mg/kg	0.017	NONE	< 0.017
Selenium	mg/kg	0.04	NONE	< 0.040
Zinc	mg/kg	0.004	NONE	0.08
Chloride	mg/kg	1.5	NONE	20
Fluoride	mg/kg	0.5	NONE	4.6
Sulphate	mg/kg	0.45	NONE	46
Total dissolved solids	mg/kg	60	NONE	650
Total monohydric phenols	mg/kg	0.1	NONE	< 0.10
Dissolved organic carbon	mg/kg	1	NONE	104

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

i2 Analytical

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Waste Acceptance Criteria Analytical Results

Waste Acceptance Criteria Analysis Results				25-060051				
Report No:								
						Client: Remada Ltd		
Location				Rochdale				
Lab Reference (Sample Number)				740924		Landfill Waste Acceptance Criteria		
						Limits		
Sampling Date				03/11/2025		Inert Waste Landfill	Stable Non- reactive HAZARDOUS waste in non- hazardous Landfill	Hazardous Waste Landfill
Sample ID				WS01A				
Depth (m)				0.20				
Solid Waste Analysis								
TOC (%)**				1.6		3%		
Loss on Ignition (%) **				3.3		5%		
BTEX (µg/kg) **				< 10		6%		
Sum of PCBs (mg/kg) **				< 0.007		10%		
Mineral Oil (mg/kg) EH, 10, CU, AL				< 10		6000		
Total PAH (WAC-17) (mg/kg)				6.24		1		
pH (units)**				8.3		500		
Acid Neutralisation Capacity (mmol / kg)				9.7		100		
						--		
						>6		
						To be evaluated		
						To be evaluated		
Eluate Analysis				10:1		Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)				mg/l		using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
				mg/kg				
Arsenic *				< 0.00100		0.5		
Barium *				0.0253		2		
Cadmium *				< 0.000100		100		
Chromium *				< 0.00040		5		
Copper *				0.019		10		
Mercury *				< 0.000500		70		
Molybdenum *				0.00282		2		
Nickel *				0.00056		50		
Lead *				0.0022		10		
Antimony *				< 0.0017		0.7		
Selenium *				< 0.0040		5		
Zinc *				0.008		0.1		
Chloride *				2		0.5		
Fluoride*				0.46		0.06		
Sulphate *				4.6		0.1		
TDS*				65		0.06		
Phenol Index (Monohydric Phenols) *				< 0.010		0.1		
DOC				10.4		1		
						104		
						500		
						800		
						1000		
Leach Test Information								
Stone Content (%)				25.8				
Sample Mass (kg)				2				
Dry Matter (%)				88				
Moisture (%)				12				

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3. This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Analytical Report Number : 25-060051

Project / Site name: Rochdale

* 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 *
740924	WS01A	None Supplied	0.2	Brown loam and clay with gravel and stones
740925	WS05	None Supplied	0.8	Brown loam with gravel
740926	WS03	None Supplied	0.2	Brown loam and clay with gravel and stones

Analytical Report Number : 25-060051

Project / Site name: Rochdale

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
pH at 20°C in soil	Determination of pH in soil by addition of water followed by electrometric measurement	In-house method	L005B	W	MCERTS
Total organic carbon (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
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	MCERTS
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031B	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination	L033B	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	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
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
One stage WAC 10:1 leachate preparation	One stage batch test at a liquid to solid ratio of 10 L/kg	BS EN 12457-2-2002	L043B	W	ISO 17025
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe	In-house method based on Guidance on Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046B	W	NONE
Loss on ignition of soil @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	In-house method	L047-PL	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

Analytical Report Number : 25-060051

Project / Site name: Rochdale

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
TPH Chromatogram in soil	TPH Chromatogram in soil	In-house method	L064B	D	NONE
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
Total petroleum hydrocarbons by GC-FID in soil	Determination of total petroleum hydrocarbons in soil by GC-FID	In-house method	L076B	D	NONE
Chromium III in soil	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080-PL/L130B	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazine followed by colorimetry	In-house method	L080-PL	W	MCERTS
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
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 cyanide in soil	Determination of total 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
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025
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
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate	In-house method	L009B	D	MCERTS
Soil Descriptions	Textural classification	In-house method	L019B	W	NONE

Analytical Report Number : 25-060051

Project / Site name: Rochdale

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
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.

