

PHASE 2 GROUND INVESTIGATION

Lidl Great Britain Ltd
Purbrook Way, Havant

Client: Lidl Great Britain Limited

Remada Ltd
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Executive Summary

Remada Ltd was commissioned by Lidl Great Britain Ltd to undertake a Phase 2 Ground Investigation at Purbrook Way, Havant, PO9 3QJ at the location indicated in **Figure 1**. This report supersedes report 770.02.02 and presents the findings of additional ground investigation at the study site.

Site Setting & History

The site is irregular in shape with boundaries that are parallel with Purbrook Way to the south and the adjacent B&Q store to the east. The western and northern boundary is curved and formed by the access road to B&Q.

The site has not been previously developed but its present-day topography and historic maps indicated that is formed of a spoil heap of surplus soils. The source of spoil heap (made ground) is not known but may be due to construction of either the B&Q store or adjacent roads (Purbrook Way and/or A3(M)).

Published Geology & Hydrogeology

Published geological maps indicate that the site is directly underlain by London Clay of thickness 77 to 120m which is designated as Unproductive Strata, overlying Reading Beds and a sequence of chalks.

Ground Investigation

In August 2020, the investigation comprised 3 No cable tool boreholes to target 10m depth and 5 No window sample holes to 5m depth. Due to dense vegetation and restraints imposed by the ecologist, it was not possible to access all window sample locations with the proposed car park. Made Ground was observed at all exploratory locations as firm to stiff orange/brown grey slightly gravelly clay to a maximum depth of 5.0m in CP1 and CP2 beneath the store footprint. At CP3A and CP3B the fill material contained concrete boulders and concrete kerbstones that were removed by excavator and the exploratory hole was advanced as a trial pit. WS2 was also obstructed by a concrete boulder within the fill material that was subsequently removed by excavator and the exploratory hole was advanced as a trial pit.

Bedrock was encountered in all of the exploratory holes as stiff to very stiff micaceous blue grey CLAY considered to be representative of London Clay. Due to the change in topographical elevation between the perimeter of the site and central area beneath the proposed store footprint, the depth to bedrock varied from 0.25m at WS1 to 5.0m in CP1 and CP2.

In November 2020, the additional investigation comprised a 5m x 5m grid of dynamic probes to identify potential obstructions to piles and potential soft spots or pockets of waste within the fill material. In addition, previously inaccessible WS4 was excavated as trial pit TP1, whilst a second pit (TP2) was also excavated. The Dynamic Probe n100 data provide greater confidence that the fill material is formed from compacted or engineered clay and that no zones or pockets of soft waste are present beneath the proposed store footprint.

Human Health Assessment

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

Water Resources Assessment

The results of the soil chemical analysis undertaken has identified that concentrations of metals and inorganic contaminants are within the range of typical made ground. Detectable concentrations of TPH and PAHs were encountered WS2; however, BGS Sheet 316 indicates that the London Clay extends to a minimum of 77m and it is therefore considered to be protective of the underlying groundwater source protection zone. There are no watercourses within close proximity of site.

Waste Classification

Additional sampling and analyses were undertaken on the made ground fill at between 0.5m and 3.5m bgl to enable an assessment of potential waste disposal classification as it was anticipated that ground would be



reduced to enable the development. The concentrations of metals and organic contaminants were generally in the range of inert soils and in general, the results of the chemical analysis indicate that the material would generally be classified as inert however due to concentration of Total Organic Carbon it may be necessary to discuss the results with potential receive site to ensure that the surplus is removed as an inert material.

Geotechnical Considerations

The proposed site layout is indicated in **Figure 3** with the Lidl store zone being in the east of the site and parallel with the retaining wall to B&Q. The proposed car park and delivery access is indicated to be from the access road that links B&Q to Purbrook Way and through which ground levels reduce from 43.5m AOD at the junction of Purbrook Way to 36.5m AOD in the B&Q car park. The site is retained at 39.5m AOD by the retaining wall to B&Q but ground levels increase through the landscape area to 43.5m AOD. Remada's superseded report 770.02.01 states that "it is anticipated that existing ground levels would be reduced by at least 2m" however Lidl have advised that the proposed Finished Floor Level would be 41.95m AOD. Consequently, a raft foundation or shallow pad foundations would place additional load on the retaining wall that forms the B&Q car park as indicated in **Figure 4**. Deep trench or piled foundations would be required to transfer the foundation loads to a level at which the retaining wall is not influenced.

Piled foundations end bearing within the underlying stiff to very stiff blue grey clay is a potential solution and potential pile capacities have been estimated however there are potential obstructions to piles at the locations indicated on **Table 3** and as recorded in the exploratory logs. Preliminary calculations indicate that for trench foundations of 4m depth bearing in the stiff orange brown gravelly clay overlying blue grey clay of minimum undrained shear strength = 100 kN/m² a design bearing resistance of 250 kN/m² will be appropriate in order to satisfy the ultimate and serviceable limit states.

Recommendations

The existing landscape fill has been formed from compacted or engineered cohesive material that may be suitable beneath shallow foundations but piled or deep trench foundations are required to prevent additional loading of the retaining wall that forms the car park to B&Q.

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.

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 store.



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Issue No /	Date	Prepared By	Technical Review	Authorised
01	14.12.20	G Jones	P Dickinson	G Jones
02 Updated Layout	22.01.24	G Jones	P Dickinson	G Jones



1 INTRODUCTION

Remada Ltd was commissioned by Lidl Great Britain Ltd to undertake a Phase 2 Ground Investigation at Purbrook Way, Havant, PO9 3QJ at the location indicated in **Figure 1**. This report supersedes report 770.02.01 and presents the findings of the additional ground investigation.

1.1 Objectives

The objectives of this assessment are as follows:

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

1.2 Scope of Work

The scope of the investigation is generally in accordance with BS10175:2011+A2 2017 and layout of this report has been designed with the Environment Agency's CLR11⁽¹⁾ in mind and guidance issued by the Environment Agency for land contamination reports.

August 2020

The original scope of work comprised:

- 3 No cable tool boreholes inclusive of Standard Penetration Tests (SPTs) to a depth of 10m beneath the proposed store footprint;
- 4 No window sample boreholes inclusive of SPTs to target depths of 6m including SPTs beneath the proposed store footprint and car park (5 No were proposed but access was not possible);
- 3 No combined groundwater and gas monitoring standpipes installed with window sample boreholes;
- 4 No 600mm diameter plate bearing tests;
- 4 No California Bearing Ratio (CBR) tests;
- Suite of geotechnical classification and strength tests;
- 5 No soil sample suites for chemical analysis of CLEA metals, asbestos, speciated hydrocarbons, cyanide and phenols to further delineate soil contamination;
- 4 No ground gas and groundwater monitoring visits to satisfy planning requirements; and
- Combined Factual & Interpretative Geoenvironmental Report.

The scope of work was then increased to enable waste classification of potentially surplus soils and comprised an additional:

- 6 No soil sample suites for chemical analysis of CLEA metals, asbestos, speciated hydrocarbons, cyanide and phenols; and
- 3 No soil samples for the analysis of waste acceptance criteria (WAC).



November 2020

A subsequent additional investigation comprised:

- 5m x 5m grid of dynamic probe holes beneath the proposed store footprint to identify obstructions to piling, soft deposits or pockets of waste;
- 2 No trial pits, and
- Provision of a 13 tonne excavator to facilitate access for the probing works.

1.3 Previous Reports

The following Phase 1 Desk Study had been previously prepared for the site:

Phase 1 Site Investigation & Preliminary Risk Assessment. Remada Ltd Report 770.01.01 August 2018.

This report supersedes report 770.02.01 to include the findings of additional ground investigation.

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 SUMMARY OF PHASE 1 DESK STUDY

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

Site Setting

*The site is irregular in shape and with boundaries that are parallel with Purbrook Way the south and the adjacent B&Q store to the east as indicated in **Figure 2**. The western and northern boundary is curved and formed by the access road to B&Q. The topography of the site is obscured by impenetrable dense vegetation in central and southern parts however the northern is grassy and slopes down to the access road that serves B&Q. The boundary to B&Q is formed by a retaining wall that retains the site at approximately 3m above the adjacent car park. The southern boundary of the site also reduces in level to form a low-lying abandoned track adjacent to Purbrook Way.*

Site History

The site has not been previously developed but its present-day topography and historic maps indicated that is formed of a spoil heap of surplus soils. The source of spoil heap (made ground) is not known but may be due to construction of either the B&Q store or adjacent roads (Purbrook Way and/or A3(M)).

Published Geology / Hydrogeology

Published geological maps indicate that the site is directly underlain by London Clay of thickness 77 to 120m which is designated as unproductive strata.

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.*

Geotechnical

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



Potential Source Areas	Potential Contaminant of Concern	Pathways	Potential Receptor	Exposure Route (Human unless otherwise stated)	Potential Identified Linkage (unmitigated)	Findings of Ground investigation	Risk (Un-mitigated)	Proposed Remediation (Mitigation) Measures	Residual Risk Estimation
On-site Sources				Direct Ingestion Soil	Yes	To be assessed (TBA)	Potential risk	(To be assessed (TBA)	(To be assessed (TBA)
Earthworks spoil heap		Disturbance due to construction plant causing direct contact, dusts, vapours.		Indoor ingestion Dust	Yes	As above	Potential risk	TBA	TBA
				Skin Contact with Soils	Yes	As above	Potential risk	TBA	TBA
				Skin Contact with Dust	Yes	As above	Potential risk	TBA	TBA
Off-site Sources				Inhalation of Outdoor Dust	Yes	As above	Potential risk	TBA	TBA
Adjacent B&Q store	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, Va, Zn, Boron, TPH /PAH.	Direct Contact with occupants of the proposed development	Occupants of the development / building fabric	Inhalation of Outdoor Vapours	Yes	As above	Potential risk	TBA	TBA
Highways		Inhalation of fibres / vapours / gases by occupants of proposed development	Adjacent residents during construction	Inhalation of Indoor Vapours	Yes	As above	Potential risk	TBA	TBA
Nearby Petrol station				Inhalation of ground gas	Yes	As above	Potential risk	TBA	TBA
				Inhalation of radon gas	No	N/A	Negligible	Negligible	Negligible
				Ingestion via permeated water supply pipework	Yes	As above	Potential risk	TBA	TBA
		Permeation of water supply pipework		Direct contact with Bedrock – Unproductive Strata	No	As above	Negligible	Negligible	Negligible
		Leachate	N/A	Groundwater Source Protection Zone (Beneath London Clay)	No	N/A	Negligible	Negligible	Negligible

Table 1: Outline Conceptual Site Model

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

3 ENVIRONMENTAL & GEOTECHNICAL INVESTIGATION METHODOLOGY

3.1 Investigation Strategy

The access road from Purbrook Way to the B&Q store adjacent to the proposed Lidl site reduces in level from 43.5m to 36.5m in the B&Q car park. Purbrook Way is formed from an earthworks embankment and original ground levels at the site location appeared to be similar to that of the B&Q car park. The site is also retained from the B&Q car park at a level of 39.5m AOD. Consequently, due to the potential depth of landscape fill, the scope of the ground investigation was varied from Lidl's standard 04.2018 to include three (3 No.) cable tool boreholes inclusive of SPTs beneath the store footprint to a depth of 10m to prove natural ground.

August 2020

Lidl had arranged for BlueJay Ecology to supervise vegetation clearance to the borehole and window sample positions; however, it was not possible to gain access to proposed location WS4. The vegetation comprised impenetrable brambles, hawthorn, gorse, and blackberry. Vegetation clearance was undertaken on the 10th & 11th August 2020 and 4 No window samples inclusive of SPTs were bored on the 11th August 2020. Due to the vegetation clearance, the cable tool rig was postponed until 17th August 2020. In addition to the above, 2 No plate bearing tests and 4 No CBR tests were carried out on the fill material at accessible locations on 11th August 2020.

Following strimming of vegetation, a tracked excavator then cleared ground level vegetation to enable access to exploratory positions. The excavator was also used to create level working platforms at positions WS1 and WS5 on the slope of the landscape bund.

November 2020

Due to ground obstructions encountered during the initial investigation, Remada returned to site to implement a grid of dynamic probing and to excavate trial pits at previously inaccessible locations.

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



Slope levelled to enable window sampler at WS1. The ground level at the window sample position was reduced by approximately 1m.



Slope levelled to enable window sampler at WS5. A ramp was formed to the right of WS5 to enable access to exploratory positions at the top of the fill.



Vegetation clearance to give access to WS2



Vegetation cleared to give access to WS3



Access route through cleared vegetation to
Cabletool Holes (CP1 & CP2)



Concrete obstruction being removed from location
of WS2



Location of CP3 following excavation of concrete
obstruction



Location of WS3 following excavation of concrete
obstruction



3.2 Investigation & Sampling Methodology

3.2.1 August 2020

Cable tool holes CP1, CP2 & CP3, and window sample WS1 were bored within the proposed store footprint. WS2, WS3 and WS5 were bored within the proposed car park but location WS4 was not accessible as the dense vegetation could not be cleared. All holes fully penetrated the made ground landscape fill to prove the depth to the underlying London Clay.

Combined Groundwater and Ground Gas monitoring standpipes were installed in CP03, WS02 and WS05.

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 and the SPT Calibration Certificates are presented at **Appendix A**.

3.2.2 November 2020

Remada returned to site following vegetation clearance in November 2020 to probe the proposed store footprint on a 5m x 5m grid to identify potential obstructions to piled foundations or soft spots of waste within the landscape fill material. In addition, previously inaccessible WS4 was excavated as trial pit TP1 and a second pit (TP2) was also excavated. It was necessary to provide the excavator to facilitate site access for the probing rigs.

3.2.3 CBR Tests

Four (4 No.) CBR tests were carried out in the proposed car park and the test results are presented at **Appendix B**.

3.2.4 Plate Bearing Tests

Four (4 No) plate bearing tests were carried out at the locations indicated on **Figure 2 & Figure 3** on the fill material using a 600 mm diameter plate to a test pressure of 300 kPa. The test results are presented at **Appendix C**.

3.3 Dynamic Probing

Cable tool and window samples holes had been obstructed by large boulders of concrete. In order to determine if these obstructions were widespread beneath the proposed store footprint a grid of dynamic probe holes was set out on a 5m x 5m grid at 94 No locations indicated on **Figure 4**.

