

**Supplementary
Intrusive
Investigation**

**Client: Lidl Great Britain
Ltd**

**Briton Ferry Road,
Neath**

Report No: 769.05.02

September 2025





Executive Summary

Remada Ltd was commissioned by Lidl Great Britain Ltd (hereafter 'the Client') to conduct a Supplementary Phase 2 Ground Investigation for a proposed store at Briton Ferry Road, Neath, South Wales SA11 1AS.

This report follows a Phase 1 Desk Study (Remada report ref: 769.10.01 dated September 2025), a Coal Mining Risk Assessment (Remada report ref: 769.01.03 dated September 2025) and a Phase 2 Ground Investigation (Remada report reference 769.02.03 dated September 2025).

Intrusive Investigation

The proposed development at the time of writing is for 'demolition of existing buildings [Lidl store and adjacent Poundstretcher store] and replacement with a Class A1 foodstore with associated carparking, landscaping, engineering and drainage works'.

A supplementary intrusive investigation was designed and implemented by Remada Ltd, in order to increase coverage within the proposed building footprint and to further investigate the risk to controlled waters in response to NRW letter reference CAS-181089-F7D7. Three window sample boreholes (WS201 – WS203) were advanced to a target depth of 6.0m bgl within the Lidl store area on 24th August 2022. Access was not possible into the existing Poundstretcher (northern) area on the day of the intrusive investigation.

The findings of the supplementary investigation generally confirmed the findings of Remada's previous intrusive investigation in 2020, with a variable thickness of made ground being encountered overlying superficial Tidal Flat Deposits (a Secondary (Undifferentiated) Aquifer). SPT N-values >50 were recorded at depths of between 4.0m and 6.0m bgl, interpreted as being the top of the Hughes Member bedrock (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 concentrations of contaminants with groundwater and surface water sampled from have been compared with the Water Framework Directive Regulations 2015 Schedule 3 General Quality of Groundwater as an applicable Environmental Quality Standards (EQS) for Secondary Aquifers. The AA-EQS level has been adopted.

Elevated concentrations of benzo(b)fluoranthene, benzo(k)fluoranthene and benzo(g,h,i)perylene were detected in exceedance of the respective EQS within all three groundwater samples analyses. The concentrations of fluoranthene recorded in WS201 and WS203 were recorded in exceedance of the EQS, whilst an exceedance for dissolved mercury was detected in WS202. Benzene has been used as a proxy for the comparison of solubility of Total Petroleum Hydrocarbons (TPH).

Within the surface water samples, the downstream sample recorded an elevated concentration of benzo(g,h,i)perylene, although this 0.01 µg/l value was also at the laboratory's limit of detection.

Cryddan Brook flows from east to west proximal to the northern boundary of the site, and whilst the invert level is unknown, it is located circa 2.0m below the adjacent roadway (i.e. approx. 5.5m AOD). The standing water levels recorded with three monitoring wells during Remada's supplementary investigation ranged between 5.48m AOD (WS202) and 4.10m AOD (WS203). Consequently, this indicates that the groundwater level underlying the site is on par with the brook's level and that a potential pathway exists between the two.



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 i.e. soil contaminants are not greater than respective GAC. 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 results of the groundwater chemical analysis have identified detectable concentrations of some dissolved metals, TPH and PAHs within the three most recent samples (from WS201 – WS203). Localised exceedances of the respective EQS for fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene and benzo(g,h,i)perylene and dissolved mercury were recorded in exceedance of the respective EQS.

The results of the surface water chemical analysis upstream and downstream have also identified detectable concentrations of dissolved metals, TPH and PAH. However, no concentrations were identified above the MDL (the benzo(ghi)perylene concentration in the downstream sample being detected at the MDL).

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.

Waste Classification

In general, the results of the chemical analyses indicate that the material would be classified as non-hazardous waste. While Waste Acceptance Criteria (WAC) analysis has not been undertaken, three of the four samples selected for analysis exceeded this TOC limit for disposal in an inert landfill. Therefore, it is considered that the waste should be classified as non-hazardous. WAC testing is not required for disposal of non-hazardous waste to landfill.

Geotechnical Assessment

Remada's previous intrusive investigation in 2020 concluded that all foundations should bear on the same strata, in order to prevent differential settlement. Either ground improvement in the form of vibro concrete columns or piled foundations are considered necessary to transfer foundation loads to a suitable bearing layer. Floor slabs should be suspended and bearing on the piled foundations.

The window sampling undertaken by Remada in 2022 has identified similar ground conditions of made ground and organic superficial deposits, with suspected bedrock encountered between 4.0m and 6.0m bgl. Consequently, the supplementary intrusive investigation supports the foundation recommendations provided within Remada's previous report (ref: 769.02.02 dated March 2022).

The results of the BRE SD1 testing from 2020 and 2022 have been combined, in order to provide a more accurate review of the concrete classification requirements for the site. In accordance with BRE SD1 for buried concrete in a brownfield site with static groundwater, characteristic values for water soluble sulphate and pH have been taken as 440mg/l and 7.3 respectively, whilst the mean of the highest two calculated Total Potential Sulphate (3x Total Sulphur) is 1.92%.

Therefore, a Design Sulphate Class DS-4 is considered appropriate for buried concrete and an ACEC Class of AC-3s is considered appropriate for the location. This is an increase from DS-2 and AC-1s previously reported by Remada and is due to the elevated Total Potential Sulphate concentrations identified within the underlying soils. Further soil sampling and BRE SD1 analysis may be able to reduce this classification.



Contents

1	INTRODUCTION	4
1.1	OBJECTIVES.....	4
1.2	SCOPE OF WORK	4
1.3	PREVIOUS REPORTS	5
1.4	LIMITATIONS.....	5
2	REVIEWS OF PREVIOUS REPORTS	6
2.1	PHASE 1 DESK STUDY (REMADA, 2025)	6
2.2	COAL MINING RISK ASSESSMENT (REMADA, 2025)	7
2.3	PHASE 2 GROUND INVESTIGATION REPORT (REMADA, 2025).....	8
3	SITE WALKOVER.....	12
4	ENVIRONMENTAL & GEOTECHNICAL INVESTIGATION METHODOLOGY.....	15
4.1	INVESTIGATION STRATEGY	15
4.2	BURIED SERVICE CLEARANCE	15
4.3	INTRUSIVE INVESTIGATION	15
4.4	IN-SITU TESTING	15
4.5	SOIL SAMPLING.....	16
4.6	GAS & GROUNDWATER.....	16
4.7	SURFACE WATER SAMPLING.....	16
4.8	QUALITY ASSURANCE AND QUALITY CONTROL	16
4.9	LABORATORY ANALYSIS & TESTING.....	17
5	GEOTECHNICAL & ENVIRONMENTAL INVESTIGATION FINDINGS	18
5.1	GROUND CONDITIONS	18
5.2	IN-SITU TESTING.....	18
5.3	SOIL OBSERVATIONS	20
5.4	GROUNDWATER OBSERVATIONS	20
5.5	CHEMICAL ANALYSIS	21
5.6	GEOTECHNICAL TESTING	22
6	GENERIC QUANTITATIVE RISK ASSESSMENT.....	23
6.1	HUMAN HEALTH RISK ASSESSMENT	23
6.2	COMPARISON OF SOIL ANALYSIS RESULTS WITH HUMAN HEALTH GAC	23
6.3	CONTROLLED WATERS RISK ASSESSMENT	23
6.4	REVISED CONCEPTUAL SITE MODEL.....	25
6.5	WASTE CLASSIFICATION & WASTE ACCEPTANCE	25
6.6	HEALTH & SAFETY CONSIDERATIONS	25
7	GEOTECHNICAL SITE ASSESSMENT	27
7.1	GEOTECHNICAL CONSIDERATIONS.....	27
7.2	COMPARISON WITH PREVIOUS SITE INVESTIGATION.....	27
7.3	FOUNDATIONS.....	28
7.4	PROTECTION OF BURIED CONCRETE	29
8	CONCLUSIONS & RECOMMENDATIONS	30
8.1	CONCLUSIONS	30
8.2	RECOMMENDATIONS.....	31
	STUDY LIMITATIONS	33

**TABLES**

Table 1	Refined Conceptual Site Model (March 2022)
Table 2	Groundwater Levels during Supplementary Investigation
Table 3	Comparison of Soil Chemical Analyses with GAC
Table 4	Comparison of Water Chemical Analysis with EQS
Table 5	Refined Conceptual Site Model (November 2022)

GRAPHS

Graph 1	Plot of SPT N Values vs Depth
Graph 2	Plot of Mass Shear Strength vs Depth
Graph 3	Comparison of Remada's SPT N-values from 2022 & 2020 Investigations

FIGURES

Figure 1	Site Location Plan
Figure 2	Proposed Layout & Exploratory Location Plan

EXPLORATORY HOLE LOGS**APPENDICES**

Appendix A	SPT Hammer Energy Test Certificate
Appendix B	Low Flow Testing Certificates
Appendix C	Soil Chemical Analyses
Appendix D	Water Chemical Analysis
Appendix E	Geotechnical Analysis

Issue No	Date	Prepared By	Technical Review	Authorised
01	03.11.2022	A Howells	P Dickinson	G Jones
02	19.09.2025	P Dickinson	G Jones	G Jones



1 INTRODUCTION

Remada Ltd was commissioned by Lidl Great Britain Ltd (hereafter 'the Client') to undertake a Supplementary Phase 2 Ground Investigation for the proposed new store at Briton Ferry Road, Neath, South Wales SA11 1AS at the location indicated in **Figure 1**.

This report follows a Phase 1 Desk Study (Remada report ref: 769.10.01 dated September 2025), a Coal Mining Risk Assessment (Remada report ref: 769.01.03 dated September 2025) and a Phase 2 Ground Investigation (Remada report reference 769.02.03 dated September 2025). Consequently, this Supplementary Intrusive Investigation report supersedes 769.05.01 issued in November 2022.

1.1 Objectives

The objectives of this assessment are as follows:

- to supplement the previous Phase II Investigation relating to the site by providing further coverage of the site area.
- to contribute to the conceptual model of the site to identify plausible pollutant linkages, particularly with regards to groundwater; and
- to further assess ground conditions in relation to 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.

Due to the study site's positioning within Wales, the scope was also designed in line with the Welsh Land Contamination Working Group's Development of Land Affected by Contamination: A Guide for Developers version 4: September 2023. This guidance represents the culmination of a co-operative effort involving the Welsh Local Government Association (WLGA) and Natural Resources Wales (NRW). For the purpose of this report, any references to the Environment Agency (EA) should be seen as interchangeable with NRW.

This investigation was undertaken to address queries raised by NRW in their correspondence reference CAS-181089-F7D7 dated February 2022; namely, further coverage of the wider site area and assessment of the underlying groundwater regime.

The supplementary scope of work comprised:

- 1 No. Day of window sample boreholes with Standard Penetration Tests (SPTs) at 1m intervals (starting with a maximum depth of 1m bgl and including made ground / near surface strata material) to a target depth of 6m bgl.
- Installation of combined ground gas and groundwater monitoring standpipes within all window sample boreholes.
- 1 No. groundwater monitoring visit to satisfy NRW requirements.
- 1 No. sampling of water from the adjacent Cryddan Brook, upstream and downstream of the site, to assess the effect of the site on the quality of the water.
- Disturbed soil sampling to confirm the previous investigation's geotechnical classification, comprising strength testing and chemical analysis as described below.
- Suite of geotechnical classification and strength tests, including 4 No. BRE SD1 analyses.



- 5 No. standard water suites for pH, Aluminium, Arsenic, Beryllium, Cadmium, Chromium (trivalent & hexavalent), Copper, Iron, Mercury, Manganese, Nickel, Lead, Selenium, Vanadium, Zinc, Nitrite and Nitrate, Ammonia, Total Cyanide, Colour, Electrical Conductivity, Dissolved Organic Carbon, Turbidity, Odour, TPHCWG and PAH(16).
- 4 No. standard suites for asbestos (quantitative), pH, Arsenic, Beryllium, Cadmium, Chromium (trivalent & hexavalent), Copper, Mercury, Nickel, Lead, Selenium, Vanadium, Zinc, Fraction of Organic Carbon, TPHCWG, PAH(16) and Phenol; and
- Combined Factual & Interpretative Geoenvironmental Report.

1.3 Previous Reports

The following reports had been previously prepared for the site:

- Phase 1 Site Investigation & Preliminary Risk Assessment. Remada Ltd report ref: 769.10.01, issued in September 2025.
- Coal Mining Risk Assessment, Remada Ltd report ref: 769.01.03, issued in September 2025.
- Phase 2 Ground Investigation. Remada Ltd Report 769.02.03 issued in September 2025.

The following report was provided by the Client for review:

- Geo-Environmental Investigation Report Briton Ferry Road, Neath January 2016, Opus CC/J-B0756.00 (R01).

1.4 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 REVIEWS OF PREVIOUS REPORTS

2.1 Phase 1 Desk Study (Remada, 2025)

The Executive Summary and Conceptual Site Model presented within Remada's Phase 1 Desk Study are reproduced below. Remada's report included a review of Opus Ltd's Geo-Environmental Investigation Report from 2016, which in turn presented a review of an earlier report by Earth Science Partnership (2002):

Site Setting

The study site occupies an irregular (but very broadly triangular) plot to the west of A474 Briton Ferry Road. The site comprises three distinct areas, with a Lidl store present in the south-western area, a separate retail building previously occupied by 'Vitality Health & Fitness' and 'Poundstretcher' in the north-western area, and associated car parking occupying the eastern half of the site. Access to the study site is from School Road on the eastern boundary.

Site History

The earliest available mapping of 1878 and 1881 indicates it to be predominantly occupied by marshland. A railway line associated with the adjacent (off-site) Melin Crythan Works encroaches into the northern margins of the site in an arc. A 'Japan Works' encroaches into the south-western boundary of the site, extending off-site towards the south-west and expanding to occupy the southern half of the site by 1889. The Cryddan Brook bisects the central area of the site and would continue to do so until 1995, when it is no longer shown. By 1919 the railway sidings have expanded into the central area of the site, with rationalisation of these occurring by 1952. Buildings associated with the Melin Crythan Works / Tin Plate Works were constructed in the eastern area of the site in 1882, with the works complex being redeveloped between 1952 and 1958 when a new elongated building was constructed in the north-eastern margins of the site.

Between 1980 and 1987, the majority of the buildings in the southern area of the site are no longer shown, with only a north-west to south-east orientated elongate building still present parallel to Cryddan Brook and still labelled as 'Melyn Works'. A 'tank' of unspecified contents is indicated to be present encroaching into the eastern boundary of the site. By 1989, the majority of the buildings have been removed from the entire site, with only one small rectangular structure remaining adjacent to the eastern boundary. The area to the north of Cryddan Brook was labelled as a Coal Yard. The existing Lidl store building appears to have been constructed between 1993 and 1995, with its associated car park occupying the southern and eastern areas of the site. The Electricity Sub-Station adjacent to the eastern corner first appears in 1995, whilst the two now-defunct retail units in the north-western quadrant appear between the mapping of 1999 and Opus' investigation on-site in 2016.

Geology / Hydrogeology

Published geological maps record that the site is underlain by undivided deposits of Landscaped Ground and superficial Tidal Flat Deposits; the latter being designated as Secondary A and Secondary Undifferentiated Aquifers. The bedrock directly underlying the site is formed of the Hughes Member, for which the parent unit is the Pennant Sandstone Formation and designated as a Secondary A Aquifer.

Information obtained during Opus' intrusive investigation in the northern area of the site in 2016 recorded granular Made Ground to a maximum depth of 4.7m bgl, underlain by very soft grey CLAY. Historic BGS trial pit records in the eastern and north-eastern area of the site dating from 1994 recorded Made Ground to a maximum depth of 2.0m bgl, underlain by very clayey fine SAND to the base of a pit at 3.0m bgl.