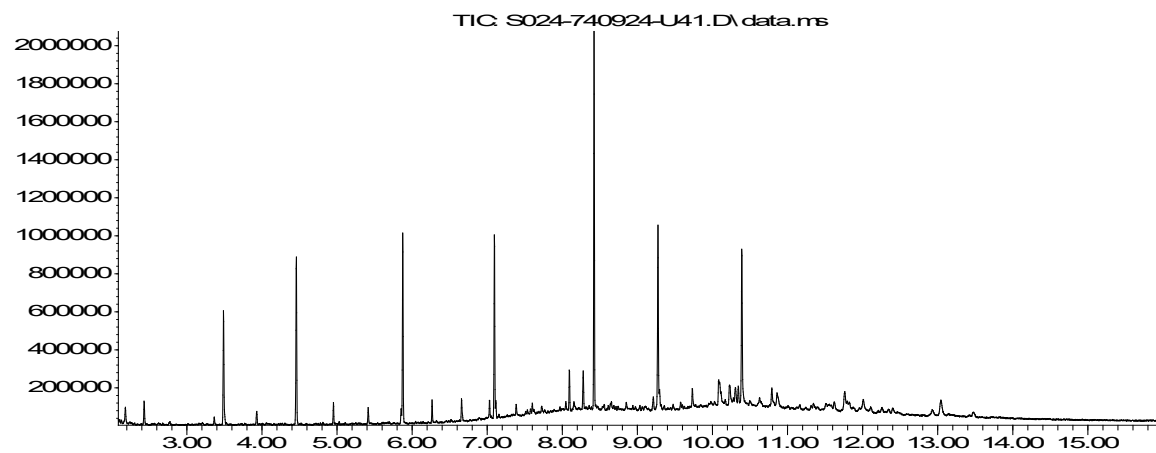
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

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.