Super Heavy Dynamic Probing (DPSH) records a continuous blow count or resistance to penetration intervals of 100mm and therefore provides a continuous profile of soil density with depth. A maximum or refusal value is taken as 50 blows / 100mm. Consequently, in addition to identifying obstructions, the DPSH logs provide an indication of soil strength beneath the proposed store footprint.

34 Soil Sampling

3.4.1 Environmental

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



Soil samples were scheduled for a minimum standard suite of chemical analysis that comprised quantitative asbestos, fraction of organic carbon, pH, CLEA metals, TPHCWG, PAH(16) & (17), BTEX, phenols, sulphates and chlorides.

3.4.2 Geotechnical

Geotechnical samples were collected at depths indicated on the logs with samples retrieved either from the excavator bucket or from within a sleeve line. 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.

Soil samples were scheduled for geotechnical classification and strength testing as appropriate to recovered soils.

3.5 Gas and Groundwater Monitoring

3.5.1 Installations

Combined ground gas and groundwater monitoring standpipes were installed in WS01, WS03 & WS05, to depths of between 2.5 and 4.5m bgl with 50mm diameter slotted HDPE pipe and packed with gravel surround as recorded on the exploratory logs. Wells were completed with 0.5-1m of plain HDPE pipe and bentonite seal, with a gas bung and tap being installed at the top of the pipe.

3.5.2 Monitoring

Ground gas monitoring was undertaken using Geotech GA5000 gas analyser for the parameters reported below. Groundwater levels were measured with a GeoSense OWP30 oil water interface probe.

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

- Pressure difference between the monitoring well and the atmosphere,

- Peak and steady flow rates of gas into or out of the monitoring well;

- Peak and steady concentrations of carbon dioxide, methane, oxygen (minimum and steady recorded), carbon monoxide, hydrogen sulphide; and

- Depth to groundwater.

In total four monitoring visits were undertaken on the 3rd, 9th, 16th and 23rd September 2020. The results are presented on **Table 2**.

3.6 Quality Assurance and Quality Control

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

3.7 Laboratory Testing

3.7.1 Soil Chemical Analysis

Ten (10 No) soil samples were scheduled for the analysis of asbestos, arsenic, barium, beryllium, cadmium, chromium (III & VI), copper, mercury, nickel, lead, selenium, zinc, fraction of organic carbon, Total Petroleum Hydrocarbons (TPHCWG), Polyaromatic Hydrocarbons (PAH), BTEX compounds (benzene, toluene, ethylbenzene and xylene) and phenols.

Three (3 No) samples were scheduled for the analysis of Waste Acceptance Criteria.



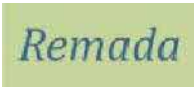
The results of laboratory chemical analyses are presented at **Appendix D**.

3.7.2 Geotechnical

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

- 10 No Natural Moisture Contents
- 10 No Atterburg Limits
- 1 No Particle Size Distribution tests
- 6 No Quick Undrained Triaxial Compression Tests; and
- 4 No BRE SD1 suites.

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



4 GEOTECHNICAL & ENVIRONMENTAL INVESTIGATION FINDINGS

4.1 Ground Conditions

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

4.1.1 Published Geology

Bedrock beneath the site is formed of London Clay and designated as unproductive strata. However, a Principal Aquifer associated with a sequence of chalk members is recorded approximately 2000m to the south. BGS Map 316 indicates that the site is underlain by London Clay to a depth of 77 to 120m, overlying Reading Beds and the following sequence of chalk members: Portsdown, Spetisbury, Tarrant, Newhaven, Seaford and Lewes etc.

4.1.2 Made Ground

Made Ground was observed at all exploratory locations as firm to stiff orange/brown grey slightly gravelly clay to a maximum depth of 5.0m in CP1 and CP2 beneath the store footprint. At CP3A and CP3B the fill material contained concrete boulders and concrete kerbstones that were removed by excavator and the exploratory hole was advanced as a trial pit.

4.1.3 Superficial Deposits

No superficial deposits were positively identified underlying the study site during Remada's investigation.

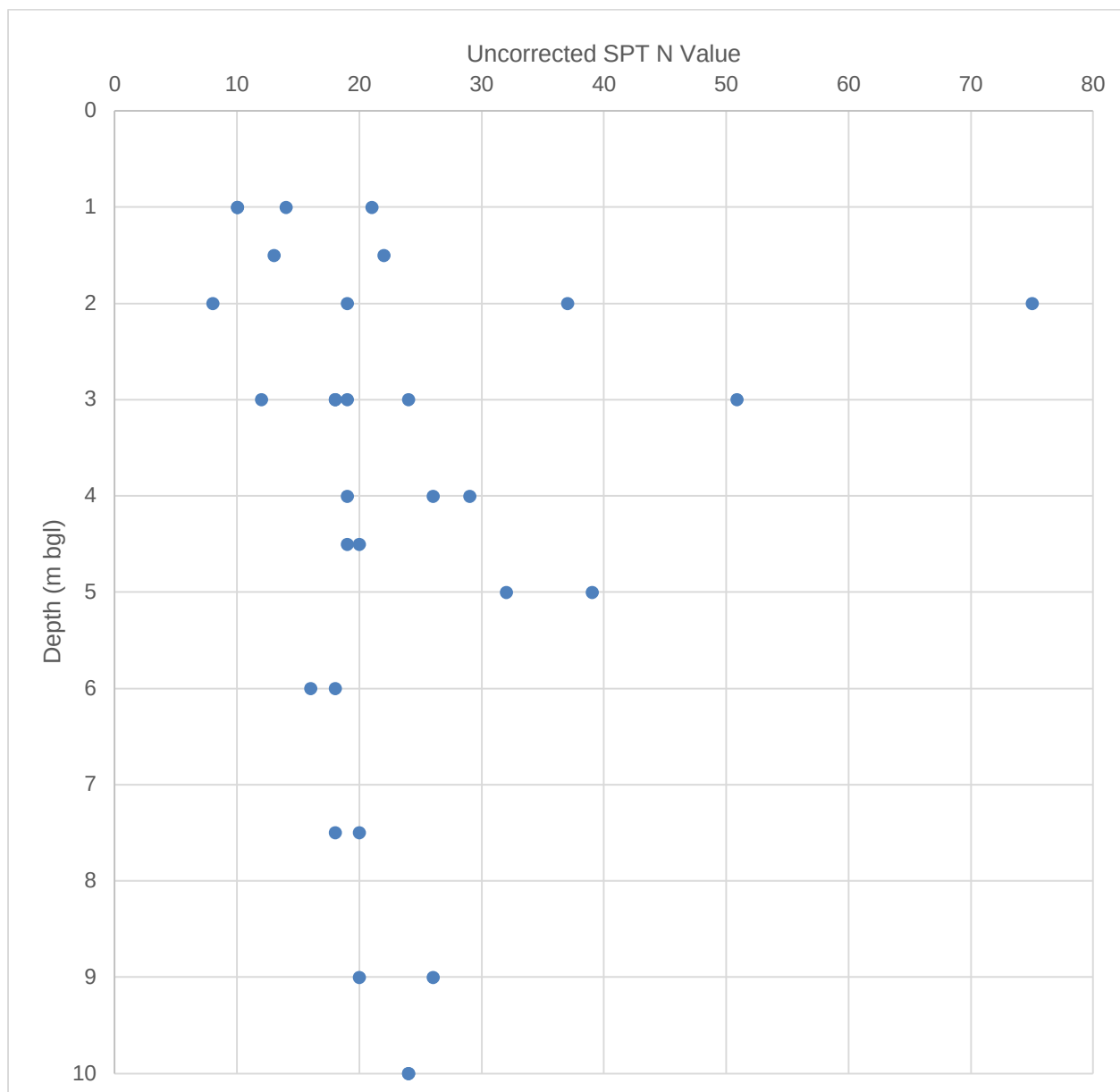
4.1.4 Bedrock

Bedrock was encountered in all of the exploratory holes as stiff to very stiff micaceous blue grey CLAY considered to be representative of London Clay. Due to the change in topographical elevation between the permitted of the site and central area beneath the proposed store footprint, the depth to bedrock varied from 0.25m at WS1 to 5.0m in CP1 and CP2. The topographical elevation of the stiff to very stiff micaceous blue grey CLAY reduced from 37.9m AOD beneath the north of the site at WS1 to 35.3m AOD at CP2 adjacent to the retaining wall beneath the southern end of the proposed store footprint.

4.2 In-situ Testing

4.2.1 Standard Penetration Tests (SPTs)

In-situ SPTs were undertaken to assist with the interpretation of strata encountered and the results of uncorrected N-values versus depth are plotted in the graph below. It should be noted that the SPTs that refused within the made ground and the weathered bedrock have not been included in the graph.



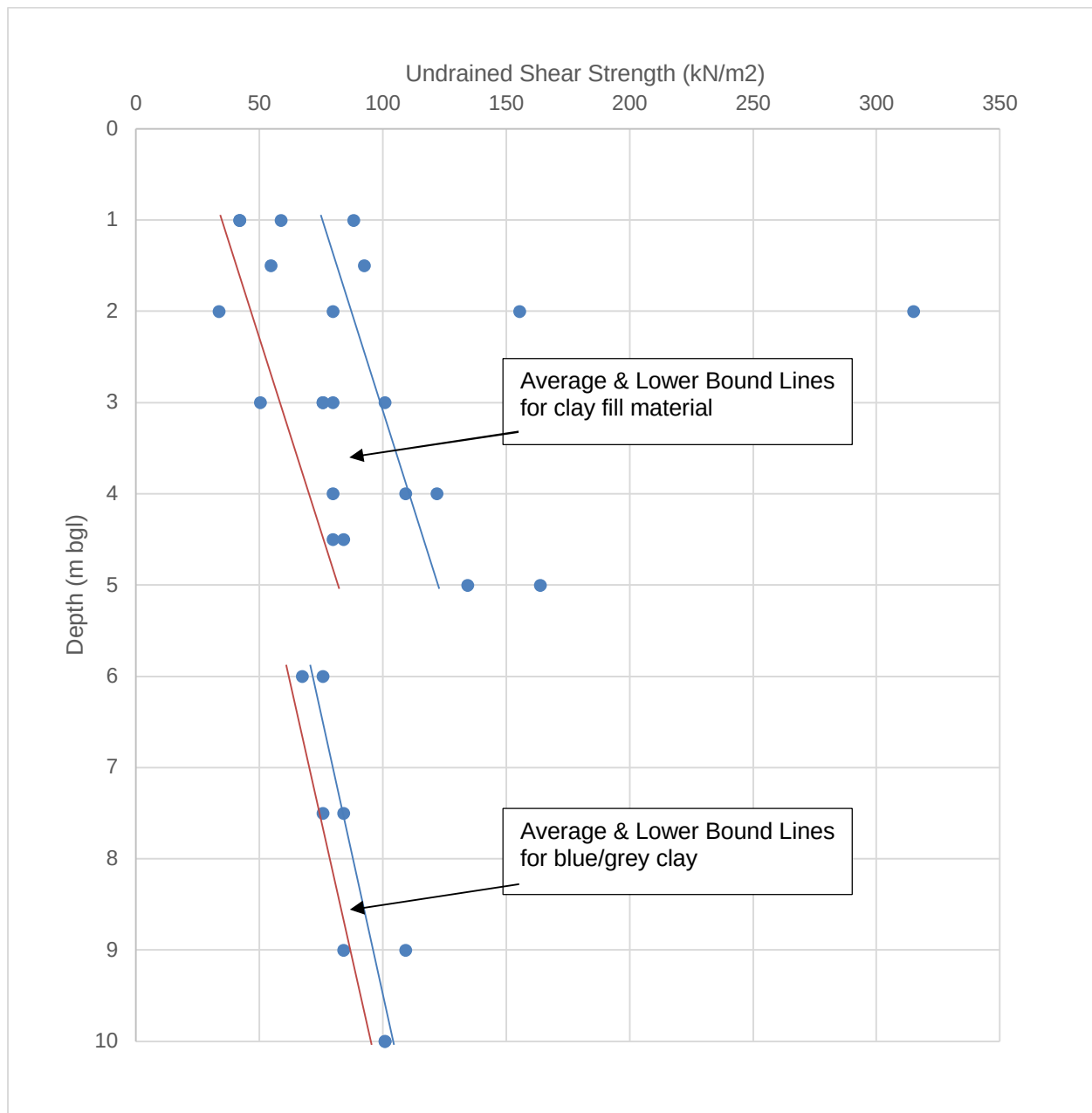
Graph 1: Plot of Uncorrected SPT N-Values Versus Depth

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

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

Where f_1 is based on the plasticity index.

A Plasticity Index of 30% has been assumed (based on geotechnical laboratory testing) which equates to an f_1 factor of 4.5.



Graph 2: Plot of Mass Shear Strength Versus Depth

4.2.2 Hand Shear Vane

Due to the friable nature of the recovered soils from the fill material it was not possible to undertake Hand Shear Vane tests on the majority of recovered samples from the majority of trial pits. Hand Shear Vane results were WS2 @ 2.75m (fill) = 50 kPa, WS2 & 4.5m (London Clay) = 90 kPa WS5 @ 0.75m (fill) = 90 kPa.

4.2.3 CBR Tests

3 No. CBR tests were carried out using TRL Dynamic Cone Penetrometer method at the locations indicated on **Figure 3** and the results are presented at **Appendix B**. Results indicate values of 5 to 10% at CBR 1 within the upper 500mm, 5 to 10% at CBR 2 but obstructed at 500mm, and 5 to 10% at CBR 3 but obstructed at 450mm.

4.2.4 Plate Bearing Tests

Four (4 No) plate bearing tests (PBT1 & PBT2) were undertaken within the proposed store footprint at the locations indicated on **Figure 3** and the results are presented at **Appendix C**. Each test was carried out using a 600mm diameter plate to a test pressure of 300 kPa and produced the following results:

	PBT 1	PBT2	PBT3	PBT4
Equivalent CBR Value (%)	11.2	7.2	4.7	4.0
Maximum Applied Stress (kPa)	293.35	293.35	293.35	293.35
Maximum Settlement (mm)	3.98	5.98	7.5	8.2
Bearing Pressure at 1.25mm Settlement	90.0	70.0	55	50
K762 (at 1.25mm settlement) kN/m ² /m	58.53	45.5	35.77	32.51

Summary of Plate Bearing Test Results

4.3 Dynamic Probing

Dynamic Probe n100 values are presented as **Table 3**. In order to enable comparison between n100 and soil strength the sum n100 for each 300mm drive has been taken as an equivalent SPT N value (300mm drive) and multiplied by the f1 value described above and the results are presented as **Table 4**.