Mining

The site is located within an area which 'might be' affected by coal mining activity and is located within a Mining Remediation Authority designated Coal Mining Reporting Area, although it is not located within



a Development High Risk Area. Consequently, it is recommended that Remada's previous Coal Mining Risk Assessment is updated to reflect the findings of this Phase 1 report.

Unexploded Ordnance (UXO) Risk

There is no indication of former military use from the desk study. Furthermore, the freely available Zetica UXO risk mapping indicates the site to be located within an area where the bomb risk is 'Low' due to WWII bombardment. This is defined by Zetica as an area having an indicated bombing density of 15 bombs per 1000 acres or less.

Radon

The site is located in both an Intermediate Probability Radon Area (3 to 5% of homes are estimated to be at or above the Action Level) and a Higher Probability Radon Area (10 to 30% of homes are estimated to be at or above the Action Level). Consequently, full radon protection measures are necessary in the proposed new development.

Recommendations

Environmental

The desk study has identified a number of on-site and off-site potential sources of contamination that would require further investigation. The following is recommended:

- Investigation of the lateral and vertical extent of made ground/fill beneath the proposed store footprint.
- Collection of soil and groundwater samples from the areas identified above for contaminants of concern; and
- Ground gas monitoring.

In accordance with CIRIA C665 the monitoring period should comprise not less than four visits for a proposed commercial development and should cover the "worst case" scenario which would occur during falling atmospheric pressure and, in particular, weather conditions such as rainfall and frost.

Geotechnical

It is recommended that a ground investigation is undertaken to enable preliminary foundation design.

2.2 Coal Mining Risk Assessment (Remada, 2025)

The pertinent findings of Remada's Coal Mining Risk Assessment (report Ref: 769.01.03, issued in September 2025) are reproduced below:

Published Geology

Published geological maps record that the site is underlain by undivided deposits of Landscaped Ground and superficial Tidal Flat Deposits; the latter being designated as Secondary A and Secondary Undifferentiated Aquifers. The bedrock directly underlying the site is formed of the Hughes Member, for which the parent unit is the Pennant Sandstone Formation and designated as a Secondary A Aquifer.

The BGS indicates that the Hughes Member bedrock comprises predominantly sandstone beneath the southern half of the site, and mudstone, siltstone and sandstone beneath the northern half. The BGS mapping indicates that the Westernmoor coal seam bisects the central area of the site, orientated north-west to south-east. The site is located less than 500m south-east from the North-East to South-West trending 'Neath Disturbance'.

The Generalised Vertical Section (GVS) on the BGS Map Sheet 247 records the following succession of coal seams within the 265m thick Hughes Member within the area (i.e. east of the Neath Disturbance) as: Graigola, Coal, Westernmoor, Mountain Coal, Garlant and Wenallt Rider. Vertical separation



between the Westernmoor and Mountain Coal is approximately 80m and the general strike and dip direction is between 12° to 15° to the north north-east.

Consultants Mining Report

The site is located within an area which 'may be affected by coal mining activity'. The Coal Authority Consultants Mining Report for the site states that 'no past mining recorded' on-site and the risk from probable unrecorded shallow mining as 'none'.

An adit is recorded approximately 75m to the south-east of the study site, adjacent to Walters Road (grid ref: 274725, 196378). The Mining Remediation Authority's interactive mapping records this adit as bearing 143 degrees, which is away from the study site.

Recommendations

The assessment has not identified a potential for the site to be impacted by either shallow worked seams or shafts and no further investigation or action is recommended.

2.3 Phase 2 Ground investigation Report (Remada, 2025)

2.3.1 Scope of Works & Ground Conditions

The investigation comprised three (3 No.) cable tool boreholes and three (3 No.) trial pits to expose existing foundations. The investigation was undertaken on the 23rd and 24th July 2020.

Two of the hand dug trial pits HDTP2 and HDTP3 exposed a spread footing bearing on made ground at a depth 0.75m bgl and with an estimated approximate width of 1.5m. HDTP1 exposed concrete that extended beyond the maximum excavation depth of 1.3m but stepped out only 0.1m indicative of a pile cap.

Made Ground comprised asphalt surfacing to a depth of 0.1m overlying sub-base to 0.4m in turn overlying a medium dense gravelly ashy fine to medium sand, gravel is wood, brick, coal and fragments of concrete. Superficial deposits were observed as soft to firm sandy or silty clay at a depth of between 2.6 and 3.0m.

Beneath the made ground soft to firm, occasionally sandy, silty clay was encountered to depths of between 3.45 and 5.0m bgl. In borehole BH1-B a slight organic odour was noted. The clay has been interpreted as Tidal Flat Deposits, as indicated to be present on the BGS map.

Beneath the Tidal Flat Deposits dense becoming very dense slightly sandy predominantly angular to subangular fine to coarse gravel comprising mudstone and shale. While the gravel was predominantly angular to subangular, the gravel was also noted to be rounded within BH1-B. There are two potential interpretations for this material: Glaciofluvial Deposits, or weathered bedrock. Given that the materials encountered comprised predominantly angular or subangular mudstone and shale it is considered that this material is more likely to represent a zone of weathered bedrock.

2.3.2 Groundwater Analyses

Water samples were recovered from Remada's BH1-B and BH2 and Opus's WS4 on 21st March 2022. Dedicated bailers were used for each monitoring well to prevent cross-contamination.

The average concentration of Dissolved Organic Carbon (DOC) and pH were 75 ug/l and 7.7 respectively. Detectable concentrations of metals were identified in all three samples, although the concentrations of beryllium, cadmium, mercury, lead and Chromium (III and VI) were recorded below the laboratory method detection limit (MDL).

The concentrations of Total Petroleum Hydrocarbon (TPH) were recorded below the MDL in all three samples analysed.



The concentrations of Polyaromatic Hydrocarbons (PAH-16) were recorded below the MDL in all three samples analysed.

2.3.3 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.

2.3.4 Water Resources Assessment

The site is not indicated to be within a Groundwater Source Protection Zone. The superficial Tidal Flat Deposits underlying the site are designated as Secondary Undifferentiated Aquifers, where it is not possible to designate it as 'A' or 'B'. The Hughes Member bedrock underlying the site is designated as a Secondary 'A' Aquifer.

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 encountered at depths of between 1.66m and 3.6m bgl within Remada's standpipes in the southern area of the site during the 2020 monitoring programme. During Opus' investigation in the northern area of the site in December 2015, groundwater was encountered in their borehole WS3 at a depth of 1.9m bgl. Standing groundwater levels recorded in the monitoring wells in WS3 and WS4A in December 2015 were 2.52m and 2.0m bgl respectively.

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.

2.3.5 Geotechnical Assessment

The Coal Mining Risk Assessment, Remada 769.01.03 did not identify a potential for unrecorded shallow worked seams to be present beneath the site. All three cable tool boreholes proved the full depth of made ground and encountered a soft to firm CLAY to a maximum depth of 5.5m in BH2. The results of undrained shear strength tests on U100 samples produced Cu values of 17 to 34kPa for the CLAY. All three boreholes refused in a gravel/shale of mudstone at between 4.5 and 6m bgl. Groundwater monitoring has recorded that all wells were dry.

In order to prevent differential settlement between the existing store and proposed extension all foundations should bear on the same strata. The made ground and underlying soft to firm slightly organic clay would produce unacceptable amounts of total and differentials settlement and consequently piled foundations are required.

Either ground improvement in the form of vibro concrete columns or piled foundations are considered necessary to transfer foundation loads to a suitable bearing layer. Concrete columns would require a depth in the order of 6m and advice should be sought from a specialist ground improvement contractor. Driven piles are unlikely to be acceptable due to vibration of the existing store and therefore either bored or CFA piles should be considered, however it may not be possible to socket CFA piles into the bedrock. Bored piles would require casing through made ground and alluvium and be socketed into the competent bearing strata in order to transfer loads. Rapid excavation of the pile sockets in weak rock is recommended to minimise the potential for



deterioration in the walls which could result in the swelling of the mudstone. After formation, the pile should be concreted immediately, preferably on the same day.

Floor slabs should be suspended and bearing on the piled foundations.

A Design Sulphate Class DS-2 is considered appropriate for buried concrete and an ACEC Class of AC-1s is considered appropriate for the location.

2.3.6 Ground Gas

The results of four rounds of gas monitoring visits placed the site into Characteristic Situation 2 and therefore ground gas protection measures will be required within the proposed buildings.

The site is located in both an Intermediate Probability Radon Area (3 to 5% of homes are estimated to be at or above the Action Level) and a Higher Probability Radon Area (10 to 30% of homes are estimated to be at or above the Action Level). Consequently, full radon protection measures are necessary in the proposed new development.



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	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, Va, Zn, Boron, TPH /PAH, VOCs and SVOCs.	Disturbance due to construction plant causing direct contact, dusts, vapours.	Occupants of the development / building fabric	• Direct Soil Ingestion	• No	N/A	N/A	N/A	N/A
• Marshland				• Indoor Dust Ingestion	• Yes	Concentrations within typical range of made ground (< GAC)	Low	Hardstanding to cover retail site minimising direct contact.	Negligible
• Japan Works		Direct Contact with occupants of the proposed development	Occupants of the development / building fabric	• Skin Contact with Soils	• Yes	Low	As above	Negligible	Low
• Melin Crythan Works / Tinplate Works / Melyn Works (Sheet & Tinplate)				• Skin Contact with Dust	• Yes	Low	As above	Negligible	Low
• Railway lines and sidings		Inhalation of fibres / vapours / gases by occupants of proposed development	Adjacent residents during construction	• Inhalation of Outdoor Dust	• Yes	Low	As above	Negligible	Low
• Unspecified tank.				• Ingestion of home grown produce	• No	Commercial development devoid of gardens	None	N/A	None
• Coal Yard		Permeation of water supply pipework	Adjacent residents during construction	• Inhalation of Outdoor Vapours	• Yes	Low	As above	Negligible	Low
• Infilled / culverted Cryddan Brook				• Inhalation of Indoor Vapours	• Yes	Low	As above	Negligible	Low
• Lidl store, former retail units and associated car park.		Leachate	Secondary (A) & (Undifferentiated) Aquifers	• Inhalation of ground gas	• Yes	CS2	Moderate risk	Gas protection measures	Low
• Electricity Sub-station				• Inhalation of radon gas	• No	Intermediate & Higher Probability Areas	Moderate risk	Full radon protection measures in new buildings	Low
Off-site Sources		Leachate	Secondary (A) & (Undifferentiated) Aquifers	• Ingestion via permeated water supply pipework	• Yes	C12-C16 and C16-C44 < threshold for PE pipework.	Low	As per UKWIR	Low
• Residential properties				• Direct contact with Secondary (A & Undifferentiated) Aquifers in Superficial Deposits	• Yes	Concentrations within typical range of made ground (< GAC)	Low	Hardstanding to prevent precipitation infiltration and leaching.	Negligible
• Tramway				• In-direct contact with Secondary (A) Aquifer in bedrock	• Yes	As above	Low	As above	Negligible

Table 1: Conceptual Site Model

3 SITE WALKOVER

The opportunity was taken to inspect the study site on 24th August 2022 by Remada Ltd prior to the intrusive works. There were no visual or olfactory indicators of contamination and a photographic record is provided in **Photos 1 – 7** below:



Photo 1: View southwards across Lidl store car park towards Esso's Mile End petrol station.



Photo 2: Eastern façade of the Lidl store building



Photo 3: View towards the north-west with Lidl store entrance in the foreground and Poundstretcher store building beyond.



Photo 4: View northwards across Lidl and Poundstretcher car parks.



Photo 5: View westwards along service access to rear of both store buildings.



Photo 6: View eastwards along service road giving access to rear of both store buildings.



Photo 7: Lidl delivery area at rear of store.



4 ENVIRONMENTAL & GEOTECHNICAL INVESTIGATION METHODOLOGY

4.1 Investigation Strategy

Three (3 No) window sample holes were advanced in the centre of the site at locations indicated on **Figure 2** on 24th August 2022, in order to increase the general borehole coverage. It was not possible to advance boreholes in the north of the site due to access restrictions. All three boreholes were installed as groundwater monitoring wells.

A single groundwater monitoring visit was scheduled for the site to measure low flow parameters and collect water samples from the installed boreholes. In addition, two water samples were collected from the Cryddan Brook upstream and downstream of the site, in order to identify any reduction in water quality caused by the site.

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

The weather conditions at the site during the fieldwork period were generally warm and dry, with no standing water or slippery ground conditions being noted.

4.2 Buried Service Clearance

Buried service plans were reviewed prior to any fieldwork activities commencing. The Client provided Remada with EDI Survey Ltd's Topographic and Services Survey drawing No. 14433/T/01-02 Rev A, dated November 2015, in advance of the intrusive works.

During the subsequent intrusive works, a visual check and buried services survey using a Cable Avoidance Tool (CAT) and Signal Generator (Genny) was carried out at each exploratory hole location.

4.3 Intrusive Investigation

Window sample boreholes (WS201 – WS203) were advanced to a target depth of 6.0m below existing ground level (bgl). However, an SPT refusal (uncorrected N-value <50) was encountered in WS203 at 4.0m bgl, resulting in its termination.

Combined groundwater and ground gas monitoring standpipes were installed in all three exploratory boreholes.

4.4 In-Situ Testing

4.4.1 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 58% 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**.

4.4.2 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.



4.5 Soil Sampling

4.5.1 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.

4.5.2 Geotechnical

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

4.6 Gas & Groundwater

4.6.1 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 2m of plain HDPE pipe and bentonite seal, with a gas bung and tap being installed at the top of the pipe.

4.6.2 Well Development

After installation, all monitoring wells were developed on 6th September 2022 to remove drilling fluids and sediment from the wells.

4.6.3 Well Purging

Prior to groundwater sampling, all wells were purged with a submersible pump. Purging continued until pH, temperature and conductivity values stabilised to silty material, deposits from the bottom of the well, stagnant oxidised water and to attract fresher groundwater from the aquifer into the well.

4.6.4 Well Sampling

Three wells were sampled with a submersible pump on 29th September 2022. Dedicated sampling tubes were used for each monitoring well to prevent cross-contamination. An AquaTroll 500 was used to record stabilised pH, temperature and conductivity values during sampling. Groundwater samples were collected in amber glass jars and amber glass vials and retained in a cool box for onwards transport to the laboratory. The low flow sampling test certificates are presented in **Appendix B**.

4.7 Surface Water Sampling

To ensure surface water samples were obtained from a safe position i.e. the up and downstream bridges, water samples were retrieved using a telescope scoop and immediately transferred to an amber sample bottle for transit and analysis.

4.8 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.



4.9 Laboratory Analysis & Testing

4.9.1 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, vanadium, zinc, fraction of organic carbon, Total Petroleum Hydrocarbons (TPHCWG), Polyaromatic Hydrocarbons (PAH), BTEX compounds (benzene, toluene, ethylbenzene and xylene) and phenols.

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

4.9.2 Chemical Analysis - Groundwater

Three (3 No) groundwater samples and two (2 No) surface water samples from the Cryddan Brook were scheduled for the analysis of pH, aluminium, arsenic, beryllium, cadmium, chromium (trivalent & hexavalent), copper, iron, mercury, manganese, nickel, lead, selenium, vanadium, zinc, nitrite and nitrate, ammonia, total cyanide, colour, electrical conductivity, dissolved organic carbon, turbidity, odour, TPHCWG and PAH(16).

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

4.9.3 Geotechnical

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

- 5 No Natural Moisture Contents; and
- 5 No Atterberg Limits.
- 3 No. BRE SD1 tests

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



5 GEOTECHNICAL & ENVIRONMENTAL INVESTIGATION FINDINGS

5.1 Ground Conditions

A summary of the ground conditions encountered during the intrusive investigation is presented below, whilst **exploratory hole logs** are included at the rear of the report.

5.1.1 Published Geology

The geological mapping suggests that the site is underlain by superficial deposits of Tidal Flat Deposits (clay, silt and sand).