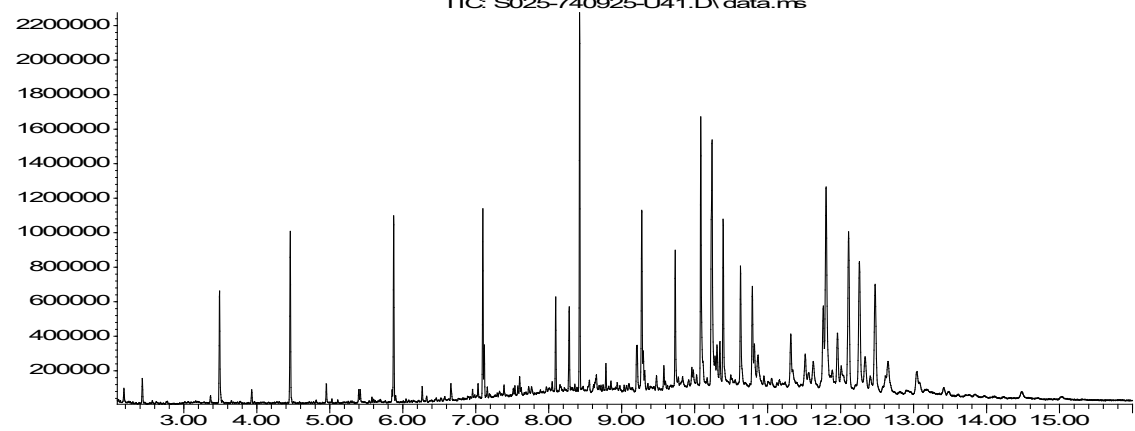
Abundance



Time→

Abundance

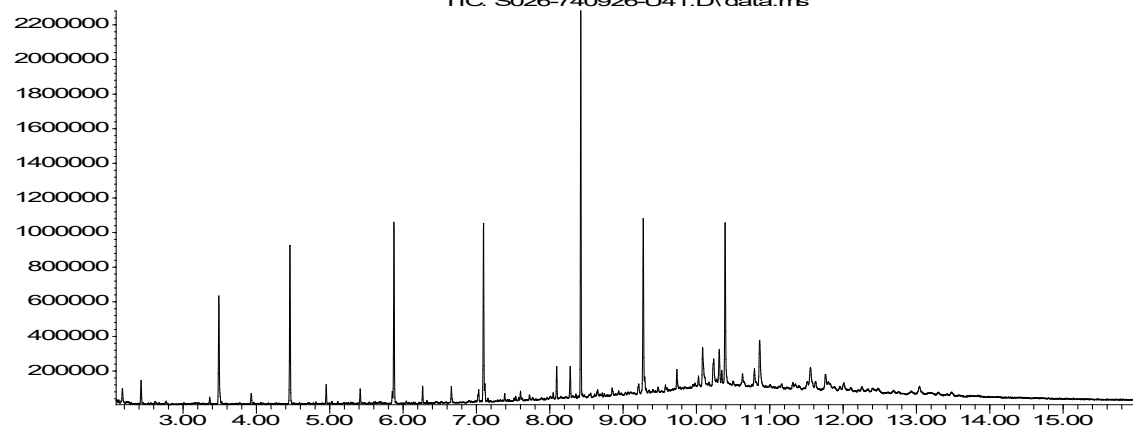
TIC: S025-740925-U41.D\data.ms



Time-->

Abundance

TIC: S026-740926-U41.D\data.ms



Time→



APPENDIX E

Laboratory Geotechnical Tests

Remada Ltd
Forward House
17 High Street
Henley-in-Arden
Warwickshire
B955AA

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
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t:
e: megan.bell@remada.co.uk
info@remada.co.uk

t: 01923 225404
f: 01923 237404
e: info-i2analytical@normecgroup.com

Analytical Report Number : 25-060392

Project / Site name:	Rochdale	Samples received on:	06/11/2025
Your job number:	1477 03	Samples instructed on/ Analysis started on:	06/11/2025
Your order number:	1477 03	Analysis completed by:	14/11/2025
Report Issue Number:	1	Report issued on:	14/11/2025
Samples Analysed:	4 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: 25-060392

Project / Site name: Rochdale

Your Order No: 1477 03

Lab Sample Number	742642	742643	742644	742645
Sample Reference	WS01A	WS04	WS03	WS04
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix	N/A	N/A	N/A	N/A
Depth (m)	0.60	2.30	1.70	1.10
Date Sampled	03/11/2025	03/11/2025	03/11/2025	03/11/2025
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status	

Stone Content	%	0.1	NONE	59.3	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	4.9	14	7.5	51
Total mass of sample received	kg	0.1	NONE	1.4	1.2	1	0.9

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	8.4	5	5.9	5.9
Total Sulphate as SO ₄	%	0.005	MCERTS	0.026	0.013	0.008	0.414
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	77	23	25	1900
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	38.7	11.7	12.7	969
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	3.6	3.5	3.6	17
Total Sulphur	mg/kg	50	MCERTS	350	73	< 50	2300
Total Sulphur	%	0.005	MCERTS	0.035	0.007	< 0.005	0.231
Ammoniacal Nitrogen as NH ₄ ⁺	mg/kg	0.5	MCERTS	< 0.5	3.3	< 0.5	190
Ammonium as NH ₄ ⁺ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	< 0.05	0.22	< 0.05	7.27
Water Soluble Nitrate (2:1) as NO ₃	mg/kg	2	NONE	4.1	< 2.0	< 2.0	5.9
Water Soluble Nitrate (2:1) as NO ₃ (leachate equivalent)	mg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0

Heavy Metals / Metalloids

Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	4.5	< 2.5	32
Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	8.9	< 5.0	64

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

Analytical Report Number : 25-060392

Project / Site name: Rochdale

* 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 *
742642	WS01A	None Supplied	0.6	Brown loam with gravel and stones
742643	WS04	None Supplied	2.3	Brown clay
742644	WS03	None Supplied	1.7	Light brown sand
742645	WS04	None Supplied	1.1	Brown loam and clay with peat and vegetation

Analytical Report Number : 25-060392

Project / Site name: Rochdale

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
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
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	L038B	D	NONE
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
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES	In-house method	L038B	D	MCERTS
Water Soluble Nitrate (leachate equivalent)	Determination of nitrate by reaction with sodium salicylate and colorimetry	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction	L078-PL	W	NONE
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser	In-house method	L082B	D	MCERTS
Ammonium as NH ₄ in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082B	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
Soil Descriptions	Textural classification	In-house method	L019B	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 30°C.