4.4 Soil Observations

At WS02 a hydrocarbon odour was observed within the orange/brown grey clay fill material between 1.0m and 2.75m bgl. The fill material contained boulders of concrete and kerbstones that prevent percussive drilling but there were no visible indicators of contamination including asbestos with the made ground.

4.5 Groundwater Observations

No groundwater seepages were observed whilst advancing the boreholes/trial pits, however resting groundwater was recorded at 3.2m bgl in WS1.

4.6 Chemical Analysis

Results of the soil chemical analysis are presented in **Table 5** at the end of the report and full laboratory certificates are presented in **Appendix D**. Results of the chemical analyses are summarised as follows. The average FOC and pH were 0.06 and 8.2 respectively. Asbestos was not detected in the samples analysed.

Detectable concentrations of metals were identified, although these are generally within the range that would typically be expected for made ground. Concentrations of TPH, PAH & BTEX were not detected above method detection limit (MDL) except within the fill material at WS2.

4.7 Geotechnical Testing

Results of the geotechnical testing are summarised as follows and full laboratory certificates are presented in **Appendix E**.

Laboratory test results produced:

CP3B 1.50 to 2.00m Brown fine to medium gravelly sandy silty CLAY of low to intermediate plasticity Acid Soluble Sulphate = 0.33%, Aqueous Extract Sulphate 0.04 g/l, pH = 7.56, total sulphur 0.13%.



WS2 2.00 to 2.75m Brown sandy silty CLAY of intermediate plasticity
WS5 0.5 to 1.0m Brown sandy silty CLAY of intermediate plasticity
WS1 0.5 to 1.0m Grey sandy silty CLAY of intermediate plasticity
CP2 2.0 to 2.5m estimated $C_u = 170$ kPa
CP2 7.45 to 8.0m Brown sandy silty CLAY of intermediate plasticity
CP1 3.0 to 3.5 Brown sandy silty CLAY of intermediate plasticity
CP1 4.45 to 4.5m, estimated $C_u = 230$ kPa.
CP1 7.0 to 7.5m Grey sandy silty CLAY of intermediate plasticity, Acid Soluble Sulphate = 0.29%, Aqueous Extract Sulphate 0.04 g/l, pH = 7.56, total sulphur 0.13%.
CP1 7.0 to 7.5m estimated $C_u = 175$ kPa
CP1 5.5 to 5.6m Brown sandy silty CLAY of intermediate plasticity
CP1 6.0 to 7.0m Grey sandy silty CLAY of intermediate plasticity

4.8 Ground Gas Monitoring Results

The results of four gas monitoring visits are presented in **Table 2** and summarised below:

Methane was recorded at a maximum steady state concentration of <0.1% on all four monitoring events;

Carbon dioxide was recorded at a maximum steady state concentration of 14.0% v/v in WS1 on 23rd September 2020 having risen on consecutive monitoring events;

Oxygen was recorded at a minimum steady state concentration of 11.4 % v/v in WS2 on 3rd September 2020;

Ground gas flow rates were recorded at a maximum of 0.5 litres per hour (l/hr) in CP2 on 23rd September 2020.

Atmospheric pressure at the time of sampling varied between a high of 1020 millibar (mbar) on 9th & 16th September 2020 and a low of 996 mbar on 23rd September 2020.



5 GENERIC QUANTITATIVE RISK ASSESSMENT

5.1 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 on request.

Default parameters have been adopted for sandy loam of pH 7 and commercial land use. The maximum FOC value was less than 0.02 giving a Soil Organic Matter (SOM) 2.58%. 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.

5.2 Comparison of Soil Analysis Results with Human Health GAC

A comparison of soil chemical analysis with GAC is presented as **Table 5**.

TPH, PAH & BTEX

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

Metals & Inorganics Excluding Asbestos

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

Asbestos

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

5.3 Controlled Waters Risk Assessment

Made ground was observed to be a natural orange/brown grey clay with occasional concrete that had been placed as fill material directly over blue/grey London Clay. The results of the soil chemical analysis undertaken has identified that concentrations of metals and inorganic contaminants are within the range of typical made ground. Detectable concentrations of TPH and PAHs were encountered WS2 however, BGS Sheet 316 indicates that the London Clay extends to a minimum of 77m and it is therefore considered to be protective of the underlying groundwater source protection zone. There are no watercourses within close proximity of site.



5.4 Ground Gas Assessment

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

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

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

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

Methane GSV = 0.1 % x 0.5 l/hr = 0.0005 l/hr (methane concentration taken as equal to the instrument detection limit of 0.1%).

Carbon Dioxide GSV = 14.0 % x 0.5 l/hr = 0.07 l/hr

The calculated GSV for methane and carbon dioxide places the site into Characteristic Situation 2. BS8485 states that gas protection measures should be considered for the proposed development.

For a commercial building of this type (Type C) at a site classified as Characteristic Situation 2 the required minimum gas protection score for a low risk site in accordance with BS 8485:2015 (Table 4) is 2.5. Appropriate forms of floor and substructure designs are listed Table 5 of BS 8485:2015; it is likely that structural barriers, ventilation and a ground gas membrane would comprise suitable mitigation measures.

5.5 Revised Conceptual Site Model

A revised Conceptual Site Model is presented as **Table 4** below.

5.6 Waste Classification

It is anticipated that the finished floor level of the proposed store would be at a lower level than the current ground level in order to be at grade with the proposed car park access and retaining wall to B&Q. Consequently, for every one metre that ground levels are reduced there would a surplus volume of approximately 5500m³ of soil requiring off-site disposal.

Additional sampling and analyses were undertaken on the made ground fill at between 0.5m and 3.5m bgl to enable an assessment of potential waste disposal classification.

The assessment has included determination of the fraction of organic carbon (foc) which can be converted to TOC by multiplying the result by 100. The maximum value of TOC for 11 No samples submitted for analysis of the orange/brown grey clay fill was 2.58 % as reported in the laboratory total analysis summarised at **Table 3**. However, three samples were also submitted for the analysis of Waste Acceptance Criteria (WAC) and the corresponding results were:

CP1 0.5 to 0.5m bgl, TOC reported in total determinands = 1.72 % whereas WAC test produced = 5.2%

CP2 0.5 to 0.7m bgl, TOC reported in total determinands = 1.26%, whereas WAC test produced = 3.0%



CP3 1.5m to 2.0m bgl reported in total determinands = 0.98% whereas WAC test produced = 4.9%

The pH values reported for all three samples in both the total determinand and WAC analysis were > 8 and < 9.

A TOC limit of 3% is placed on waste destined for disposal in an inert landfill. With respect to pH there is no limit for inert waste but for non-hazardous waste pH >6.

The concentrations of metals and organic contaminants were generally in the range of inert soils and in general, the results of the chemical analysis indicate that the material would generally be classified as inert however it may be necessary to discuss the above TOC results with potential disposal facilities.

5.7 Health & Safety Considerations

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



Potential Source Areas	Potential Contaminant of Concern	Pathways	Potential Receptor	Exposure Route (Human unless otherwise stated)	Potential Identified Linkage (unmitigated)	Findings of Ground investigation	Risk (Un-mitigated)	Proposed Remediation (Mitigation) Measures	Residual Risk Estimation
On-site Sources				Direct Soil Ingestion	Yes	<GAC	N/A	N/A	Negligible
Earthworks spoil heap		Disturbance due to construction plant causing direct contact, dusts, vapours.		Indoor Dust ingestion	Yes	<GAC	N/A	N/A	Negligible
				Skin Contact with Soils	Yes	<GAC	N/A	N/A	Negligible
				Skin Contact with Dust	Yes	<GAC	N/A	N/A	Negligible
Off-site Sources				Inhalation of Outdoor Dust	Yes	<GAC	N/A	N/A	Negligible
Adjacent B&Q store	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, Va, Zn, Boron, TPH /PAH.	Direct Contact with occupants of the proposed development	Occupants of the development / building fabric	Inhalation of Outdoor Vapours	Yes	<GAC	N/A	N/A	Negligible
Highways		Inhalation of fibres / vapours / gases by occupants of proposed development	Adjacent residents during construction	Inhalation of Indoor Vapours	Yes	<GAC	N/A	N/A	Negligible
Nearby Petrol station				Inhalation of ground gas	Yes	CS2	Potential risk	Protection Measures to BS8475	Negligible
				Inhalation of radon gas	No	N/A	Negligible	Negligible	Negligible
		Permeation of water supply pipework		Ingestion via permeated water supply pipework	Yes	<GAC	N/A	N/A	Negligible
				Direct contact with Bedrock – Unproductive Strata	No	As above	Negligible	Negligible	Negligible
		Leachate	N/A	Groundwater Source Protection Zone (Beneath London Clay)	No	N/A	Negligible	Negligible	Negligible

Table 6: Refined Conceptual Site Model

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

6 GEOTECHNICAL SITE ASSESSMENT

6.1 Geotechnical Considerations

The proposed site layout is indicated in **Figure 3** with the Lidl store zone being in the east of the site and parallel with the retaining wall to B&Q. The proposed car park and delivery access is indicated to be from the access road that links B&Q to Purbrook Way and through which ground levels reduce from 43.5m AOD at the junction of Purbrook Way to 36.5m AOD in the B&Q car park. The site is retained at 39.5m AOD by the retaining wall to B&Q but ground levels increase through the landscape area to 43.5m AOD. Remada's superseded report 770.02.01 states that "it is anticipated that existing ground levels would be reduced by at least 2m" however Lidl have advised that the proposed Finished Floor Level would be 41.95m AOD as indicated on **Figure 4**. Consequently, a raft foundation or shallow pad foundations would place additional load on the retaining wall that forms the B&Q car park as indicated in **Figure 4**. Deep trench or piled foundations would be required to transfer the foundation loads to a level at which the retaining wall is not influenced.

The investigation found that landscape fill material was in general formed from firm to very stiff ferruginous red/brown clay fill possibly arising from construction of the B&Q store, Purbrook Way or nearby A3(M). The landscape fill area was formed directly onto a stiff to very stiff micaceous blue grey CLAY considered to be representative of London Clay.

The 5m x 5m grid of dynamic probing has identified potential obstructions to piling at the locations indicated on **Table 3**. In addition, n100 readings have been correlated to soil shear strength as presented in **Table 4** and indicate a good comparison with the soil shear strength vs depth plot presented in **Graph 2**. The n100 data provide greater confidence that the fill material is formed from compacted or engineered clay and that no zones or pockets of soft waste are present beneath the proposed store footprint.

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

6.2 Design Approach

Piled foundations end bearing within the underlying stiff to very stiff blue grey clay is a potential solution and potential pile capacities are tabulated below. In general Lidl favour raft foundations but a plain slab or stiffened edge raft bearing directly on compacted fill material of minimum specified bearing capacity is not considered to be a potential alternative to a piled foundation as additional loads would be placed on the retaining wall that forms the car park to B&Q. Deep trench foundations would be required to transfer the foundations at a depth that does not place additional load on the retaining wall, however the depth and detail of the foundation to the retaining wall is not known.

Design calculations in accordance with BS EN 1997-1: 2004 require the establishment of design values for actions, ground properties and ground resistances, definition of the limits that must not be exceeded (usually a serviceability limit state), the setting up of calculation models for the relevant ultimate or serviceability limit state, and the showing by such calculation that these limits will not be exceeded.

Design values for such calculations are derived by applying partial factors to characteristic values for actions, ground properties and ground resistances, and based upon the geotechnical model and following requirements of Design Approach 1, Combination 2 calculations have been undertaken. **Table 5** provides a summary of the partial factors applied to actions, soil parameters and resistance factors. To satisfy the serviceable limit state settlement has been limited to 25mm.

Geotechnical parameter			Symbol	Combination 1		Combination 2	
Partial factors ¹ on actions (g) or effects of actions (g)	Permanent	Unfavourable ²	g _G	A1	1.35	A2	1.0
		Favourable ³			1.0		1.0
	Variable ⁴	Unfavourable	1.5		1.3		
		Favourable ⁵	0		0		
Partial factors on soil parameters (g _m)	Angle of shearing resistance ⁶		g _φ	M1	1.0	M2	1.25
	Effective cohesion		g _c		1.0		1.25
	Undrained shear strength		g _{cu}		1.0		1.4
	Unconfined strength		g _{qu}		1.0		1.4
	Weight density		g _γ		1.0		1.0
Partial resistance factors (g _r) for spread foundations	Bearing		g _{R;v}	R1	1.0	R1	1.0
	Slidings		g _{R;h}		1.0		1.0

¹These factors are given for buildings only. Different factors apply to bridges and other structures

²In this case the upper characteristic value (G_{k,sup}) of the permanent action is used

³In this case the lower characteristic value (G_{k,int}) of the permanent action is used

⁴There may be more than one variable action. The partial factor is applied to the leading variable action and modified (reduced) values

⁵The UK National Annex states that when variable actions are favourable Q_k is zero, rather than g_Q is zero

⁶This is applied to tanφ' or tanφ_{cv} although it might be more appropriate to determine the design value f_{cv} directly

Table 7: Summary of Partial Factors Applied to Actions, Soil Parameters and Resistance Factors

In order to avoid placing additional load on the retaining wall that forms the car park to B&Q preliminary calculations indicate that for trench foundations of 4m depth bearing in the stiff orange brown gravelly clay overlying blue grey clay of minimum undrained shear strength = 100 kN/m² a design bearing resistance of 250 kN/m² will be appropriate in order to satisfy the ultimate and serviceable limit states. This is only applicable for foundations with loads that are applied vertically and centrally. To satisfy the serviceable limit state settlement has been limited to 25mm.

In the absence of design loads the bearing capacity assessment has been undertaken for Design Approach 1, Combination 2 only, and a further assessment taking account of anticipated loadings (permanent and variable) will be required during detailed design in order to confirm the limit states are satisfied. All foundations will need to fully penetrate any made ground and be founded a minimum of 150mm into the founding stratum.

6.3 Piled Foundations

If a piled foundation solution is adopted, then either driven or continuous flight auger (CFA) piles could be utilised. Driven piles have the advantage of improving the density of the ground whereas CFA piles could potentially loosen the granular deposits and thus result in a reduced safe working load. The main disadvantage of driven piles is that they can cause unacceptable amounts of vibration that could potentially damage nearby above and underground structures. If driven piles are used then assurances will need to be sought from the piling contractor that damage will not be caused to nearby structures, such as the retaining wall to B&Q.