Bedrock geology is indicated to comprise Hughes Member, comprising sandstone in the south and mudstone, siltstone and sandstone in the north of the site. The Hughes Member is described as *"Green-grey, lithic arenites ("Pennant sandstones"), with thin mudstone/siltstone and seatearth interbeds, and mainly thin coals"*.

The Tidal Flat Deposits are classified by NRW as a Secondary (Undifferentiated) Aquifer. The Hughes Member is classified as a Secondary A aquifer. The site is not located within a Source Protection Zone.

5.1.2 Made Ground

Made ground was encountered within all three exploratory holes, extending to depths of between 2.0m and 2.6m bgl. Within WS201, the reinforced concrete within the delivery bay was 0.2m thick, whilst in WS202 and WS203 asphalt surfacing was encountered to 0.16m and 0.12m bgl respectively. In all three locations, hardstanding was underlain by a thin veneer of dark bluish grey limestone gravel.

The surfacing and engineered sub-base was typically underlain by light grey/ yellowish grey /dark brown / black gravelly sand and sandy gravel, with localised concrete cobbles. Gravel typically comprised brick, concrete, clinker, limestone and sandstone.

5.1.2 Natural Deposits

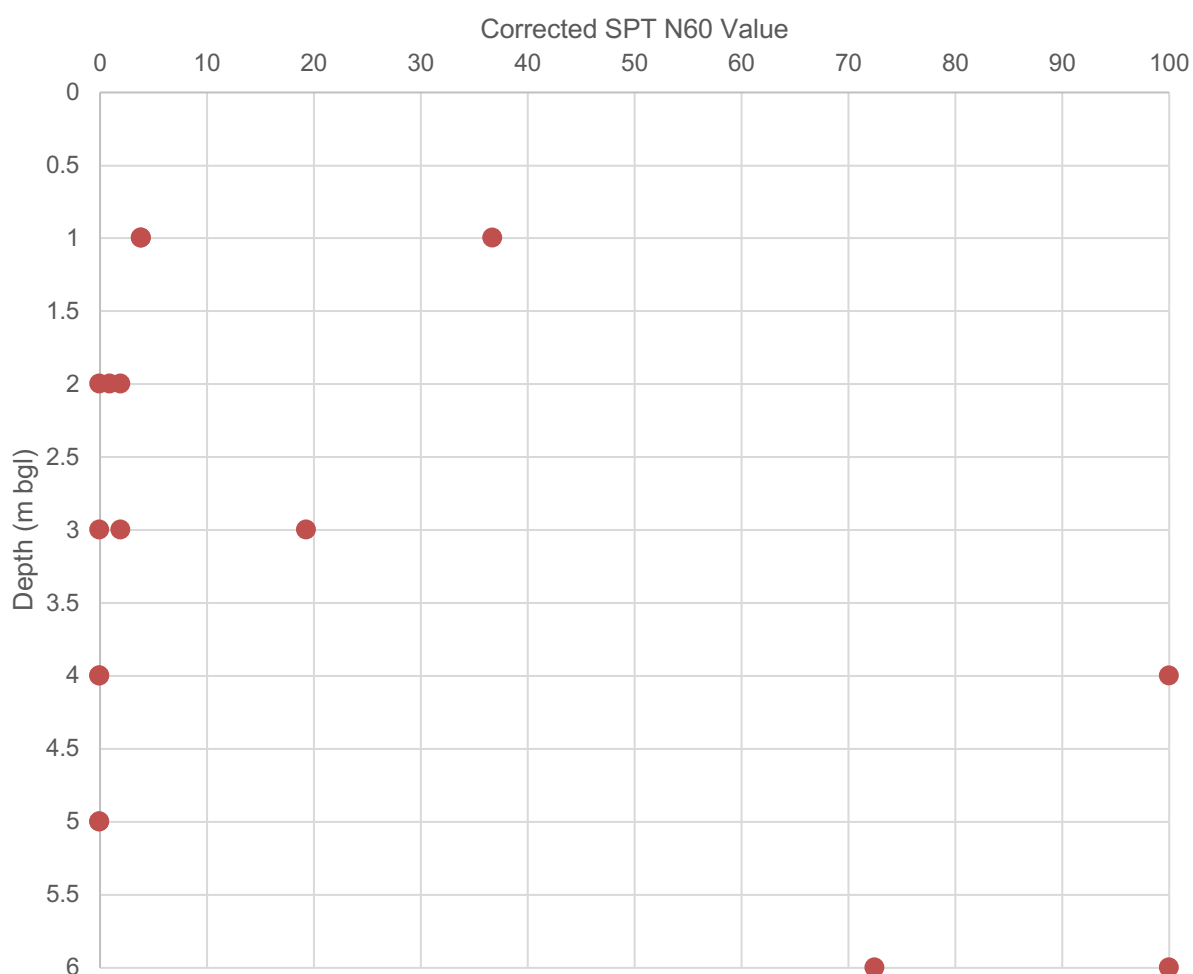
The natural deposits underlying the made ground typically comprised very soft to soft sandy SILT or silty CLAY with occasional fragments of black organic matter and localised relict roots. These deposits are considered to be representative of the superficial Tidal Flat Deposits as indicated on the published mapping.

Weathered grey SANDSTONE was encountered between 5.9m and 6.0m in WS202 and recovered as sandy angular coarse GRAVEL. This is considered to be representative of the Hughes Member bedrock.

5.2 In-situ Testing

5.2.1 Standard Penetration Tests (SPTs)

In-situ SPTs were undertaken to assist with the interpretation of strata encountered. The results of corrected N₆₀-values versus depth are plotted in the graph below. Where the corrected value is greater than 100, the plotted value has been capped at 100:



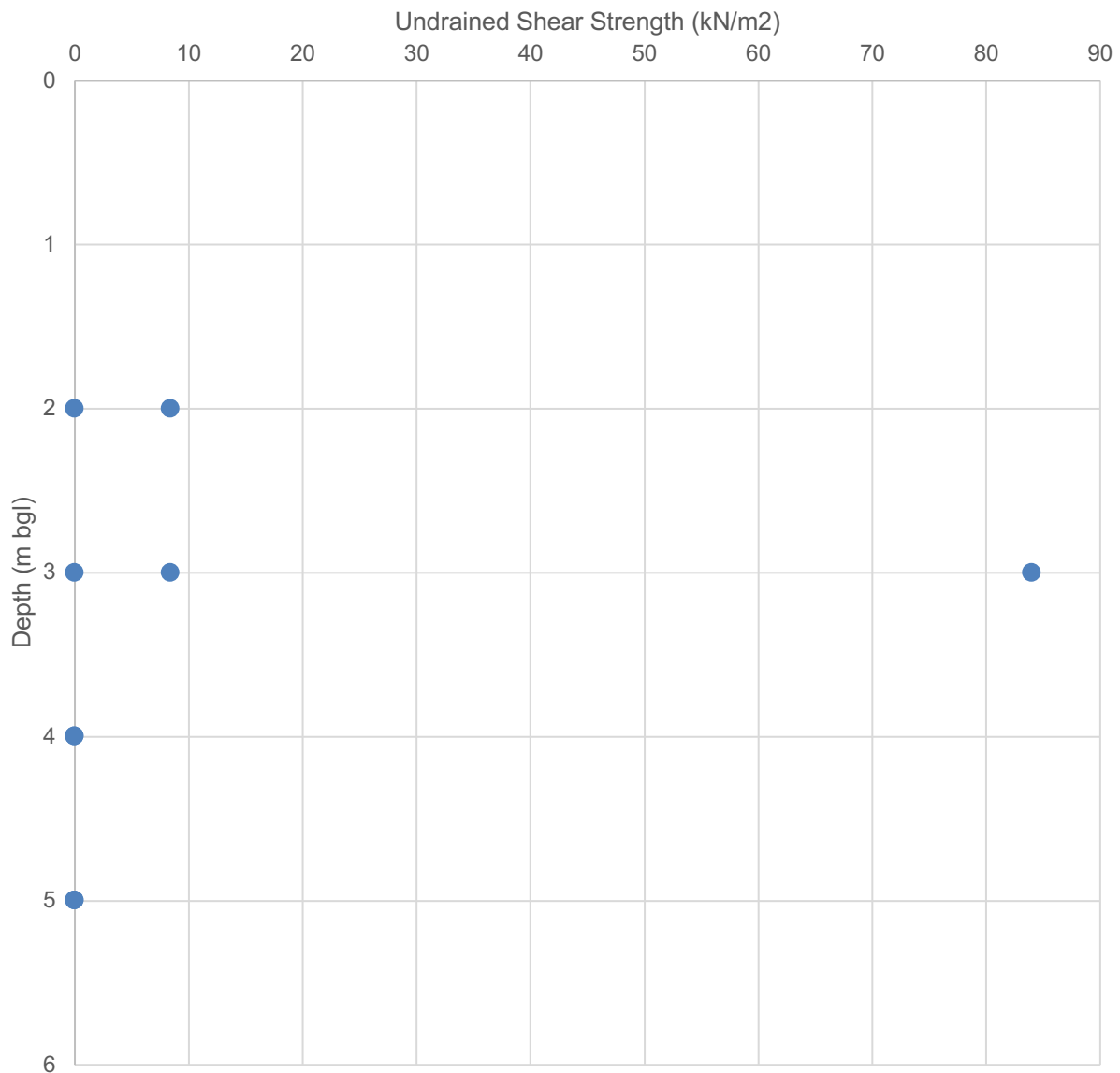
Graph 1: Plot of Corrected SPT N-Values Versus Depth

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

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

Where f_1 is based on the plasticity index.

A conservative Plasticity Index of 39% has been adopted (based on geotechnical laboratory testing) which equates to an f_1 factor of 4.2.



Graph 2: Plot of Mass Shear Strength Versus Depth

5.2.2 Hand Shear Vane Testing

It was not possible to achieve any successful field vane readings from recovered cohesive deposits during the intrusive investigation.

5.3 Soil Observations

Made Ground was recovered at all locations as a heterogeneous granular material containing a variety of man-made materials including brick, concrete, clinker and rare slag.

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

5.4 Groundwater Observations

Groundwater strikes were recorded in WS201 to WS203 during the investigation at depths of between 2.0 and 2.5m bgl. During the subsequent purging and sampling visits, groundwater was recorded within all three monitoring standpipes as summarised in the table below:



Location	Groundwater Strike during Intrusive Investigation (m AOD)	Groundwater Level in Standpipe (m AOD)		
		Purging Visit 06/09/2022	Sampling Visit 29/09/2022	Average
WS201	4.73	5.33	5.43	5.38
WS202	5.09	5.36	5.59	5.48
WS203	4.95	3.07	5.12	4.10

Table 2: Groundwater Levels during Supplementary Investigation

5.5 Chemical Analysis

5.5.1 Soils

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

The average Fraction of Organic Carbon (FOC) and pH were 0.11 and 8.5 respectively. Asbestos was not detected in the samples analysed.

Detectable concentrations of metals were identified, although these are generally within the range that would typically be expected for made ground.

Concentrations of Total Petroleum Hydrocarbons (TPH) were not detected above the method detection limit (MDL) in any of the samples analysed.

Concentrations of Polyaromatic Hydrocarbons (PAHs) were detected above the MDL in the sample from WS202 at 1.2m, with a total concentration of 8.6mg/kg being recorded.

5.5.2 Surface Water

The results of chemical analysis from samples taken in the Cryddan Brook surface water upstream and downstream of the site are presented in **Table 4**. Results of the chemical analyses are summarised as follows.

The concentrations of Dissolved Organic Carbon (DOC) ranged from 2.7mg/l upstream and 2.8 mg/l downstream. Likewise the pH values were similar; both being recorded as 8.0. Detectable concentrations of dissolved metals were identified in both samples although the concentrations of beryllium, cadmium, chromium, copper, mercury, lead, selenium and vanadium were below the laboratory method detection limit (MDL).

The total concentrations of PAH-16 ranged from 0.25 µg/l upstream and 0.27µg/l downstream.

Detectable concentrations of TPH were identified in both upstream and downstream samples. However the TPH concentration upstream of 18.2µ g/l was greater than the 17.9 µg/l recorded downstream. No BTEX compounds were identified in either sample.

5.5.3 Groundwater

The results of Remada's previous intrusive investigation on-site did not identify any concentrations of TPH or PAHs within the underlying groundwater that were above method detection limits (MDL).

Results of the groundwater chemical analysis from WS201, WS202 and WS203 are presented in **Table 4**. Results of the chemical analyses are summarised as follows.

The concentrations of DOC ranged from 2.0 (in WS202) and 5.1 (in WS203), whilst the pH ranged between 6.9 and 7.3. Detectable concentrations of metals were identified in all three samples, although the concentrations of beryllium, cadmium, chromium, lead and selenium were below the MDL.



Detectable concentrations of TPH were identified within all three samples, ranging between 16.5µg/l (in WS203) and 19.0µg/l (in WS201). The hydrocarbons were exclusively within the C21 – C35 aliphatic and aromatic carbon range. No BTEX compounds were identified in any of the three samples.

Detectable concentrations of PAHs were recorded in all samples, with the total PAH-16 ranged between 0.4µg/l (WS202) and 2.15µg/l (WS203). The PAH concentrations show no correlation with the TPH concentrations.

5.6 Geotechnical Testing

Results of the geotechnical testing are summarised below.

- Five plasticity tests undertaken revealed that the Tidal Flat Deposits were of high plasticity, with plasticity indices ranging between 27 and 36%. The results confirm the findings of the previous investigation, where plasticity indices were identified between 35 and 39%.
- The water-soluble sulphate contents varied from 0.03 to 0.24g/l in the four soil samples analysed with pH varying from 7.3 to 8.6. The total sulphur content varied from 0.22 to 0.97% and acid soluble sulphate varied from 0.14 to 0.87%.



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 0.016 to 0.27 giving a Soil Organic Matter (SOM) content range of between 2.8 to 46.6% with an average result of 19.4%. In order to present a conservative assessment, the SOM content of 2.5% has been adopted for the assessment.

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

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

- Direct soil and indoor dust ingestion;
- Skin contact with soils and dusts;
- Inhalation of indoor and outdoor dusts and vapours.

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

6.2 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

No asbestos was detected within any of the samples analysed from WS201 – WS203.

6.3 Controlled Waters Risk Assessment

6.3.1 Sensitivity – Groundwater

The site is not indicated to be within a Groundwater Source Protection Zone. The superficial Tidal Flat Deposits underlying the site are designated as a Secondary (Undifferentiated) Aquifer, where it is not possible to designate it as 'A' or 'B'. The Hughes Member bedrock underlying the site is designated as a Secondary A Aquifer. There are no groundwater abstractions recorded within 1km of the site.



Groundwater was encountered at depths of between 1.66m and 3.6m bgl within Remada's standpipes in the southern area of the site during the 2020 monitoring programme. During Opus' investigation in the northern area of the site in December 2015, groundwater was encountered in their borehole WS3 at a depth of 1.9m bgl. Standing groundwater levels recorded in the monitoring wells in WS3 and WS4A in December 2015 were 2.52m and 2.0m bgl respectively.

During Remada's supplementary investigation in 2022, groundwater was encountered at depths of between 2.0m and 2.5m bgl. Based on the findings to date, a laterally continuous groundwater body is considered to be present underlying the site, likely perched between the made ground and cohesive superficial deposits.

6.3.2 Sensitivity – Surface Waters

The nearest surface water feature is the Cryddan Brook present along the north-eastern boundary of the site. There are no surface water abstractions recorded within 1km of the site. Hydraulic connectivity is anticipated between the shallow groundwater on-site and this surface water course.

6.3.3 Comparison with EQS Levels

The concentrations of contaminants with groundwater and surface water sampled from have been compared with the Water Framework Directive Regulations 2015 Schedule 3 General Quality of Groundwater as an applicable Environmental Quality Standards (EQS) for Secondary Aquifers. The AA-EQS level has been adopted.

A comparison of groundwater chemical analysis with EQS levels (and Drinking Water Regulation 2016 levels) is presented as **Table 4**.