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



Laboratory Report



Contract Number: 82396

Client Ref: **1477.03**

Client PO: **1477.03**

Date Received: **07-11-2025**

Date Completed: **24-11-2025**

Report Date: **24-11-2025**

Client: **Remada Limited**

This report has been checked and approved by:

Contract Title: **1477.03**

For the attention of: **Megan Bell**

Richard John
Quality/Technical Manager

Description	Qty
Determination of water content BS EN ISO 17892-1:2014 - * UKAS	5
1 point Liquid & Plastic Limit.. BS EN ISO 17892-12 - * UKAS	5
Particle Size Distribution BS EN ISO 17892-4 : 5.1 - * UKAS	3
Sedimentation by Pipette Method BS EN ISO 17892-4 : 5.4 - @ Non Accredited Test	1

Notes: Observations and Interpretations are outside the UKAS Accreditation

* - denotes test included in laboratory scope of accreditation

- denotes test carried out by approved contractor

@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

Approved Signatories:

Brendan Evans (Business Support Co-ordinator) - Darren Bourne (Quality Senior Technician) - Jason Jenkins (Business Development Manager)

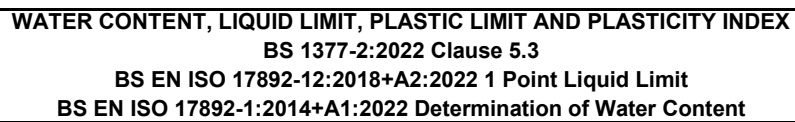
Luke Williams (Senior Laboratory Technician) - Paul Evans (Director) - Richard John (Quality/Technical Manager)

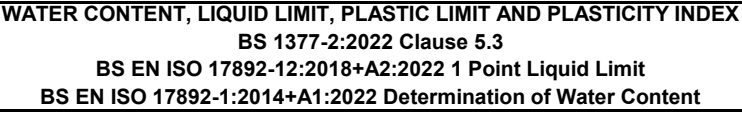
Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Wayne Honey (HR & HSE Manager)

GEO Site & Testing Services Ltd

Unit 3-4 Heol Aur, Dafen Ind Est, Llanelli, Carmarthenshire SA14 8QN

Tel: 01554 784 040 Fax: 01554 784 040 info@gstl.co.uk https://gstl.co.uk

[illegible]



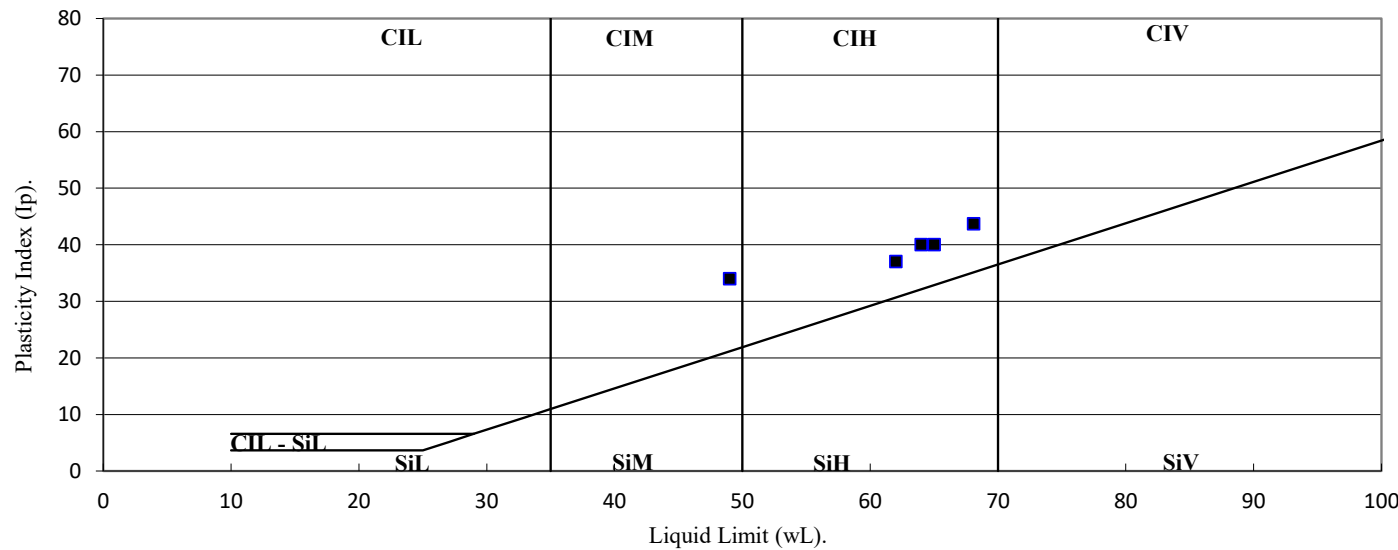
Contract Number	82396	
Project Name	1477.03	
Date Tested	20/11/2025	
Test Comments	80g/30° Fall cone used	

[illegible]

SYMBOLS : NP = Non Plastic

PLASTICITY CHART

BS EN ISO 14688-2:2018 Clause 4.4



***For sample descriptions please see sample descriptions sheet**

Operator
Ben S.

