

Phase 2 Ground Investigation

Client: Lidl Great
Britain Ltd

Blackmoorfoot
Road, Huddersfield

Report No: 1219.01.01

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Executive Summary

Remada Ltd was commissioned by Lidl Great Britain Ltd to conduct a Phase 2 Ground Investigation at the site of the former St Lukes Hospital, Blackmoorfoot Road, Huddersfield HD4 5RQ.

Summary of Previous Reports

The site was formerly used as a workhouse, lodges, and small schools, and most recently as a hospital. The hospital has since been demolished and the site was vacant at the time of the investigation, with some demolition waste and relict hardstanding evident on the ground surface.

Geological mapping indicates the site to be directly underlain by Rough Rock Sandstone bedrock, a designated Secondary (A) Aquifer. The site is not indicated to be located within a Coal Authority designated Coal Mining Reporting Area.

Intrusive Investigation

The investigation comprised the drilling of thirteen (13 No) window sample holes (WS01 – WS07 and WS09 – WS14), execution of four (6 No) plate bearing tests, one (1 No) CBR tests on 30th and 31st January 2024.

A variable thickness of Made Ground was encountered beneath the site which varied from between 0.5 and 2.5m in thickness. The Made Ground was generally granular and contained fragments of concrete and brick up to boulder size.

The geological mapping indicates the site to be directly underlain by the Rough Rock Sandstone, which was encountered beneath the Made Ground. The Rough Rock Sandstone is classified as a Secondary A Aquifer.

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

In general, the results of the chemical analysis indicate that the material would be classified as non-hazardous waste. Waste Acceptance Criteria (WAC) analysis was undertaken on two samples of Made Ground and a sample of the bedrock. The assessment indicated that all three sample would meet the requirements for disposal in an Inert landfill.

Geotechnical Assessment – Lidl Store

Either pad foundation or stiffened raft down-stands bearing directly on the Rough Rock Sandstone bedrock of N>50 is considered a suitable foundation solution. The published bearing capacity for moderately weak sandstone is 750 to >1000kN/m² (Tomlinson, 2001).

Shallow sandstone bedrock was encountered underlying the site, which will require a 360 tracked excavator (or similar) and breaker to penetrate.



Side slopes within the Made Ground and the underlying sandstone are likely to remain stable without support or without being battered back to a safe slope gradient. However, 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.

Perched groundwater was only encountered in TP3 within the made ground at 0.15m bgl. All other exploratory holes were dry during Remada's intrusive investigation. During the subsequent monitoring programme, standing water was only encountered during the second monitoring visit within WS1 and WS6 at 1.4m bgl (150.28m AOD) and 1.1m bgl (148.69m AOD) respectively.

CBR values estimated from dynamic cone penetrometer testing (DCP) and plate bearing testing (PBT) and within the proposed car parking areas ranged between 7% (CBR1 by DCP) and 86% (CBR2 by Plate Test). As above, proposed reduced levels are likely to expose the sandstone for which CBR values would be >15%.

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

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.



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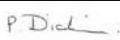
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Issue No	Date	Prepared By	Technical Review	Authorised
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1 INTRODUCTION

Remada Ltd was commissioned by Lidl Great Britain Ltd (hereafter 'the Client') to undertake a Phase 2 Ground Investigation at the site of the former St Lukes Hospital, Blackmoorfoot Road, Huddersfield HD4 5RQ 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:

- 8 No. trial pits using a 13T tracked excavator (or equivalent).
- 2 No. days of window sample boreholes to target depths of 6m including SPTs.
- 6 No combined groundwater and gas monitoring standpipes installed with window sample boreholes.
- 8 No plate bearing tests using 600mm diameter plate.
- Suite of geotechnical classification and strength tests.
- Soil sampling for chemical analysis of CLEA metals, asbestos, speciated hydrocarbons, cyanide and phenols to delineate any potential soil contamination.
- 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 4**, Findings in **Section 5** and the Exploratory Hole Locations are indicated on **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 2,000m² fronting onto Turnstone Way as shown in **Figure 2**. The proposed development will include a retaining wall which will bound the car parking and store footprint in all but the northern portion of both the car parking areas and the store.



1.4 Previous Reports

The client has provided Remada with the following reports for the site:

- Phase II Geo-Environmental Assessment Report, for St Lukes Hospital, Blackmoorfoot Road, Huddersfield. Report prepared by BWB for Persimmon Homes, Pennine Property Partnership and Henry Boot Developments Ltd, ref: STL-BWB-00-XX-EN-RP-0001_Ph2_P2, issued in June 2016.
- C9083 – Blackmoorfoot Road, Huddersfield – Technical Review of Third-Party Reports/Data. Letter prepared by Sirius Geotechnical for Lidl GB Ltd dated 5th March 2021, ref: C9083/7800/NJ/NJ.
- C9083 – Land off Blackmoorfoot Road, Huddersfield – Site Investigation Letter Report, prepared by Sirius Geotechnical for Lidl GB Ltd dated 17th September 2021, ref: C9083/AMG/9688.

The above reports have been reviewed to provide an indication of ground conditions and any potential constraints associated with the proposed development.

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 SUMMARIES OF PREVIOUS REPORTS

2.1 Summary of BWB's Phase 2 investigation (2016)

The following text is reproduced from BWB's report STL-BWB-00-XX-EN-RP-0001_Ph2_P2:

Site Setting & History

At the time of the investigation the site was unoccupied with the former hospital infrastructure having been demolished. The former floor slabs remained in-situ with several stockpiles of demolition material present across the site. The site decreases in elevation from south-west (c. 163m AOD) to north-east (c. 145m AOD). The site has historically been utilised as a workhouse, hospital, lodges and small schools.

Published Geology / Hydrogeology & Hydrology

Published geology did not indicate any artificial or superficial deposits present on site, however Made Ground was anticipated given the historical development of the site. Bedrock is indicated to be the Rough Rock Sandstone and an inferred fault is located to the north of the site. The sandstone is indicated to be a Secondary A Aquifer.

No surface water features are located in close proximity to the site.

Ground Conditions Encountered

Ground conditions were found to comprise Made Ground overlying weathered sandstone of the Rough Rock Sandstone Formation. Made Ground deposits were recorded up to 3.2m bgl in areas of historic fill behind retaining walls, whilst shallower deposits were recorded in areas of historic cut. No groundwater was encountered during the investigation or during the post investigation groundwater monitoring.

Geotechnical Appraisal

Earthworks are required to create development plateau for the proposed development. This will entail excavating material from the south-west of the site and re-engineering it within the north east of the site.

Shallow spread foundations within the weathered sandstone should provide adequate bearing capacities for the proposed development. The preliminary cut/fill models indicate that shallow spread foundations within the weathered sandstone should still be achievable in areas designated for fill.

Ground bearing floor slabs will be suitable in areas of cut and engineered fill, however there is potential for differential settlement where floor slabs are founded across boundaries between the sandstone and fill material.

Permeability rates indicate that soakaway drainage is likely to be feasible for the proposed development.

Design sulphate class DS1 and ACEC class AC-1 is required for concrete to resist attack from sulphate levels within shallow soils.

Environmental Assessment

Laboratory analysis has not identified any significantly elevated contaminant concentrations, however chrysotile asbestos has been identified within demolition materials. A clean capping topsoil layer should mitigate against the risk to future site users. Groundworkers should adopt appropriate PPE and maintain good hygiene levels to mitigate the risk.



2.2 Sirius' Third-Party Review Letter (2021)

Environmental Considerations

No evidence of ground contamination was established during the BWB investigation. This was however, established using a relatively small data set of samples. It is also worthy of note, that only 5 No. samples within the proposed Lidl site were analysed. This data set included analysis of the stockpile of demolition rubble in the locale of TP52 and weathered sandstone within TP24.

The only exception to the above results, was chrysotile asbestos was identified within the aforementioned stockpile of demolition rubble. How this stockpile was dealt with, during subsequent development of the Avant housing site, remains unknown. Furthermore, only one further sample of shallow made ground was tested (TP08), within the proposed Lidl site. Although most made ground is expected to be removed to achieve the proposed store FFL, some made ground may remain in slope faces bordering the site to the west and south. In view of this, vigilance is recommended to identify asbestos that may emerge during construction. Alternatively, it would be considered prudent to analyse additional samples of made ground for asbestos prior to commencement of construction.

Most made ground and weathered sandstone/sandstone will be removed during reduction of site levels. As such, consideration of the disposal of excess materials to a licenced landfill/ suitable receptor site should be made (in accordance with an appropriate MMP). Classification of waste is required prior to disposal off site. At this stage, classification of made ground materials cannot be made with a large degree of confidence, in light of the variability of materials and the size of the data set available. This is particularly relevant when asbestos could be present of site, which would be a key factor in determining the waste class. As such, further chemical analysis to help determine the waste classification of excess materials, as a minimum, is recommended in this respect.

No gas was recorded during the BWB investigation and the site was classified by BWB as Characteristic Situation 1 i.e., no specific ground mitigation measures are required. Generally, Sirius concurs with this assessment, as the available quantitative data indicates this classification to be appropriate. Furthermore, any sources of hazardous ground gas within made ground are likely to be removed as a result of reducing site levels. In addition, no gas emissions from underground coal workings are expected in light of the prevailing geology beneath this site. It is noted that there is a nearby landfill to the south and a very small backfilled quarry to the south west of the proposed Lidl site. However, in light of the fact the BWB investigation likely targeted these areas and found no significant hazardous gas concentrations and very low flow rates, the risk of hazardous gas affecting this development is considered low.

Geotechnical Considerations

Reduction in site levels to achieve a FFL for the store of 147.75m AOD, is likely to reveal sandstone rockhead or weathered rockhead at formation depths. As such, it is envisaged that normal spread foundations, such as a pad, would be suitable for the support of structural loads associated with a portal frame type store building. It is also envisaged that a ground bearing floor slab could be considered.

The geological rock sequence is not conducive to shallow abandoned coal mine workings beneath this site. This is supported by data from the Coal Authority, indicating the site is not within a coal mine reporting area. There is no evidence of quarrying or landfilling within the site.

It is likely/possible that retaining walls will be required along the western and southern site boundaries, to achieve the required cut level and to optimise the site area. No data exists to enable detailed design of retaining walls to take place. In the event retaining walls are to be constructed, a ground investigation of specific relevance to wall design is recommended.



Based on current plans, the subgrade could feasibly comprise weathered rock/sandstone rock. This is likely to give rise to a high CBR value. However, no quantitative value of CBR is available currently. It is therefore advised this is established prior to construction of pavements.

Based on the results from the BWB investigation, soluble sulphate concentrations and pH values indicate both made ground and natural soils require buried concrete to comply with Aggressive Chemical Environment for Concrete (ACEC) class AC-1 of the BRE SD1:2005 Version 3.

Excavation into rock is likely, most significantly in the west of the site, in order to achieve final site levels. In addition, any deep site drainage trenches are also likely to encounter rock. At this stage provision for at least breaking out of sandstone should be expected.

3 No. soakaway tests performed within TP25, within Rough Rock sandstone, returned infiltration results in the range 1.2×10^{-3} to 9.4×10^{-4} m/s, indicating soakaways could be considered on this site.

All exploratory positions within the proposed Lidl site were observed as dry during fieldwork. Instruments installed within BH01 to BH03 (inclusive), all outwith the Lidl site, were recorded as dry during the monitoring period.

2.3 Sirius' Third-Party Review Letter (2021)

Fieldwork

Fieldworks were carried out on 25th and 26th August 2021 and comprised fourteen mechanically excavated trial pits (TP01 – TP14), to a maximum depth of 5.1m below existing ground level (bgl).

Made Ground

Made ground was identified in every trial pit, to depths ranging between 0.6m and 2.9m bgl / between 147.53m and 150.21m AOD.

Intact asphalt surfacing was recorded in TP02 and TP03, to depths of 0.2m and 0.3m bgl, respectively. Buried intact asphalt surfacing was also identified in TP04 (at 0.4m bgl), TP06 (at 0.95m bgl) and TP14 (at 0.7m bgl). Made ground comprising topsoil was encountered at the surface in TP08 and TP09 (in the north-west of the site), to depths of 0.3m and 0.4m bgl, respectively.

Below the superficial materials, the remainder of the made ground was granular in nature, mostly comprising dark brown gravelly sand with low to high cobble content, of brick, concrete and sandstone, and low to medium boulder content, of concrete. The gravel-sized material comprised mostly brick, concrete and sandstone, with varying proportions of limestone, mudstone and asphalt also recorded locally.

Natural Strata

Intact sandstone (Rough Rock) was encountered directly beneath the made ground in every trial pit. This comprised weak to moderately weak yellowish brown sandstone. It was possible to excavate to depths of between 2.6m and 4.1m bgl using only a toothed 3-foot bucket with the 25-tonne excavator used. A hydraulic breaker attachment was required to advance TP02, TP03 and TP04 to depths equivalent to the proposed food store finished floor level.

Visual / Olfactory Evidence of Contamination

A slight hydrocarbon odour was noted within the made ground in TP04, between 1.4m and 2.5m bgl.

Fourteen samples of made ground (two of which comprised topsoil) were analysed for a suite of commonly occurring contaminants, including metals, speciated polycyclic aromatic hydrocarbons (PAH), asbestos, speciated total petroleum hydrocarbons (TPH), pH and water- soluble sulphate.



None of the samples of made ground tested were recorded to contain concentrations of any contaminants that exceed the Sirius Generic Assessment Criteria (GAC) for a Commercial land use. Asbestos was not detected within any of the samples analysed. Four of the samples were recorded to have pH values greater than the GAC (9), set to be protective against potential dermal irritation. Two of the samples were recorded to contain concentrations of water-soluble sulphate that exceed the GAC (0.5 g/l), set at the upper bound of Design Sulphate Class DS-1 in BRE Special Digest 1, Concrete in Aggressive Ground.

Three samples of finer material recovered from the Rough Rock sandstone were analysed for a suite of contaminants as per the made ground (excluding asbestos). None of the samples of made ground tested were recorded to contain concentrations of any contaminants that exceed the Sirius GAC for a Commercial land use. One of the samples was recorded to have a pH value greater than the GAC.

Preliminary Geotechnical Conclusions

Following excavation to reduce ground levels, competent sandstone is likely to be present at the surface or shallow depth below the footprint of the proposed food store. Therefore, conventional spread foundations (strips / pads) are likely to be a suitable foundation solution. The foundations should be a minimum of 450mm deep below finished ground level.

As competent sandstone is likely to be present at finished floor level following earthworks to reduce levels, construction of a ground-bearing floor slab is likely to be feasible.

Concrete structures (e.g., foundations and retaining walls) that are to be in contact with made ground following construction should meet the requirements of Design Sulphate Class DS-2 and ACEC Class AC-2, as defined within BRE Special Digest 1.

Ground Gas

Following excavation to reduce ground levels, little, if any, of the existing made ground will remain below the footprint of the proposed food store. Therefore, further to the previous assessments undertaken by others, no further plausible sources of ground gases have been identified by this site investigation, and therefore the risk to the proposed development is considered low, with ground gas protection, including against radon, being unnecessary.

Soakaways

Soakaway testing undertaken previously by others on the site recorded high soakaway infiltration rates within the weathered Rough Rock sandstone at shallow depth below current site levels.

If soakaways are to be considered for use on the site, it is recommended that supplementary infiltration testing is undertaken within the more competent (i.e., possibly less permeable) sandstone at representative soakaway invert depths below finished levels; it should be noted that this may not be practicable before earthworks to reduce site levels are undertaken, due to the depth of excavation required from existing levels.



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 (Unmitigated)	Proposed Remediation (Mitigation) Measures	Residual Risk Estimation
On-site Sources				Direct Soil Ingestion	Yes	To be assessed (TBA)	Potential risk	To be assessed (TBA)	To be assessed (TBA)
Historical land uses (workhouse, hospital, schools)		Disturbance due to construction plant causing direct contact, dusts, vapours.	Occupants of the development / building fabric	Indoor Dust ingestion	Yes	TBA	Potential risk	TBA	TBA
Previous phases of development and demolition		Direct Contact with occupants of the proposed development (<u>retail & off-site residential</u>)		Skin Contact with Soils	Yes	TBA	Potential risk	TBA	TBA
Made Ground	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, V, Zn, Boron, TPH /PAH, VOCs/SVOCs, PCBS	Inhalation of fibres / vapours / gases by occupants of proposed development		Skin Contact with Dust	Yes	TBA	Potential risk	TBA	TBA
Asbestos (identified in stockpiles of demolition waste during previous investigations)				Inhalation of Outdoor Dust	Yes	TBA	Potential risk	TBA	TBA
Hydrocarbon odour noted during 2021 investigation by Sirius	Ground gases	Permeation of water supply pipework	Adjacent residents during construction	Inhalation of Outdoor Vapours	Yes	TBA	Potential risk	TBA	TBA
				Inhalation of ground gas	Yes	TBA	Potential risk	TBA	TBA
				Inhalation of radon gas	No	Low Probability Radon Area	Negligible	None required	Negligible
				Inhalation of Indoor Vapours	Yes	TBA	Potential risk	TBA	TBA
				Ingestion via permeated water supply pipework	Yes	TBA	Potential risk	TBA	TBA
Off-site Sources									
Quarries, mills, landfills, waste sites, electrical substation		Leachate	Secondary A Aquifer	Leaching to Secondary A Aquifer in Bedrock	Yes	TBA	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.