Elevated concentrations of benzo(b)fluoranthene, benzo(k)fluoranthene and benzo(g,h,i)perylene were detected in exceedance of the respective EQS within all three groundwater samples analyses. The concentrations of fluoranthene recorded in WS201 and WS203 were recorded in exceedance of the EQS, whilst an exceedance for dissolved mercury was detected in WS202. Benzene has been used as a proxy for the comparison of solubility of Total Petroleum Hydrocarbons (TPH).

Within the surface water samples, the downstream sample recorded an elevated concentration of benzo(g,h,i)perylene, although this 0.01 µg/l value was also at the laboratory's limit of detection.

6.3.4 Risk Assessment

Cryddan Brook flows from east to west proximal to the northern boundary of the site, and whilst the invert level is unknown, it is located circa 2.0m below the adjacent roadway (i.e. approx. 5.5m AOD). The standing water levels recorded with three monitoring wells during Remada's supplementary investigation ranged between 5.48m AOD (WS202) and 4.10m AOD (WS203). Consequently, this indicates that the groundwater level underlying the site is on par with the brook's level and that a potential pathway exists between the two.

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 (i.e., soil contaminants are not greater than respective GAC). 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 results of the groundwater chemical analysis have identified detectable concentrations of some dissolved metals, TPH and PAHs within the three most recent samples (from WS201 –



WS203). Localised exceedances of the respective EQS for fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene and benzo(g,h,i)perylene and dissolved mercury were recorded in exceedance of the respective EQS.

The results of the surface water chemical analysis upstream and downstream have also identified detectable concentrations of dissolved metals, TPH and PAH. However, no concentrations were identified above the MDL (the benzo(ghi)perylene concentration in the downstream sample being detected at the MDL).

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 Revised Conceptual Site Model

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

6.5 Waste Classification & Waste Acceptance

6.5.1 Waste Classification

Waste classification should be undertaken using the results of solid (total) analyses and not WAC analyses.

The assessment has included determination of the FOC which can be converted to total organic carbon (TOC) by multiplying the result by 100. A TOC limit of 3% is placed on waste destined for disposal in an inert landfill. Three of the four samples tested exceeded the 3% limit.

Asbestos was detected in a single sample at a concentration of 0.005%, which is less than the threshold for hazardous waste. The sum concentrations of metals and hydrocarbons were less 0.1%, and therefore it is likely that the soil would be classed non-hazardous, however this should be confirmed by the receiving site. WAC testing is not required for disposal of non-hazardous waste to landfill.

6.5.2 Waste Acceptance

While Waste Acceptance Criteria (WAC) analysis has not been undertaken, the assessment has included determination of the FOC which can be converted to TOC by multiplying the result by 100. A TOC limit of 3% is placed on waste destined for disposal in an inert landfill. Concentrations of greater than 3% TOC were measured in three of the four samples tested, and in general the made ground would be classified as non-hazardous.

As two of the five samples selected for analysis exceeded this limit, it is considered that the waste should be classified as non-hazardous. WAC testing is not required for disposal of non-hazardous waste to landfill. However, a full assessment of contaminants has not been undertaken and the final disposal classification should be confirmed by the receiving site.

6.6 Health & Safety Considerations

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



Potential Source Areas	Potential Contaminant of Concern	Pathways	Potential Receptor	Exposure Route (Human unless otherwise stated)	Potential Identified Linkage (unmitigated)	Findings of Ground investigation	Risk (Un-mitigated)	Proposed Remediation (Mitigation) Measures	Residual Risk Estimation		
<u>On-site Sources</u>	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, Va, Zn, Boron, TPH /PAH, VOCs and SVOCs.	Disturbance due to construction plant causing direct contact, dusts, vapours.	Occupants of the development / building fabric	• Direct Soil Ingestion	• No	N/A	N/A	N/A	N/A		
• Marshland • Japan Works • Melin Crythan Works / Tinplate Works / Melyn Works (Sheet & Tinplate) • Railway lines and sidings • Unspecified tank. • Coal Yard • Infilled / culverted Cryddan Brook • Lidl store, former retail units and associated car park. • Electricity Sub-station				Direct Contact with occupants of the proposed development	Adjacent residents during construction	• Indoor Dust Ingestion	• Yes	Concentrations within typical range of made ground (< GAC)	Low	Hardstanding to cover retail site minimising direct contact.	Negligible
						• Skin Contact with Soils	• Yes	Low	As above	Negligible	Low
						• Skin Contact with Dust	• Yes	Low	As above	Negligible	Low
		• Inhalation of Outdoor Dust	• Yes			Low	As above	Negligible	Low		
		• Ingestion of home grown produce	• No	Commercial development devoid of gardens	None	N/A	None				
		• Inhalation of Outdoor Vapours	• Yes	Low	As above	Negligible	Low				
		• Inhalation of Indoor Vapours	• Yes	Low	As above	Negligible	Low				
		• Inhalation of ground gas	• Yes	CS2	Moderate risk	Gas protection measures	Low				
		• Inhalation of radon gas	• No	Intermediate & Higher Probability Areas	Moderate risk	Full radon protection measures in new buildings	Low				
		• Ingestion via permeated water supply pipework	• Yes	No elevated levels of contaminants identified.	Low	As per UKWIR	Low				
<u>Off-site Sources</u>		Permeation of water supply pipework	Secondary (A) & (Undifferentiated) Aquifers	• Direct contact with Secondary (A & Undifferentiated) Aquifers in Superficial Deposits	• Yes	Concentrations within typical range of made ground (< GAC)	Low	Hardstanding to prevent precipitation infiltration and leaching.	Negligible		
				• In-direct contact with Secondary (A) Aquifer in bedrock	• Yes	As above	Low	As above	Negligible		
• Residential properties • Tramway • Smithy • Coal Yard • Various Works • Railway line & sidinga • Fuel Filling Station			Leachate								

Table 5: Refined Conceptual Site Model (September 2025)

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



7 GEOTECHNICAL SITE ASSESSMENT

7.1 Geotechnical Considerations

An indicative site layout has been made available to Remada, illustrating the proposed store footprint to be in the southern area of the site and occupying the footprint of the existing Lidl store on-site. The proposed delivery ramp would be located adjacent to the north-west boundary, partially occupying the footprint of the existing delivery ramp. The other areas of the site, including the existing Poundstretcher building, would be occupied by car parking and soft landscaping.

Remada's boreholes BH1 to BH3B were located in the south-western area of the site as shown in **Figure 2**, within the footprint of the proposed store. Further boreholes were advanced within the proposed car parking areas, however due to the operational nature of the store, investigation under the existing building was not possible. Foundation inspection pits were undertaken adjacent to the existing store to assess the existing foundations.

All three cable boreholes proved the base of made ground at depths between 2.6 and 3m bgl. This was underlain by soft to firm silty locally sandy clay to depths between 3.45 and 5.5m bgl. Probable weathered bedrock was encountered underlying the cohesive deposits and was recovered as dense becoming very dense sandy gravel. Bedrock comprising mudstone/shale was encountered in BH1B at 4.5m bgl.

Groundwater strikes were not recorded during the drilling, and groundwater was not encountered during subsequent monitoring rounds.

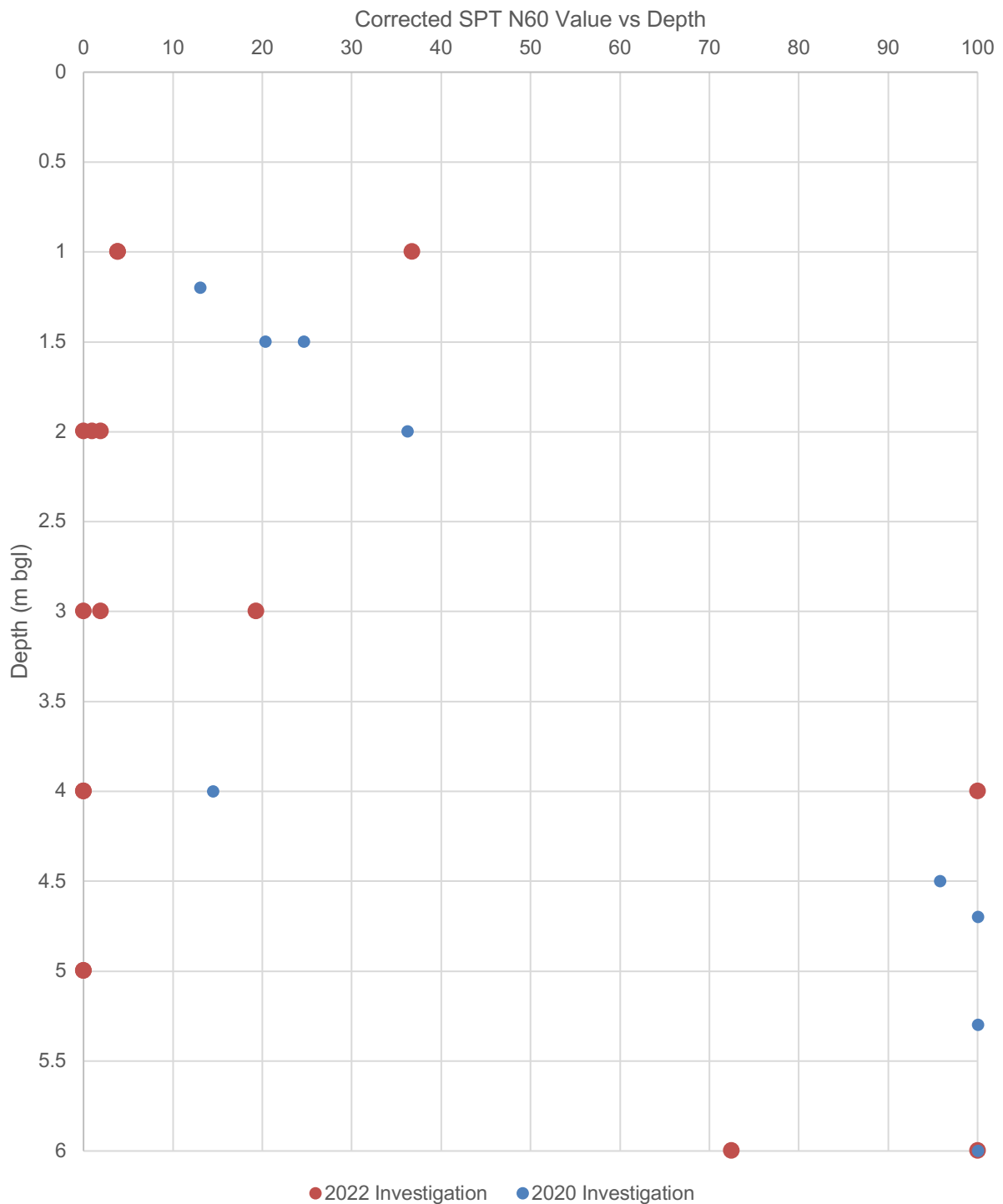
The three boreholes advanced in the centre and east of the site largely confirm the findings of the previous investigation. WS201 and WS202 were advanced near the existing store; WS201 encountered soft clays to the completion depth of 6m bgl, however refused at 6mbgl, indicating possible bedrock. WS202 identified sandstone bedrock at 5.9m bgl. WS203 in the proposed car park area refused at 4.0m bgl.

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

7.2 Comparison with Previous Site Investigation

Three cable percussive boreholes (BH1, BH2 and BH3-B) were previously advanced by Remada under the proposed Lidl store footprint. A summary of the ground conditions encountered within each of these exploratory holes has been provided in **Section 2**. However, the ground conditions encountered during the previous investigation generally correlate with the current investigation.

The SPT N-values obtained during Remada's Supplementary investigation have been compared with the previous 2020 investigation, to provide a more comprehensive view of the ground conditions underlying the site. The results are presented in **Graph 3** below. Where the N-value corrected for the full 300mm was greater than 100, the plotted value has been capped at 100.



Graph 3: Comparison of Remada's SPT N-values from 2020 and 2022 investigations

7.3 Foundations

Remada's previous intrusive investigation in 2020 concluded that all foundations should bear on the same strata, in order to prevent differential settlement. Either ground improvement in the form of vibro concrete columns or piled foundations are considered necessary to transfer foundation loads to a suitable bearing layer. Floor slabs should be suspended and bearing on the piled foundations.



The window sampling undertaken by Remada in 2022 has identified similar ground conditions of made ground and organic superficial deposits, with suspected bedrock encountered between 4.0m and 6.0m bgl. Consequently, the supplementary intrusive investigation supports the foundation recommendations provided within Remada's previous report (ref: 769.02.02 dated March 2022).

7.4 Protection of Buried Concrete

The results of the BRE SD1 testing from 2020 and 2022 have been combined, in order to provide a more accurate review of the concrete classification requirements for the site.

In accordance with BRE SD1 for buried concrete in a brownfield site with static groundwater, analysis of the seven samples for water soluble sulphate returned values of up to 0.64 g/l and pH > 7.3. Characteristic values for water soluble sulphate and pH have been taken as 440mg/l and 7.3 respectively, whilst the mean of the highest two calculated Total Potential Sulphate (3x Total Sulphur) is 1.92%.

Therefore, a Design Sulphate Class DS-4 is considered appropriate for buried concrete and an ACEC Class of AC-3s is considered appropriate for the location. This is an increase from DS-2 and AC-1s previously reported by Remada and is due to the elevated Total Potential Sulphate concentrations identified within the underlying soils.



8 CONCLUSIONS & RECOMMENDATIONS

8.1 Conclusions

The following conclusions have been made based on the findings of this investigation and the findings of the previous Phase 2 investigation undertaken by Remada.

8.1.1 Phase 2 Site Investigations

The proposed development at the time of writing is for '*demolition of existing buildings [Lidl store and adjacent Poundstretcher store] and replacement with a Class A1 foodstore with associated carparking, landscaping, engineering and drainage works*'.

A supplementary intrusive investigation was designed and implemented by Remada Ltd, in order to increase coverage within the proposed building footprint and to further investigate the risk to controlled waters. Three window sample boreholes (WS201 – WS203) were advanced to a target depth of 6.0m bgl within the Lidl store area on 24th August 2022. Access was not possible into the existing Poundstretcher (northern) area on the day of the intrusive investigation.

The findings of the supplementary investigation generally confirmed the findings of Remada's previous intrusive investigation in 2020, with a variable thickness of made ground being encountered overlying superficial Tidal Flat Deposits (a Secondary (Undifferentiated) Aquifer). SPT N-values >50 were recorded at depths of between 4.0m and 6.0m bgl, interpreted as being the top of the Hughes Member bedrock (a Secondary A Aquifer).

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

Cryddan Brook flows from east to west proximal to the northern boundary of the site, and whilst the invert level is unknown, it is located circa 2.0m below the adjacent roadway (i.e. approx. 5.5m AOD). The standing water levels recorded with three monitoring wells during Remada's supplementary investigation ranged between 5.48m AOD (WS202) and 4.10m AOD (WS203). Consequently, this indicates that the groundwater level underlying the site is on par with the brook's level and that a potential pathway exists between the two.

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 i.e. soil contaminants are not greater than respective GAC. 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 results of the groundwater chemical analysis have identified detectable concentrations of some dissolved metals, TPH and PAHs within the three most recent samples (from WS201 – WS203). Localised exceedances of the respective EQS for fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene and benzo(g,h,i)perylene and dissolved mercury were recorded in exceedance of the respective EQS.

The results of the surface water chemical analysis upstream and downstream have also identified detectable concentrations of dissolved metals, TPH and PAH. However, no concentrations were



identified above the MDL (the benzo(ghi)perylene concentration in the downstream sample being detected at the MDL).

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.

8.1.4 Waste Classification

In general, the results of the chemical analyses indicate that the material would be classified as non-hazardous waste. While Waste Acceptance Criteria (WAC) analysis has not been undertaken, three of the four samples selected for analysis exceeded this TOC limit for disposal in an inert landfill. Therefore, it is considered that the waste should be classified as non-hazardous. WAC testing is not required for disposal of non-hazardous waste to landfill.