PARTICLE SIZE DISTRIBUTION
BS 1377-2:2022 Clause 10 &
BS EN ISO 17892-4:2016
Wet Sieve, Clause 5.2

Contract Number

82396

Borehole/Pit No.

WS02

Project Name

1477.03

Sample No.

Sample Description

Brown slightly fine to medium gravelly silty/clayey fine to coarse
SAND

Depth Top

2.40

Depth Base

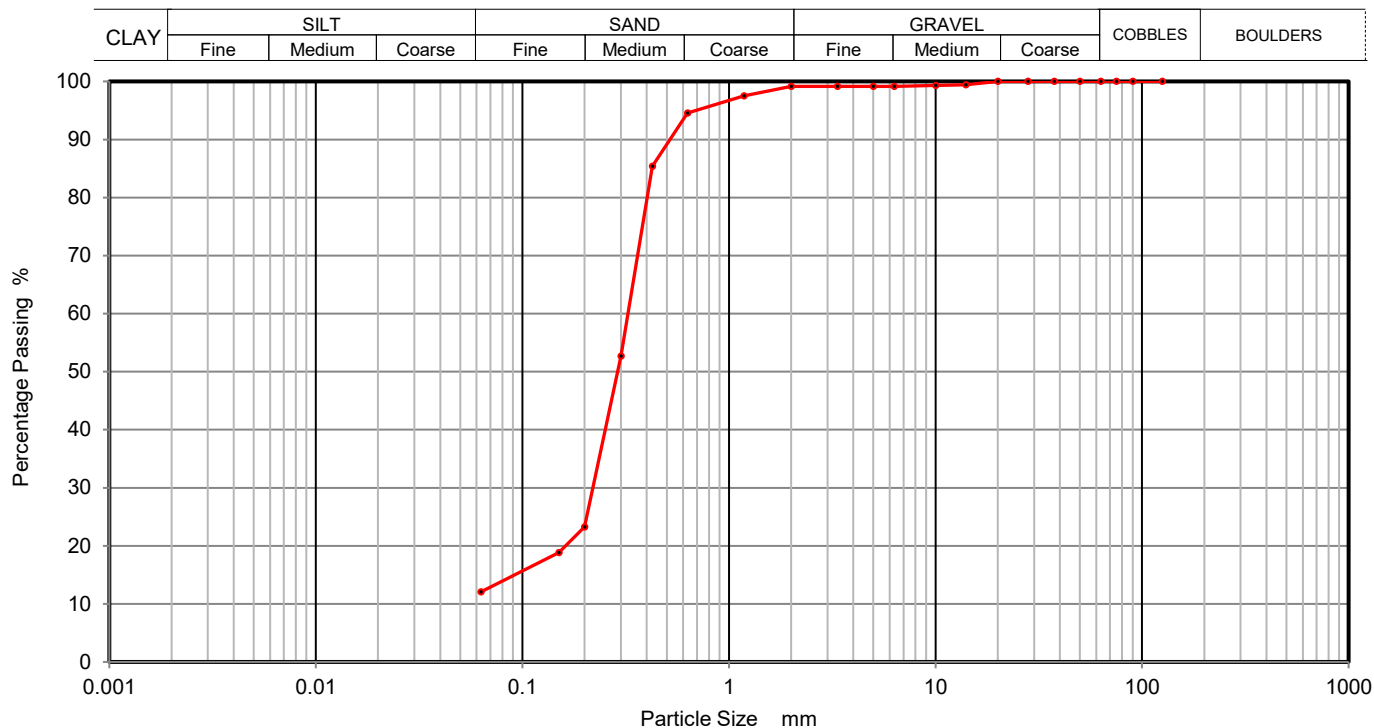
3.00

Date Tested

19/11/2025

Sample Type

B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	99		
6.3	99		
5	99		
3.35	99		
2	99		
1.18	98		
0.63	95		
0.425	85		
0.30	53		
0.20	23		
0.15	19		
0.063	12		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	87
Silt and Clay	12

Grading Analysis	
Uniformity Coefficient	N/A

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator

Jordan Williams

PARTICLE SIZE DISTRIBUTION
BS 1377-2:2022 Clause 10 &
BS EN ISO 17892-4:2016
Wet Sieve, Clause 5.2

Contract Number

82396

Borehole/Pit No.