3 SITE WALKOVER

The opportunity was taken to inspect the proposed Lidl store site on the 30th of January 2024 by Callum Whitehead and Sam Taylor of Remada Ltd during the intrusive works, as recorded in the photographs below. Demolition rubble was noted about the site's surface and there was evidence of fly tipping in the north-eastern corner of the site.



Photo 1: A steel fence runs parallel to the site's northern boundary within the northern portion of the site and forms the site's secure entrance. This is a view facing northeast from the site entrance.



Photo 2: A view facing southwest towards the site entrance and the western site boundary beyond. To the north of the steel fence the site comprises a grassed area sloping gently downwards from the west to the east of the site. South of the steel gate, the site has been stripped and relict concrete and asphalt ground cover was noted.



Photo 3: View facing southwest from the site's eastern boundary, showcasing the transition from the grassed area in the north to the stripped portion of the site in the south and also highlighting the fly tipping and dumping of demolition/construction material on-site.



Photo 4: View facing southeast along the south-eastern site boundary.



Photo 5: View facing northeast from the southwest corner of the site. Dumping of construction material (gravel) presumably by the adjoining Avant Homes development is noted.



Photo 6: View of construction of landscaped areas during the site works apparently encroaching onto the site by its southern boundary. The electrical substation adjoining the site's eastern boundary is visible in the top left of the photograph.



Photo 7: View facing northeast towards the site's eastern boundary.



Photo 8: View facing southwest from the approximate centre of the site to the site entrance.



4 ENVIRONMENTAL & GEOTECHNICAL INVESTIGATION METHODOLOGY

4.1 Investigation Strategy

The investigation comprised the drilling of thirteen (13 No) windowless sampler boreholes: nine of which were advanced within the footprint of the proposed store, and the remaining four (4 No) were advanced in the proposed car park. Exploratory holes WS01, WS02, WS03, WS07, WS09, WS10, and WS11 were positioned on/near the area of the proposed retaining wall. Four (4 No) plate load tests were undertaken within the footprint of the proposed Lidl store and two (2 No) were undertaken within areas of proposed car parking. Plate testing for CBR purposes with the proposed car park could not be undertaken at the location of exploratory hole TPO1 due to the depth of topsoil, however a DCP CBR test (CBR1) was undertaken in this location. Eight (8 No) trial pits were also excavated to the depth of refusal beneath each of the plate load testing locations, with the exception of PBT04, and in the locations of TPO1 and TPO8 at the site's northern and southern boundaries. Four trial pits were carried out within the footprint of the proposed store, and four were undertaken in the proposed car parking areas.

Exploratory hole locations are indicated on **Figure 2**.

Ground gas/groundwater monitoring wells were installed within six (6 No) of the windowless sampler boreholes, and subsequently four (4 No) ground gas monitoring visits were scheduled for the site to provide the minimum required by C665.

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 site work was undertaken on the 30th and 31st of January 2024. The weather conditions during the fieldwork period were generally cool and dry. Some areas of standing water were noted, particularly in the centre of the site, and slippery ground conditions associated with wet mud were noted along the site's southern and eastern portions.

4.2 Intrusive Investigation

Thirteen window sample boreholes (WS01 – WS07, and WS09 - WS14) were undertaken using a Premier 110 tracked window sampling rig and advanced to a target depth of between 3.0m and 7.0m below existing ground level (bgl) dependent on location relative to the proposed site layout. SPT refusal values (N = 50) were recorded at relatively shallow depths in 12 of the window samples on either bedrock or obstructions

Combined Groundwater and Ground Gas monitoring standpipes were installed within exploratory holes WS01 – WS06. Exploratory holes WS02, WS04, WS05, and WS06 were located within the proposed Lidl store footprint.

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 65% 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 Plate Bearing Tests

Six plate bearing tests were carried in general accordance with BS EN 1997:2007 Annex K or IAN 73/06 to a minimum pressure of 350kN/m² using a 600mm diameter plate, at the locations in **Figure 2**. A 14-tonne 360 tracked excavator provided the reaction load. Test results are presented in **Appendix B**.

4.3.4 Dynamic Cone Penetrometer (DCP) Tests

One DCP test was 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 also 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 on the trial pit and window sample logs with samples retrieved either from the excavator bucket or 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 0.5-1m 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 6th, 15th, 20th and 27th February 2024 at WS01 – WS06 and the results are presented in **Table 2**.

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

Four (4 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, three (3 No.) soil samples were scheduled for Waste Acceptance Criteria (WAC) analysis.

The results of laboratory chemical analyses are presented at **Appendix C**.

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:

- 3 No Natural Moisture Contents
- 3 No Plasticity Indices; and
- 4 No BRE SD1 suites.

The results of the geotechnical testing are presented at **Appendix D**.



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 hole logs** are presented at the end of the report.

5.1.1 Published Geology

Published geological mapping indicates the site to be directly underlain by Rough Rock Sandstone bedrock. The British Geological Survey (BGS) describe this bedrock as typically comprising '*coarse-grained feldspathic sandstone, cross-bedded*'. The Rough Rock Sandstone is classified as a Secondary A Aquifer.

5.1.2 Made Ground

Made Ground was encountered within all thirteen (13 No) exploratory hole locations, ranging in thickness between 0.10m and 2.50m, where proven.

Asphalt hardstanding was encountered within three locations (TP03, TP05, and WS05) with thicknesses ranging between 0.05m and 0.15m. Asphalt hardstanding was encountered buried within exploratory hole TP06 from 0.45 to 0.60m bgl.

The Made Ground underlying the hardstanding typically comprised granular deposits, recorded on-site as either sandy GRAVEL or gravelly SAND. The gravels were typically angular, fine to medium of mixed lithologies including brick fragments, concrete fragments, limestone and mudstone. However, within WS08 in the western area of the site, soft dark brown gravelly clay was encountered between 0.4m and 1.0m bgl containing brick and concrete fragments.

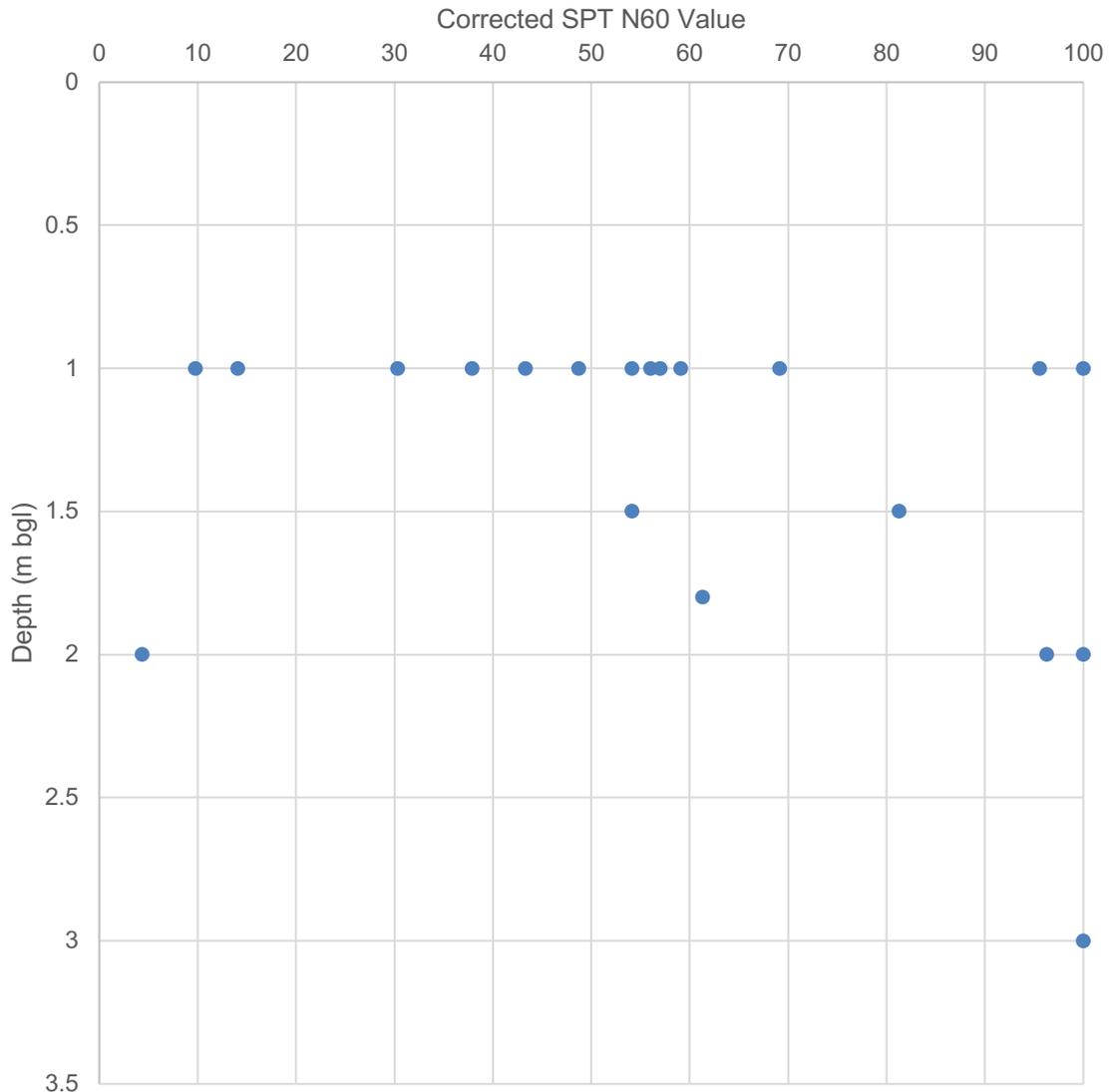
5.1.3 Natural Deposits

Within all of the exploratory holes which proved the base of the Made Ground, the bedrock of the Rough Rock Sandstone was encountered underlying it. The sandstone was typically encountered as yellowish grey brown or reddish brown weak to moderately strong coarse-grained sandstone with shelly fragments, though was locally weathered to a gravelly sand with lithorelict sandstone gravels.

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 the corrected N-values versus depth are plotted in the graph below. The corrected N₆₀ values have been capped at 100, where the calculated N₆₀ >100.



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

5.2.2 Plate Bearing Test

In the footprint of the proposed Lidl store, plate load testing achieved K762 values of 23 to 37 kN/m²/m. The results of the plate bearing tests are presented in **Appendix B**.

5.2.3 CBR Tests

The results of the six plate bearing tests on the Made Ground just below ground surface levels in the area of the proposed car park achieved CBR values of approximately 1 to 86%.

The results of the DCP test undertaken within the proposed car park area produced a value of approximately 3 to 27% (average 14%) within the upper 500mm.

5.3 Soil Observations

Made Ground was encountered within all the exploratory hole positions as a heterogeneous granular material containing a variety of man-made materials including brick, concrete, plastic, ceramic, and fragments of geogrid.

There were no visible or olfactory indicators of contamination within the sampled soils.

5.4 Groundwater Observations

Groundwater was not encountered during the course of the intrusive investigation; however perched water was noted above the subbase within exploratory hole TPO3, immediately below the relict asphalt surfacing.

5.5 Chemical Analysis

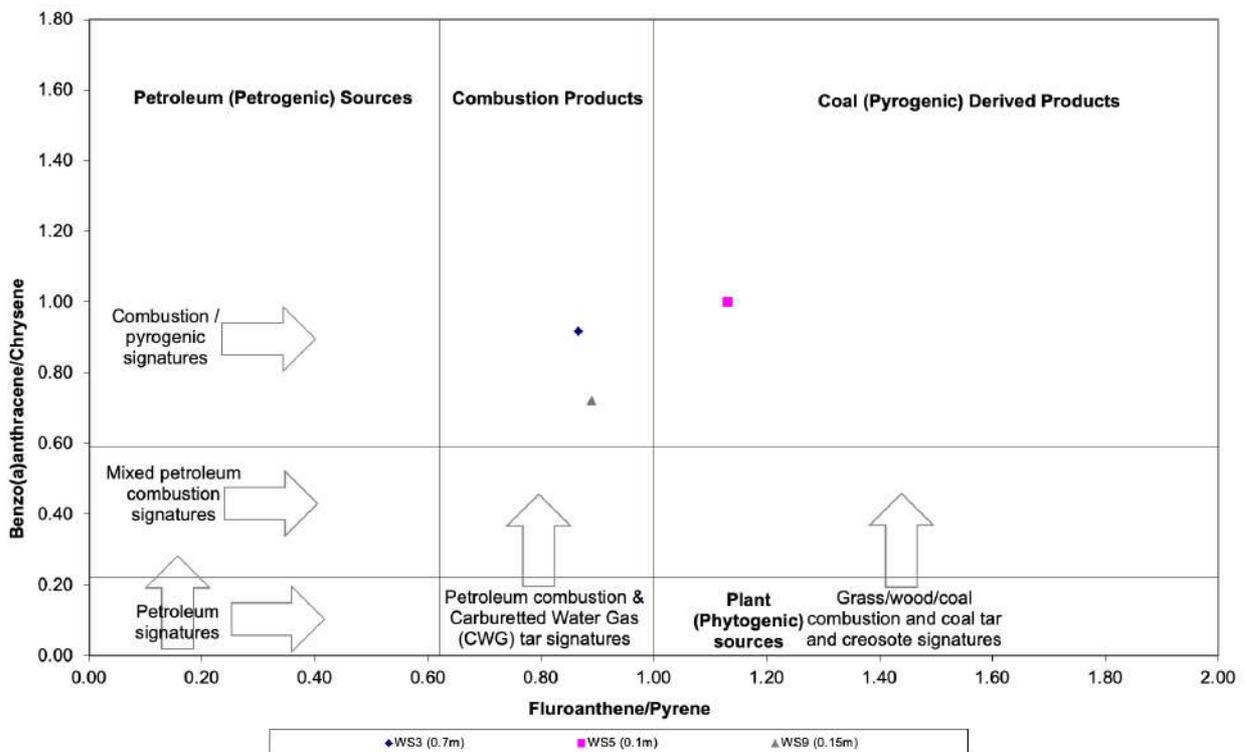
Results of the soil chemical analysis are presented in **Table 3** and summarised as follows.

The average FOC and pH were 0.011 and 9.6 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 the four samples analysed. The hydrocarbons were generally heavy end hydrocarbons within the range C10 to C35 carbon range.

Concentrations of PAHs were generally low (<2 mg/kg). A maximum concentration of a single determinant was 8.6mg/kg of fluoranthene encountered in a sample recovered from WS05 at 0.10m bgl.

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 four PAHs used have been plotted and all are indicated to be combustion related PAHs which could be associated with urban background sources.



Graph 2: PAH Double Ratio Plot



5.6 Geotechnical Testing

5.6.1 Plasticity Testing

Plasticity testing was undertaken on three samples of cohesive soils recovered from the window sample boreholes, with the results ranging between 22% and 27%. These indicate the soils to be of intermediate (CI) plasticity and low to medium volume change potential as summarised in the table below:

Location	Depth (m)	Plasticity Index (%)	Passing .425mm (%)	Modified Plasticity Index	Volume Change Potential
WS4	0.3 – 0.5	22	81	17.8	Low
WS6	0.4 – 0.6	27	82	22.1	Medium
WS10	0.7 – 0.9	25	86	21.5	Medium

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

5.6.2 BRE SD1 Analysis

The water-soluble sulphate contents varied from 16.8 to 600mg/l in the four (4 No) soil samples analysed, with pH varying from 8.1 to 9.7. The total sulphur content varied from <0.005 to 0.080%.

5.7 Ground Gas Monitoring Results

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

- Methane concentrations within all of the monitoring wells during all of the visits were recorded as being less than the instrument detection limit.
- A maximum steady state concentration of Carbon Dioxide was recorded as 1.1% v/v in WS04 during a monitoring visit undertaken on the 27th of February 2024. Detectable concentrations of carbon dioxide were recorded in all the monitoring wells over the course of the monitoring period.
- A minimum steady state concentration of Oxygen was recorded as 18.4% v/v in WS05 during a monitoring visit undertaken on the 27th of February 2024.
- Ground gas flow rates were recorded at a maximum of 0.1 litres per hour (l/hr) in WS02 during a monitoring visit undertaken on the 6th February 2024, and in WS01 on the 15th of February 2024.
- Groundwater was encountered only during the monitoring visit undertaken on the 15th February 2024. During all other monitoring visits, the boreholes were recorded as being dry. On the 15th of February, water was noted at 1.40m bgl (150.28m AOD) and 1.10m bgl (148.69m AOD) within exploratory holes WS01 and WS06, respectively; and,
- Atmospheric pressure at the time of sampling varied between a high of 999 millibar (mbar) on the 27th of February 2024 and a low of 982 mbar on the 20th February 2024. The monitoring visits were undertaken during periods of rising, steady and falling pressure trends over the preceding forty-eight hours.