8.2 Recommendations

Remada's previous intrusive investigation in 2020 concluded that all foundations should bear on the same strata, in order to prevent differential settlement. Either ground improvement in the form of vibro concrete columns or piled foundations are considered necessary to transfer foundation loads to a suitable bearing layer. Floor slabs should be suspended and bearing on the piled foundations.

The window sampling undertaken by Remada in 2022 has identified similar ground conditions of made ground and organic superficial deposits, with suspected bedrock encountered between 4.0m and 6.0m bgl. Consequently, the supplementary intrusive investigation supports the foundation recommendations provided within Remada's previous report (ref: 769.02.02 dated March 2022).

The results of the BRE SD1 testing from 2020 and 2022 have been combined, in order to provide a more accurate review of the concrete classification requirements for the site. In accordance with BRE SD1 for buried concrete in a brownfield site with static groundwater, characteristic values for water soluble sulphate and pH have been taken as 440mg/l and 7.3 respectively, whilst the mean of the highest two calculated Total Potential Sulphate (3x Total Sulphur) is 1.92%.

Therefore, a Design Sulphate Class DS-4 is considered appropriate for buried concrete and an ACEC Class of AC-3s is considered appropriate for the location. This is an increase from DS-2 and AC-1s previously reported by Remada and is due to the elevated Total Potential Sulphate concentrations identified within the underlying soils. Further soil sampling and BRE SD1 analysis may be able to reduce this classification.



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STUDY LIMITATIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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



TABLES

(Not presented within text)

Table 3: Comparison of Soil Chemical Analyses with GAC

Laboratory ID				LQM / CIEH Commercial GAC 6% SOM	1495486	1495487	1495489	1495490	1040112	1040113	1040114	
Sample ID	Client Sample ID :				WS201	WS201	WS202	WS203	HDTP1	HDTP2	HDTP3	
Borehole	Sample Location:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
Depth	Top Depth (m):				0.65	1.6	1.2	0.5	0.50	0.75	0.60	
	Bottom Depth (m):									0.85	0.70	
Sample Date	Date Sampled (\$):				24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	23-Jul-2020	23-Jul-2020	23-Jul-2020	
Determinand	Accred.	Units	LOD	[mg/kg unless stated]								
ACM Type	U		N/A		-	-	-	-	-	-	Cement, Fibres/Clumps	
Asbestos Identification	U	%	0.001		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	
ACM Detection Stage	U		N/A		-	-	-	-	-	-	Stereo Microscopy	
Asbestos by Gravimetry											0.005	
Total Asbestos											0.005	
Moisture	N	%	0.020		4.2	21	16.0	11	9.0	7.6	8.9	
pH	M		N/A		9.5	8.3	8.0	8.7	9.8	9.7	9.4	
Boron (Hot Water Soluble)	N	mg/kg	0.40						0.83	1.2	0.66	
Magnesium (Water Soluble)	M	g/l	0.010						< 0.010	< 0.010	< 0.010	
Arsenic	M	mg/kg	1.0	640	4.2	33.0	33.0	41.0	35	21	36	
Beryllium	U	mg/kg	1.0	12	< 0.5	1.2	0.8	1.6	2.0	< 1.0	< 1.0	
Cadmium	M	mg/kg	0.10	190	0.31	1.30	0.25	0.81	0.66	< 0.10	1.2	
Copper	M	mg/kg	0.50	68000	12	120	180	44	99	7.7	130	
Mercury	M	mg/kg	0.10	58 ^{typ} (25.8)	< 0.05	1.2	2.00	0.08	0.72	< 0.10	12	
Nickel	M	mg/kg	0.50	980	3.7	35	35.0	21.0	30	9.8	41	
Lead	M	mg/kg	0.50	2300	26	91	86	90	350	17	230	
Selenium	M	mg/kg	0.20	12000	< 0.25	1.2	0.81	2.1	0.43	< 0.20	0.55	
Vanadium	U	mg/kg	5.0	9000	19	26	29.0	20.0	160	28	58	
Zinc	M	mg/kg	0.50	730000	53	340	100	170	350	30	690	
Chromium (Trivalent)	N	mg/kg	1.0	8600	42	12	17.0	9.9	240	20	160	
Chromium (Hexavalent)	N	mg/kg	0.50	33	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Fraction of Organic Carbon	M		0.0010		0.063	0.270	0.100	0.016	0.059	0.0030	0.050	
Calculated SOM from FOC					10.862	46.552	17.241	2.759	5.9	0.3	5.0	
Calculated TOC from FOC					6.300	27.000	10.000	1.600	10.1	0.5	8.6	
Aliphatic TPH >C5-C6	N	mg/kg	1.0	12000sol (1150)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C6-C8	N	mg/kg	1.0	40000sol (736)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C8-C10	M	mg/kg	1.0	11000vap (451)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C10-C12	M	mg/kg	1.0	47000vap (283)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C12-C16	M	mg/kg	1.0	90000sol (142)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C16-C21	M	mg/kg	1.0	1800000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic TPH >C21-C35	M	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0	7.2	< 1.0	< 1.0	
Aliphatic TPH >C35-C44	N	mg/kg	1.0	1800000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Total Aliphatic Hydrocarbons:	N	mg/kg	5.0		< 5.0	< 5.0	< 5.0	< 5.0	7.2	< 5.0	< 5.0	
Aromatic TPH >C5-C7	N	mg/kg	1.0	86000sol (4710)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C7-C8	N	mg/kg	1.0	180000vap (4360)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C8-C10	M	mg/kg	1.0	17000vap (3580)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C10-C12	M	mg/kg	1.0	34000sol (2150)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C12-C16	M	mg/kg	1.0	38000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic TPH >C16-C21	U	mg/kg	1.0	28000	< 1.0	< 1.0	< 1.0	< 1.0	8.4	16	8.0	
Aromatic TPH >C21-C35	M	mg/kg	1.0	28000	< 1.0	< 1.0	< 1.0	< 1.0	430	150	120	
Aromatic TPH >C35-C44	N	mg/kg	1.0	28000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Total Aromatic Hydrocarbons	N	mg/kg	5.0		< 5.0	< 5.0	< 5.0	< 5.0	440	170	120	
Total Petroleum Hydrocarbons	N	mg/kg	10.0		< 10	< 10	< 10	< 10	450	170	120	
Naphthalene	M	mg/kg	0.10	1100sol (432)	< 0.10	< 0.10	0.57	< 0.10	0.77	0.30	0.58	
Acenaphthylene	M	mg/kg	0.10	100000	< 0.10	< 0.10	0.13	< 0.10	1.1	0.14	0.25	
Acenaphthene	M	mg/kg	0.10	100000	< 0.10	< 0.10	0.19	< 0.10	1.2	0.48	1.1	
Fluorene	M	mg/kg	0.10	71000	< 0.10	< 0.10	0.16	< 0.10	1.2	0.49	1.2	
Phenanthrene	M	mg/kg	0.10	23000	< 0.10	< 0.10	0.99	< 0.10	7.0	5.8	11	
Anthracene	M	mg/kg	0.10	540000	< 0.10	< 0.10	0.11	< 0.10	2.5	2.0	2.9	
Fluoranthene	M	mg/kg	0.10	23000	0.29	0.32	1.40	< 0.10	14	15	20	
Pyrene	M	mg/kg	0.10	54000	0.45	0.25	1.20	< 0.10	14	16	21	
Benzo[a]anthracene	M	mg/kg	0.10	180	< 0.10	< 0.10	0.56	< 0.10	11	8.3	12	
Chrysene	M	mg/kg	0.10	350	< 0.10	< 0.10	0.83	< 0.10	12	8.2	11	
Benzo[b]fluoranthene	M	mg/kg	0.10	45	< 0.10	< 0.10	1.10	< 0.10	20	9.4	15	
Benzo[k]fluoranthene	M	mg/kg	0.10	1200	< 0.10	< 0.10	0.44	< 0.10	6.6	3.5	5.4	
Benzo[a]pyrene	M	mg/kg	0.10	36	< 0.10	< 0.10	0.89	< 0.10	14	7.8	11	
Indeno[1,2,3-c,d]Pyrene	M	mg/kg	0.10	510	< 0.10	< 0.10	< 0.10	< 0.10	11	4.5	6.5	
Dibenz[a,h]Anthracene	M	mg/kg	0.10	3.6	< 0.10	< 0.10	< 0.10	< 0.10	4.2	1.2	2.0	
Benzo[g,h,i]perylene	M	mg/kg	0.10	4000	< 0.10	< 0.10	< 0.10	< 0.10	12	4.3	5.5	
Total Of 16 PAH's	M	mg/kg	2.0		< 2.0	< 2.0	9	< 2.0	130	87	130	
Benzene	M	µg/kg	1.0	90*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Toluene	M	µg/kg	1.0	180000vap (4360)*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Ethylbenzene	M	µg/kg	1.0	27000vap (2840)*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
m- & p-Xylene	M	µg/kg	1.0	30000sol (3170)*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
o-Xylene	M	µg/kg	1.0	33000sol (2620)*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Total Phenols	M	mg/kg	0.10	1300dir (34000)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.30	< 0.30	< 0.30	



Determinand concentration below the GAC
 Determinand concentration in exceedance of GAC
 Determinand concentration

NC: No published criteria

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

Table 4: Comparison of Water Chemical Analyses with EQS

Client: Remada Ltd	Water Framework Directive Regs 2015 Schedule 3 General Quality of Groundwater (Annual Average µg/l)	Drinking Water Regulations 2016 (µg/l)			292946	292947	292948	292949	292950	22-11218	22-11218	22-11218
Quotation No.:												
					UPSTREAM	DOWNSTREAM	WS201	WS202	WS203	1398215	1398216	1398217
					WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
					29-Sep-22	29-Sep-22	29-Sep-22	29-Sep-22	29-Sep-22	21-Mar-2022	21-Mar-2022	21-Mar-2022
Determinand			Units	LOD								
pH				N/A	8	8	6.9	6.9	7.3	7.6	7.7	7.7
Aluminium			µg/l	10	17	15	16	< 10	19			
Arsenic (Dissolved)	50	10	µg/l	0.5	0.7	0.7	2.8	0.7	1.9	18	1.4	1.2
Beryllium (Dissolved)			µg/l	1	< 1	< 1	< 1	< 1	< 1	150	150	79
Cadmium (Dissolved)	0.09	5	µg/l	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 1.0	< 1.0
Copper (Dissolved)		2000	µg/l	0.5	< 0.5	< 0.5	< 0.5	0.9	1.6	< 0.11	< 0.11	< 0.11
Iron			µg/l	10	92	75	129	< 10	29	< 0.50	1.1	4.6
Mercury (Dissolved)	0.07***	1	µg/l	0.05	< 0.05	< 0.05	< 0.05	0.11	< 0.05	< 0.05	< 0.05	< 0.05
Manganese			µg/l	0.5	0.7	1	1390	1190	392			
Nickel (Dissolved)		20	µg/l	0.5	0.7	0.7	3	5.2	2.2	< 0.50	3.2	1.9
Lead (Dissolved)		10	µg/l	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.50	< 0.50	< 0.50
Selenium (Dissolved)		10	µg/l	1	< 1	< 1	< 1	< 1	< 1	< 0.50	0.61	< 0.50
Vanadium (Dissolved)			µg/l	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 0.50	< 0.50	1.1
Zinc (Dissolved)		5000	µg/l	1.2	4.2	3.7	11.2	7.6	3.9	12	12	37
Chromium (Trivalent)	4.7	50	µg/l	100	< 100	< 100	< 100	< 100	< 100	< 20	< 20	< 20
Chromium (Hexavalent)	3.4	50	µg/l	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 20	< 20	< 20
Dissolved Organic Carbon			mg/l	2.0	2.7	2.8	2.5	2	5.1	90	94	41
Aliphatic TPH >C5-C6			µg/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8			µg/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10			µg/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12			µg/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16			µg/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21			µg/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35			µg/l	5		9.8			9.3	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44			µg/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons			µg/l	5	11.6	9.8	11.6	12	9.3	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7			µg/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8			µg/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10			µg/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12			µg/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16			µg/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21			µg/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35			µg/l	5	6.6	8.1	7.4	6.5	7.2	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44			µg/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons			µg/l	5	6.6	8.1	7.4	6.5	7.2	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons			µg/l	10	18.2	17.9	19	18.6	16.5	< 10	< 10	< 10
Naphthalene	130		µg/l	0.01	0.02	0.01	0.03	0.01	0.04	< 0.10	< 0.10	< 0.10
Acenaphthylene			µg/l	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.10	< 0.10	< 0.10
Acenaphthene			µg/l	0.01	< 0.01	< 0.01	0.02	< 0.01	0.01	< 0.10	< 0.10	< 0.10
Fluorene			µg/l	0.01	< 0.01	< 0.01	0.02	0.02	0.03	< 0.10	< 0.10	< 0.10
Phenanthrene			µg/l	0.01	0.03	0.04	0.19	0.06	0.15	< 0.10	< 0.10	< 0.10
Anthracene	0.1	14	µg/l	0.01	< 0.01	0.01	0.07	0.02	0.04	< 0.10	< 0.10	< 0.10
Fluoranthene	0.12	16	µg/l	0.01	0.04	0.05	0.23	0.07	0.33	< 0.10	< 0.10	< 0.10
Pyrene			µg/l	0.01	0.04	0.05	0.22	0.06	0.33	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene			µg/l	0.01	0.01	0.02	0.06	0.02	0.14	< 0.10	< 0.10	< 0.10
Chrysene			µg/l	0.01	0.03	0.03	0.12	0.04	0.25	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	0.017	20	µg/l	0.01	0.01	< 0.01	0.05	0.02	0.16	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	0.017	20	µg/l	0.01	0.01	0.01	0.08	0.02	0.2	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	0.27	20	µg/l	0.01	0.01	0.01	0.07	0.02	0.19	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene			µg/l	0.01	< 0.01	< 0.01	0.04	< 0.01	0.1	< 0.10	< 0.10	< 0.10
Dibenz[a,h]Anthracene			µg/l	0.01	< 0.01	< 0.01	0.02	< 0.01	0.03	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	0.0082	22	µg/l	0.01	< 0.01	0.01	0.06	0.02	0.14	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's			µg/l	0.01	0.25	0.27	1.29	0.4	2.15	< 2.0	< 2.0	< 2.0
Phenol			mg/l	0.0050						< 0.0050	< 0.0050	< 0.0050