WS03

Project Name

1477.03

Sample No.

Sample Description

Brown fine to medium gravelly silty/clayey fine to coarse SAND

Depth Top

2.00

Depth Base

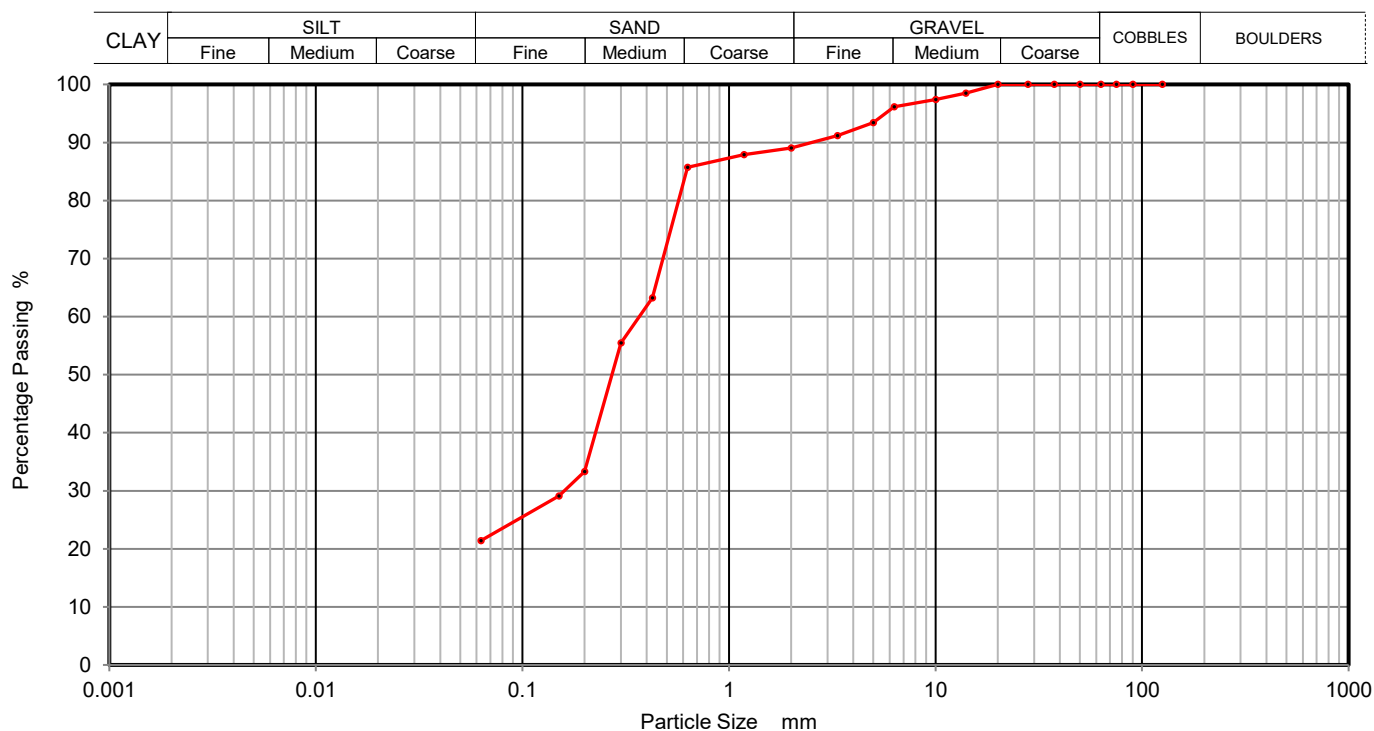
3.00

Date Tested

19/11/2025

Sample Type

B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	98		
10	97		
6.3	96		
5	93		
3.35	91		
2	89		
1.18	88		
0.63	86		
0.425	63		
0.30	55		
0.20	33		
0.15	29		
0.063	21		

Sample Proportions	% dry mass
Cobbles	0
Gravel	11
Sand	68
Silt and Clay	21

Grading Analysis	
Uniformity Coefficient	N/A

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator

Jordan Williams

PARTICLE SIZE DISTRIBUTION
BS 1377-2:2022 Clause 10 &
BS EN ISO 17892-4:2016
Wet Sieve & Pipette Analysis, Clause 5.2 & 5.4

Contract Number

82396

Borehole/Pit No.