Pile clearance excavations may also be required to remove known concrete obstructions within the fill material.

Remada has undertaken a preliminary assessment of potential safe working loads for pile design based upon the following idealised soil profile based on the intrusive work and the following assumptions:

Depth (m)	Ground Conditions	Assumptions
Existing GL to -2.0m	N/A	Assumed to be removed to reduce levels on site
-2.0m (formation level) to -5m	Firm to stiff orange/brown grey slightly gravelly clay Fill	Assume cohesive for skin friction component. N values and cu values taken from Remada's design lines as shown on Graphs 1 and 2 as follows: Average N value of 15 taken at 3 to 4m depth for driven piles, reduced by 15% for CFA piles. Lower bound cu value of 60kN/m ² taken at 3 to 4m depth.
>6.0	Stiff blue / grey clay	Assume cohesive for skin friction and end-bearing component. N values and cu values taken from Remada's design lines as shown on Graphs 1 and 2 as follows: Average N value of 20 taken at 7 to 9m depth for driven piles, reduced by 15% for CFA piles. Lower bound cu value of 75kN/m ² taken at 7 to 9m depth.

Table 8: Soil Profile for Pile Estimates

Groundwater has been assumed to be at >10mbgl.

The following table provides a summary of the preliminary estimated safe working loads base on the assumptions detailed above:

Pile Type	CFA	CFA	CFA	Driven	Driven	Driven
Pile Toe Depth (m)	8	8	8	8	8	8
Pile Diameter (m)	0.2	0.3	0.4	0.2	0.3	0.4
Safe Working Load (kN)	145	224	307	163	251	343

Table 9: Preliminary Estimated Safe Working Loads

The safe working load has been calculated by two different methods. In the first method a factor of safety of 2.5 is applied to both the end bearing and skin friction components. In the second method a factor of safety of 3.0 is applied to the end bearing component and 1.5 to the skin friction component. The safe working load is calculated by both methods and the lower of the two adopted.

The estimated safe working load is indicative only and specialist piling contractors should be consulted with regard to the design and performance of their piled foundations.

The calculated safe working load has been calculated for a single isolated pile. The effect of group action has not been taken into consideration. In addition, negative skin friction in the made ground has not been taken into consideration.

6.4 Floor Slab

If the site is to be piled then a suspended floor would be required.

6.5 Excavations and Temporary Works

Trial pits were excavated within the firm to stiff orange/brown and grey clay fill to remove shallow obstructions to boreholes and remained dry and open for the period of the excavation. Side slopes within the Made Ground fill and should be being battered back to a safe slope gradient. A detailed inspection of the side slopes should be made during excavation and a risk assessment carried out to fully assess the support measures required.



6.6 External Car Park Construction

CBR values estimated from the DCP tests indicated that the upper 0.5m of clay fill material produced values of 5 to 10% but as it is anticipated that ground levels will be reduced, it may be appropriate to carry out additional CBR tests at the proposed formation level.

6.7 Protection of Buried Concrete

In accordance with BRE SD1 for buried concrete in a brownfield site with static groundwater, analyse of selected samples for water soluble sulphate returned values of up to 0.04 g/l and pH >7.4. A total potential sulphate value of 0.42% was also calculated from the total sulphur results. Therefore, a Design Sulphate Class DS-2 is considered appropriate for buried concrete and an ACEC Class of AC-1s is considered appropriate for the location.

6.8 General Construction Advice

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

Foundation concrete, or alternatively, a blinding layer of concrete, should be placed immediately after excavation and inspection in order to protect the formation against softening and disturbance.

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

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

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



7 CONCLUSIONS & RECOMENDATIONS

7.1 Conclusions

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

7.1.1 Phase 2 Site Investigation

Site Setting

The site has not been previously developed but its present-day topography and historic maps indicated that is formed of a spoil heap of surplus soils. The source of spoil heap (made ground) is not known but may be due to construction of either the B&Q store or adjacent roads (Purbrook Way and/or A3(M)).

Published Geology & Hydrogeology

Published geological maps indicate that the site is directly underlain by London Clay of thickness 77m to 120m which is designated as unproductive strata, overlying Reading Beds and a sequence of chalks.

Intrusive Investigation

In August 2020 the investigation comprised 3 No cable tool boreholes to target 10m depth and 5 No window sample holes to 5m depth. Due to dense vegetation and restraints imposed by the ecologist, it was not possible to access all window sample locations with the proposed car park. Made Ground was observed at all exploratory locations as firm to stiff orange/brown grey slightly gravelly clay to a maximum depth of 5.0m in CP1 and CP2 beneath the store footprint. At CP3A and CP3B the fill material contained concrete boulders and concrete kerbstones that were removed by excavator and the exploratory hole was advanced as a trial pit. WS2 was also obstructed by a concrete boulder within the fill material that was subsequently removed by excavator and the exploratory hole was advanced as a trial pit.

Bedrock was encountered in all of the exploratory holes as stiff to very stiff micaceous blue grey CLAY considered to be representative of London Clay. Due to the change in topographical elevation between the perimeter of the site and central area beneath the proposed store footprint, the depth to bedrock varied from 0.25m at WS1 to 5.0m in CP1 and CP2.

In November 2020, the additional investigation comprised a 5m x 5m grid of dynamic probes to identify potential obstructions to piles and potential soft spots or pockets of waste within the fill material. In addition, previously inaccessible WS4 was excavated as trial pit TP1 and a second pit (TP2) was also excavated. The Dynamic Probe n100 data provide greater confidence that the fill material is formed from compacted or engineered clay and that no zones or pockets of soft waste are present beneath the proposed store footprint.

7.1.2 Human Health Risk Assessment Retail Zone

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.

7.1.3 Water Resources Risk Assessment

The results of the soil chemical analysis undertaken has identified that concentrations of metals and inorganic contaminants are within the range of typical made ground. Detectable concentrations of TPH and PAHs were encountered WS2; however, BGS Sheet 316 indicates that the London Clay extends to a minimum of 77m and it is therefore considered to be protective of the underlying groundwater source protection zone. There are no watercourses within close proximity of site.

7.1.4 Waste Classification

Additional sampling and analyses were undertaken on the made ground fill at between 0.5m and 3.5m

bgl to enable an assessment of potential waste disposal classification as it was anticipated that ground levels would be reduced to enable the development. The concentrations of metals and organic contaminants were generally in the range of inert soils and in general, the results of the chemical analysis indicate that the material would generally be classified as inert. However, due to the concentration of Total Organic Carbon (TOC) it may be necessary to discuss the results with potential receiving site to ensure that the surplus is removed as an inert material.

7.1.5 Geotechnical Considerations

An indicative site layout is presented in **Figure 3** with the Lidl store zone being in the east of the site and parallel with the retaining wall to B&Q. The proposed car park and delivery access is indicated to be from the access road that links B&Q to Purbrook Way and through which ground levels reduce from 43.5m AOD at the junction of Purbrook Way to 36.5m AOD in the B&Q car park. The site is retained at 39.5m AOD by the retaining to B&Q but ground levels increase through the landscape area to 43.5m AOD. Remada's superseded report 770.02.01 states that "it is anticipated that existing ground levels would be reduced by at least 2m" however Lidl have advised that the proposed Finished Floor Level would be 41.95m AOD. Consequently, a raft foundation or shallow pad foundations would place additional load on the retaining wall that forms the B&Q car park and deep trench or piled foundations would be required to transfer the foundation loads to a level at which the retaining wall is not influenced as indicated in **Figure 4**.

Piled foundations end bearing within the underlying stiff to very stiff blue grey clay is a potential solution and potential pile capacities have been estimated however there are potential obstructions to piles at the locations indicated on **Table 3** and as recorded in the exploratory logs. Preliminary calculations indicate that for trench foundations of 4m depth bearing in the stiff orange brown gravelly clay overlying blue grey clay of minimum undrained shear strength = 100 kN/m² a design bearing resistance of 250 kN/m² will be appropriate in order to satisfy the ultimate and serviceable limit states.

7.2 Recommendations

The existing landscape fill has been formed from compacted or engineered cohesive material that may be suitable beneath shallow foundations, piled or deep trench foundations are required to prevent additional loading of the retaining wall that forms the car park to B&Q.

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.

A CBR of 5 % is considered appropriate for the proposed car park.

7.3 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 store.

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STUDY LIMITATIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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



TABLES

Table 2: Gas Groundwater Monitoring Data

GAS & GROUNDWATER MONITORING DATA													Remada						
SITE		Purbrook Way, Hampshire, PO9 3QJ																	
PROJECT No.		770.02			Atmospheric & Ground Conditions														
Carried Out by:		Idris Shafqat			Atmospheric Pressure Variations During Visit								Ground Surface Conditions						
Date:		03.09.2020			1013mb								Dry						
Instrument Details	GA 5000 G501261			Atmospheric Pressure Trend Over Previous 48hrs								Weather Conditions							
				Falling								Cloudy, windy							
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (% v/v)		CH ₄ Steady LEL (%)	CO ₂ (% v/v)		O ₂ (% v/v)		Duration (secs)^	Flow Rate (l/hr)	Relative Pressure (Pa)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m AOD)	Depth of Pipe (m bgl)	Comments
			Peak	Steady		Peak	Steady	Minimum	Steady				Peak	Steady					
WS1	38.180	50	0.0	0.0	0.0	11.7	8.8	11.3	16.0	60	0.1	0.49	-	-	1013	3.200	34.980	4.000	
CP2	40.530	50	0.1	0.0	0.0	1.8	0.8	19.6	20.5	60	0.2	0.51	-	-	1013	Dry	DRY	4.000	
WS2	42.120	50	0.1	0.0	0.0	6.0	6.8	12.5	11.4	60	0.1	0.48	-	-	1013	Dry	DRY	4.000	

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

GAS & GROUNDWATER MONITORING DATA													Remada								
SITE		Purbrook Way, Hampshire, PO9 3QJ																			
PROJECT No.		770.02		Atmospheric & Ground Conditions																	
Carried Out by:		Idris Shafqat		Atmospheric Pressure Variations During Visit										Ground Surface Conditions							
Date:		09.09.2020		1020mb										Dry							
Instrument Details	GA 5000 G501261			Atmospheric Pressure Trend Over Previous 48hrs										Weather Conditions							
				Rising										Sunny, warm, blue skies							
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (% v/v)		CH ₄ Steady LEL (%)	CO ₂ (% v/v)		O ₂ (% v/v)		Duration (secs)*	Flow Rate (l/hr)	Relative Pressure (Pa)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m AoD)	Depth of Pipe (m bgl)	Comments		
			Peak	Steady		Peak	Steady	Minimum	Steady				Peak	Steady							
WS1	38.180	50	0.0	0.0	0.0	12.3	9.0	13.2	16.2	60	0.2	0.54	-	-	1020	3.260	34.920	4.000			
CP2	40.530	50	0.0	0.0	0.0	1.9	1.2	19.2	20.0	60	0.4	0.31	-	-	1020	DRY	DRY	4.000			
WS2	42.120	50	0.0	0.0	0.0	6.8	5.3	11.9	14.5	60	0.1	0.02	-	-	1020	DRY	DRY	4.000			

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

GAS & GROUNDWATER MONITORING DATA													Remada								
SITE		Purbrook Way, Hampshire, PO9 3QJ																			
PROJECT No.		770.02		Atmospheric & Ground Conditions																	
				Atmospheric Pressure Variations During Visit									Ground Surface Conditions								
Carried Out by:		Idris Shafqat		1020mb									Dry								
Date:		16.09.2020		Atmospheric Pressure Trend Over Previous 48hrs									Weather Conditions								
Instrument Details	GA 5000 G501261			Falling									Sunny, warm, blue skies								
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (% v/v)		CH ₄ Steady LEL (%)	CO ₂ (% v/v)		O ₂ (% v/v)		Duration (secs)*	Flow Rate (l/hr)	Relative Pressure (Pa)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m AoD)	Depth of Pipe (m bgl)	Comments		
			Peak	Steady		Peak	Steady	Minimum	Steady				Peak	Steady							
WS1	38.180	50	0.0	0.0	0.0	13.2	10.1	13.6	14.8	60	-0.2	0.80	-	-	1020	3.650	34.530	4.000			
CP2	40.530	50	0.0	0.0	0.0	2.1	1.0	19.0	20.6	60	-0.1	0.78	-	-	1020	DRY	DRY	4.000			
WS2	42.120	50	0.0	0.0	0.0	6.3	5.0	13.5	14.7	60	-0.1	0.77	-	-	1020	DRY	DRY	4.000			

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

GAS & GROUNDWATER MONITORING DATA													Remada						
SITE		Purbrook Way, Hampshire, PO9 3QJ																	
PROJECT No.		770.02		Atmospheric & Ground Conditions															
Carried Out by:		Idris Shafqat		Atmospheric Pressure Variations During Visit									Ground Surface Conditions						
Date:		23.09.2020		996mb									Dry						
Instrument Details		GA 5000 G501261		Atmospheric Pressure Trend Over Previous 48hrs									Weather Conditions						
				Falling									Sunny, warm, blue skies						
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (% v/v)		CH ₄ Steady LEL (%)	CO ₂ (% v/v)		O ₂ (% v/v)		Duration (secs)^	Flow Rate (l/hr)	Relative Pressure (Pa)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m AoD)	Depth of Pipe (m)	Comments
			Peak	Steady		Peak	Steady	Minimum	Steady				Peak	Steady					
WS1	38.180	50	0.0	0.0	0.0	14.4	14.0	13.2	13.4	60	0.4	0.12	-	-	996	3.750	34.430	4.000	
CP2	40.530	50	0.1	0.0	0.0	2.4	2.1	19.5	19.7	60	0.5	-0.05	-	-	996	DRY	DRY	4.000	
WS2	42.120	50	0.0	0.0	0.0	5.1	4.7	14.8	15.0	60	0.4	-0.02	-	-	996	DRY	DRY	4.000	

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

Table 2: Gas and Groundwater Monitoring Data

Table 3: DPSH n100 Values

Row	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D17	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	E15	E16	E17	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20	F21	F22	F23	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46	F47	F48	F49	F50	F51	F52	F53	F54	F55	F56	F57	F58	F59	F60	F61	F62	F63	F64	F65	F66	F67	F68	F69	F70	F71	F72	F73	F74	F75	F76	F77	F78	F79	F80	F81	F82	F83	F84	F85	F86	F87	F88	F89	F90	F91	F92	F93	F94	F95	F96	F97	F98	F99	F100	Average																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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50 Obstruction