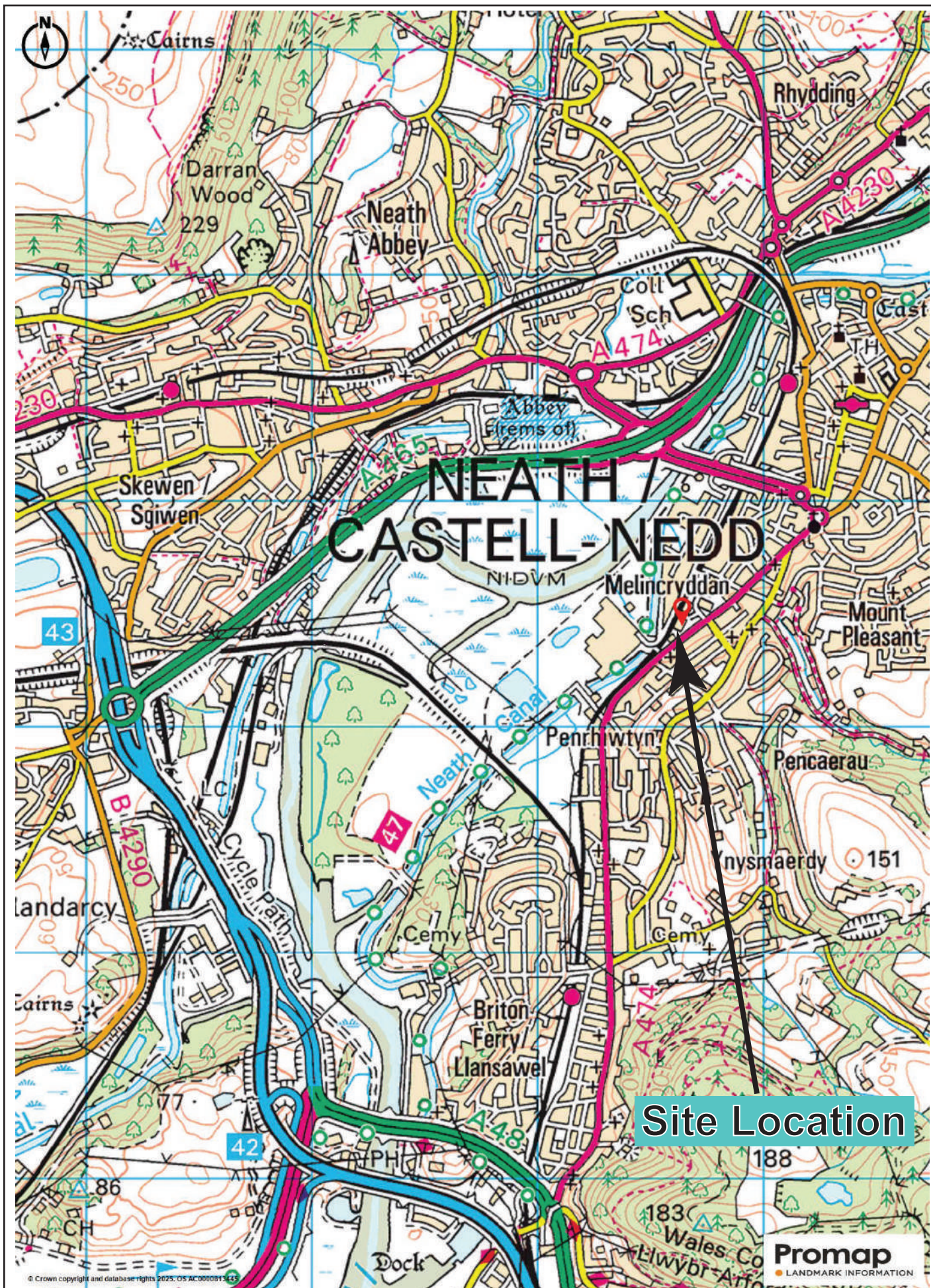
Solubility of Benzene in water = . 1780 ug/l. TPH concentrations as Benzene are greater than the limit of solubility

Exceedance of Schedule 3
Exceedance of DWR

Note *** No annual average, maximum allowable concentration adopted.



FIGURES



Notes

Revision	Approved	Date

Project Title
Briton Ferry Road, Neath

Drawing Title
Site Location Plan

Client
Lidl Great Britain Ltd

Scale
as shown

Drawn
PD

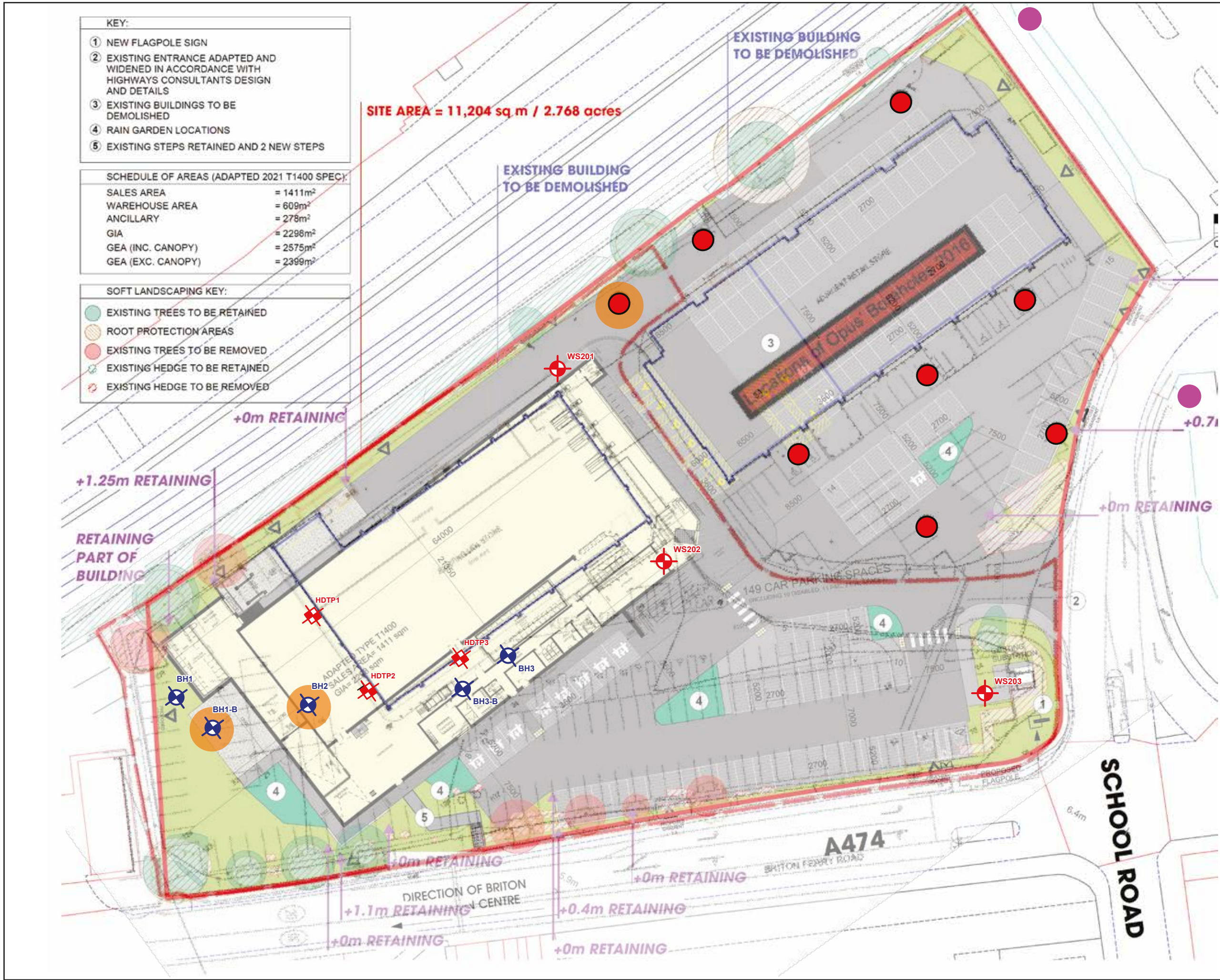
Size
A4

Date
18.09.25

Job No.
769.10

Figure No.
01





Legend

- Cable Percussive Borehole Location
- Hand Excavated Inspection Pit
- Window sample Borehole
- Groundwater samples March 2022
- Opus window sample holes 2016
- River water sample

Notes

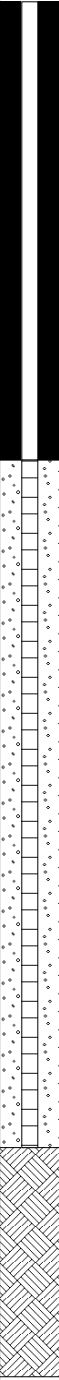
Issue	Approved	Date
-	AH	23.09.22
Project Title	Briton Ferry Road, Neath	
Drawing Title	Exploratory Hole Location Plan	
Client	Lidl Great Britain Ltd	
Scale	Drawn	Size
as shown	AH	A4
Date	Job No.	Figure No.
23.09.22	769.05	02
Drawing Reference		
769.05-Fig2		



EXPLORATORY HOLE LOGS

Percussion Drilling Log

Project Name: BRITON FERRY ROAD		Client: Lidl Great Britain Ltd		Date: 24/08/2022	
Location: Neath		Contractor:		Co-ords: E274633.00 N196481.00	
Project No. : 769		Crew Name:		Drilling Equipment: Tracked Rig	
Borehole Number WS201	Hole Type WS	Level 7.23m AoD	Logged By CE	Scale 1:33	Page Number Sheet 1 of 1

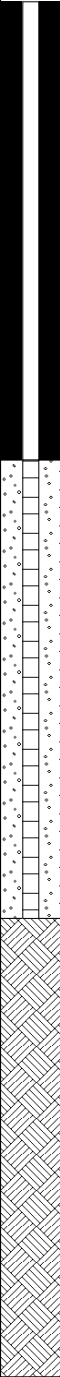
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	7.03		MADE GROUND: Grey reinforced concrete.	1
								<i>Plastic membrane encountered at 0.2m bgl.</i>	
		0.65	ES		0.50	6.73		MADE GROUND: Dark bluish grey angular coarse gravel of limestone.	
		1.00	SPT	N=4 (1,1/1,1,1,1)	0.80	6.43		MADE GROUND: Brown and creamish brown fine to coarse sand with frequent coarse gravel-sized fragments of concrete and rare clinker.	
		1.60	ES					MADE GROUND: Very loose dark brown and black coarse sand with frequent coarse gravel-sized fragments of brick, concrete, sandstone and rare clinker.	2
		2.00	SPT	N=1 (0,0/1,0,0,0)					
		2.70	ES		2.60	4.63		Soft dark brown and dark brownish grey sandy SILT with occasional fragments of black organic matter (up to 10mm).	
		3.00	SPT	N=0 (0,0/0,0,0,0)	3.00	4.23		Very soft to soft bluish grey silty CLAY with occasional relict roots (up to 5mm thick) and rare fragments of black organic matter (up to 10mm).	3
		3.20	D						
		4.00	SPT	N=0 (1,0/0,0,0,0)					
		5.00	SPT	N=0 (1,0/0,0,0,0)					
		6.00	SPT	50 (5,12/50 for 200mm)	6.00	1.23		End of Borehole at 6.000m	6

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

Remarks 1. Groundwater encountered at 2.5m bgl. 2. Installation to 5.0m bgl; 2.0m plain pipe, 3.0m slotted pipe.										
---	--	--	--	--	--	--	--	--	--	---

Percussion Drilling Log

Project Name: BRITON FERRY ROAD		Client: Lidl Great Britain Ltd		Date: 24/08/2022	
Location: Neath		Contractor:		Co-ords: E274663.00 N196462.00	
Project No. : 769		Crew Name:		Drilling Equipment: Tracked Rig	
Borehole Number WS202	Hole Type WS	Level 7.29m AoD	Logged By CE	Scale 1:33	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					
					0.16 0.25	7.13 7.04		MADE GROUND: Asphalt.	
								MADE GROUND: Dark bluish grey angular coarse gravel of limestone.	
								MADE GROUND: Brown and creamish brown fine to coarse sand with frequent coarse gravel sized fragments of concrete and rare clinker.	
		1.00	SPT	N=4 (1,1/1,1,1,1)					1
		1.20	ES						
		2.00	SPT	N=2 (1,0/1,0,0,1)					2
					2.20	5.09		Soft dark brown and dark brownish grey sandy SILT with occasional fragments of black organic matter (up to 10mm).	
		2.65	D						
		3.00	SPT	N=2 (1,1/0,0,1,1)	3.00	4.29		Soft dark brown and dark brownish grey sandy SILT with occasional fragments of black organic matter (up to 10mm).	3
		4.00	SPT	N=0 (0,0/0,0,0,0)					4
		4.50	D						
		5.00	SPT	N=0 (0,0/0,0,0,0)					5
		5.50	D						
		6.00	SPT	50 (25 for 85mm/50 for 160mm)	5.90 6.00	1.39 1.29		Weak grey fine to medium grained SANDSTONE. Recovered as sandy angular coarse GRAVEL. End of Borehole at 6.000m	6

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

Remarks 1. Groundwater encountered at 2.2m bgl. 2. Installation to 4.0m bgl; 2.0m plain pipe, 2.0m slotted pipe.										
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Percussion Drilling Log

Project Name: BRITON FERRY ROAD		Client: Lidl Great Britain Ltd		Date: 24/08/2022	
Location: Neath		Contractor:		Co-ords: E274712.00 N196474.00	
Project No. : 769		Crew Name:		Drilling Equipment: Tracked Rig	
Borehole Number WS203	Hole Type WS	Level 6.95m AoD	Logged By CE	Scale 1:33	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					
		0.12			0.12	6.83		MADE GROUND: Asphalt.	
		0.30			0.30	6.65		MADE GROUND: Dark bluish grey angular coarse gravel of limestone.	
		0.50	ES					MADE GROUND: Light grey and yellowish grey very sandy angular gravel of brick, clinker and concrete, with occasional cobbles of concrete. Sand is coarse.	
		1.00	SPT	N=38 (10,10/14,10,7,7)					1
		1.40			1.40	5.55			
		1.60	ES					MADE GROUND: Dark brown and black very sandy angular coarse gravel of brick, clinker and limestone. Sand is coarse.	
		2.00	SPT	N=0 (0,0/0,0,0,0)	2.00	4.95		Very soft becoming firm dark grey and dark bluish grey sandy clayey SILT with occasional fragments of black organic matter (up to 15mm). Sand is fine.	2
		2.50	D						
		3.00	SPT	N=20 (1,1/0,0,10,10)					3
		4.00	SPT	50 (25 for 85mm/50 for 160mm)	4.00	2.95		End of Borehole at 4.000m	4
									5
									6

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

Remarks 1. Groundwater encountered at 2.0m bgl. 2. Installation to 4.0m bgl; 2.0m plain pipe, 2.0m slotted pipe.											
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APPENDIX A

SPT Hammer Energy Test Certificate

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

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

SPT Hammer Ref: DART300
Test Date: 06/09/2021
Report Date: 06/09/2021
File Name: DART300.spt
Test Operator: JL

Instrumented Rod Data

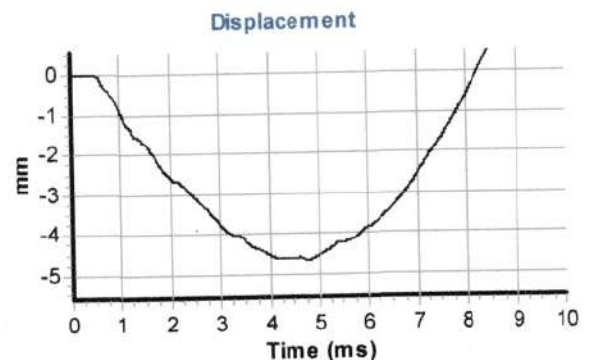
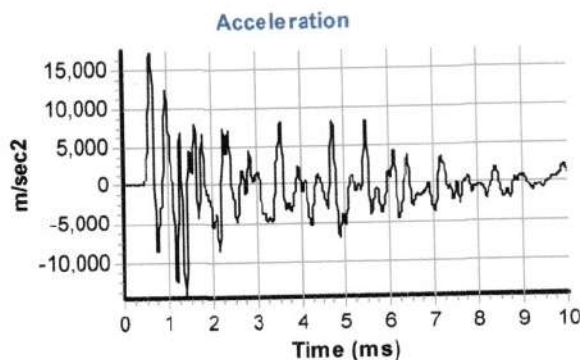
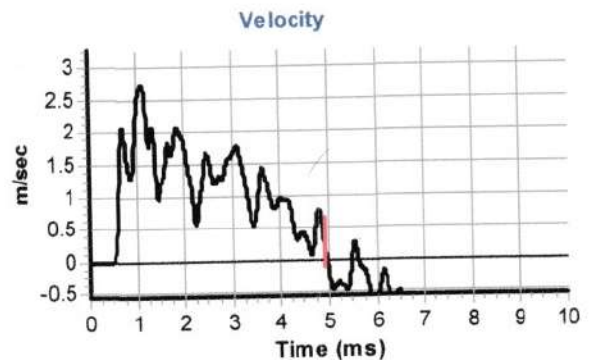
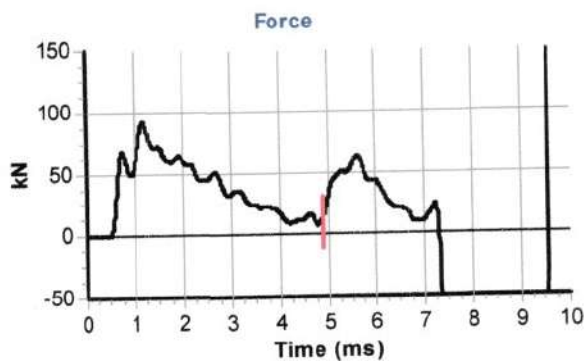
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