6 GENERIC QUANTITATIVE RISK ASSESSMENT

6.1 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 2**.

Default parameters have been adopted for sandy loam of pH 7 and commercial land use. FOC ranged from 0.0024 to 0.0240 giving a Soil Organic Matter (SOM) content range of between 1.0 and 4.2% with an average result of 2.0%. 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.

6.2 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 protective of on-site workers.

Metals & Inorganics Excluding Asbestos

None of the analytes tested were detected at concentrations that exceeded the human health GAC protective of on-site workers.

Asbestos

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



6.3 Controlled Waters Risk Assessment

6.3.1 Sensitivity – Groundwater

The Rough Rock Sandstone bedrock underlying the site is designated as a Secondary 'A' Aquifer. There is a single groundwater abstraction point, some 430m from the site. The site does not lie within a Source Protection Zone.

6.3.2 Sensitivity – Surface Waters

There are no surface water features within the vicinity of the study site. There are no surface water abstractions recorded within 1km of the site.

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.

The groundwater was not encountered during the course of the intrusive investigation, however groundwater levels were observed within two of Remada's standpipes during one visit on the 20th of February 2024. Groundwater was encountered during this visit at 1.40 and 1.10 mbgl within exploratory holes WS01 and WS06, respectively. The other boreholes during this visit, and all boreholes during the other visits undertaken during the 2024 monitoring programme, were found to be dry.

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 % x 0.1 l/hr = 0.0001 l/hr (methane concentration taken as equal to the instrument detection limit of 0.1%).
- Carbon Dioxide GSV = 1.1 % x 0.1 l/hr = 0.0011 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 methane and carbon dioxide were both within these typical limits it is considered that the Characteristic Situation 1 classification is appropriate for the site. Therefore, gas protection measures are not deemed necessary for the proposed development.

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

The results of the assessment indicated that contaminant concentrations within the made ground, topsoil and natural soils were generally low and would classify the soils as non-hazardous with LoW Code 17 05 04 (soils and stones other than those mentioned in 17 05 03).

6.6.2 Waste Acceptance

Waste Acceptance Criteria (WAC) analysis was undertaken on two samples of Made Ground and a sample of the bedrock. The assessment of all three samples indicated that they 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
On-site Sources Historical land uses (workhouse, hospital, schools) Previous phases of development and demolition Made Ground Asbestos (identified in stockpiles of demolition waste during previous investigations) Hydrocarbon odour noted during 2021 investigation by Sirius Off-site Sources Quarries, mills, landfills, waste sites, electrical substation	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, V, Zn, Boron, TPH/PAH, VOCs/SVOCs, PCBS Ground gases	Disturbance due to construction plant causing direct contact, dusts, vapours. Direct Contact with occupants of the proposed development (<u>retail & off-site residential</u>) Inhalation of fibres / vapours / gases by occupants of proposed development Permeation of water supply pipework Leachate	Occupants of the development / building fabric Adjacent residents during construction Secondary A Aquifer	Direct Soil Ingestion	• Yes	No exceedance of GAC.	Very Low	Hardstanding to cover retail site and car parking areas minimising direct contact.	Negligible
				• Indoor Dust ingestion	• Yes	As above	Very Low	As above	Negligible
				• Skin Contact with Soils	• Yes	As above	Very Low	As above	Negligible
				• Skin Contact with Dust	• Yes	As above	Very Low	As above	Negligible
				• Inhalation of Outdoor Dust	• Yes	As above	Very Low	As above	Negligible
				• Inhalation of Outdoor Vapours	• Yes	As above	Very Low	As above	Negligible
				• Inhalation of Indoor Vapours	• Yes	As above	Very Low	As above	Negligible
				• Ingestion via permeated water supply pipework	• Yes	As above	Very Low	As above	Negligible
				• Inhalation of ground gas	• Yes	CSI	Negligible	None	Negligible
				• Inhalation of radon gas	• No	Low Probability Radon Area	Very low	None required	Negligible
• Leaching to Secondary A Aquifer in Bedrock	• Yes	Concentrations within typical range of made ground (< GAC)	Low	Hardstanding to prevent precipitation infiltration and leaching.	Negligible				

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 in the eastern and south-eastern areas of the site, adjacent to Turnstone Way. The proposed delivery ramp would be located adjacent to the south-eastern boundary. The remainder of the site would be occupied by car parking and soft landscaping. The client has confirmed that the anticipated Finished Floor Level at the time of writing is 147.5m AOD.

Remada's window sample boreholes WS02, WS04 – WS06 and WS11 – WS14 and trial pits TP4 – TP8 were positioned within the proposed Lidl store footprint, with trial pit TP8 positioned within the proposed delivery bay area.

Uncorrected SPT N-values at 1.0m bgl within these eight window sample boreholes ranged between 13 (WS2) and >50. Sandstone bedrock was encountered within all twelve exploratory hole locations within the proposed store footprint at depths of between 146.5m and 149.4m above ordnance datum (m AOD). Therefore, sandstone will be either exposed as part of a reduced level or encountered with 0.5m or so of the proposed finished floor level.

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

Either pad foundations or raft down-stands bearing directly on the Rough Rock Sandstone bedrock of $N > 50$ are considered suitable foundation solutions. The published bearing capacity for moderately weak sandstone is 750 to $>1000 \text{ kN/m}^2$ (Tomlinson, 2001).

7.3 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**.

7.4 Excavations and Temporary Works

Shallow sandstone bedrock was encountered underlying the site, which will require a 360 tracked excavator (or similar) and breaker to penetrate.

Side slopes within the Made Ground and the underlying sandstone are likely to remain stable without support or without being battered back to a safe slope gradient. However, 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.

Perched groundwater was only encountered in TP3 within the made ground at 0.15m bgl. All other exploratory holes were dry during Remada's intrusive investigation. During the subsequent monitoring programme, standing water was only encountered during the second monitoring visit within WS1 and WS6 at 1.4m bgl (150.28m AOD) and 1.1m bgl (148.69m AOD) respectively.

7.5 External Car Park Construction

CBR values estimated from dynamic cone penetrometer testing (DCP) and plate bearing testing (PBT) and within the proposed car parking areas ranged between 7% (CBR1 by DCP) and 86% (CBR2 by Plate



Test). As above, proposed reduced levels are likely to expose the sandstone for which CBR values would be >15%.

Poorly compacted Made Ground, relict foundations and demolition waste on-site should be excavated, processed as necessary to produce a 6F2 material and replaced in compacted layers in accordance with an engineering specification.

7.6 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 0.60 g/l and pH >7.6. A total potential sulphate value of 0.24% 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-2 is considered appropriate for the location.

7.7 General Construction Advice

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.



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 was previously occupied by a hospital, but this had been demolished by the time of Remada's intrusive investigation. The majority of the site surface consisted of relict asphalt surfacing and Made Ground mixed with demolition rubble.

Geological mapping indicates the site to be directly underlain by Rough Rock Sandstone bedrock, a designated Secondary (A) Aquifer. The site is not indicated to be located within a Coal Authority designated Coal Mining Reporting Area.

The investigation comprised the drilling of thirteen (13 No) window sample holes (WS01 – WS07 and WS09 – WS14), execution of six (6 No) plate bearing tests, one (1 No) CBR tests on 30th and 31st January 2024.

A variable thickness of made ground was encountered beneath the site which varied from between 0.1m and 2.5m in thickness. The made ground was generally consisted of gravel or sandy, gravelly clay and contained fragments of concrete and brick up to boulder size.

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

In general, the results of the chemical analysis indicate that the material would be classified as non-hazardous waste. Waste Acceptance Criteria (WAC) analysis was undertaken on two samples of Made Ground and a sample of the bedrock. The assessment indicated that all three sample would meet requirements for disposal in an Inert landfill.

8.2 Recommendations

Either pad foundation or stiffened raft down-stands bearing directly on the Rough Rock Sandstone bedrock of N>50 is considered a suitable foundation solution. The published bearing capacity for moderately weak sandstone is 750 to >1000kN/m² (Tomlinson, 2001). Finished floor levels are not known at the time of writing this report and it is assumed that these will be close to the existing site entrance level off Turnstone Way.



Shallow sandstone bedrock was encountered underlying the site, which will require a 360 tracked excavator (or similar) and breaker to penetrate.

Side slopes within the Made Ground and the underlying sandstone are likely to remain stable without support or without being battered back to a safe slope gradient. However, 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.

Perched groundwater was only encountered in TP3 within the made ground at 0.15m bgl. All other exploratory holes were dry during Remada's intrusive investigation. During the subsequent monitoring programme, standing water was only encountered during the second monitoring visit within WS1 and WS6 at 1.4m bgl (150.28m AOD) and 1.1m bgl (148.69m AOD) respectively.

CBR values estimated from dynamic cone penetrometer testing (DCP) and plate bearing testing (PBT) and within the proposed car parking areas ranged between 7% (CBR1 by DCP) and 86% (CBR2 by Plate Test). As above, proposed reduced levels are likely to expose the sandstone for which CBR values would be >15%.

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



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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

Table 2: Gas Groundwater Monitoring Data

GAS & GROUNDWATER MONITORING DATA																			
SITE		LIDL BLACKMOORFOOT																	
PROJECT No.		1219.01		Atmospheric & Ground Conditions															
Visit 1 of 4		Atmospheric Pressure Variations During Visit										Ground Surface Conditions							
Carried Out by:		Peter Dickinson		983 - 984mb										Wet					
Date:		06.02.2024		Atmospheric Pressure Trend Over Previous 48hrs										Weather Conditions					
Instrument Details		GA 5000 G501261		Falling										Raining					
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)		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					
WS1	151.680	50	0.0	0.0	0.0	0.1	0.1	19.8	19.8	60	0.0		-	-	983	DRY	DRY	1.500	
WS2	147.850	50	0.0	0.0	0.0	0.1	0.1	19.7	19.7	60	0.1		-	-	984	DRY	DRY	2.000	
WS3	152.710	50	0.0	0.0	0.0	0.1	0.1	19.6	19.6	60	0.0		-	-	983	DRY	DRY	3.000	
WS4	149.070	50	0.0	0.0	0.0	0.1	0.1	20.1	20.1	60	0.0		-	-	983	DRY	DRY	1.000	
WS5	149.130	50	0.0	0.0	0.0	0.1	0.1	20.2	20.1	60	0.0		-	-	984	DRY	DRY	1.000	
WS6	149.790	50	0.0	0.0	0.0	0.1	0.1	20.2	20.2	60	0.0		-	-	984	DRY	DRY	1.400	Headworks flooded

NR = Not Recorded ^ For measurement of gas concentrations > = Above LEL WST = Water Sample Taken GL = Ground Level

GAS & GROUNDWATER MONITORING DATA																			
SITE		LIDL BLACKMOORFOOT																	
PROJECT No.		1219.01		Atmospheric & Ground Conditions															
Visit 2 of 4		Atmospheric Pressure Variations During Visit										Ground Surface Conditions							
Carried Out by:		Callum Whitehead		987-989										Damp					
Date:		15.02.2024		Atmospheric Pressure Trend Over Previous 48hrs										Weather Conditions					
Instrument Details		GA 5000 G501261		Steady										Cloudy					
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)		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					
WS1	151.680	50	0.0	0.0	0.0	0.3	0.1	20.2	20.3	60	0.1		-	-	989	1.400	150.280	1.500	
WS2	147.850	50	0.0	0.0	0.0	0.2	0.0	19.1	19.7	60	0.0		-	-	988	DRY	DRY	2.000	
WS3	152.710	50	0.0	0.0	0.0	0.3	0.2	18.7	18.7	60	0.0		-	-	988	DRY	DRY	3.000	
WS4	149.070	50	0.0	0.0	0.0	0.6	0.5	19.3	19.5	60	0.0		-	-	988	DRY	DRY	1.000	
WS5	149.130	50	0.0	0.0	0.0	0.4	0.0	19.1	19.4	60	0.0		-	-	988	DRY	DRY	1.000	
WS6	149.790	50	0.0	0.0	0.0	0.1	0.0	19.5	19.6	60	0.0		-	-	987	1.100	148.690	1.400	

Notes: NR = Not Recorded ^ For measurement of gas concentrations > = Above LEL WST = Water Sample Taken GL = Ground Level

Table 2: Gas Groundwater Monitoring Data

GAS & GROUNDWATER MONITORING DATA																			
SITE		LIDL BLACKMOORFOOT																	
PROJECT No.		1219.01											Atmospheric & Ground Conditions						
Visit 3 of 4		Atmospheric Pressure Variations During Visit											Ground Surface Conditions						
Carried Out by:		Sam Taylor											982 mB						
Date:		20.02.2024											Dry						
Instrument Details		GA 5000 G501261											Atmospheric Pressure Trend Over Previous 48hrs						
		Rising											Weather Conditions						
													Clear						
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)		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					
WS1	151.680	50	0.0	0.0	0.0	0.8	0.8	11.2	19.5	60	0.0		-	-	982	DRY	DRY	1.500	
WS2	147.850	50	0.0	0.0	0.0	0.8	0.8	16.0	21.0	60	0.0		-	-	982	DRY	DRY	2.000	
WS3	152.710	50	0.0	0.0	0.0	0.8	0.7	19.6	19.6	60	0.0		-	-	982	DRY	DRY	3.000	
WS4	149.070	50	0.0	0.0	0.0	0.7	0.7	20.1	20.1	60	0.0		-	-	982	DRY	DRY	1.000	
WS5	149.130	50	0.0	0.0	0.0	0.7	0.5	20.2	20.1	60	0.0		-	-	982	DRY	DRY	1.000	
WS6	149.790	50	0.0	0.0	0.0	0.8	0.8	20.2	20.2	60	0.0		-	-	982	DRY	DRY	1.400	Headworks flooded

Notes: NR = Not Recorded ^ For measurement of gas concentrations > = Above LEL WST = Water Sample Taken GL = Ground Level

GAS & GROUNDWATER MONITORING DATA																			
SITE		LIDL BLACKMOORFOOT																	
PROJECT No.		1219.01											Atmospheric & Ground Conditions						
Visit 4 of 4		Atmospheric Pressure Variations During Visit											Ground Surface Conditions						
Carried Out by:		Callum Whitehead											996-999						
Date:		27.02.24											Damp						
Instrument Details		GA 5000 G501261											Atmospheric Pressure Trend Over Previous 48hrs						
		Falling											Weather Conditions						
													Sunny with some rain						
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)		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					
WS1	151.680	50	0.0	0.0	0.0	0.8	0.8	19.2	19.8	60	0.0	0.00	-	-	999	DRY	DRY	1.500	Headworks Flooded
WS2	147.850	50	0.0	0.0	0.0	0.2	0.0	19.2	19.8	60	0.0	0.00	-	-	997	DRY	DRY	2.000	
WS3	152.710	50	0.0	0.0	0.0	0.5	0.4	18.9	19.0	60	0.0	0.00	-	-	996	DRY	DRY	3.000	
WS4	149.070	50	0.0	0.0	0.0	1.1	1.1	18.6	18.6	60	0.0	0.00	-	-	999	DRY	DRY	1.000	Headworks Flooded
WS5	149.130	50	0.0	0.0	0.0	0.2	0.2	18.4	18.4	60	0.0	0.00	-	-	998	DRY	DRY	1.000	
WS6	149.790	50	0.0	0.0	0.0	0.3	0.2	19.2	19.5	60	0.0	0.0	-	-	997	DRY	DRY	1.400	

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 1: Comparison of Soil Chemical Analyses with GAC