Depth	m	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36	C37	C38	C39	C40	C41	C42	C43	C44	C45	C46	C47	C48	C49	C50	C51	C52	C53	C54	C55	C56	C57	C58	C59	C60	C61	C62	C63	C64	C65	C66	C67	C68	C69	C70	C71	C72	C73	C74	C75	C76	C77	C78	C79	C80	C81	C82	C83	C84	C85	C86	C87	C88	C89	C90	C91	C92	C93	C94	C95	C96	C97	C98	C99	C100	C101	C102	C103	C104	C105	C106	C107	C108	C109	C110	C111	C112	C113	C114	C115	C116	C117	C118	C119	C120	C121	C122	C123	C124	C125	C126	C127	C128	C129	C130	C131	C132	C133	C134	C135	C136	C137	C138	C139	C140	C141	C142	C143	C144	C145	C146	C147	C148	C149	C150	C151	C152	C153	C154	C155	C156	C157	C158	C159	C160	C161	C162	C163	C164	C165	C166	C167	C168	C169	C170	C171	C172	C173	C174	C175	C176	C177	C178	C179	C180	C181	C182	C183	C184	C185	C186	C187	C188	C189	C190	C191	C192	C193	C194	C195	C196	C197	C198	C199	C200	C201	C202	C203	C204	C205	C206	C207	C208	C209	C210	C211	C212	C213	C214	C215	C216	C217	C218	C219	C220	C221	C222	C223	C224	C225	C226	C227	C228	C229	C230	C231	C232	C233	C234	C235	C236	C237	C238	C239	C240	C241	C242	C243	C244	C245	C246	C247	C248	C249	C250	C251	C252	C253	C254	C255	C256	C257	C258	C259	C260	C261	C262	C263	C264	C265	C266	C267	C268	C269	C270	C271	C272	C273	C274	C275	C276	C277	C278	C279	C280	C281	C282	C283	C284	C285	C286	C287	C288	C289	C290	C291	C292	C293	C294	C295	C296	C297	C298	C299	C300	C301	C302	C303	C304	C305	C306	C307	C308	C309	C310	C311	C312	C313	C314	C315	C316	C317	C318	C319	C320	C321	C322	C323	C324	C325	C326	C327	C328	C329	C330	C331	C332	C333	C334	C335	C336	C337	C338	C339	C340	C341	C342	C343	C344	C345	C346	C347	C348	C349	C350	C351	C352	C353	C354	C355	C356	C357	C358	C359	C360	C361	C362	C363	C364	C365	C366	C367	C368	C369	C370	C371	C372	C373	C374	C375	C376	C377	C378	C379	C380	C381	C382	C383	C384	C385	C386	C387	C388	C389	C390	C391	C392	C393	C394	C395	C396	C397	C398	C399	C400	C401	C402	C403	C404	C405	C406	C407	C408	C409	C410	C411	C412	C413	C414	C415	C416	C417	C418	C419	C420	C421	C422	C423	C424	C425	C426	C427	C428	C429	C430	C431	C432	C433	C434	C435	C436	C437	C438	C439	C440	C441	C442	C443	C444	C445	C446	C447	C448	C449	C450	C451	C452	C453	C454	C455	C456	C457	C458	C459	C460	C461	C462	C463	C464	C465	C466	C467	C468	C469	C470	C471	C472	C473	C474	C475	C476	C477	C478	C479	C480	C481	C482	C483	C484	C485	C486	C487	C488	C489	C490	C491	C492	C493	C494	C495	C496	C497	C498
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Estimated from n100 values recorded at continuous drive of 300mm to equate to SPT N for a 300m
Each value is a rolling mean of 3 readings

Table 5: Comparison of Soil Chemical Analyses with Generic Assessment Criteria

Chemtest Sample ID.:				1048003	1048004	1048005	1048006	1051524	1051525	1051526	1051527	1051528	1051529	1051530
Sample Location:			GAC (Commercial) 2.5% SOM	WS1	WS2	WS3	WS5	CP3B	CP3B	CP2	CP2	CP2	CP1	CP1
Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Top Depth (m):				0.00	1.50	0.50	0.50	0.50	1.50	0.50	1.50	3.00	0.50	2.50
Bottom Depth (m):				0.20	2.00	1.00	1.00	0.70	2.00	0.70	2.00	3.50	0.70	2.50
Date Sampled:				11-Aug-2020	11-Aug-2020	11-Aug-2020	11-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020
Determinand	Units	LOD												
ACM Type		N/A		-	-	-	-	-	-	-	-	-	-	-
Asbestos Identification	%	0.001		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage		N/A		-	-	-	-	-	-	-	-	-	-	-
pH		4.0		5.7	7.7	8.6	6.2	8.5	8.4	8.5	8.2	6.4	8.0	6.3
Boron (Hot Water Soluble)	mg/kg	0.40	240,000	0.61	< 0.40	< 0.40	< 0.40	0.56	0.50	0.68	< 0.40	0.51	0.55	< 0.40
Arsenic	mg/kg	1.0	640	8.7	8.5	11	7.6	13	9.2	13	10	12	10	6.3
Beryllium	mg/kg	1.0	12	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.3	< 1.0	< 1.0
Cadmium	mg/kg	0.10	190	< 0.10	< 0.10	< 0.10	< 0.10	0.36	0.10	0.17	< 0.10	< 0.10	0.14	< 0.10
Copper	mg/kg	0.50	68,000	11	6.3	14	8.5	13	12	14	9.9	22	12	6.9
Mercury	mg/kg	0.10	320	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	mg/kg	0.50	980	17	6.3	19	18	20	21	23	13	41	19	6.2
Lead	mg/kg	0.50	2,300	12	4.6	17	8.5	27	18	24	16	31	20	6.6
Selenium	mg/kg	0.20	12,000	0.64	0.41	0.60	0.43	0.30	0.42	0.41	0.41	0.60	0.33	0.31
Vanadium	mg/kg	5.0	9,000	28	23	40	26	40	35	43	30	33	36	20
Zinc	mg/kg	0.50	730,000	58	28	57	46	57	49	66	42	89	54	29
Chromium (Trivalent)	mg/kg	1.0	8,600	23	15	31	21	28	25	29	24	30	25	13
Chromium (Hexavalent)	mg/kg	0.50	33	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fraction of Organic Carbon		0.0010		0.0049	0.0025	0.0044	0.0034	0.015	0.0057	0.0073	0.0019	0.0027	0.010	0.0089
TOC				0.49	0.25	0.44	0.34	1.5	0.57	0.73	0.19	0.27	1	0.89
SOM				0.84	0.43	0.76	0.58	2.58	0.88	1.28	0.33	0.46	1.72	1.53
Aliphatic TPH >C5-C6	mg/kg	1.0	5900	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	mg/kg	1.0	17000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	mg/kg	1.0	4800	< 1.0	32	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	mg/kg	1.0	23000	< 1.0	8.5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	mg/kg	1.0	82000	< 1.0	24	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	mg/kg	1.0	1700000	< 1.0	21	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	mg/kg	1.0		< 1.0	36	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	mg/kg	1.0	1700000	< 1.0	4.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	mg/kg	5.0		< 5.0	130	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	mg/kg	1.0	46000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	mg/kg	1.0	110000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	mg/kg	1.0	8100	< 1.0	3.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	mg/kg	1.0	28000	< 1.0	5.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	mg/kg	1.0	37000	< 1.0	20	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	mg/kg	1.0	28000	< 1.0	26	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	mg/kg	1.0	28000	< 1.0	120	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	mg/kg	1.0	28000	< 1.0	7.5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	mg/kg	5.0		< 5.0	190	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	mg/kg	10.0		< 10	310	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	mg/kg	0.10	460	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	mg/kg	0.10	97000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.10	97000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.10	68000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.10	22000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.10	540000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.10	23000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.55	< 0.10	< 0.10
Pyrene	mg/kg	0.10	54000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.44	< 0.10	< 0.10
Benzo[a]anthracene	mg/kg	0.10	170	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg	0.10	350	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	mg/kg	0.10	44	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	mg/kg	0.10	1200	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	mg/kg	0.10	35	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno[1,2,3-c,d]Pyrene	mg/kg	0.10	510	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz[a,h]Anthracene	mg/kg	0.10	3.6	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	mg/kg	0.10	4000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	mg/kg	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Benzene	µg/kg	1.0	47	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1.0	110,000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1.0	13,000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	µg/kg	1.0	14,000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/kg	1.0	15,000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols	mg/kg	0.30	690	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

350

Denotes an exceedence of GAC

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.

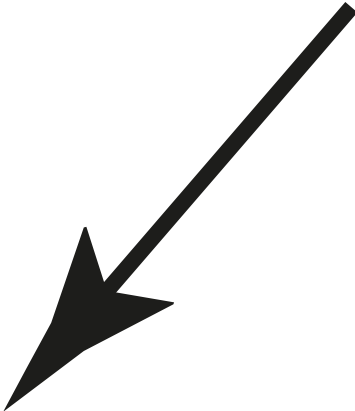
dir: Screening criteria based on threshold protective of direct skin contact (guideline in brackets based on health effects following long term exposure provided for illustration only).

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

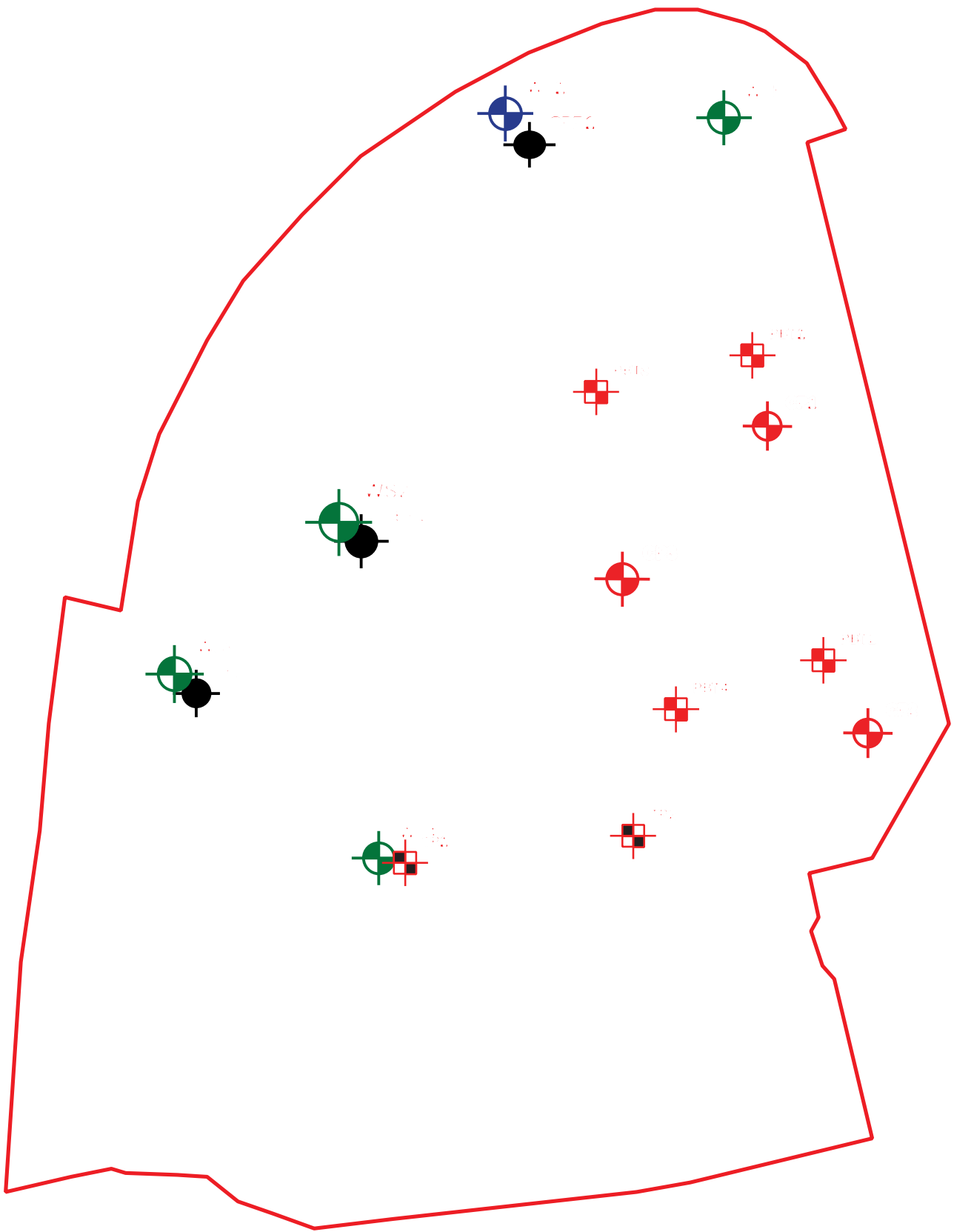


FIGURES

Site Location



Notes	Project Title	Scale	Drawn	Size
	Havant, Purbrook Way	as shown	GJ	A4
	Drawing Title	Date	Job No.	Drawing /Rev No.
	Site Location Plan	08.07.20	770	Fig1
	Client			
	Lidl Great Britain Ltd		<i>Remada</i>	