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

Comments / Location

REGIONAL DRILLING / 77130



Calculations

Area of Rod A (mm²): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 276

Energy Ratio E_r (%):

58

Signed: C. McCLUSKEY

Title: FITTER

The recommended calibration interval is 12 months



APPENDIX B

Low Flow Certificates

Table 4.2: Low Flow Sampling Paramters

Site:	Neath
Project No.:	769.05

Operator:	AH
Date:	29/09/2022

Instrument Details:	
----------------------------	--

Well No.	Well Screen (m bgl)	Well Diameter (mm)	Depth to base (m bgl)	Depth to product (m bgl)	Depth to water (m bgl)	Well elevation (m aOD)	Groundwater elevation (m aOD)	Purge time (t)	Purge Vol (l)	pH	Temp. (°C)	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/l)	ORP (mV)	Corrected ORP* (mV)	Comments
WS201	2-6	50	4.35	N/A	1.80	7.230	5.430	5	4	6.72	18.59	996	0.10	-183.2	200.7	
								10	8	6.68	18.64	998	0.06	-189.3	200.6	
								15	12	6.65	18.74	994	0.03	-198.3	200.5	
								20	16	6.67	18.71	1004	0.00	-213.6	200.6	
								25	27	6.66	18.83	999	0.32	-227.8	200.4	
								30	36	6.67	18.82	1001	0.38	-234.6	200.5	
WS202	2-4	50	3.50	N/A	1.70	7.290	5.590	5	4	6.84	18.91	1259	0.14	-204.6	200.4	
								10	8	6.83	19.01	1249	0.13	-206.4	200.3	
								15	12	6.81	19.09	1240	0.25	-199.5	200.2	
								20	15	6.81	19.07	1240	0.15	-203.1	200.2	
								25	19	6.81	19.00	1242	0.08	-209.9	200.3	
								30	23	6.81	19.02	1240	0.11	-211.2	200.3	
WS203	2-6	50	3.95	N/A	1.83	6.950	5.120	5	3	7.02	18.10	410	-0.01	-260.4	201.1	
								10	6	7.02	18.10	209	-0.03	-260.9	201.1	
								15	9	7.05	18.07	208	0.16	-266.5	201.1	
								20	12	7.09	18.02	407	0.22	-268.3	201.1	
								25	15	7.09	17.90	407	0.30	-265.9	201.2	
								30	18	7.11	17.88	407	0.36	-268.4	201.3	

Legend

NA - Not applicable
 ND - not detected
 m bgl - metres below ground level
 mb TOC - metres below Top of Casing
 m AOD - metres Above Ordnance Datum
 l - litres
 °C - degrees celsius
 µS/cm^c - micro siemens per centimetre
 mV - milli volts
 pH - potential of Hydrogen (dimensionless)
 ORP - Oxidation Reduction Potential
 NVO - No visual or olfactory evidence of contamination

*** ORP Correction Factor:**

ORP values are dependent on solution composition, temperature, and sensor type. In order to normalise these to a standard hydrogen electrode (SHE) the following correction factor is applied:

$$E_h = E_m + E_{ref}$$

Where: E_h = Corrected ORP value
 E_m = ORP measured by probe

$$E_{ref} = \text{Correction factor} = [215.81 - \text{temperature} \times (0.77942 + \text{temperature} \times 0.001934)]$$

Therefore:	Temp. (°C)	Approximate correction
	10	207.8
	15	203.7
	20	199.4



APPENDIX C

Laboratory Chemical Analyses – Soil



2183

Final Report

Report No.:	22-32794-1		
Initial Date of Issue:	02-Sep-2022		
Client	Remada Ltd		
Client Address:	Forward House 17 High Street Henley in Arden B95 5AA		
Contact(s):	Peter Dickinson		
Project	769.05 Lidl Neath		
Quotation No.:		Date Received:	26-Aug-2022
Order No.:	769.05	Date Instructed:	26-Aug-2022
No. of Samples:	6		
Turnaround (Wkdays):	5	Results Due:	02-Sep-2022
Date Approved:	02-Sep-2022		
Approved By:			

Details: Stuart Henderson, Technical Manager

Results - Soil

Project: 769.05 Lidl Neath

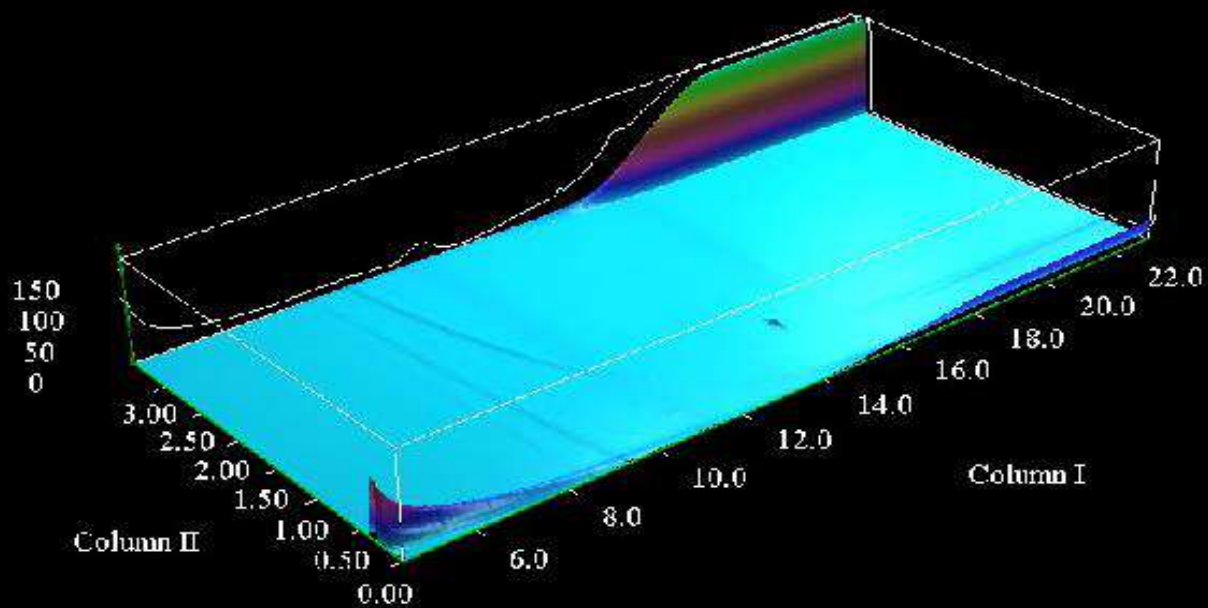
Client: Remada Ltd	Chemtest Job No.:		22-32794	22-32794	22-32794	22-32794	22-32794	22-32794
Quotation No.:	Chemtest Sample ID.:		1495486	1495487	1495488	1495489	1495490	1495491
	Sample Location:		WS201	WS201	WS201	WS202	WS203	W2S03
	Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):		0.65	1.6	2.7	1.2	0.5	1.5
	Date Sampled:		24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022
	Asbestos Lab:		DURHAM	DURHAM		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD				
ACM Type	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	4.2	21	28	16
Chromatogram (TPH)	N			N/A	See Attached	See Attached	See Attached	See Attached
pH	U	2010		4.0	9.5	8.3	8.0	8.7
pH (2.5:1)	N	2010		4.0		8.3	7.3	8.6
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40	1.5		0.46
Magnesium (Water Soluble)	U	2120	mg/kg	20		< 20	< 20	< 20
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		0.032	0.24	0.025
Total Sulphur	U	2175	%	0.010		0.31	0.97	0.22
Chloride (Water Soluble)	U	2220	g/l	0.010		0.034	0.037	0.011
Nitrate (Water Soluble)	N	2220	g/l	0.010		0.014	< 0.010	< 0.010
Ammonium (Extractable)	U	2425	mg/kg	0.50		7.3	48	2.3
Sulphate (Total)	U	2430	%	0.010		0.14	0.87	0.17
Arsenic	U	2455	mg/kg	0.5	4.2	33		33
Beryllium	U	2455	mg/kg	0.5	< 0.5	1.2		0.8
Cadmium	U	2455	mg/kg	0.10	0.31	1.3		0.25
Copper	U	2455	mg/kg	0.50	12	120		180
Mercury	U	2455	mg/kg	0.05	< 0.05	1.2		2.0
Nickel	U	2455	mg/kg	0.50	3.7	35		35
Lead	U	2455	mg/kg	0.50	26	91		86
Selenium	U	2455	mg/kg	0.25	< 0.25	1.2		0.81
Vanadium	U	2455	mg/kg	0.5	19	26		29
Zinc	U	2455	mg/kg	0.50	53	340		100
Chromium (Trivalent)	N	2490	mg/kg	1.0	42	12		17
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50		< 0.50
Fraction of Organic Carbon	U	2625		0.0010	0.063	0.27		0.10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0		< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0		< 1.0

Results - Soil

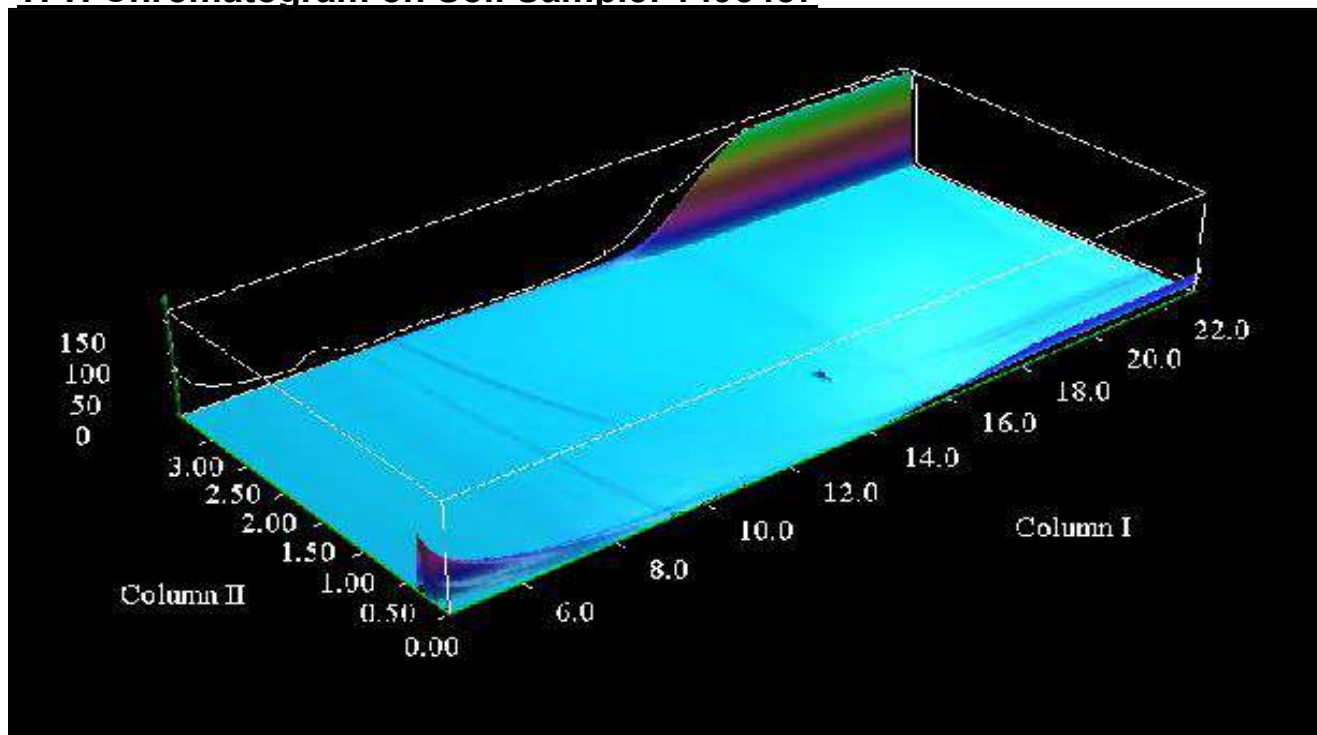
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Client: Remada Ltd	Chemtest Job No.:		22-32794	22-32794	22-32794	22-32794	22-32794	22-32794
Quotation No.:	Chemtest Sample ID.:		1495486	1495487	1495488	1495489	1495490	1495491
	Sample Location:		WS201	WS201	WS201	WS202	WS203	W2S03
	Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):		0.65	1.6	2.7	1.2	0.5	1.5
	Date Sampled:		24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022
	Asbestos Lab:		DURHAM	DURHAM		DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD				
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.57	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.13	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.19	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.16	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.99	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.11	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	0.29	0.32	1.4	< 0.10
Pyrene	U	2700	mg/kg	0.10	0.45	0.25	1.2	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.56	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.83	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	1.1	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.44	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.89	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	8.6	< 2.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10

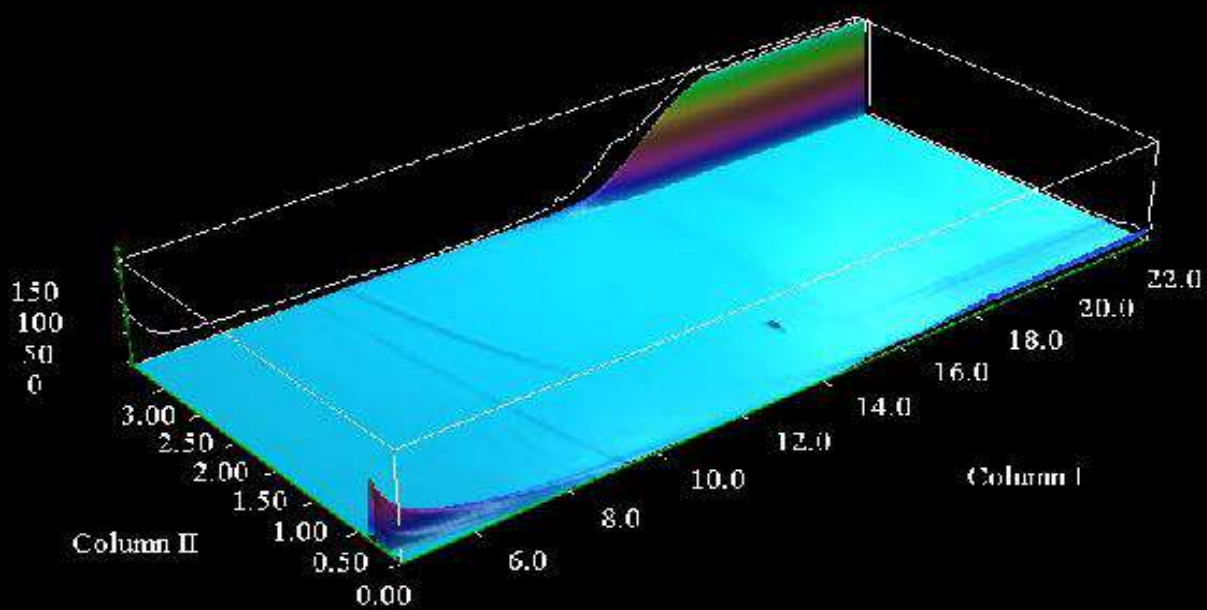
TPH Chromatogram on Soil Sample: 1495486