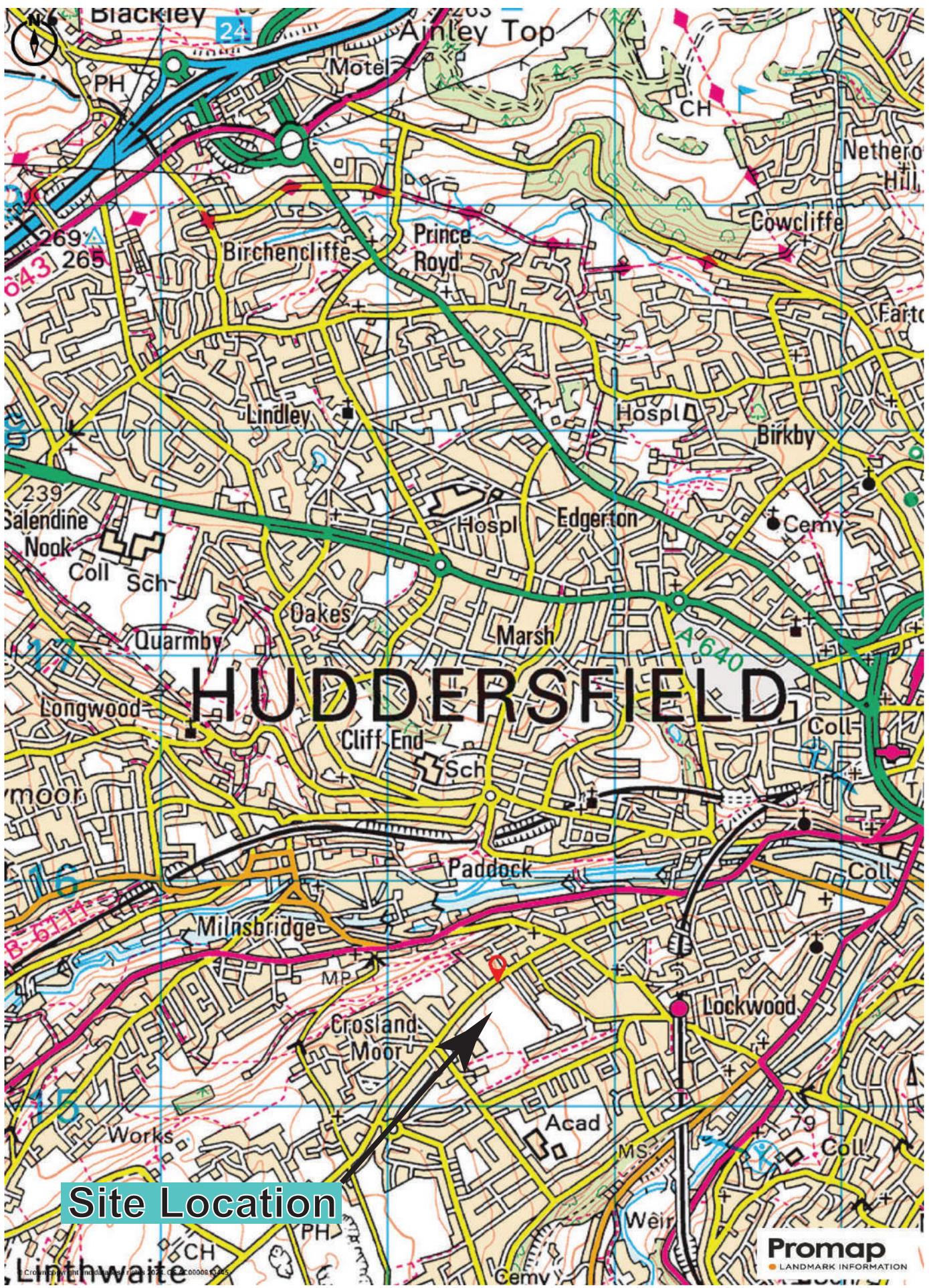
Lab Sample Number:				Commercial GAC 2.5% SOM	109192	109193	109194	109195	109196	109197	109198	109199
Sample Reference:					WS03	WS04	WS05	WS05	WS06	WS09	WS11	WS12
Borehole:					0.70	0.80	0.10	1.00	1.20	0.15	1.00	0.40
Top Depth (m):					-	-	-	-	-	-	-	-
Basal Depth (m):					-	-	-	-	-	-	-	-
Date Sampled:				30/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024	30/01/2024	30/01/2024	30/01/2024	
Determinand	Units	Limit of detection	Accreditation Status	[mg/kg unless stated]								
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected							
Asbestos Analyst ID	NA	NA	NA	-	-	-	-	-	-	-	-	-
Moisture	%	0.01	NONE	-	14	6.5	8.5	5.1	7.2	15	11	11
pH	pH Units	N/A	MCERTS	-	10.6	8.1	7.6	8.4	8.2	7.9	9.7	8.4
Arsenic	mg/kg	1.00	MCERTS	640	10	-	5.3	-	-	35	-	6.9
Beryllium	mg/kg	0.05	MCERTS	12	0.84	-	0.34	-	-	1.4	-	0.48
Boron	mg/kg	0.20	MCERTS	240000	1.2	-	0.3	-	-	0.5	-	0.6
Cadmium	mg/kg	0.20	MCERTS	190	< 0.2	-	< 0.2	-	-	< 0.2	-	0.4
Chromium (Hexavalent)	mg/kg	1.80	MCERTS	33	< 1.8	-	< 1.8	-	-	< 1.8	-	< 1.8
Chromium (Trivalent)	mg/kg	1.00	NONE	8600	19	-	11	-	-	16	-	13
Chromium	mg/kg	1.00	MCERTS	-	19	-	11	-	-	16	-	13
Copper	mg/kg	1.00	MCERTS	68000	33	-	16	-	-	69	-	20
Lead	mg/kg	1.00	MCERTS	NC	58	-	20	-	-	140	-	46
Mercury	mg/kg	0.30	MCERTS	58** (25.8)	< 0.3	-	< 0.3	-	-	0.5	-	< 0.3
Nickel	mg/kg	1.00	MCERTS	980	16	-	9	-	-	19	-	11
Selenium	mg/kg	1.00	MCERTS	12000	< 1.0	-	< 1.0	-	-	< 1.0	-	< 1.0
Vanadium	mg/kg	1.00	MCERTS	9000	26	-	14	-	-	33	-	16
Zinc	mg/kg	1.00	MCERTS	730000	91	-	30	-	-	120	-	65
Total Cyanide	mg/kg	1.00	MCERTS	-	-	-	-	-	-	-	-	-
Fraction Organic Carbon (FOC)	NA	0.00	MCERTS	-	0.0064	-	0.0057	-	-	0.024	-	0.0098
Calculated SOM from FOC	-	-	-	-	1.0	-	0.98	-	-	4.14	-	1.69
Calculated TOC from FOC	-	-	-	-	0.64	-	0.57	-	-	2.40	-	0.98
Aliphatic TPH >C5-C6	mg/kg	0.00	NONE	5900sol (558)	< 0.020	-	< 0.020	-	-	< 0.020	-	< 0.020
Aliphatic TPH >C6-C8	mg/kg	0.00	NONE	17000sol (322)	< 0.020	-	< 0.020	-	-	< 0.020	-	< 0.020
Aliphatic TPH >C8-C10	mg/kg	0.00	NONE	4800vap (1190)	< 0.050	-	< 0.050	-	-	< 0.050	-	< 0.050
Aliphatic TPH >C10-C12	mg/kg	1.00	MCERTS	2300vap (118)	< 1.0	-	5.4	-	-	< 1.0	-	< 1.0
Aliphatic TPH >C12-C16	mg/kg	2.00	MCERTS	82000sol (59)	< 2.0	-	5.1	-	-	2.8	-	< 2.0
Aliphatic TPH >C16-C21	mg/kg	8.00	MCERTS	1700000	< 8.0	-	13	-	-	< 8.0	-	< 8.0
Aliphatic TPH >C21-C35	mg/kg	8.00	MCERTS	-	40	-	47	-	-	19	-	41
Total Aliphatic Hydrocarbons:	mg/kg	10.00	NONE	-	40	-	70	-	-	22	-	41
Aromatic TPH >C5-C7	mg/kg	0.00	NONE	46000sol (2260)	< 0.010	-	< 0.010	-	-	< 0.010	-	< 0.010
Aromatic TPH >C7-C8	mg/kg	0.00	NONE	11000sol (1920)	< 0.010	-	< 0.010	-	-	< 0.010	-	< 0.010
Aromatic TPH >C8-C10	mg/kg	0.00	NONE	8100vap (1500)	< 0.050	-	< 0.050	-	-	< 0.050	-	< 0.050
Aromatic TPH >C10-C12	mg/kg	1.00	MCERTS	28000sol (899)	< 1.0	-	< 1.0	-	-	< 1.0	-	< 1.0
Aromatic TPH >C12-C16	mg/kg	2.00	MCERTS	37000	< 2.0	-	3.9	-	-	5.1	-	3.3
Aromatic TPH >C16-C21	mg/kg	10.00	MCERTS	28000	< 10	-	35	-	-	24	-	29
Aromatic TPH >C21-C35	mg/kg	10.00	MCERTS	28000	37	-	54	-	-	54	-	95
Total Aromatic Hydrocarbons	mg/kg	10.00	NONE	-	37	-	93	-	-	83	-	130
Naphthalene	mg/kg	0.05	MCERTS	4600sol (183)	< 0.05	-	< 0.05	-	-	0.2	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	9700sol (212)	< 0.05	-	< 0.05	-	-	0.07	-	0.12
Acenaphthene	mg/kg	0.05	MCERTS	9700sol (141)	< 0.05	-	0.17	-	-	0.6	-	0.16
Fluorene	mg/kg	0.05	MCERTS	6800	< 0.05	-	0.14	-	-	0.46	-	0.16
Phenanthrene	mg/kg	0.05	MCERTS	22000	0.51	-	1.4	-	-	5.3	-	2.2
Anthracene	mg/kg	0.05	MCERTS	540000	0.16	-	1.1	-	-	1.3	-	0.64
Fluoranthene	mg/kg	0.05	MCERTS	23000	1.3	-	8.6	-	-	7.1	-	4.5
Pyrene	mg/kg	0.05	MCERTS	54000	1.5	-	7.6	-	-	6.1	-	4.2
Benzofluoranthene	mg/kg	0.05	MCERTS	170	0.77	-	2.9	-	-	3	-	2.1
Chrysene	mg/kg	0.05	MCERTS	350	0.84	-	2.9	-	-	3.3	-	2.1
Benzofluoranthene	mg/kg	0.05	ISO 17025	45	1.1	-	3	-	-	3.4	-	2.5
Benzokluoranthene	mg/kg	0.05	ISO 17025	1200	0.55	-	1.2	-	-	1.4	-	1.2
Benzofluoranthene	mg/kg	0.05	MCERTS	35	0.87	-	2.4	-	-	2.7	-	2.1
Indeno(1,2,3-c,d)Pyrene	mg/kg	0.05	MCERTS	510	0.51	-	1.1	-	-	1.4	-	1.2
Dibenz(a,h)Anthracene	mg/kg	0.05	MCERTS	3.6	< 0.05	-	0.3	-	-	0.35	-	0.33
Benzofluoranthene	mg/kg	0.05	MCERTS	4000	0.57	-	1.3	-	-	1.8	-	1.5
Total Of 16 PAHs	mg/kg	0.8	ISO 17025	-	8.67	-	34.1	-	-	38.4	-	25
Benzene	µg/kg	5.00	MCERTS	47*	< 5.0	-	< 5.0	-	-	< 5.0	-	< 5.0
Toluene	µg/kg	5.00	MCERTS	11000vap (1920)*	< 5.0	-	< 5.0	-	-	< 5.0	-	< 5.0
Ethylbenzene	µg/kg	5.00	MCERTS	13000vap (1220)*	< 5.0	-	< 5.0	-	-	< 5.0	-	< 5.0
p & m-xylene	µg/kg	5.00	MCERTS	14000sol (1350)*	< 5.0	-	< 5.0	-	-	< 5.0	-	< 5.0
o-xylene	µg/kg	5.00	MCERTS	15000sol (1120)*	< 5.0	-	< 5.0	-	-	< 5.0	-	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5.00	NONE	13000	< 5.0	-	< 5.0	-	-	< 5.0	-	< 5.0
Total Phenols	mg/kg	1.00	MCERTS	6900 (30000)	< 1.0	-	< 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, U/S: 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

Promap
LANDMARK INFORMATION

Notes	Revision	Approved	Date	Project Title	Scale	Drawn	Size
				Lidl, Blackmoorfoot Road	as shown	PD	A4
				Drawing Title	Date	Job No.	Figure No.
				Site Location Plan	29.02.24	1219	01
			Client	 			
			Lidl Great Britain Ltd				



EXPLORATORY HOLE LOGS

Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412509.00 N415524.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked Rig	
Borehole Number WS01	Hole Type WS	Level 151.68m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.50	151.18		MADE GROUND: Soft brown sandy gravelly clay. Sand is fine. Gravel is angular to subangular, fine to medium of brick, sandstone and concrete.	
		1.00	SPT	N=45 (1,2/4,11,14,16)	1.00	150.68		Brown mottled light brown and reddish brown clayey gravelly fine to medium SAND. Gravel is angular to subangular, fine to medium of sandstone.	1
					1.20	150.48		Medium dense light brown clayey gravelly fine to medium SAND. Gravel is angular to subangular, fine to medium of sandstone.	
		1.50	SPT	50 (25 for 125mm/50 for 200mm)	1.50	150.18		Weathered light brown SANDSTONE. Recovered as sandy angular, fine to medium GRAVEL. Sand is fine to medium.	
								End of Borehole at 1.500m	4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks
 1. Refusal at 1.50m bgl.
 2. No groundwater encountered.
 3. Installed with 1.0m plain and 1.0m slotted pipe



Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412569.00 N415530.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked rig	
Borehole Number WS02	Hole Type WS	Level 147.85m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	147.65		MADE GROUND: Brown sandy clayey subangular, fine to medium gravel of concrete.	
					0.90	146.95		MADE GROUND: Soft friable dark grey sandy gravelly clay. Gravel is angular to subrounded, fine to medium of brick, concrete and asphalt.	
		1.00	SPT	N=13 (2,2/3,4,3,3)				Reddish brown SANDSTONE. Recovered as sandy angular to subrounded, fine to medium GRAVEL.	1
		2.00	SPT	50 (25,/50 for 160mm)	2.00	145.85		End of Borehole at 2.000m	2
									3
									4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

- Refusal at 2.0m bgl
- No groundwater encountered
- Installed with 1.0m plain and 1.0m slotted pipe



Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E415563.00 N415470.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked rig	
Borehole Number WS03	Hole Type WS	Level 152.71m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50 - 0.70	ES		0.20	152.51	MADE GROUND: grass over Brown clayey gravelly topsoil. Gravel is angular to subrounded, fine to medium of brick.		
							MADE GROUND: Soft friable sandy gravelly clay. Gravel is angular to subrounded, fine to medium of brick and concrete.		
		1.00	SPT	N=9 (4,3/3,2,2,2)	1.00	151.71	MADE GROUND: Loose brown and grey clayey sandy angular to subangular, fine gravel of concrete and coal.	1	
		2.00	SPT	N=4 (1,1/1,1,1,1)				2	
					2.50	150.21	Brown very clayey fine to medium SAND.		
					2.70	150.01	Yellowish brown SANDSTONE. Recovered as sandy angular to subrounded, fine to medium GRAVEL.		
	3.00	SPT	50 (35 for 105mm/50 for 150mm)	3.00	149.71	End of Borehole at 3.000m	3		
								4	

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

- No groundwater encountered.
- Installed with 1.0m plain pipe and 2.0m slotted.



Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 31/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412539.00 N415530.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked Rig	
Borehole Number WS04	Hole Type WS	Level 149.07m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.50	D		0.50	148.57		MADE GROUND: Soft friable dark brown sandy gravelly clay. Gravel is angular to subrounded, fine to medium of sandstone and brick.	
		0.80 - 1.00	D					Yellowish brown SANDSTONE. Recovered as sandy angular to subrounded, fine to medium GRAVEL.	
		1.00	SPT	N=50 (7,7/50 for 285mm)	1.00	148.07		End of Borehole at 1.000m	1
									2
									3
									4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks
 1. Refused at 1.0m bgl
 2. No groundwater encountered
 3. Installed with 0.5m plain and 0.5m slotted pipe



Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 31/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412557.00 N415512.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked Rig	
Borehole Number WS05	Hole Type WS	Level 149.13m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10 - 0.30	ES		0.05 0.10	149.08 149.03		MADE GROUND: Soft friable dark grey sandy gravelly clay. Gravel is angular to subrounded, fine to medium of sandstone and brick. MADE GROUND: Asphalt
		0.30 - 1.50	B					Yellowish reddish brown SANDSTONE. Recovered as very gravelly fine to medium SAND. Gravel is angular to subrounded, fine to medium.
		1.00 - 1.20 1.00	D SPT	N=50 (7,8/10,12,13,15)	1.50	147.63		End of Borehole at 1.500m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks
 1. Refused at 1.5m bgl .
 2. No groundwater encountered.
 3. Installed with 0.5m plain pipe and 1.0m slotted.



Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 31/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412569.00 N415494.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked Rig	
Borehole Number WS06	Hole Type WS	Level 149.79m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10 - 0.60	D		0.10	149.69		MADE GROUND: Soft friable dark grey gravelly clay. Gravel is angular to subrounded, fine to medium of sandstone and brick. MADE GROUND: Sandy clayey angular to subangular, fine to medium gravel of brick and concrete
					0.60	149.19		MADE GROUND: Asphalt
					0.75	149.04		Yellowish brown SANDSTONE. Recovered as sandy angular to subangular, fine to medium gravel.
			1.00	SPT	N=50 (7,10/50 for 235mm)			
			1.20 - 1.40	D		1.40	148.39	

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks
 1. Refusal at 1.4m bgl.
 2. No groundwater encountered.
 3. installed with 1.0m plain and 0.4m slotted pipe.



Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412521.00 N415554.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked rig	
Borehole Number WS07	Hole Type WS	Level 149.00m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.80	148.20		MADE GROUND: Soft friable dark grey sandy gravelly clay. Gravel is angular to subrounded, fine to medium of sandstone and brick.	
		1.00	SPT	N=35 (4,4/5,10,10,10)				Grey weathered SANDSTONE. Recovered as sandy angular to subrounded, fine to medium GRAVEL.	1
		1.50	SPT	50 (25 for 95mm/50 for 150mm)	1.50	147.50		End of Borehole at 1.500m	2
									3
									4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks
 1. Refusal at 1.5m bgl
 2. No groundwater encountered
 3. Backfilled with arisings



Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412515.00 N415506.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked rig	
Borehole Number WS09	Hole Type WS	Level 152.63m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
[Pattern]		0.15 - 0.35	ES		0.15	152.48	[Pattern]	MADE GROUND: Soft brown silty sandy gravelly clay. Gravel is angular, fine to medium of brick.	
					0.50	152.13	[Pattern]	Dark grey slightly gravelly SAND. Gravel is angular to subangular, fine of sandstone.	
					1.00	151.63	[Pattern]	Light brown gravelly fine to medium SAND.	
		1.00 - 1.80 1.00	B SPT	N=40 (10,8/10,10,10,10)	1.00	151.63	[Pattern]	Yellowish brown weathered SANDSTONE. Recovered as sandy angular to subangular, fine to coarse GRAVEL.	1
		1.80	SPT	50 (15,10/50 for 265mm)	1.80	150.83		End of Borehole at 1.800m	2
									3
									4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks
 1. Refusal at 1.8m bgl.
 2. No groundwater encountered
 3. Backfilled with arisings..



Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412593.00 N415491.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked Rig	
Borehole Number WS10	Hole Type WS	Level 148.85m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		1.00	SPT	50 (25 for 75mm/50 for 275mm)	0.20	148.65		MADE GROUND: Brown very gravelly sandy clayey topsoil.	
					0.90	147.95		MADE GROUND: Brown sandy gravelly clay. Sand is fine to medium. Gravel is angular, fine to medium of sandstone, concrete and brick.	
					1.00	147.85	MADE GROUND: Concrete		
					End of Borehole at 1.000m				

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks
 1. Refusal at 1.0m bgl.
 2. No groundwater encountered.
 3. Backfilled with arisings.



Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412584.00 N415506.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked rig	
Borehole Number WS11	Hole Type WS	Level 147.70m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
[Pattern]					0.70	147.00	[Pattern]	MADE GROUND: Brown soft gravelly sandy clay. Sand is fine to medium. Gravel is angular to subrounded, fine to medium of brick, sandstone and asphalt.	
							[Pattern]	<i>Concrete from 0.5 to 0.6m bgl</i>	
		1.00 - 1.20 1.00	D SPT	N=28 (12,7/7,7,7,7)	1.20	146.50	[Pattern]	MADE GROUND: Brown gravelly fine to coarse sand. Gravel is angular to subrounded, fine to medium of concrete.	1
		1.50	SPT	40 (10,15/40 for 135mm)	1.50	146.20	[Pattern]	Yellowish brown weathered SANDSTONE. Recovered as sandy angular to subrounded, fine to medium GRAVEL. Sand is fine to coarse.	
							End of Borehole at 1.500m	2	
								3	
								4	

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks
 1. Refusal at 1.5m bgl.
 2. No groundwater encountered.
 3. Backfilled with arisings.



Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412536.00 N415524.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked Rig	
Borehole Number WS12	Hole Type WS	Level 150.00m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
[Pattern]		0.40 - 0.60	ES		0.60	149.40	[Pattern]	MADE GROUND: dark grey soft friable sandy gravelly clay. Gravel is angular to subrounded, fine to medium of sandstone, asphalt and brick.	
							[Pattern]	Yellowish brown SANDSTONE. Recovered as sandy angular to subrounded, fine to medium GRAVEL.	
		1.00	SPT	50 (10,14/50 for 170mm)	1.00	149.00		End of Borehole at 1.000m	1
								2	
								3	
								4	

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks
 1. Refusal at 1.2m bgl.
 2. No groundwater encountered.
 3. Backfilled with arisings.



Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412557.00 N415542.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked rig	
Borehole Number WS13	Hole Type WS	Level 147.36m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
[Pattern]		0.20 - 0.40	ES		0.10	147.26	[Pattern]	MADE GROUND: Soft brown gravelly clay. Gravel is angular, fine of sandstone	1
					0.20	147.16		MADE GROUND: White gravelly fine to medium sand. Gravel is angular, fine of potentially chalk.	
					0.60	146.76		MADE GROUND: Soft dark grey gravelly fine to medium sandy clay. Gravel is angular, fine to medium of brick and sandstone	
		1.00	SPT	50 (25,/50 for 160mm)	[Pattern]	Reddish brown SANDSTONE. Recovered as sandy angular, to subrounded, fine to medium GRAVEL.			
					1.20	146.16		End of Borehole at 1.200m	2
									3
									4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks
 1. Refusal at 1.2m bgl.
 2. No groundwater encountered.
 3. backfilled with arisings.



Percussion Drilling Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412554.00 N415533.00	
Project No. : 1219.01		Crew Name:		Drilling Equipment: Tracked rig	
Borehole Number WS14	Hole Type WS	Level 148.00m AoD	Logged By CW	Scale 1:20	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
[Pattern]		1.00	SPT	N=50 (6,8/50 for 290mm)	0.20	147.80	[Pattern]	MADE GROUND: Soft friable dark grey sandy gravelly clay. Gravel is angular to subrounded, fine to medium of sandstone and brick.	1
					0.40	147.60	[Pattern]	MADE GROUND: Grey angular to subrounded, fine to medium gravel of concrete.	
							[Pattern]	Reddish brown SANDSTONE. Recovered as sandy angular, to subrounded, fine to medium GRAVEL.	
					1.50	146.50		End of Borehole at 1.500m	2
									3
									4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks
 1. Refusal at 1.5m bgl.
 2. No groundwater encountered
 3. Backfilled with arisings



Trial Pit Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412524.00 N415546.00	
Project No. : 1219.01		Crew Name:		Equipment: 13T Tracked Excavator	
Location Number TP01	Location Type TP	Level 150.18m AoD	Logged By S Taylor	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
[Pattern]		2.00 - 2.20	B		0.40	150.18	[Pattern]	Grass over dark greyish brown clayey slightly gravelly sandy TOPSOIL with frequent rootlets. Gravel consists of fine to coarse subangular to subrounded flint, brick fragments and subrounded quartzite.	1
					1.20	149.78	[Pattern]	MADE GROUND: Grey brown gravelly fine to coarse-grained SAND with moderate cobble content and rare boulders. Gravel is subangular to rounded fine to coarse of mixed lithologies including brick fragments, flint, ceramics, concrete and quartzite. Cobbles are angular of brick and concrete. Boulders are angular of concrete paving slabs.	
					2.70	148.98	[Pattern]	Weak to moderately strong light yellowish brown coarse-grained SANDSTONE with shelly fragments recovered as very gravelly coarse-grained SAND with frequent cobbles.	2
							End of Borehole at 2.700m	3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.70	0.50	Pit walls noted to be stable.	None				

Remarks
 1. No groundwater encountered.
 2. Backfilled with arisings upon completion.



Trial Pit Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412512.00 N415518.00	
Project No. : 1219.01		Crew Name:		Equipment: 13T Tracked Excavator	
Location Number TP02	Location Type TP	Level 152.04m AoD	Logged By S Taylor	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	152.04		MADE GROUND: Dark grey-brown fine to coarse SAND with modest cobble content. Gravel is subangular to subrounded fine to coarse of brick fragments concrete fragments and quartzite. Cobbles are angular of brick.	1
					2.50	151.74		Weak to moderately strong light yellowish brown coarse-grained SANDSTONE with shelly fragments recovered as very gravelly coarse-grained SAND with frequent cobbles.	2
								End of Borehole at 2.500m	3
									4
									5

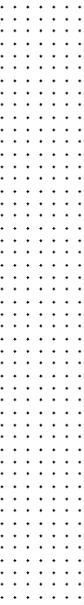
Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.80	0.55	Pit walls noted to be stable	None				

Remarks
 1. No groundwater encountered.
 2. Backfilled with arisings upon completion.



Trial Pit Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412532.00 N415504.00	
Project No. : 1219.01		Crew Name:		Equipment: 13T Tracked Excavator	
Location Number TP03	Location Type TP	Level 151.32m AoD	Logged By S Taylor	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.15	151.32		MADE GROUND: Asphalt.
					0.25	151.17		MADE GROUND: Brown sandy angular to subangular GRAVEL of sandstone.
								
					2.30	151.07		End of Borehole at 2.300m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.70	0.55	Pit walls noted to be stable	None				

Remarks

1. No groundwater encountered.
2. Backfilled with arisings upon completion.



Trial Pit Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412552.00 N415524.00	
Project No. : 1219.01		Crew Name:		Equipment: 13T Tracked Excavator	
Location Number TP05	Location Type TP	Level 148.76m AoD	Logged By S Taylor	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
[Pattern]					0.05	148.76	[Pattern]	MADE GROUND: Asphalt.
					0.10	148.71		MADE GROUND: Brown sandy GRAVEL of fine to coarse angular to subangular sandstone.
					0.60	148.66		MADE GROUND: Light yellowish-brown very gravelly SAND with low cobble content. Gravel is angular, fine to coarse of sandstone, brick and ceramic fragments. Cobbles are angular of sandstone.
					2.30	148.16	[Pattern]	Weak to moderately strong light yellowish brown coarse-grained SANDSTONE with shelly fragments recovered as very gravelly coarse-grained SAND with frequent cobbles. Where intact, thin (50-100mm) planar bedding was noted in the trial pit walls.
								End of Borehole at 2.300m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.85	0.60	Pit walls noted to be stable	None				

Remarks

1. No groundwater encountered.
2. Backfilled with arisings upon completion.



Trial Pit Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412582.00 N415505.00	
Project No. : 1219.01		Crew Name:		Equipment: 13T Tracked Excavator	
Location Number TP06	Location Type TP	Level 148.11m AoD	Logged By S Taylor	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
TP06					0.45	148.11	MADE GROUND	MADE GROUND: Dark grey brown gravelly very clayey fine to coarse SAND with moderate cobble content. Gravel is angular to subrounded fine coarse of mixed lithologies including brick concrete fragments, ceramics, plastic, geogrid, flint, and quartzite. Cobbles are angular of brick.	
					0.60	147.66	MADE GROUND	MADE GROUND: Asphalt.	
					1.30	147.51	SAND	Orange brown very gravelly medium to coarse-grained SAND. Gravel consists of fine to coarse angular to subangular sandstone.	1
					2.50	146.81	SANDSTONE	Weak to moderately strong light yellowish brown coarse-grained SANDSTONE with shelly fragments recovered as very gravelly coarse-grained SAND with frequent cobbles.	2
							End of Borehole at 2.500m	3	
								4	
								5	

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.75	0.50	Pit walls noted to be stable	None				

Remarks

1. No groundwater encountered.
2. Backfilled with arisings upon completion.



Trial Pit Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412575.00 N415497.00	
Project No. : 1219.01		Crew Name:		Equipment: 13T Tracked Excavator	
Location Number TP07	Location Type TP	Level 149.54m AoD	Logged By S Taylor	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
[Pattern]		1.50 - 1.70	B		0.25	149.54	[Pattern]	<p>MADE GROUND: dark grey brown clayey gravelly SAND with low cobble content. Gravel is angular to rounded fine to coarse of mixed lithologies including brick, concrete fragments, pea gravel, sandstone, quartzite and flint. Cobbles are angular of sandstone.</p> <p>MADE GROUND: Light yellowish-brown very gravelly coarse-grained SAND with some cobbles and fragments of brick and ceramic. Gravel consists of fine to coarse angular sandstone. Cobbles consist of angular sandstone.</p>
					0.35	149.29		
				0.70	149.19	[Pattern]	<p>MADE GROUND: dark grey brown clayey gravelly SAND with low cobble content. Gravel is angular to rounded fine to coarse of mixed lithologies including brick, concrete fragments, sandstone, quartzite and flint. Cobbles are angular of sandstone.</p> <p>Weak to moderately strong light yellowish brown coarse-grained SANDSTONE with shelly fragments recovered as very gravelly coarse-grained SAND with frequent cobbles.</p>	
				2.30	148.84	[Pattern]	End of Borehole at 2.300m	

Dimensions		Trench Support and Comment		Pumping Data			
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.75	0.55	Pit walls noted to be stable	None				

Remarks

- No groundwater encountered.
- Backfilled with arisings upon completion.



Trial Pit Log

Project Name: Blackmoorfoot Road, Huddersfield		Client: Lidl Great Britain Ltd		Date: 30/01/2024	
Location: Blackmoorfoot Road, Huddersfield		Contractor: Remada Ltd		Co-ords: E412587.00 N415490.00	
Project No. : 1219.01		Crew Name:		Equipment: 13T Tracked Excavator	
Location Number TP08	Location Type TP	Level 149.71m AoD	Logged By S Taylor	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
[Pattern]					0.70	149.71	[Pattern]	MADE GROUND: Dark grey brown clayey gravelly medium to coarse SAND with low cobble content. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick, concrete, flint and quartzite. Cobbles are angular of sandstone.	
					0.80	149.01	[Pattern]	MADE GROUND: Non-reinforced concrete.	
								[Pattern]	Weak to moderately strong light yellowish brown coarse-grained SANDSTONE with shelly fragments recovered as very gravelly coarse-grained SAND with frequent cobbles.
					2.20	148.91		End of Borehole at 2.200m	2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.80	0.60	Pit walls noted to be stable	None				

Remarks
 1. No groundwater encountered.
 2. Backfilled with arisings upon completion.





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: 01/09/2023
Report Date: 01/09/2023
File Name: DART300.spt
Test Operator: CM

Instrumented Rod Data

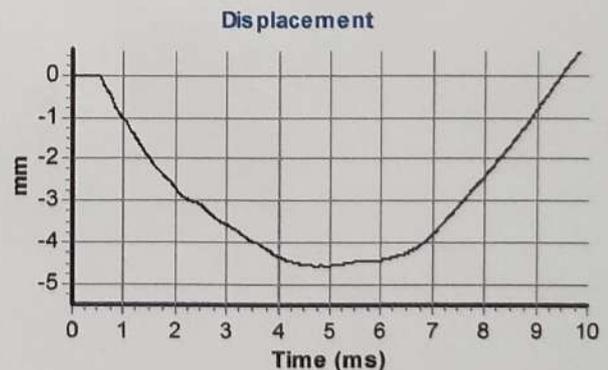
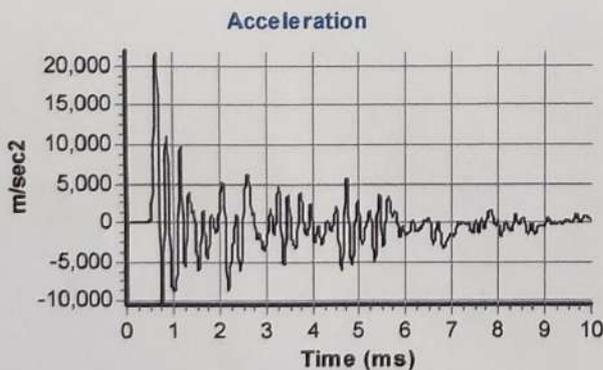
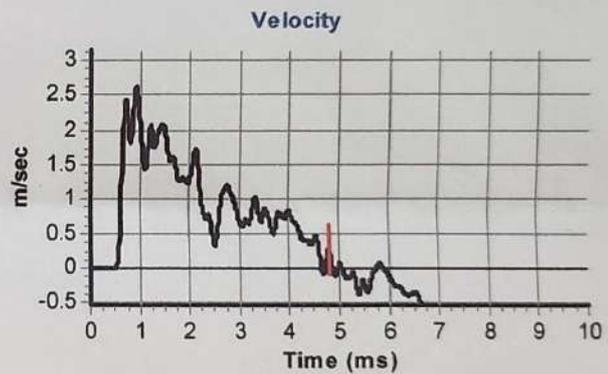
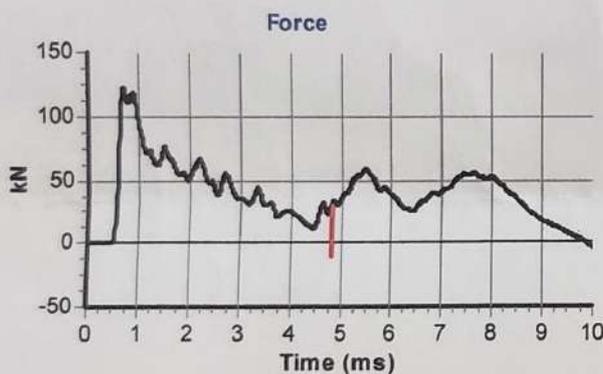
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.5
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 72572
Accelerometer No.2: 72757

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 LTD - 86346



Calculations

Area of Rod A (mm²): 970
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 308