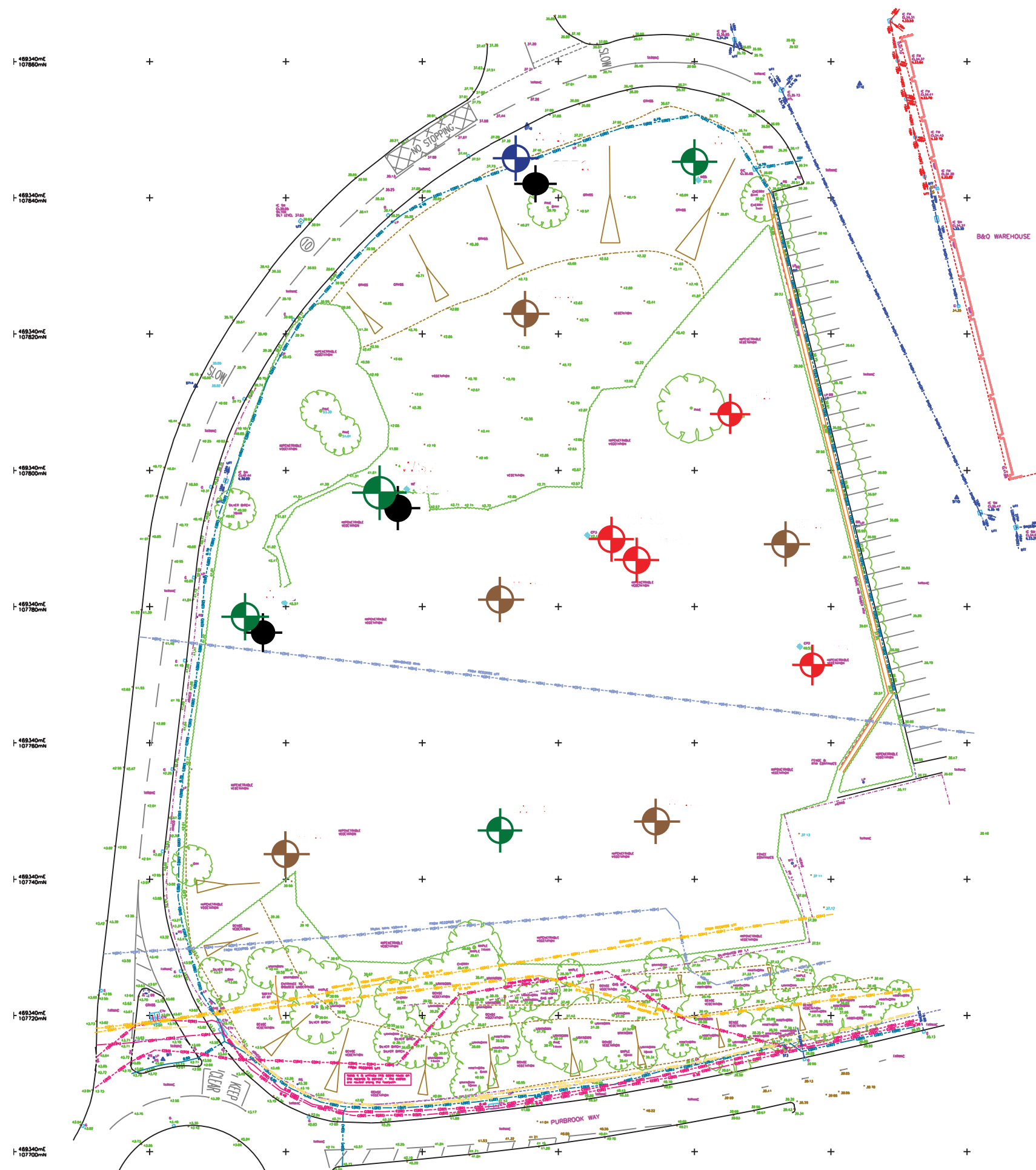
- Legend
-  Window Sample & Installation
 -  Window Sample
 -  Cabletool Borehole & Installation
 -  CBR Test
 -  Plate Bearing Test
 -  Trial Pit

Notes

WS 4 was not accessible in August 2020 but substituted with trial pit TP 1 November 2020.

Dynamic probe locations presented on separate drawing.

Project Title		
Havant, Purbrook Way		
Drawing Title		
Figure 2: Exploratory Locations with Existing Layout		
Client		
Lidl Great Britain Ltd		
Scale	Drawn	Size
As shown	GJ	A3
Date	Job No.	Drawing Rev No.
11.12.20	770	02



Legend

-  Window Sample & Installation
-  Window Sample
-  Cabletool Borehole & Installation
-  CBR Test
-  Probe Hole
-  Supplementary Window Sample (February 2023)

Notes

Project Title
Havant, Purbrook Way

Drawing Title
Figure 2: Exploratory Hole Locations

Client
Lidl Great Britain Ltd

Scale As shown	Drawn PD	Size A4
Date 04.04.2024	Job No. 770	Drawing Rev No. 02



F E D C B A

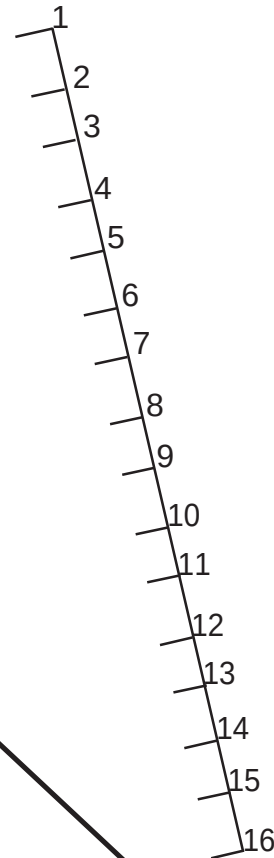
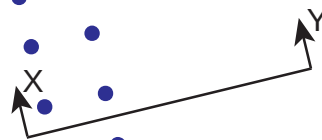
Approximate 5m x 5m grid
of Dynamic Probes

469414E 107837N

469440E 107842N

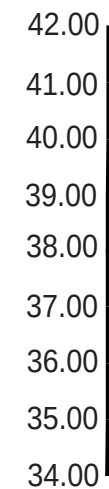
469458E 107768N

469433E 107765N



Top of Retaing wall to
B&Q car park = 37.00 (varies)
Car park Finished Road
Level = 36.50 to 37.00 mAOD

Proposed Finished Floor
Level (FFL) = 41.95m AOD



10m

Base level of raft at 41.40
(approximately 0.6m below FFL)

Top of retaining wall

Foundation detail
not known

Minimum depth of
foundation required
not to increase load
on wall is to be
established

Section X-Y

Legend

● Dynamic Probe

Notes

Proposed layout reproduced
from One Design Drawing
19139 AD110

Project Title
Havant, Purbrook Way

Drawing Title
Figure 4: Dynamic Probe
Locations & Section

Client
Lidl Great Britain Ltd

Scale As shown	Drawn GJ	Size A3
Date 27.10.20	Job No. 770	Drawing Rev No. 02

Remada

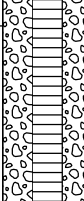
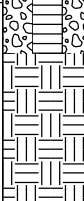
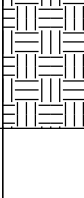


EXPLORATORY LOGS



BOREHOLE LOG

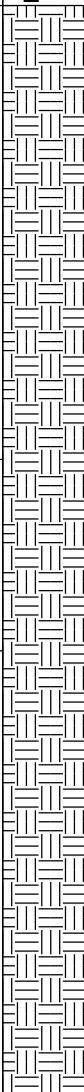
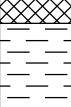
Project Havant				BOREHOLE No	
Job No 770.02	Date 11-08-20	Ground Level (m) 42.12	Co-Ordinates () E 469,396.0 N 107,796.0		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS			Water				STRATA		Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION			
1.00	ES	N10			(1.00)	MADE GROUND: Light brown/grey gravelly sandy clay. Gravel is chalk, brick and concrete (earthworks fill).				
			41.12		1.00	MADE GROUND: Concrete boulder with steel beam - Removed by excavator.				
1.50-1.90			40.62	1.50	MADE GROUND: Soft to firm red/brown/grey clay with black staining and a hydrocarbon odour (earthworks fill).					
2.00-2.75		D	N8			(0.40)	MADE GROUND: Firm to stiff blue/grey/brown clay (earthworks fill).			
2.00		40.22		1.90		MADE GROUND: Firm to stiff blue/grey/brown clay (earthworks fill).				
3.00		N18			(0.85)	MADE GROUND: Firm to stiff brown/grey clay (earthworks fill).				
			39.37		2.75	MADE GROUND: Firm to stiff brown/grey clay (earthworks fill).				
					(1.00)	Stiff to very stiff blue/grey micaceous CLAY (LONDON CLAY).				
4.00			38.37		3.75					
5.00		N29			(1.75)					
						36.62	5.50			
		N32								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered.
All dimensions in metres Scale 1:37.5			Client Lidl Great Britain Ltd			Method/ Plant Used Tracked Rig			Logged By GJ		

BOREHOLE LOG

Project Havant				BOREHOLE No	
Job No 770.02	Date 11-08-20	Ground Level (m) 42.57	Co-Ordinates () E 469,380.0 N 107,780.0		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS			Water				STRATA		Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick- ness)	DESCRIPTION			
1.00-2.00 1.00 2.00 3.00 4.00	ES	N21			(2.25)	MADE GROUND: Stiff light brown gravelly slightly sandy clay. Gravel is brick (earthworks fill). Becoming very stiff.....				
					2.25	MADE GROUND: Firm brown gravelly clay. Gravel is chalk (earthworks fill).				
			40.32		(0.95)					
			39.37		3.20	MADE GROUND: Stiff brown/blue/grey sandy clay (earthworks fill).				
					(2.30)					
			37.07		5.50					
					(0.50)	Stiff blue/grey micaceous clay				
					6.00					
					36.57					

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered.
All dimensions in metres Scale 1:37.5			Client Lidl Great Britain Ltd			Method/ Plant Used Tracked Rig			Logged By GJ		



BOREHOLE LOG

Project Havant				BOREHOLE No	
Job No 770.02	Date 11-08-20	Ground Level (m) 39.12	Co-Ordinates () E 469,442.0 N 107,844.0		
Contractor				Sheet 1 of 1	

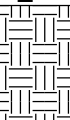
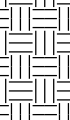
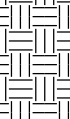
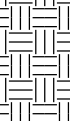
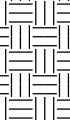
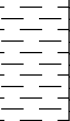
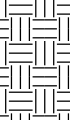
SAMPLES & TESTS			Water				STRATA	Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick- ness)	DESCRIPTION		
0.60-0.80	ES					(1.60)	MADE GROUND: Firm to stiff ferruginous red/brown/grey clay.		
1.00		N10							
			37.52		1.60				
2.00		N37					Firm blue grey micaceous CLAY.		
2.55-3.00	U						Becoming stiff...		
3.00		N50/ 295 mm					Becoming very stiff....		
						(3.90)			
			33.62		5.50				

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered.
All dimensions in metres Scale 1:37.5			Client Lidl Great Britain Ltd			Method/ Plant Used Tracked Rig			Logged By GJ		



BOREHOLE LOG

Project Havant				BOREHOLE No	
Job No 770.02	Date 17-08-20 18-08-20	Ground Level (m) 41.87	Co-Ordinates () E 469,447.0 N 107,809.0		
Contractor				Sheet 1 of 1	

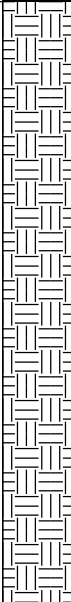
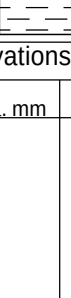
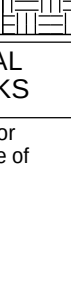
SAMPLES & TESTS			Water				STRATA		Geology	Instrument/ Backfill				
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick- ness)	DESCRIPTION							
0.50	ES	N22	40.77		(1.10)	MADE GROUND: Firm to stiff orange/brown very sandy slightly gravelly clay (earthworks fill).								
1.50						1.10	MADE GROUND: Firm to stiff orange / brown sandy clay (earthworks fill).							
2.00	D		N12	39.87		(0.90)	MADE GROUND: Orange brown silty clayey sand (earthworks fill).							
2.00	ES			39.37		(0.50)	MADE GROUND: Stiff orange brown/grey clay (earthworks fill).							
2.50	U100	N20				MADE GROUND: Stiff orange brown/grey clay (earthworks fill).								
3.00	D					(1.50)								
3.00				37.87		4.00	Stiff to very stiff blue grey slightly micacious CLAY.							
4.00	U100	N20												
4.45	D													
4.50														
5.50	D	N18												
6.00	D													
6.00														
7.00	U100	N20			(6.50)									
7.50														
9.00		N20												
10.00		N24												
			31.37		10.50									

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered.
All dimensions in metres Scale 1:65.625			Client Lidl Great Britain Ltd			Method/ Plant Used Dando 2000			Logged By GJ		



BOREHOLE LOG

Project Havant				BOREHOLE No	
Job No 770.02	Date 18-08-20 19-08-20	Ground Level (m) 40.53	Co-Ordinates () E 107,744.0 N 469,455.0		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS			Water				STRATA	Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick- ness)	DESCRIPTION		
0.50	ES	N13			(2.60)		MADE GROUND: Firm to stiff orange/brown grey slightly gravelly clay (earthworks fill).		
1.50	ES								
1.50									
2.20	U100	N19	37.93		2.60		MADE GROUND: Stiff to very stiff orange brown silty clay (earthworks fill).		
3.00	ES								
3.00									
4.00	U100	N19			(2.40)				
4.50	D								
4.50									
		N19	35.53		5.00		Stiff to very stiff blue/grey slightly micacious CLAY.		
6.00									
6.50	D								
7.00	U100	N16							
7.45	D								
7.50									
		N18			(5.50)				
9.00									
		N26							
		N24							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered
All dimensions in metres Scale 1:65.625			Client Lidl Great Britain Ltd			Method/ Plant Used Dando 2000			Logged By GJ		



BOREHOLE LOG

Project Havant				BOREHOLE No
Job No 770.02	Date 17-08-20 17-08-20	Ground Level (m) 42.11	Co-Ordinates () E 469,424.0 N 107,791.0	
Contractor				Sheet 1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	Geology	Instrument/ Backfill
0.50-0.70	ES	N16				(2.05)	Made Ground: Stiff to very stiff orange brown slightly gravelly clay. Gravel is concrete and brick.		
1.50				40.06		2.05	Obstruction		
				39.61		2.50			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS	
Depth	Date	Time	Casing		Water Depth	From	To	Hours	From	To		
			Depth	Dia. mm								
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered	
All dimensions in metres Scale 1:65.625		Client Lidl Great Britain Ltd				Method/ Plant Used Dando 2000					Logged By GJ	

$$|^{12}H^{12}| \text{ S.O.} = ()^* + ()^{12} = ^{12}H^{12} \text{ S.O.}$$

BOREHOLE LOG

Project Havant				BOREHOLE No CP3B
Job No 770.02	Date 17-08-20 17-08-20	Ground Level (m) 42.11	Co-Ordinates () E 469,424.0 N 107,79 2.0	
Contractor				
				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA					Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION			
0.50	ES	N38			(2.10)	MADE GROUND: Stiff to very stiff slightly gravelly clay. Gravel is concrete and brick.				
1.50	DES									
1.50				40.01		2.10				
1.50				39.71		2.40	OBSTRUCTION: Concrete boulders and kerbstones removed by 8 tonne excavator and explorator hole continued as a trial pit - see photos.			
				39.21		(0.50) 2.90	MADE GROUND: Stiff to very stiff orange brown/grey gravelly clay. Gravel is concrete and brick.			
						(2.10)	MADE GROUND: Stiff to very stiff orange/brown slightly sandy CLAY.			
				37.11		5.00				
			36.61		(0.50) 5.50	Very stiff blue grey slightly micaceous CLAY.				



Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered
All dimensions in metres Scale 1:65.625			Client Lidl Great Britain Ltd			Method/ Plant Used Dando 2000			Logged By GJ		

Well

Well



APPENDIX A

SPT Hammer Calibration Certificates

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: AR2847
Test Date: 03/09/2019
Report Date: 03/09/2019
File Name: AR2847.spt
Test Operator: JL

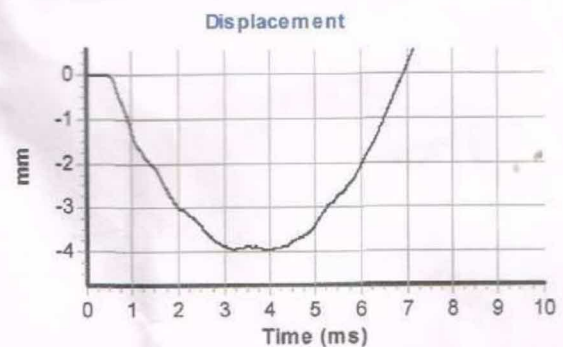
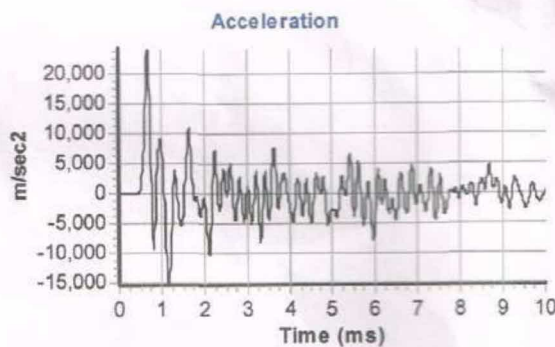
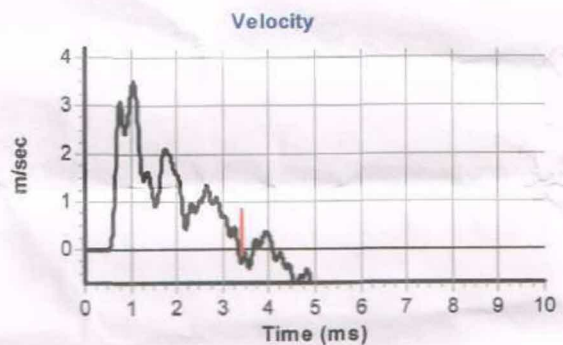
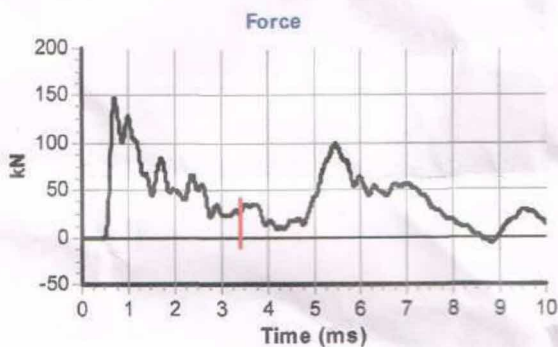
Instrumented Rod Data

Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.2
Assumed Modulus E_a (GPa): 210
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



Calculations

Area of Rod A (mm²): 931
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 334

Energy Ratio E_r (%): **71**

Title: TRAINEE FITTER

The recommended calibration interval is 12 months



**DANDO DRILLING
INTERNATIONAL**

SPT Hammer Energy Test Report

In accordance with BSEN ISO 22476-3:2005

Dando Drilling International
Unit G
Ford Airfield Industrial Estate
Ford
West Sussex
BN18 OHY

SPT Hammer Ref: DT16200
Test Date: 13/02/2020
Report Date: 17/02/2020
File Name: DT16200.spt
Test Operator: NICK

Instrumented Rod Data

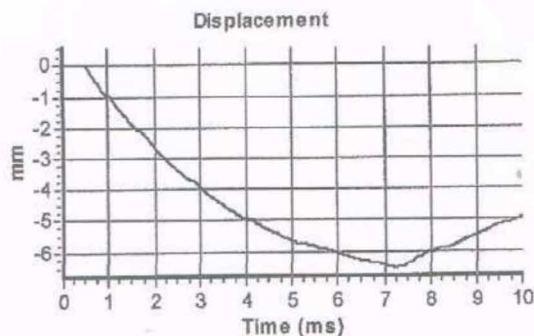
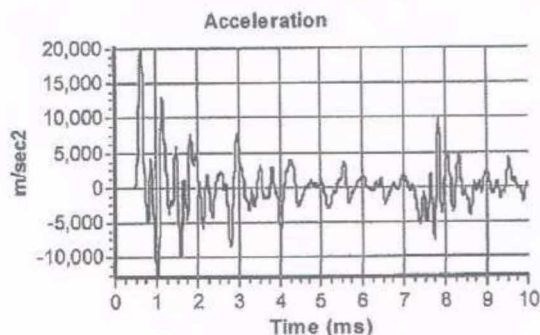
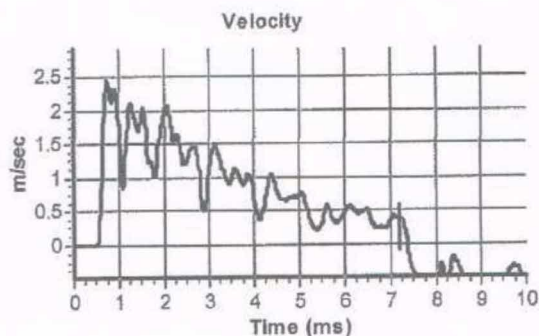
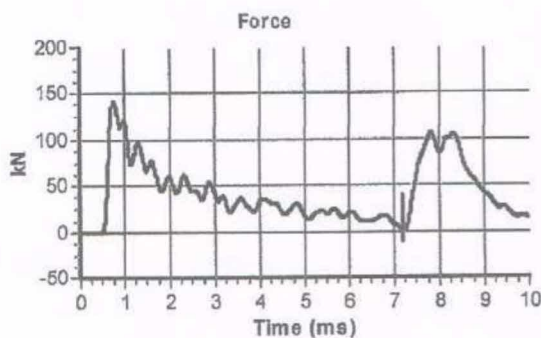
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.5
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 11855
Accelerometer No.2: 9983

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 16.5

Comments / Location

Dando MK2 Terrier



Calculations

Area of Rod A (mm²): 970
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 373

Energy Ratio E_r (%): **79**

Signed: Nick Jacobs-smith

Title: Fitter

The recommended calibration interval is 12 months



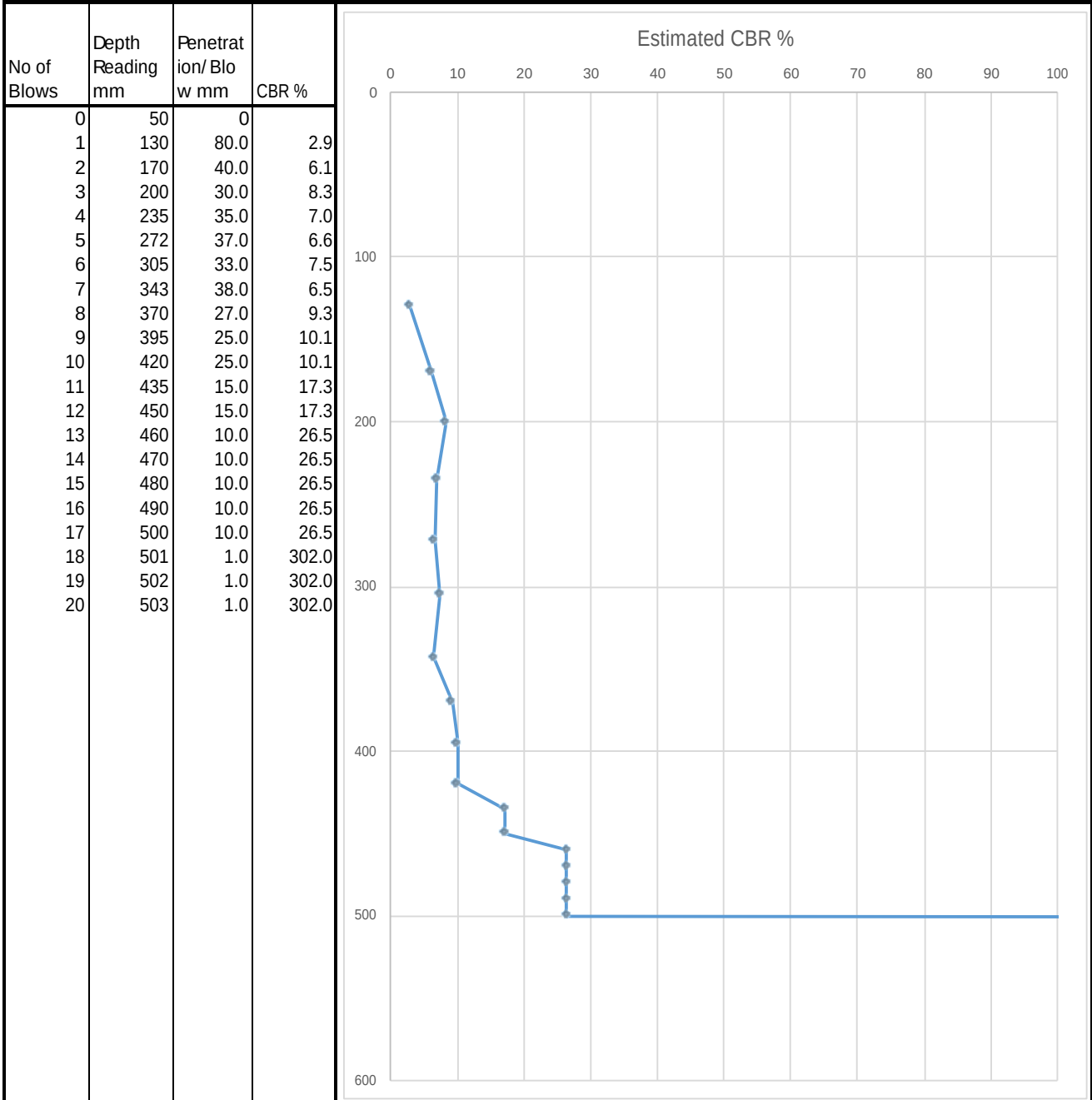
Appendix B

CBR Test Results

TRL Dynamic Cone Penetrometer Test Results

Remada

Client:	Lidl GB Ltd	Struct' Eng':		Test No:	CBR2	Location:	
Project No:	770.02	Date:	16.09.2020	Start Depth:	Formation	Test Strata:	MADE GROUND
$Log10(CBR) = 2.480 - 1.057 \times Log10(mm/blow)$						Weather:	Dry Sunny



Notes:

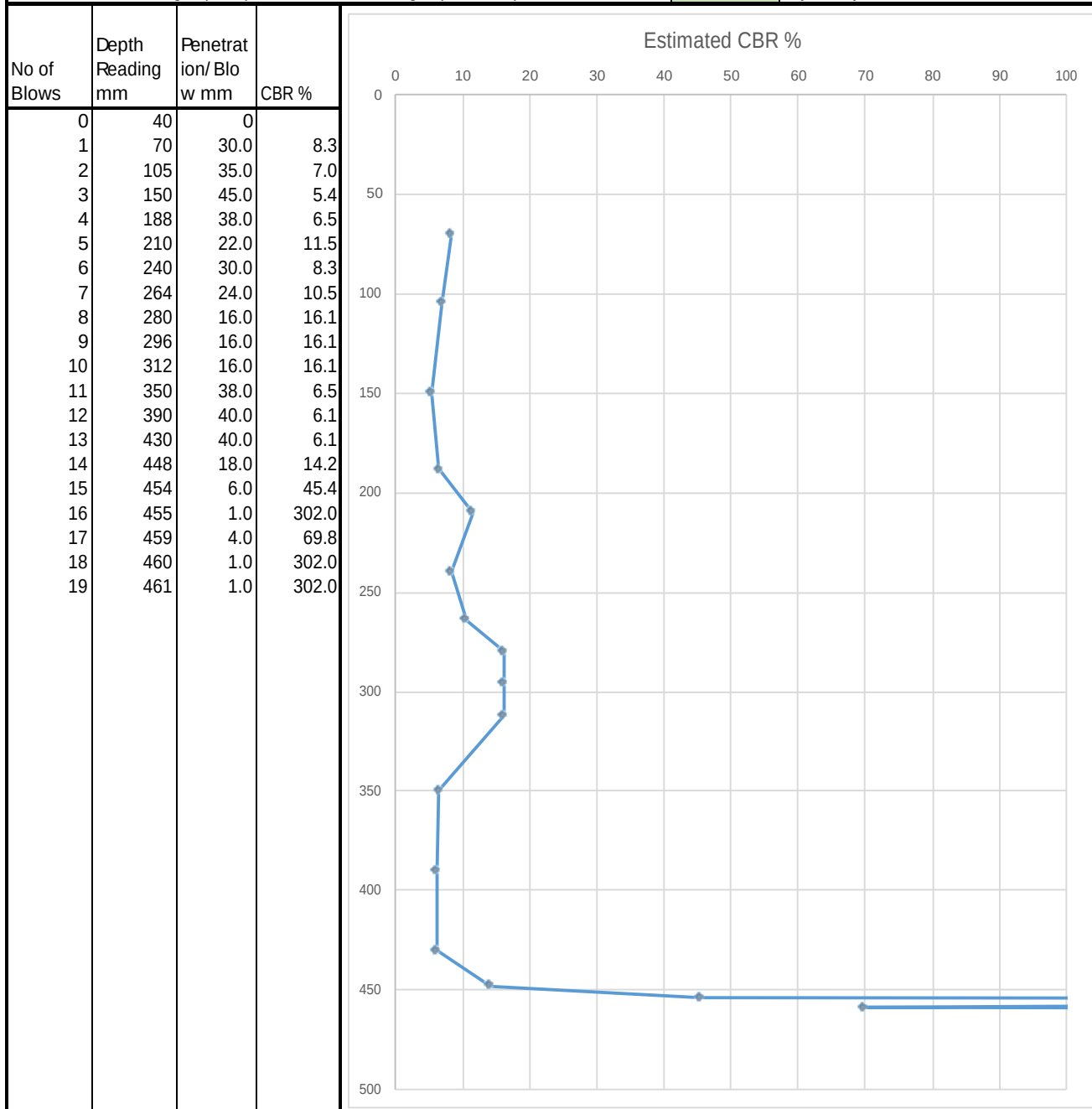
Tested by: I Shafqat
Date: 16.09.2020

Checked by: G Jones
Date: 16.09.2020

TRL Dynamic Cone Penetrometer Test Results

Remada

Client:	Lidl GB Ltd	Struct' Eng':		Test No:	CBR3	Location:	
Project No:	770.02	Date:	16.09.2020	Start Depth:	Formation	Test Strata:	MADEGROUND
$Log10(CBR) = 2.480 - 1.057 \times Log10(mm/blow)$						Weather:	Dry Sunny