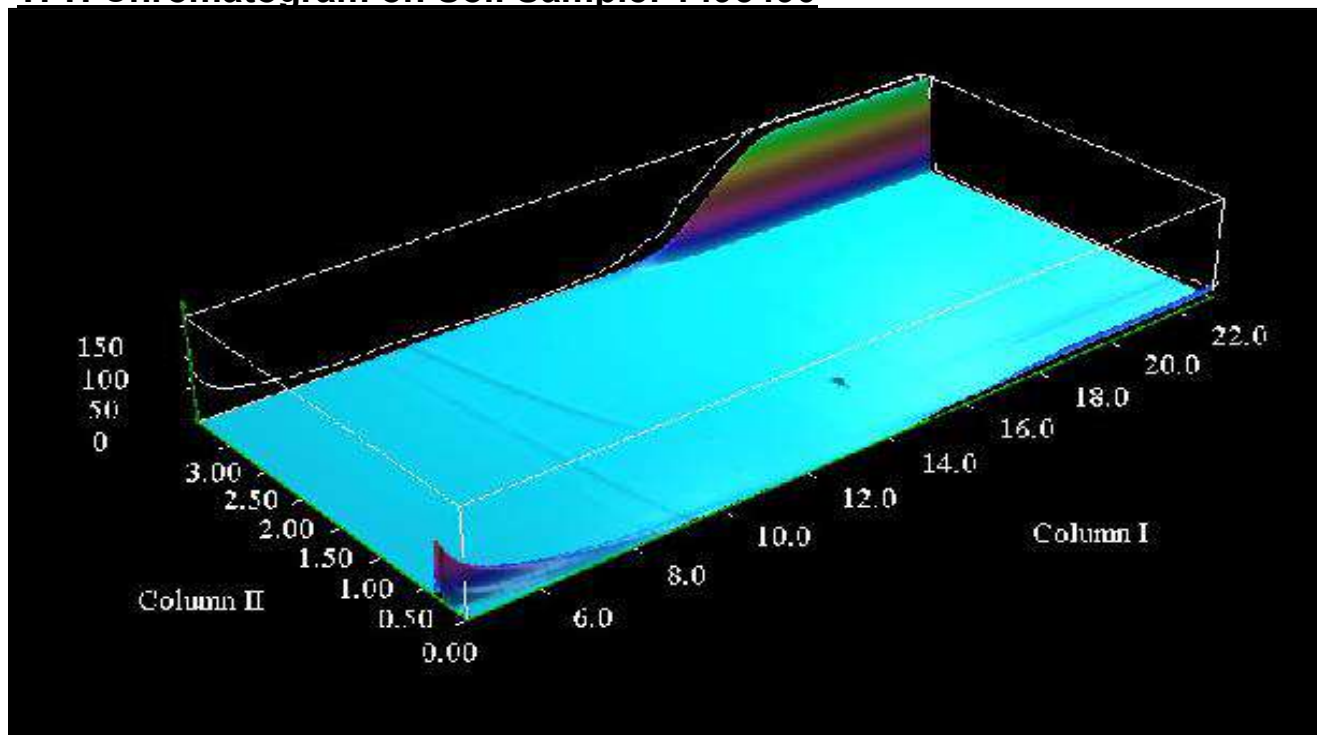
TPH Chromatogram on Soil Sample: 1495487



TPH Chromatogram on Soil Sample: 1495489



TPH Chromatogram on Soil Sample: 1495490



Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurement by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2425	Extractable Ammonium in soils	Ammonium	Extraction with potassium chloride solution / analysis by 'Aquakem 600' Discrete Analyser using sodium salicylate and sodium dichloroisocyanurate.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com



APPENDIX D

Laboratory Chemical Analyses – Groundwater



Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 22-43672

Issue: 1

Date of Issue: 10/10/2022

Contact: Andrew Howells

Customer Details: Remada Ltd
Forward House
17 High Street
Henley in Arden
Warwickshire B95 5AA

Quotation No: Q22-03069

Order No: Not Supplied

Customer Reference: 769.05

Date Received: 03/10/2022

Date Approved: 10/10/2022

Details: Neath

Approved by:

Tim Reeve, Quality Officer

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

This report may only be reproduced in full



Sample Summary

Report No.: 22-43672, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
296073	WS203	29/09/2022	03/10/2022		
296072	WS202	29/09/2022	03/10/2022		
296071	WS201	29/09/2022	03/10/2022		
296070	Downstream	29/09/2022	03/10/2022		
296069	Upstream	29/09/2022	03/10/2022		



2683

Results Summary

Report No.: 22-43672, issue number 1

ELAB Reference				296069	296070	296071	296072	296073
Customer Reference								
Sample ID								
Sample Type				WATER	WATER	WATER	WATER	WATER
Sample Location				Upstream	Downstream	WS201	WS202	WS203
Sample Depth (m)								
Sampling Date				29/09/2022	29/09/2022	29/09/2022	29/09/2022	29/09/2022
Determinand	Codes	Units	LOD					
Dissolved Metals								
Aluminium	U	ug/l	10	17	15	16	< 10	19
Arsenic	U	ug/l	0.5	0.7	0.7	2.8	0.7	1.9
Beryllium	U	ug/l	1	< 1	< 1	< 1	< 1	< 1
Cadmium	U	ug/l	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	U	ug/l	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium (III)	N	ug/l	100	< 100	< 100	< 100	< 100	< 100
Copper	U	ug/l	0.5	< 0.5	< 0.5	< 0.5	0.9	1.6
Iron	U	ug/l	10	92	75	129	< 10	29
Mercury	U	ug/l	0.05	< 0.05	< 0.05	< 0.05	0.11	< 0.05
Manganese	U	ug/l	0.5	0.7	1.0	1390	1190	392
Nickel	U	ug/l	0.5	0.7	0.7	3.0	5.2	2.2
Lead	U	ug/l	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Selenium	U	ug/l	1	< 1	< 1	< 1	< 1	< 1
Vanadium	U	ug/l	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5
Zinc	U	ug/l	1.2	4.2	3.7	11.2	7.6	3.9
Anions								
Nitrite	N	mg/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nitrate	N	mg/l	0.5	2.1	2.1	0.7	< 0.5	< 0.5
Inorganics								
Hexavalent Chromium	U	ug/l	100	< 100	< 100	< 100	< 100	< 100
Ammonia as NH4	N	mg/l	0.1	0.6	0.1	2.6	1.3	6.4
Total Cyanide	U	ug/l	5	< 5	< 5	< 5	< 5	< 5
Miscellaneous								
Colour	N	Hazen	1	0	0	0	0	0
Electrical Conductivity	U	uS/cm	50	141	140	970	1220	429
Dissolved organic carbon	N	mg/l	1.5	2.7	2.8	2.5	2.0	5.1
pH	U	pH units	0.1	8.0	8.0	6.9	6.9	7.3
Turbidity	N	NTU	30	< 30	< 30	400	100	300
Odour	N		0	Earthy	None	Earthy	Earthy	No odour
Polyaromatic hydrocarbons								
Naphthalene GCMS	N	ug/l	0.01	0.02	0.01	0.03	0.01	0.04
Acenaphthylene GCMS	N	ug/l	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Acenaphthene GCMS	N	ug/l	0.01	< 0.01	< 0.01	0.02	< 0.01	0.01
Fluorene GCMS	N	ug/l	0.01	< 0.01	< 0.01	0.02	0.02	0.03
Phenanthrene GCMS	N	ug/l	0.01	0.03	0.04	0.19	0.06	0.15
Anthracene GCMS	N	ug/l	0.01	< 0.01	0.01	0.07	0.02	0.04
Fluoranthene GCMS	N	ug/l	0.01	0.04	0.05	0.23	0.07	0.33
Pyrene GCMS	N	ug/l	0.01	0.04	0.05	0.22	0.06	0.33
Benzo (a) anthracene GCMS	N	ug/l	0.01	0.01	0.02	0.06	0.02	0.14
Chrysene GCMS	N	ug/l	0.01	0.03	0.03	0.12	0.04	0.25
Benzo (b) fluoranthene GCMS	N	ug/l	0.01	0.01	< 0.01	0.05	0.02	0.16
Benzo (k) fluoranthene GCMS	N	ug/l	0.01	0.01	0.01	0.08	0.02	0.20
Benzo (a) pyrene GCMS	N	ug/l	0.01	0.01	0.01	0.07	0.02	0.19
Indeno (1,2,3-cd) pyrene GCMS	N	ug/l	0.01	< 0.01	< 0.01	0.04	< 0.01	0.10
Dibenzo(a,h)anthracene GCMS	N	ug/l	0.01	< 0.01	< 0.01	0.02	< 0.01	0.03
Benzo(ghi)perylene GCMS	N	ug/l	0.01	< 0.01	0.01	0.06	0.02	0.14
Total PAH(16) GCMS	N	ug/l	0.01	0.25	0.27	1.29	0.40	2.15

Results Summary

Report No.: 22-43672, issue number 1

ELAB Reference				296069	296070	296071	296072	296073
Customer Reference								
Sample ID								
Sample Type				WATER	WATER	WATER	WATER	WATER
Sample Location				Upstream	Downstream	WS201	WS202	WS203
Sample Depth (m)								
Sampling Date				29/09/2022	29/09/2022	29/09/2022	29/09/2022	29/09/2022
Determinand	Codes	Units	LOD					
BTEX								
Benzene	U	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Toluene	U	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Ethylbenzene	U	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Xylenes	U	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
MTBE	U	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
TPH CWG								
>C5-C6 Aliphatic (HS_1D_MS)	N	ug/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C6-C8 Aliphatic (HS_1D_MS)	N	ug/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C8-C10 Aliphatic (EH_CU_1D_AL)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C10-C12 Aliphatic (EH_CU_1D_AL)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C12-C16 Aliphatic (EH_CU_1D_AL)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C16-C21 Aliphatic (EH_CU_1D_AL)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C21-C35 Aliphatic (EH_CU_1D_AL)	N	ug/l	5	11.6	9.8	11.6	12.0	9.3
>C35-C40 Aliphatic (EH_CU_1D_AL)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total (>C5-C40) Aliphatic (HS_1D_MS+EH_CU_1D_AL)	N	ug/l	5	11.6	9.8	11.6	12.0	9.3
>C5-C7 Aromatic (HS_1D_MS)	N	ug/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C7-C8 Aromatic (HS_1D_MS)	N	ug/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C8-C10 Aromatic (EH_CU_1D_AR)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C10-C12 Aromatic (EH_CU_1D_AR)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C12-C16 Aromatic (EH_CU_1D_AR)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C16-C21 Aromatic (EH_CU_1D_AR)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C21-C35 Aromatic (EH_CU_1D_AR)	N	ug/l	5	6.6	8.1	7.4	6.5	7.2
>C35-C40 Aromatic (EH_CU_1D_AR)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total (>C5-C40) Aromatic (HS_1D_MS+EH_CU_1D_AR)	N	ug/l	5	6.6	8.1	7.4	6.5	7.2
Total (>C5-C40) Ali/Aro (HS_1D_MS+EH_CU_1D_Total)	N	ug/l	5	18.2	17.9	19.0	18.6	16.5

Method Summary

Report No.: 22-43672, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Water					
Aliphatic/Aromatic hydrocarbons in water	N		10/10/2022		GC-FID
BS1008 water for concrete	N		10/10/2022		
Turbidity of waters	N		10/10/2022		Colorimetry
Dissolved organic carbon	N		05/10/2022	102	IR
pH of waters	U		04/10/2022	113	Electromeric
Chromium Hexavalent in waters	U		05/10/2022	123	Colorimetry
PAHs and/or PCBs in waters	N		04/10/2022	135	GC-MS
Electrical conductivity of water	U		04/10/2022	136	Electromeric
Ammonia in waters	N		10/10/2022	151	Colorimetry
BTEX in waters	U		10/10/2022	200	GC-MS
Low range Aliphatic hydrocarbons water	N		10/10/2022	200	GC-MS
Low range Aromatic hydrocarbons water	N		10/10/2022	200	GC-MS
Cyanide in waters	U		04/10/2022	205	Colorimetry
Aliphatic hydrocarbons in water	N		04/10/2022	215	GC-FID
Aromatic hydrocarbons in water	N		04/10/2022	215	GC-FID
Dissolved metals by ICP in waters	U		04/10/2022	301	ICPMS
Anions	N		04/10/2022	305	Ion Chromatography

Tests marked N are not UKAS accredited

Report Information

Report No.: 22-43672, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination. Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed. ELAB are unable to provide an interpretation or opinion on the content of this report. The results relate only to the sample received. PCB congener results may include any coeluting PCBs Uncertainty of measurement for the determinands tested are available upon request Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
 All water samples will be retained for 7 days following the date of the test report
 Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry



APPENDIX E

Laboratory Geotechnical Tests



Laboratory Report



Contract Number: 61080

Client Ref: **769.05**

Client PO: **769.05**

Date Received: **30-08-2022**

Date Completed: **13-09-2022**

Report Date: **13-09-2022**

Client: **Remada Limited**
Forward house
17 high street
Henley in Arden
B95 5AA

This report has been checked and approved by:

Paul Evans
Director

Contract Title: **Lidl Neath**

For the attention of: **Peter Dickinson**

Test Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	5
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	5
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) - Paul Evans (Director) - Richard John (Quality/Technical Manager)

Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Wayne Honey (Human Resources/ Health and Safety Coordinator)

GEO Site & Testing Services Ltd

Units 3-4, Heol Aur, Dafen, Llanelli, Carmarthenshire, Wales SA14 8QN

Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk



Contract Number	61080	
Site Name	Lidl Neath	
Client Reference	769.05	

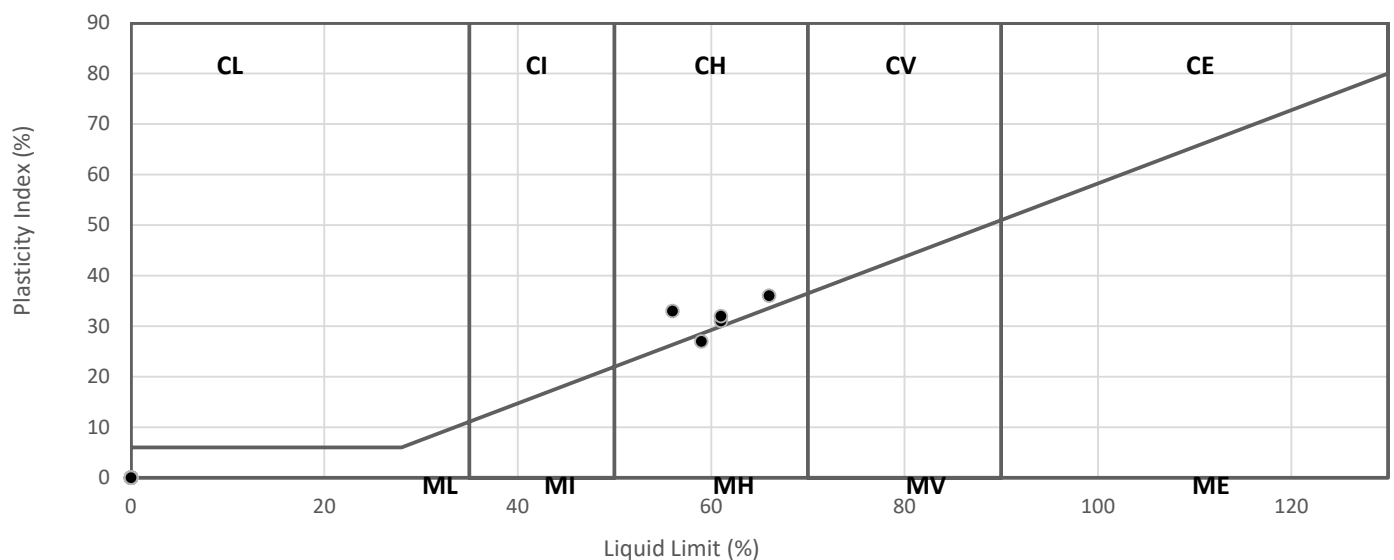
[illegible]

Contract Number	61080	
Project Location	Lidl Neath	
Date Tested	12/09/2022	

[illegible]

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION BS 5930:1999+A2:2010



Operators
Clayton Jenkins