Energy Ratio E_r (%): **65**

Signed: C. McCLUSKEY

Title: FITTER

The recommended calibration interval is 12 months



APPENDIX B

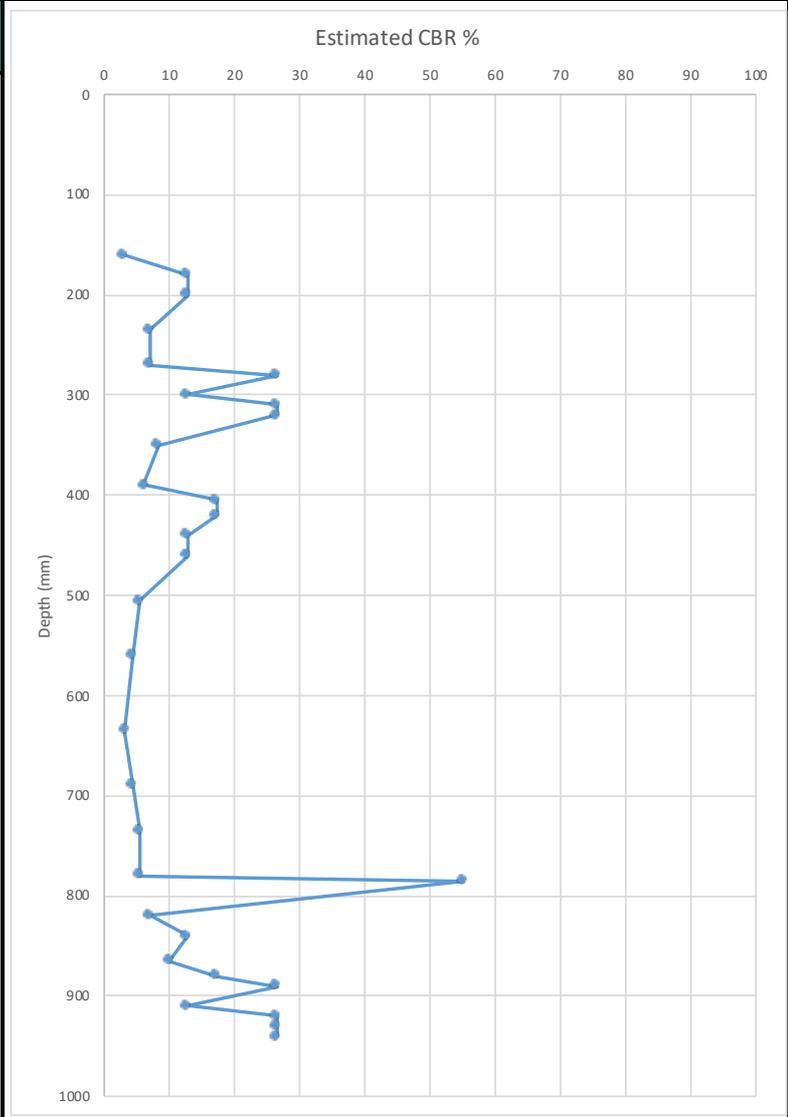
Plate Bearing & Dynamic Cone Penetrometer Test Results

TRL Dynamic Cone Penetrometer Test Results



Client:	Lidl Great Britain Ltd	Site Location:	Blackmoorfoot	Test No:	CBR1	Location:	412519, 415555
Project No:	1219.01	Date:	31.01.24	Start Depth:	Surface	Test Strata:	Topsoil
$\text{Log10}(\text{CBR}) = 2.480 - 1.057 \times \text{Log10}(\text{mm/blow})$						Weather:	Dry Sunny

No of Blows	Depth Reading mm	Penetration/ Blow mm	CBR %
0	80	0	
1	160	80.0	2.9
2	180	20.0	12.7
3	200	20.0	12.7
4	235	35.0	7.0
5	270	35.0	7.0
6	280	10.0	26.5
7	300	20.0	12.7
8	310	10.0	26.5
9	320	10.0	26.5
10	350	30.0	8.3
11	390	40.0	6.1
12	405	15.0	17.3
13	420	15.0	17.3
14	440	20.0	12.7
15	460	20.0	12.7
16	505	45.0	5.4
17	560	55.0	4.4
18	635	75.0	3.1
19	690	55.0	4.4
20	735	45.0	5.4
21	780	45.0	5.4
22	785	5.0	55.1
23	820	35.0	7.0
24	840	20.0	12.7
25	865	25.0	10.1
26	880	15.0	17.3
27	890	10.0	26.5
28	910	20.0	12.7
29	920	10.0	26.5
30	930	10.0	26.5
31	940	10.0	26.5



Notes:

Tested by: C Whitehead
 Date: 31.01.24
 Checked by: G Jones
 Date: 29.02.24

Plate Bearing Test Report

In-house Plate Bearing Test procedure based on BS1377 Part 9:1990 and IAN 73/06 (Incremental Loading)

Client :	Lidl Great Britain Ltd
Job Name:	Lidl, Blackmoorfoot Road
Job Number	1219.01
Site	Blackmoorfoot Road, Huddersfield

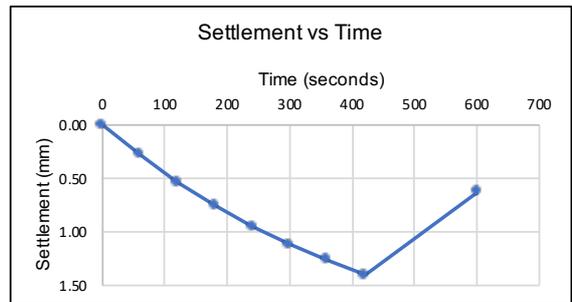
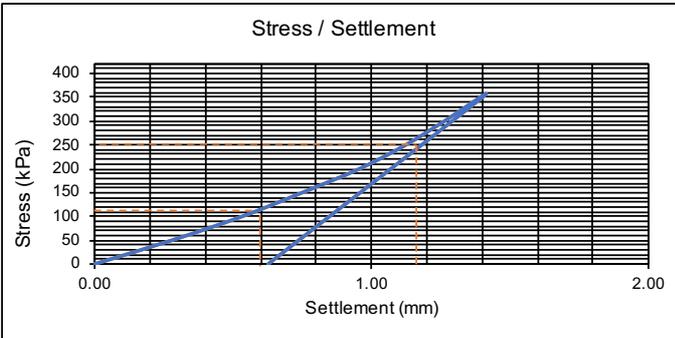
Test Date:	30/01/2024
Reaction Load	14 tonne excavator
Plate Diameter (mm)	600
Layer Thickness (mm)	800

Test Location	CBR 2 (TP02)
Test Strata	Subsoil
Ground Condition	Dry
Material	Subsoil
Weather	Dry

Equivalent CBR Value (%)	86
Maximum Applied Stress (kPa)	350.0
Maximum Settlement (mm)	1.40
Bearing Pressure at 1.25mm Settlement	295.2
K762 (at 1.25mm settlement) kN/m2/m	250

Time (s)	Stress (kPa)	Settlement (mm)
0	0	0.00
60	50	0.28
120	100	0.53
180	150	0.75
240	200	0.96
300	250	1.12
360	300	1.26
420	350	1.40
600	0	0.63

Remarks:



Deformation Modulus (EV Calculation)

Plate Diameter (mm)	Maximum σ [kN/m ²]	0.3 σ [kN/m ²]	0.7 σ [kN/m ²]	s1 (mm)	s2 (mm)	Ev [MN/m ²]
600	350.0	105.00	245.00	0.56	1.11	114.20

$$E_v = 1.5 \cdot r \cdot \frac{\Delta \sigma}{\Delta s} \quad (4)$$

where r is the radius of the loading plate (mm), Δs is the difference in the settlement amount between the points with 30% and 70% of the maximum stress, and $\Delta \sigma$ is the difference in the stress.

Report Prepared By: Sam Taylor
Approved By: G Jones

Date: 01/02/2024
Date: 01/02/2024

Plate Bearing Test Report

In-house Plate Bearing Test procedure based on BS1377 Part 9:1990 and IAN 73/06 (Incremental Loading)

Client :	Lidl Great Britain Ltd
Job Name:	Lidl, Blackmoorfoot Road
Job Number	1219.01
Site	Blackmoorfoot Road, Huddersfield

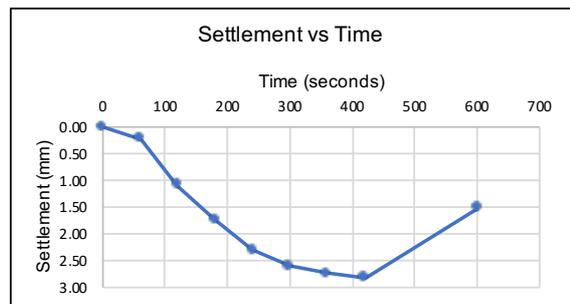
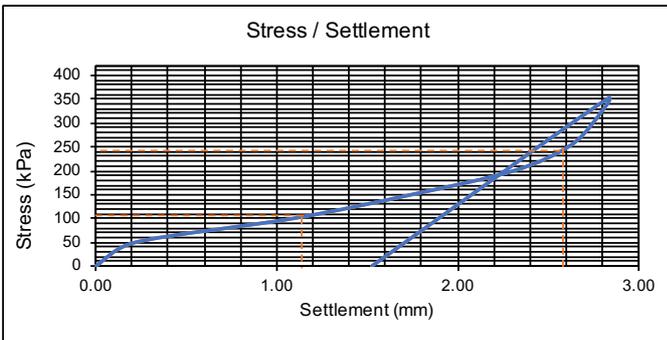
Test Date:	30/01/2024
Reaction Load	14 tonne excavator
Plate Diameter (mm)	600
Layer Thickness (mm)	430

Test Location	CBR 3 (TP03)
Test Strata	Subsoil
Ground Condition	Dry
Material	Subsoil
Weather	Dry

Equivalent CBR Value (%)	16
Maximum Applied Stress (kPa)	350.0
Maximum Settlement (mm)	2.82
Bearing Pressure at 1.25mm Settlement	112.0
K762 (at 1.25mm settlement) kN/m2/m	124

Time (s)	Stress (kPa)	Settlement (mm)
0	0	0.00
60	50	0.22
120	100	1.09
180	150	1.75
240	200	2.31
300	250	2.61
360	300	2.75
420	350	2.82
600	0	1.53

Remarks:



Deformation Modulus (EV Calculation)

Plate Diameter (mm)	Maximum σ [kN/m^2]	0.3 σ [kN/m^2]	0.7 σ [kN/m^2]	s1 (mm)	s2 (mm)	Ev [MN/m^2]
600	350.0	105.00	245.00	1.16	2.58	44.32

$$E_v = 1.5 \cdot r \cdot \frac{\Delta \sigma}{\Delta s} \quad (4)$$

where r is the radius of the loading plate (mm), Δs is the difference in the settlement amount between the points with 30% and 70% of the maximum stress, and $\Delta \sigma$ is the difference in the stress.

Report Prepared By: Sam Taylor
Approved By: G Jones

Date: 01/02/2024
Date: 01/02/2024

Plate Bearing Test Report

In-house Plate Bearing Test procedure based on BS1377 Part 9:1990 and IAN 73/06 (Incremental Loading)

Client :	Lidl Great Britain Ltd
Job Name:	Lidl, Blackmoorfoot Road
Job Number	1219.01
Site	Blackmoorfoot Road, Huddersfield

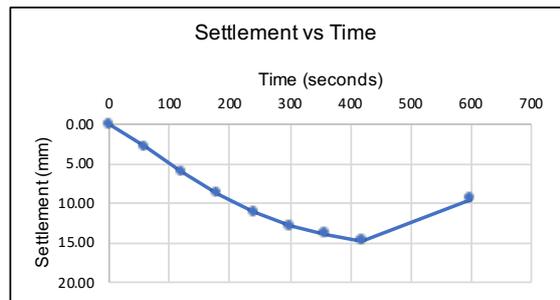
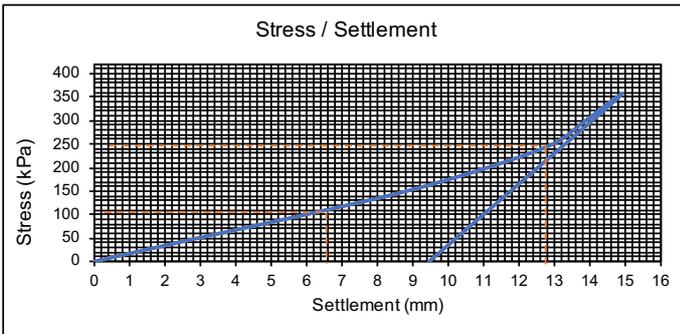
Test Date:	30/01/2024
Reaction Load	14 tonne excavator
Plate Diameter (mm)	600
Layer Thickness (mm)	430

Test Location	PBT4 (TP04)
Test Strata	Subsoil
Ground Condition	Wet
Material	Subsoil
Weather	Dry

Equivalent CBR Value (%)	0.9
Maximum Applied Stress (kPa)	350.0
Maximum Settlement (mm)	14.81
Bearing Pressure at 1.25mm Settlement	21.2
K762 (at 1.25mm settlement) kN/m2/m	24

Time (s)	Stress (kPa)	Settlement (mm)
0	0	0.00
60	50	2.95
120	100	5.98
180	150	8.82
240	200	11.10
300	250	12.94
360	300	13.87
420	350	14.81
600	0	9.46

Remarks:



Deformation Modulus (Ev Calculation)

Plate Diameter (mm)	Maximum σ [kN/m ²]	0.3 σ [kN/m ²]	0.7 σ [kN/m ²]	s1 (mm)	s2 (mm)	Ev [MN/m ²]
600	350.0	105.00	245.00	6.27	12.76	9.70

$$E_v = 1.5 \cdot r \cdot \frac{\Delta\sigma}{\Delta s} \quad (4)$$

where r is the radius of the loading plate (mm), Δs is the difference in the settlement amount between the points with 30% and 70% of the maximum stress, and $\Delta\sigma$ is the difference in the stress.

Report Prepared By: Sam Taylor
 Approved By: G Jones

Date: 01/02/2024
 Date: 01/02/2024

Plate Bearing Test Report

In-house Plate Bearing Test procedure based on BS1377 Part 9:1990 and IAN 73/06 (Incremental Loading)

Client :	Lidl Great Britain Ltd
Job Name:	Lidl, Blackmoorfoot Road
Job Number	1219.01
Site	Blackmoorfoot Road, Huddersfield

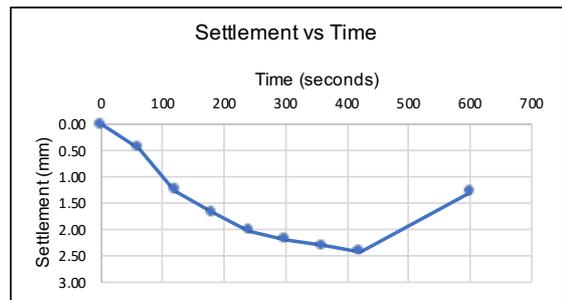
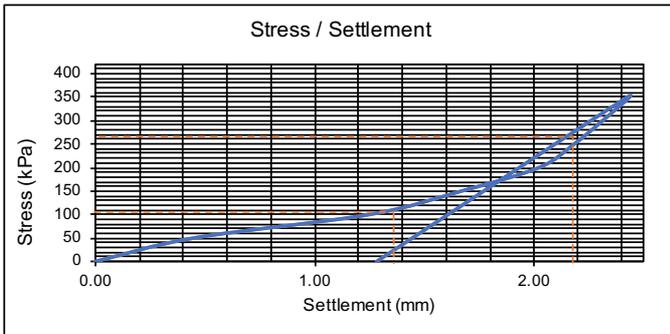
Test Date:	30/01/2024
Reaction Load	14 tonne excavator
Plate Diameter (mm)	600
Layer Thickness (mm)	500

Test Location	PBT5 (TP05)
Test Strata	Subsoil
Ground Condition	Dry
Material	Subsoil
Weather	Dry

Equivalent CBR Value (%)	13
Maximum Applied Stress (kPa)	350.0
Maximum Settlement (mm)	2.43
Bearing Pressure at 1.25mm Settlement	100.0
K762 (at 1.25mm settlement) kN/m2/m	144

Time (s)	Stress (kPa)	Settlement (mm)
0	0	0.00
60	50	0.45
120	100	1.25
180	150	1.67
240	200	2.02
300	250	2.18
360	300	2.31
420	350	2.43
600	0	1.28

Remarks:



Deformation Modulus (EV Calculation)

Plate Diameter (mm)	Maximum σ [kN/m ²]	0.3 σ [kN/m ²]	0.7 σ [kN/m ²]	s1 (mm)	s2 (mm)	Ev [MN/m ²]
600	350.0	105.00	245.00	1.29	2.17	71.97

$$E_v = 1.5 \cdot r \cdot \frac{\Delta \sigma}{\Delta s} \quad (4)$$

where r is the radius of the loading plate (mm), Δs is the difference in the settlement amount between the points with 30% and 70% of the maximum stress, and $\Delta \sigma$ is the difference in the stress.