WS04

Project Name

1477.03

Sample No.

Sample Description

Brown fine to coarse sandy silty CLAY

Depth Top

2.00

Depth Base

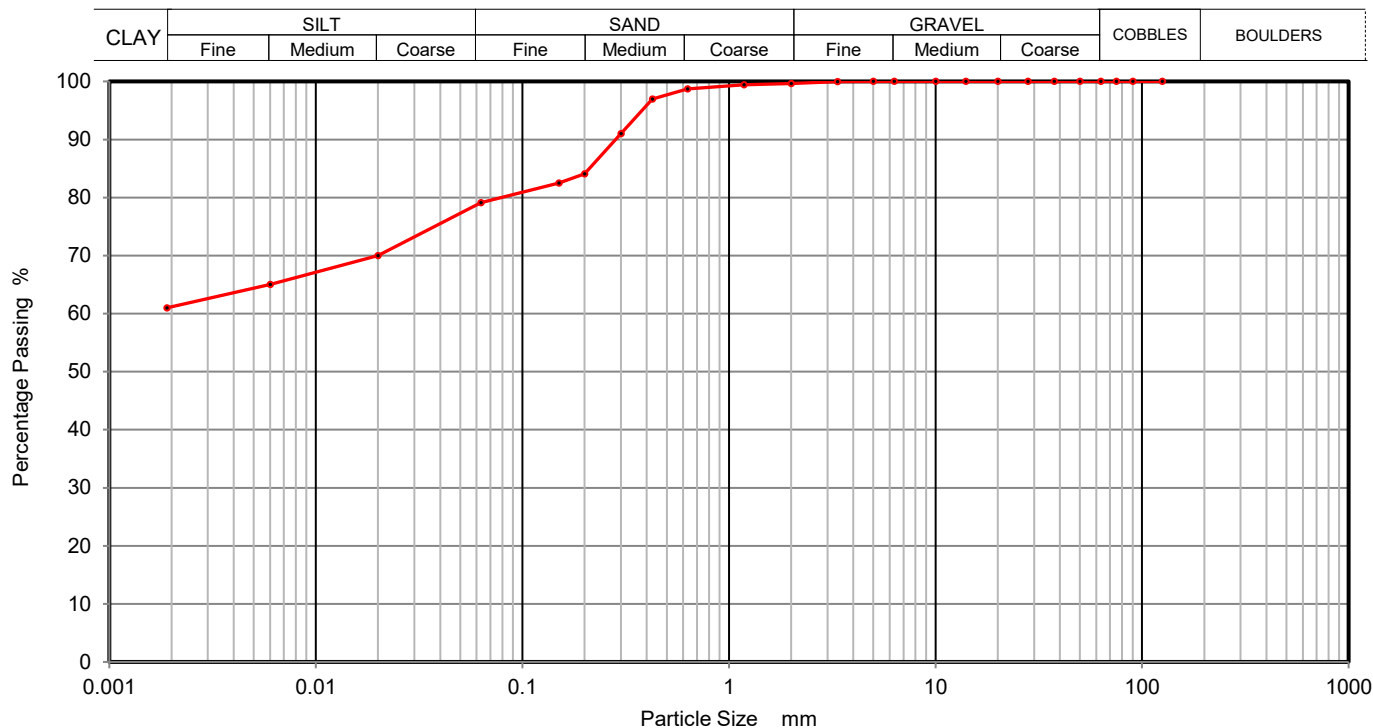
2.50

Date Tested

19/11/2025

Sample Type

B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	70
90	100	0.0060	65
75	100	0.0020	61
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.63	99		
0.425	97		
0.30	91		
0.20	84		
0.15	83		
0.063	79		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	21
Silt	18
Clay	61

Grading Analysis	
Uniformity Coefficient	N/A

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator

Jordan Williams