Report Prepared By: Sam Taylor
Approved By: G Jones

Date: 01/02/2024
Date: 01/02/2024

Plate Bearing Test Report

In-house Plate Bearing Test procedure based on BS1377 Part 9:1990 and IAN 73/06 (Incremental Loading)

Client :	Lidl Great Britain Ltd
Job Name:	Lidl, Blackmoorfoot Road
Job Number	1219.01
Site	Blackmoorfoot Road, Huddersfield

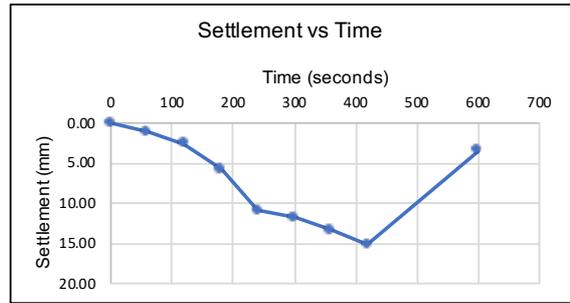
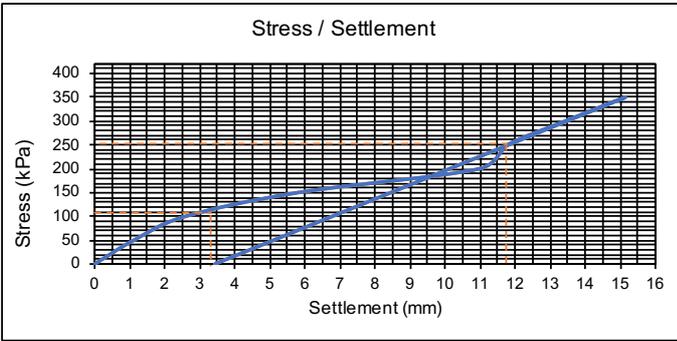
Test Date:	30/01/2024
Reaction Load	14 tonne excavator
Plate Diameter (mm)	600
Layer Thickness (mm)	300

Test Location	PBT6 (TP06)
Test Strata	Subsoil
Ground Condition	Dry
Material	Subsoil
Weather	Dry

Equivalent CBR Value (%)	4.6
Maximum Applied Stress (kPa)	350.0
Maximum Settlement (mm)	15.14
Bearing Pressure at 1.25mm Settlement	54.4
K762 (at 1.25mm settlement) kN/m2/m	23

Time (s)	Stress (kPa)	Settlement (mm)
0	0	0.00
60	50	1.12
120	100	2.59
180	150	5.80
240	200	10.98
300	250	11.78
360	300	13.42
420	350	15.14
600	0	3.43

Remarks:



Deformation Modulus (EV Calculation)

Plate Diameter (mm)	Maximum σ [kN/m ²]	0.3 σ [kN/m ²]	0.7 σ [kN/m ²]	s1 (mm)	s2 (mm)	Ev [MN/m ²]
600	350.0	105.00	245.00	2.91	11.70	7.17

$$E_v = 1.5 \cdot r \cdot \frac{\Delta \sigma}{\Delta s} \quad (4)$$

where r is the radius of the loading plate (mm), Δs is the difference in the settlement amount between the points with 30% and 70% of the maximum stress, and $\Delta \sigma$ is the difference in the stress.

Report Prepared By: Sam Taylor
Approved By: G Jones

Date: 01/02/2024
Date: 01/02/2024

Plate Bearing Test Report

In-house Plate Bearing Test procedure based on BS1377 Part 9:1990 and IAN 73/06 (Incremental Loading)

Client :	Lidl Great Britain Ltd
Job Name:	Lidl, Blackmoorfoot Road
Job Number	1219.01
Site	Blackmoorfoot Road, Huddersfield

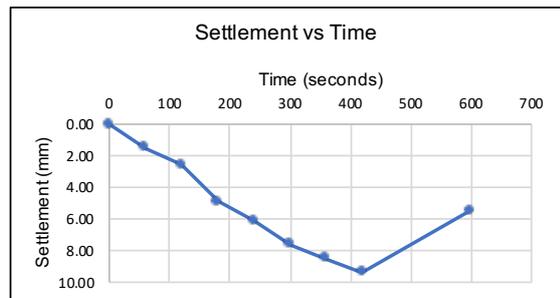
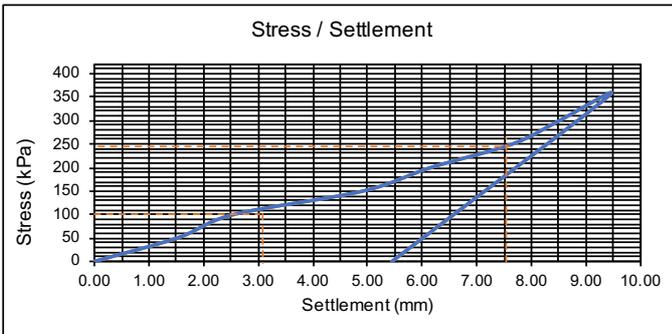
Test Date:	30/01/2024
Reaction Load	14 tonne excavator
Plate Diameter (mm)	600
Layer Thickness (mm)	600

Test Location	PBT7 (TP07)
Test Strata	Subsoil
Ground Condition	Dry
Material	Subsoil
Weather	Dry

Equivalent CBR Value (%)	2.8
Maximum Applied Stress (kPa)	350.0
Maximum Settlement (mm)	9.39
Bearing Pressure at 1.25mm Settlement	41.1
K762 (at 1.25mm settlement) kN/m2/m	37

Time (s)	Stress (kPa)	Settlement (mm)
0	0	0.00
60	50	1.52
120	100	2.55
180	150	4.92
240	200	6.16
300	250	7.65
360	300	8.51
420	350	9.39
600	0	5.45

Remarks:



Deformation Modulus (EV Calculation)

Plate Diameter (mm)	Maximum σ [kN/m ²]	0.3 σ [kN/m ²]	0.7 σ [kN/m ²]	s1 (mm)	s2 (mm)	Ev [MN/m ²]
600	350.0	105.00	245.00	2.79	7.50	13.37

$$E_v = 1.5 \cdot r \cdot \frac{\Delta\sigma}{\Delta s} \quad (4)$$

where r is the radius of the loading plate (mm), Δs is the difference in the settlement amount between the points with 30% and 70% of the maximum stress, and $\Delta\sigma$ is the difference in the stress.

Report Prepared By: Sam Taylor
Approved By: G Jones

Date: 01/02/2024
Date: 01/02/2024



APPENDIX C

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

e: sam.taylor@remada.co.uk; info@remada.co.uk

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

Analytical Report Number : 24-001439

Project / Site name:	Blackmoorfoot Road, Huddersfield	Samples received on:	02/02/2024
Your job number:	1219.01	Samples instructed on/ Analysis started on:	02/02/2024
Your order number:	1219.01	Analysis completed by:	12/02/2024
Report Issue Number:	1	Report issued on:	16/02/2024
Samples Analysed:	8 soil samples		

Signed: _____

Dominika Liana
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 24-001439

Project / Site name: Blackmoorfoot Road, Huddersfield

Your Order No: 1219.01

Lab Sample Number				109192	109193	109194	109195	109196
Sample Reference				WS03	WS04	WS05	WS05	WS06
Sample Number				None Supplied				
Depth (m)				0.70	0.80	0.10	1.00	1.20
Date Sampled				30/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024
Time Taken				1000	0830	0900	0900	0930
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Stone Content	%	0.1	NONE	< 0.1	67	55	46	46
Moisture Content	%	0.01	NONE	14	6.5	8.5	5.1	7.2
Total mass of sample received	kg	0.1	NONE	1.2	0.5	1.3	0.5	0.5

Asbestos

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

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	10.6	8.1	7.6	8.4	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Total Sulphate as SO4	%	0.005	MCERTS	-	0.011	-	0.016	0.023
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	34	-	85	150
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	16.8	-	42.6	73.9
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	< 0.5	-	< 0.5	< 0.5
Total Sulphur	mg/kg	50	MCERTS	-	< 50	-	63	150
Total Sulphur	%	0.005	MCERTS	-	< 0.005	-	0.006	0.015
Ammoniacal Nitrogen as NH4	mg/kg	0.5	MCERTS	-	< 0.5	-	< 0.5	< 0.5
Ammonium as NH4 (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-	< 0.05	-	< 0.05	< 0.05
Organic Matter (automated)	%	0.1	MCERTS	1.1	-	1	-	-
Fraction Organic Carbon (FOC) Automated	%	0.001	MCERTS	0.0064	-	0.0057	-	-
Water Soluble Nitrate (2:1) as N	mg/kg	2	NONE	-	< 2.0	-	< 2.0	< 2.0
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	< 2.0	-	< 2.0	< 2.0

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	0.17	-	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	0.14	-	-
Phenanthrene	mg/kg	0.05	MCERTS	0.51	-	1.4	-	-
Anthracene	mg/kg	0.05	MCERTS	0.16	-	1.1	-	-
Fluoranthene	mg/kg	0.05	MCERTS	1.3	-	8.6	-	-
Pyrene	mg/kg	0.05	MCERTS	1.5	-	7.6	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.77	-	2.9	-	-
Chrysene	mg/kg	0.05	MCERTS	0.84	-	2.9	-	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	1.1	-	3	-	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.55	-	1.2	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.87	-	2.4	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.51	-	1.1	-	-
Dibenzo(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	0.3	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.57	-	1.3	-	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	8.67	-	34.1	-	-
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Analytical Report Number: 24-001439

Project / Site name: Blackmoorfoot Road, Huddersfield

Your Order No: 1219.01

Lab Sample Number				109192	109193	109194	109195	109196
Sample Reference				WS03	WS04	WS05	WS05	WS06
Sample Number				None Supplied				
Depth (m)				0.70	0.80	0.10	1.00	1.20
Date Sampled				30/01/2024	31/01/2024	31/01/2024	31/01/2024	31/01/2024
Time Taken				1000	0830	0900	0900	0930
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	-	5.8	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.84	-	0.34	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	-	0.3	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	-
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	-	< 1.8	-	-
Chromium (III)	mg/kg	1	NONE	19	-	11	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	-	11	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	33	-	16	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	58	-	20	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	-	9	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	26	-	14	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	91	-	30	-	-

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

Petroleum Hydrocarbons

TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	-	< 0.020	-	-
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	-	< 0.020	-	-
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	< 0.050	-	< 0.050	-	-
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL_#1_#2	mg/kg	1	MCERTS	< 1.0	-	5.4	-	-
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL_#1_#2	mg/kg	2	MCERTS	< 2.0	-	5.1	-	-
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	< 8.0	-	13	-	-
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL_#1_#2	mg/kg	8	MCERTS	40	-	47	-	-
TPHCWG - Aliphatic >C5 - C35 EH_CU+HS_1D_AL_#1_#2	mg/kg	10	NONE	40	-	70	-	-
TPHCWG - Aliphatic >C6 - C35 EH_CU+HS_1D_AL_#1_#2	mg/kg	10	NONE	45	-	70	-	-

TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	-	< 0.010	-	-
TPHCWG - Aromatic >EC6 - EC8 HS_1D_AR	mg/kg	0.1	NONE	< 0.10	-	< 0.10	-	-
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	-	< 0.010	-	-
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	< 0.050	-	< 0.050	-	-
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR_#1_#2	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR_#1_#2	mg/kg	2	MCERTS	< 2.0	-	3.9	-	-
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	< 10	-	35	-	-
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	37	-	54	-	-
TPHCWG - Aromatic >EC5 - EC35 EH_CU+HS_1D_AR_#1_#2	mg/kg	10	NONE	37	-	93	-	-
TPHCWG - Aromatic >EC6 - EC35 EH_CU+HS_1D_AR_#1_#2	mg/kg	10	NONE	37	-	93	-	-

VOCs

MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	-	< 5.0	-	-
Benzene	µg/kg	5	MCERTS	< 5.0	-	< 5.0	-	-
Toluene	µg/kg	5	MCERTS	< 5.0	-	< 5.0	-	-
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	-	< 5.0	-	-
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	-	< 5.0	-	-
o-Xylene	µg/kg	5	MCERTS	< 5.0	-	< 5.0	-	-

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

Analytical Report Number: 24-001439

Project / Site name: Blackmoorfoot Road, Huddersfield

Your Order No: 1219.01

Lab Sample Number				109197	109198	109199
Sample Reference				WS09	WS11	WS12
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.15	1.00	0.40
Date Sampled				30/01/2024	30/01/2024	30/01/2024
Time Taken				1100	1200	1300
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			

Stone Content	%	0.1	NONE	< 0.1	54	41
Moisture Content	%	0.01	NONE	15	11	11
Total mass of sample received	kg	0.1	NONE	0.8	0.5	1

Asbestos

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

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7.9	9.7	8.4
Total Cyanide	mg/kg	1	MCERTS	< 1.0	-	< 1.0
Total Sulphate as SO4	%	0.005	MCERTS	-	0.198	-
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	1200	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	600	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	36	-
Total Sulphur	mg/kg	50	MCERTS	-	800	-
Total Sulphur	%	0.005	MCERTS	-	0.08	-
Ammoniacal Nitrogen as NH4	mg/kg	0.5	MCERTS	-	0.6	-
Ammonium as NH4 (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-	< 0.05	-
Organic Matter (automated)	%	0.1	MCERTS	4.2	-	1.7
Fraction Organic Carbon (FOC) Automated	%	0.001	MCERTS	0.024	-	0.0098
Water Soluble Nitrate (2:1) as N	mg/kg	2	NONE	-	< 2.0	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	< 2.0	-

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	0.2	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.07	-	0.12
Acenaphthene	mg/kg	0.05	MCERTS	0.6	-	0.16
Fluorene	mg/kg	0.05	MCERTS	0.46	-	0.16
Phenanthrene	mg/kg	0.05	MCERTS	5.3	-	2.2
Anthracene	mg/kg	0.05	MCERTS	1.3	-	0.64
Fluoranthene	mg/kg	0.05	MCERTS	7.1	-	4.5
Pyrene	mg/kg	0.05	MCERTS	6.1	-	4.2
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3	-	2.1
Chrysene	mg/kg	0.05	MCERTS	3.3	-	2.1
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	3.4	-	2.5
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	1.4	-	1.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.7	-	2.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.4	-	1.2
Dibenzo(a,h)anthracene	mg/kg	0.05	MCERTS	0.35	-	0.33
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.8	-	1.5

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	38.4	-	25
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Analytical Report Number: 24-001439

Project / Site name: Blackmoorfoot Road, Huddersfield

Your Order No: 1219.01

Lab Sample Number				109197	109198	109199
Sample Reference				WS09	WS11	WS12
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.15	1.00	0.40
Date Sampled				30/01/2024	30/01/2024	30/01/2024
Time Taken				1100	1200	1300
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	35	-	6.9
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.4	-	0.48
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	-	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	0.4
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	-	< 1.8
Chromium (III)	mg/kg	1	NONE	16	-	13
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	-	13
Copper (aqua regia extractable)	mg/kg	1	MCERTS	69	-	20
Lead (aqua regia extractable)	mg/kg	1	MCERTS	140	-	46
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	19	-	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	33	-	16
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	120	-	65

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

Petroleum Hydrocarbons

TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	-	< 0.020
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	-	< 0.020
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	< 0.050	-	< 0.050
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AR_#1_#2	mg/kg	1	MCERTS	< 1.0	-	< 1.0
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AR_#1_#2	mg/kg	2	MCERTS	2.8	-	< 2.0
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AR_#1_#2	mg/kg	8	MCERTS	< 8.0	-	< 8.0
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AR_#1_#2	mg/kg	8	MCERTS	19	-	41
TPHCWG - Aliphatic >C5 - C35 EH_CU+HS_1D_AL_#1_#2	mg/kg	10	NONE	22	-	41
TPHCWG - Aliphatic >C6 - C35 EH_CU+HS_1D_AL_#1_#2	mg/kg	10	NONE	27	-	49

TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	-	< 0.010
TPHCWG - Aromatic >EC6 - EC8 HS_1D_AR	mg/kg	0.1	NONE	< 0.10	-	< 0.10
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	-	< 0.010
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	< 0.050	-	< 0.050
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR_#1_#2	mg/kg	1	MCERTS	< 1.0	-	< 1.0
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR_#1_#2	mg/kg	2	MCERTS	5.1	-	3.3
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	24	-	29
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR_#1_#2	mg/kg	10	MCERTS	54	-	95
TPHCWG - Aromatic >EC5 - EC35 EH_CU+HS_1D_AR_#1_#2	mg/kg	10	NONE	83	-	130
TPHCWG - Aromatic >EC6 - EC35 EH_CU+HS_1D_AR_#1_#2	mg/kg	10	NONE	83	-	130

VOCs

MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	-	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	-	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	-	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	-	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	-	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	-	< 5.0

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

Analytical Report Number : 24-001439

Project / Site name: Blackmoorfoot Road, Huddersfield

* 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 *
109192	WS03	None Supplied	0.7	Brown gravely sand with clinker and brick
109193	WS04	None Supplied	0.8	Brown sand with stones
109194	WS05	None Supplied	0.1	Brown sand with stones
109195	WS05	None Supplied	1	Brown sand with stones
109196	WS06	None Supplied	1.2	Brown sand with stones
109197	WS09	None Supplied	0.15	Brown sand with gravel
109198	WS11	None Supplied	1	Brown sand with stones
109199	WS12	None Supplied	0.4	Brown sand with stones

Analytical Report Number : 24-001439

Project / Site name: Blackmoorfoot Road, Huddersfield

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
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
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
Speciated EPA-16 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
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/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088	D/W	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction	L078B	D	NONE
Chromium III in soil	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE

Analytical Report Number : 24-001439

Project / Site name: Blackmoorfoot Road, Huddersfield

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080	W	MCERTS
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	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	W	MCERTS
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser	In-house method	L082B	D	MCERTS
Ammonium as NH4 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	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

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

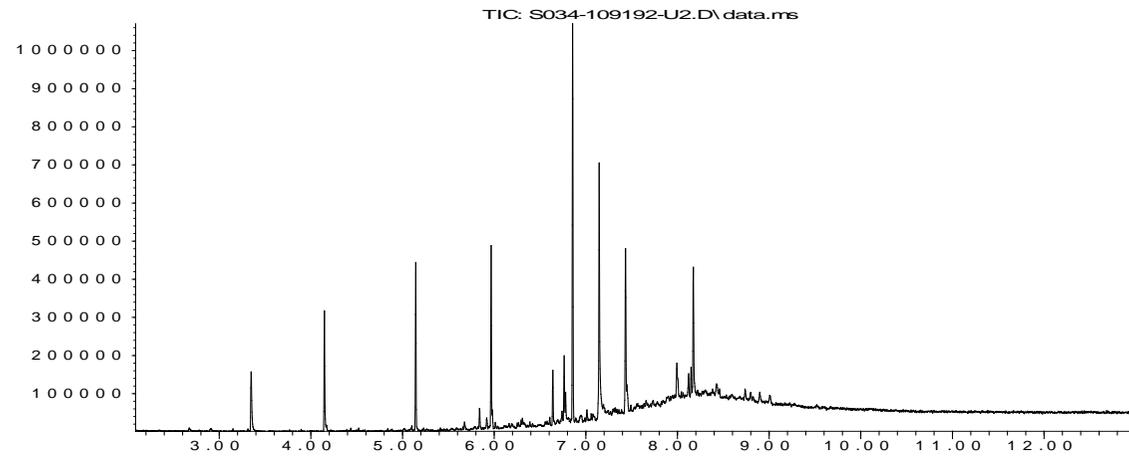
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

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

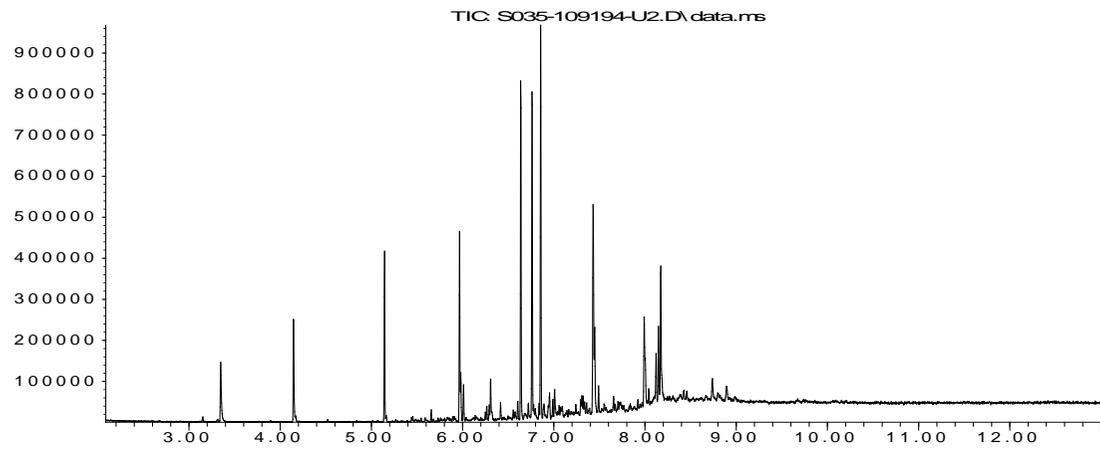
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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.

Abundance

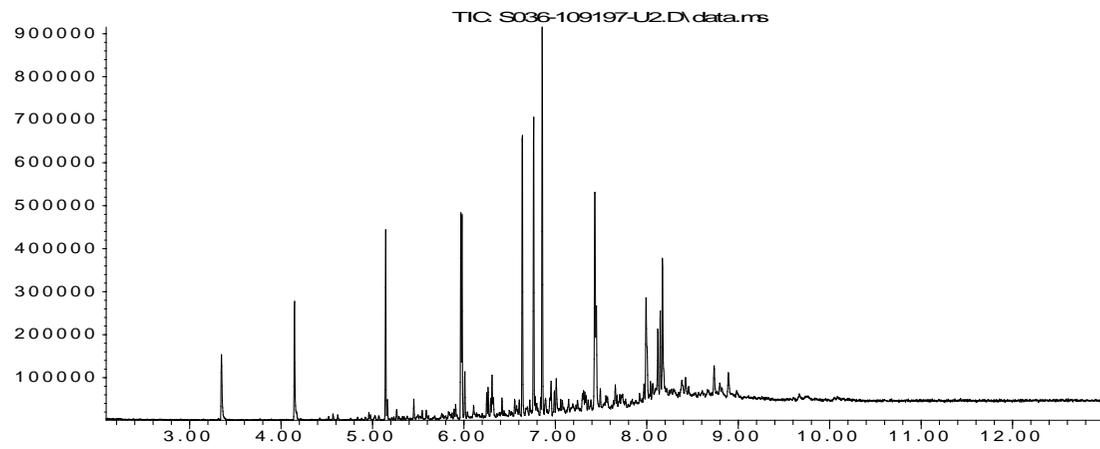


Abundance



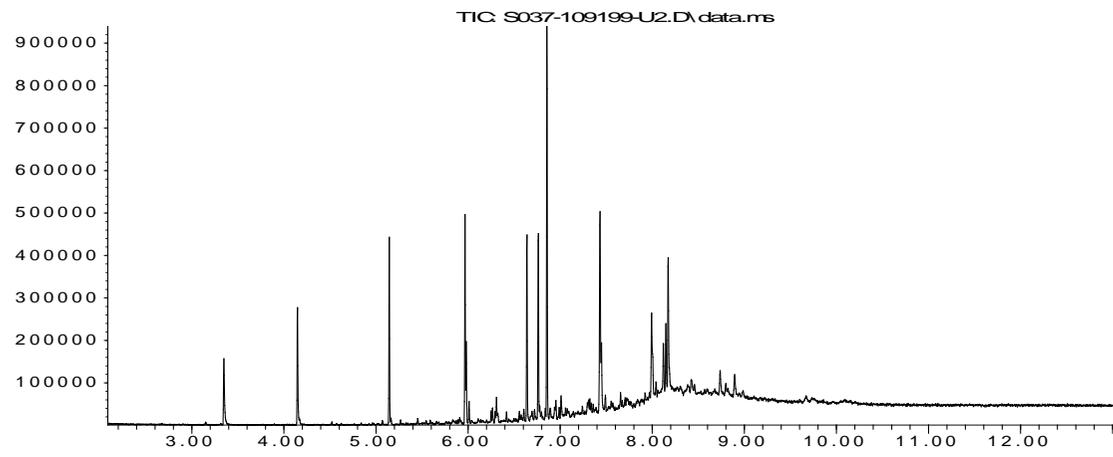
Time-->

Abundance



Time-->

Abundance



Time-->

Sample Deviation Report



Analytical Report Number : 24-001439

Project / Site name: Blackmoorfoot Road, Huddersfield

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS12	N/A	S	109199	b	BTEX and/or Volatile organic compounds in soil	L073B	b
WS12	N/A	S	109199	b	Monohydric phenols in soil	L080	b
WS12	N/A	S	109199	b	Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in soil	L064B	b
WS12	N/A	S	109199	b	TPH Chromatogram in soil	L064B	b
WS12	N/A	S	109199	b	Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	L076B/L088	b



Remada Ltd
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i2 Analytical Ltd.
7 Woodshots Meadow,
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WD18 8YS

e: sam.taylor@remada.co.uk; info@remada.co.uk

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

Analytical Report Number : 24-001442

Project / Site name:	Blackmoorfoot Road, Huddersfield	Samples received on:	02/02/2024
Your job number:	1219.01	Samples instructed on/ Analysis started on:	02/02/2024
Your order number:	1219.01	Analysis completed by:	14/02/2024
Report Issue Number:	1	Report issued on:	16/02/2024
Samples Analysed:	3 10:1 WAC samples		

Signed:

Dominika Liana
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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



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Environmental Science

i2 Analytical7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YSTelephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com**Waste Acceptance Criteria Analytical Results**

Report No:	24-001442					
	Client: REMADALT					
Location	Blackmoorfoot Road, Huddersfield					
Lab Reference (Sample Number)	109200			Landfill Waste Acceptance Criteria		
Sampling Date	30/01/2024			Limits		
Sample ID	WS03			Inert Waste Landfill	Stable Non- reactive HAZARDOUS waste in non- hazardous Landfill	Hazardous Waste Landfill
Depth (m)	0.70					
Solid Waste Analysis						
TOC (%)**	0.6			3%	5%	6%
Loss on Ignition (%) **	2.9			--	--	10%
BTEX (µg/kg) **	< 5.0			6000	--	--
Sum of PCBs (mg/kg) **	< 0.007			1	--	--
Mineral Oil (mg/kg) <small>EH, LD, CU, AL</small>	66			500	--	--
Total PAH (WAC-17) (mg/kg)	11.4			100	--	--
pH (units)**	8.8			--	>6	--
Acid Neutralisation Capacity (mmol / kg)	18			--	To be evaluated	To be evaluated
Eluate Analysis						
	10:1			10:1	Limit values for compliance leaching test	
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l		mg/kg		using BS EN 12457-2 at L/S 10 l/kg (mg/kg)	
Arsenic *	0.00269			0.0269	0.5	2
Barium *	0.0145			0.145	20	100
Cadmium *	0.000141			0.00141	0.04	1
Chromium *	0.0057			0.057	0.5	10
Copper *	0.014			0.14	2	50
Mercury *	< 0.000500			< 0.00500	0.01	0.2
Molybdenum *	0.00256			0.0256	0.5	10
Nickel *	0.0012			0.012	0.4	10
Lead *	0.0027			0.027	0.5	10
Antimony *	< 0.0017			< 0.017	0.06	0.7
Selenium *	< 0.0040			< 0.040	0.1	0.5
Zinc *	0.015			0.15	4	50
Chloride *	0.24			2.4	800	15000
Fluoride*	0.27			2.7	10	150
Sulphate *	81			810	1000	20000
TDS*	110			1100	4000	60000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-
DOC	6.46			64.6	500	800
Leach Test Information						
Stone Content (%)	< 0.1					
Sample Mass (kg)	1.5					
Dry Matter (%)	86					
Moisture (%)	14					
Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)						
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited						

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.



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Environmental Science

i2 Analytical7 Woodshots Meadow
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Watford, WD18 8YSTelephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com**Waste Acceptance Criteria Analytical Results**

Report No:	24-001442					
	Client: REMADALT					
Location	Blackmoorfoot Road, Huddersfield					
Lab Reference (Sample Number)	109201			Landfill Waste Acceptance Criteria		
Sampling Date	30/01/2024			Limits		
Sample ID	WS05			Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Depth (m)	0.10					
Solid Waste Analysis						
TOC (%)**	0.6			3%	5%	6%
Loss on Ignition (%) **	2.5			--	--	10%
BTEX (µg/kg) **	< 5.0			6000	--	--
Sum of PCBs (mg/kg) **	< 0.007			1	--	--
Mineral Oil (mg/kg) <small>EH, LD, CU, AL</small>	86			500	--	--
Total PAH (WAC-17) (mg/kg)	38.2			100	--	--
pH (units)**	8.4			--	>6	--
Acid Neutralisation Capacity (mmol / kg)	12			--	To be evaluated	To be evaluated
Eluate Analysis						
	10:1			10:1	Limit values for compliance leaching test	
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg		
				using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2
Barium *	0.0102			0.102	20	100
Cadmium *	0.000107			0.00107	0.04	1
Chromium *	0.0017			0.017	0.5	10
Copper *	0.010			0.10	2	50
Mercury *	< 0.000500			< 0.00500	0.01	0.2
Molybdenum *	0.00102			0.0102	0.5	10
Nickel *	0.0011			0.011	0.4	10
Lead *	< 0.0010			< 0.010	0.5	10
Antimony *	0.0044			0.044	0.06	0.7
Selenium *	< 0.0040			< 0.040	0.1	0.5
Zinc *	0.011			0.11	4	50
Chloride *	0.62			6.2	800	15000
Fluoride*	0.12			1.2	10	150
Sulphate *	15			150	1000	20000
TDS*	39			390	4000	60000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-
DOC	7.18			71.8	500	800
Leach Test Information						
Stone Content (%)	55					
Sample Mass (kg)	1.3					
Dry Matter (%)	92					
Moisture (%)	8.5					
Results are expressed on a dry weight basis, after correction for moisture content where applicable.				* = UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation				** = MCERTS accredited		

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.



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Environmental Science

i2 Analytical7 Woodshots Meadow
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Watford, WD18 8YSTelephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com**Waste Acceptance Criteria Analytical Results**

Report No:	24-001442					
	Client: REMADALT					
Location	Blackmoorfoot Road, Huddersfield					
Lab Reference (Sample Number)	109202			Landfill Waste Acceptance Criteria		
Sampling Date	30/01/2024			Limits		
Sample ID	WS12			Inert Waste Landfill	Stable Non- reactive HAZARDOUS waste in non- hazardous Landfill	Hazardous Waste Landfill
Depth (m)	0.40					
Solid Waste Analysis						
TOC (%)**	1.0			3%	5%	6%
Loss on Ignition (%) **	3.0			--	--	10%
BTEX (µg/kg) **	< 5.0			6000	--	--
Sum of PCBs (mg/kg) **	< 0.007			1	--	--
Mineral Oil (mg/kg) <small>EH, LD, CU, AL</small>	60			500	--	--
Total PAH (WAC-17) (mg/kg)	29.0			100	--	--
pH (units)**	8.5			--	>6	--
Acid Neutralisation Capacity (mmol / kg)	11			--	To be evaluated	To be evaluated
Eluate Analysis						
	10:1			10:1	Limit values for compliance leaching test	
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l		mg/kg		using BS EN 12457-2 at L/S 10 l/kg (mg/kg)	
Arsenic *	0.00751			0.0751	0.5	2
Barium *	0.0143			0.143	20	100
Cadmium *	< 0.000100			< 0.00100	0.04	1
Chromium *	0.0019			0.019	0.5	10
Copper *	0.029			0.29	2	50
Mercury *	< 0.000500			< 0.00500	0.01	0.2
Molybdenum *	0.00177			0.0177	0.5	10
Nickel *	0.0017			0.017	0.4	10
Lead *	0.0035			0.035	0.5	10
Antimony *	< 0.0017			< 0.017	0.06	0.7
Selenium *	< 0.0040			< 0.040	0.1	0.5
Zinc *	0.013			0.13	4	50
Chloride *	3.1			31	800	15000
Fluoride*	0.23			2.3	10	150
Sulphate *	11			110	1000	20000
TDS*	55			550	4000	60000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-
DOC	13.7			137	500	800
Leach Test Information						
Stone Content (%)	41					
Sample Mass (kg)	1.0					
Dry Matter (%)	89					
Moisture (%)	11					
Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)						
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited						

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 : 24-001442

Project / Site name: Blackmoorfoot Road, Huddersfield

* 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 *
109200	WS03	None Supplied	0.7	Brown gravely sand with clinker and brick
109201	WS05	None Supplied	0.1	Brown sand with stones
109202	WS12	None Supplied	0.4	Brown sand with stones

Analytical Report Number : 24-001442

Project / Site name: Blackmoorfoot Road, Huddersfield

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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 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
Sample Preparation		In-house method	L043B	W	NONE
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 an 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	D	MCERTS
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	NONE
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	W	ISO 17025

Analytical Report Number : 24-001442

Project / Site name: Blackmoorfoot Road, Huddersfield

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025
WAC Leachate 10:1		In-house method	L043B	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.

Sample Deviation Report



Analytical Report Number : 24-001442

Project / Site name: Blackmoorfoot Road, Huddersfield

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS12	N/A	S	109202	b	BTEX and/or Volatile organic compounds in soil	L073B	b
WS12	N/A	S	109202	b	PCB's By GC-MS in soil	L027B	b
WS12	N/A	S	109202	b	Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in soil	L064B	b
WS12	N/A	S	109202	b	Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	L076B/L088	b



APPENDIX D

Laboratory Geotechnical Tests



Laboratory Report



Contract Number: 71029

Client Ref: **1219.01**

Client PO: **1219.01**

Date Received: **02-02-2024**

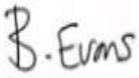
Date Completed: **13-02-2024**

Report Date: **13-02-2024**

Client: **Remada Limited**

This report has been checked and approved by:

Contract Title: **Blackmoorfoot rOAD, Huddersfield**
For the attention of: **Peter Dickinson**


Brendan Evans
Office Administrator

Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	3
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	3
Disposal of samples for job	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 (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)

Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)

Wayne Honey (Human Resources/ Health and Safety Manager)