Notes:

Tested by : I Shafqat
Date: 16.09.2020

Checked by: G Jones
Date: 16.09.2020



Appendix C

Plate Bearing Test Results

Plate Bearing Test Report

Remada

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

Client :	Lidl Great Britain LTD
Job Name:	Lidl Havant
Job Number	770.01
Site	Purbrook Way, Hampshire, PO93QJ

Report Date:	11.08.2020
Reaction Load	14 Tonne Excavator
Plate Diameter (mm)	607
Test Depth in layer of material	Surface

Test Location	PBT1
Test Strata	MADEGROUND
Ground Condition	Dry
Weather	Sunny, warm

Equivalent CBR Value (%)	11.1
Maximum Applied Stress (kPa)	293.35
Maximum Settlement (mm)	3.98
Bearing Pressure at 1.25mm Settlement	90.0
K762 (at 1.25mm settlement) kN/m2/m	58.53

Time (s)	Stress (kPa)	Settlement (mm)
0	3	0.00
0	17	0.00
30	35	0.47
60	52	0.68
120	69	0.98
180	86	1.28
240	104	1.53
330	121	1.72
390	138	2.19
450	155	2.65
510	173	2.87
660	190	2.99
720	207	3.24
780	224	3.41
840	242	3.61
900	259	3.76
960	276	3.86
1020	293	3.98

Remarks:



Report Prepared By: I Shafqat

Date: 11.08.20

Approved By: G S Jones

Date: 11.08.20

Plate Bearing Test Report

Remada

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

Client :	Lidl Great Britain LTD
Job Name:	Lidl Havant
Job Number	770.01
Site	Purbrook Way, Hampshire, PO93QJ

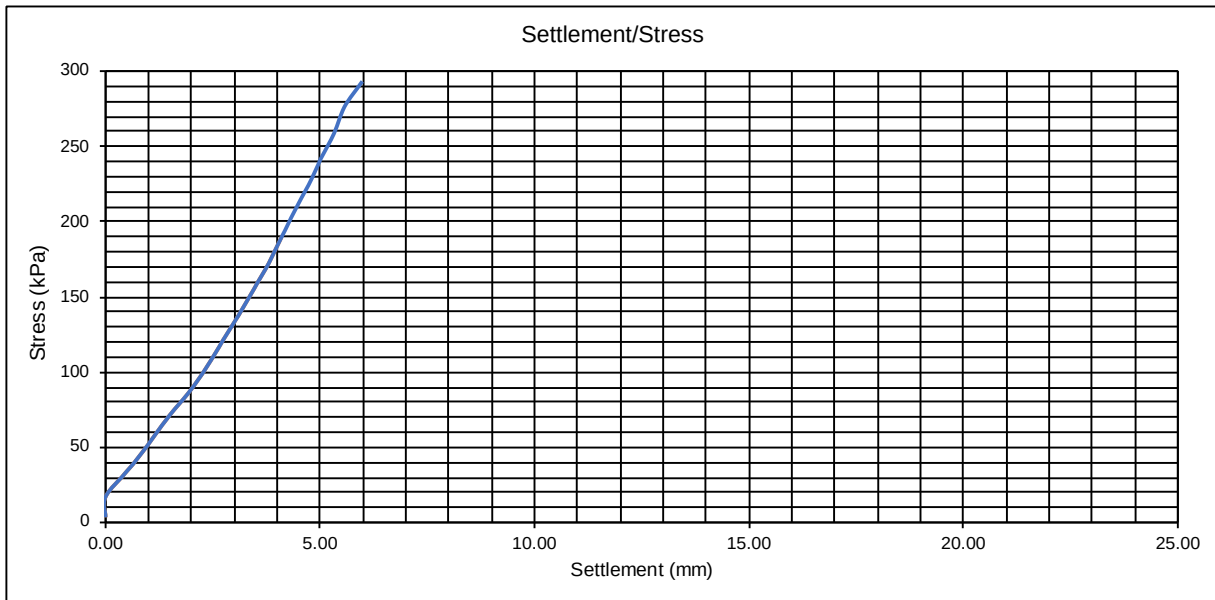
Report Date:	11.08.2020
Reaction Load	14 Tonne Excavator
Plate Diameter (mm)	607
Test Depth in layer of material	Surface

Test Location	PBT2
Test Strata	MADEGROUND
Ground Condition	Dry
Weather	Sunny, warm

Equivalent CBR Value (%)	7.2
Maximum Applied Stress (kPa)	293.35
Maximum Settlement (mm)	5.98
Bearing Pressure at 1.25mm Settlement	70.0
K762 (at 1.25mm settlement) kN/m2/m	45.52

Time (s)	Stress (kPa)	Settlement (mm)
0	3	0.00
0	17	0.00
30	35	0.52
60	52	0.99
120	69	1.43
180	86	1.94
240	104	2.37
330	121	2.74
390	138	3.11
450	155	3.46
510	173	3.81
660	190	4.11
720	207	4.41
780	224	4.74
840	242	5.02
900	259	5.34
960	276	5.57
1020	293	5.98

Remarks:



Report Prepared By: I Shafqat

Date: 11.08.20

Approved By: G S Jones

Date: 11.08.20

Plate Bearing Test Report

Remada

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

Client :	Lidl Great Britain LTD
Job Name:	Lidl Havant
Job Number	770.02
Site	Purbrook Way, Hampshire, PO93QJ

Report Date:	26.11.2020
Reaction Load	14 Tonne Excavator
Plate Diameter (mm)	607
Test Depth in layer of material	Surface

Test Location	PBT3
Test Strata	MADEGROUND
Ground Condition	Wet
Weather	Cloudy, light rain

Equivalent CBR Value (%)	4.7
Maximum Applied Stress (kPa)	293.35
Maximum Settlement (mm)	7.5
Bearing Pressure at 1.25mm Settlement	55.0
K762 (at 1.25mm settlement) kN/m2/m	35.77

Time (s)	Stress (kPa)	Settlement (mm)
0	3	0.00
0	17	0.00
30	35	0.83
60	52	1.25
90	69	1.74
140	86	2.27
200	104	2.93
260	121	3.49
320	138	3.99
400	155	4.36
490	173	4.80
610	190	5.24
700	207	5.61
760	224	6.04
820	242	6.37
880	259	6.77
960	276	7.17
1050	293	7.53

Remarks:



Report Prepared By: I Shafqat

Date: 26.11.20

Approved By: G S Jones

Date: 26.11.20

Plate Bearing Test Report

Remada

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

Client :	Lidl Great Britain LTD
Job Name:	Lidl Havant
Job Number	770.02
Site	Purbrook Way, Hampshire, PO93QJ

Report Date:	26.11.2020
Reaction Load	14 Tonne Excavator
Plate Diameter (mm)	607
Test Depth in layer of material	Surface

Test Location	PBT4
Test Strata	MADEGROUND
Ground Condition	Wet
Weather	Cloudy, light rain

Equivalent CBR Value (%)	4.0
Maximum Applied Stress (kPa)	293.35
Maximum Settlement (mm)	8.2
Bearing Pressure at 1.25mm Settlement	50.0
K762 (at 1.25mm settlement) kN/m2/m	32.51

Time (s)	Stress (kPa)	Settlement (mm)
0	3	0.00
0	17	0.00
30	35	0.97
60	52	1.40
100	69	1.85
160	86	2.34
220	104	3.01
300	121	3.51
360	138	4.00
420	155	4.50
480	173	4.99
540	190	5.41
620	207	5.89
750	224	6.34
840	242	6.76
900	259	7.19
960	276	7.70
1020	293	8.23

Remarks:



Report Prepared By: I Shafqat

Date: 11.08.20

Approved By: G S Jones

Date: 11.08.20



APPENDIX D

Laboratory Chemical Analysis



Final Report

Report No.:	20-21350-1		
Initial Date of Issue:	24-Aug-2020		
Client	Remada Ltd		
Client Address:	Forward House 17 High Street Henley in Arden B95 5AA		
Contact(s):	Greg Jones Peter Dickinson		
Project	770.02 Havant		
Quotation No.:		Date Received:	13-Aug-2020
Order No.:		Date Instructed:	13-Aug-2020
No. of Samples:	4		
Turnaround (Wkdays):	5	Results Due:	19-Aug-2020
Date Approved:	24-Aug-2020		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Soil

Project: 770.02 Havant

Client: Remada Ltd	Chemtest Job No.:				20-21350	20-21350	20-21350	20-21350
Quotation No.:	Chemtest Sample ID.:				1048003	1048004	1048005	1048006
	Client Sample ID.:				1.00	2.00	3.00	4.00
	Sample Location:				WS1	WS2	WS3	WS5
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.00	1.50	0.50	0.50
	Bottom Depth (m):				0.20	2.00	1.00	1.00
	Date Sampled:				11-Aug-2020	11-Aug-2020	11-Aug-2020	11-Aug-2020
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD				
ACM Type	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-
Moisture	N	2030	%	0.020	9.0	18	9.4	14
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand
Chromatogram (TPH)	N			N/A	See Attached	See Attached	See Attached	See Attached
pH	M	2010		4.0	5.7	7.7	8.6	6.2
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.61	< 0.40	< 0.40	< 0.40
Arsenic	M	2450	mg/kg	1.0	8.7	8.5	11	7.6
Beryllium	U	2450	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	M	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Copper	M	2450	mg/kg	0.50	11	6.3	14	8.5
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	17	6.3	19	18
Lead	M	2450	mg/kg	0.50	12	4.6	17	8.5
Selenium	M	2450	mg/kg	0.20	0.64	0.41	0.60	0.43
Vanadium	U	2450	mg/kg	5.0	28	23	40	26
Zinc	M	2450	mg/kg	0.50	58	28	57	46
Chromium (Trivalent)	N	2490	mg/kg	1.0	23	15	31	21
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fraction of Organic Carbon	M	2625		0.0010	0.0049	0.0025	0.0044	0.0034
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	32	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	8.5	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	24	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	21	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	36	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	4.1	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	130	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	3.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	5.4	< 1.0	< 1.0

Results - Soil

Project: 770.02 Havant

Client: Remada Ltd	Chemtest Job No.:				20-21350	20-21350	20-21350	20-21350
Quotation No.:	Chemtest Sample ID.:				1048003	1048004	1048005	1048006
	Client Sample ID.:				1.00	2.00	3.00	4.00
	Sample Location:				WS1	WS2	WS3	WS5
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.00	1.50	0.50	0.50
	Bottom Depth (m):				0.20	2.00	1.00	1.00
	Date Sampled:				11-Aug-2020	11-Aug-2020	11-Aug-2020	11-Aug-2020
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD				
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	20	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	26	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	120	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	7.5	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	190	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	310	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30

TPH Chromatogram on Soil Sample: 1048003

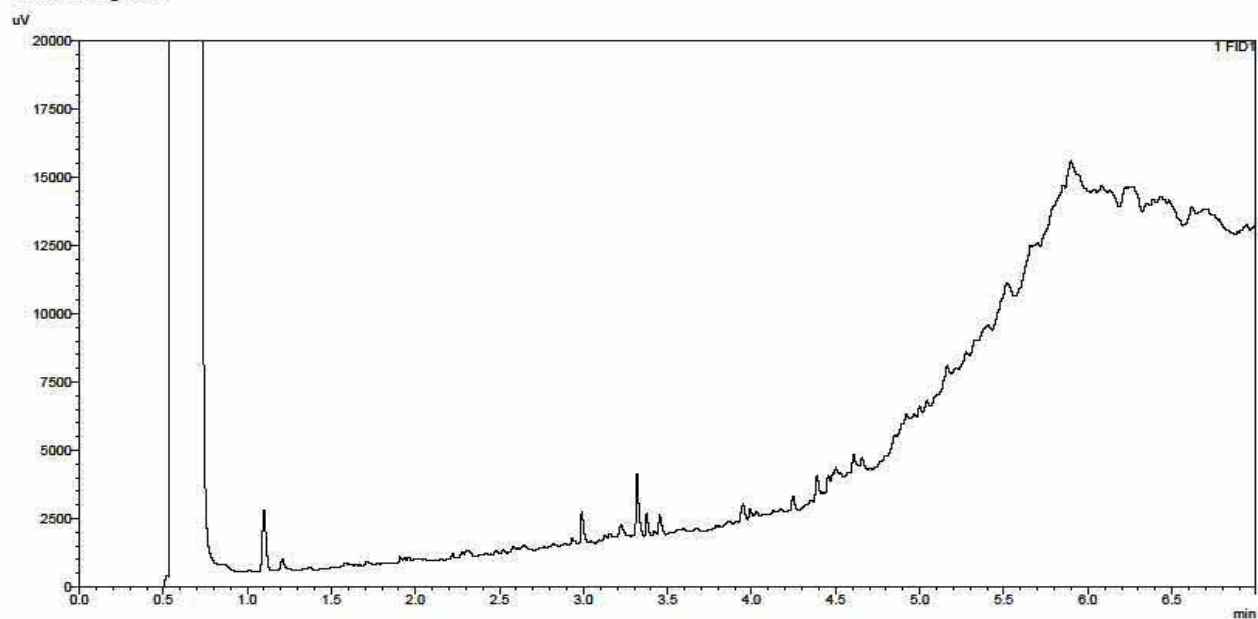
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Sample Name : 1048003 20-21350
Data Filename : 14 August 2020_17082020_1048003 20-21350_012.god
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 38
Date Acquired : 17/08/2020 12:56:36
Date Processed : 17/08/2020



Chemtest

<Chromatogram>



TPH Chromatogram on Soil Sample: 1048004

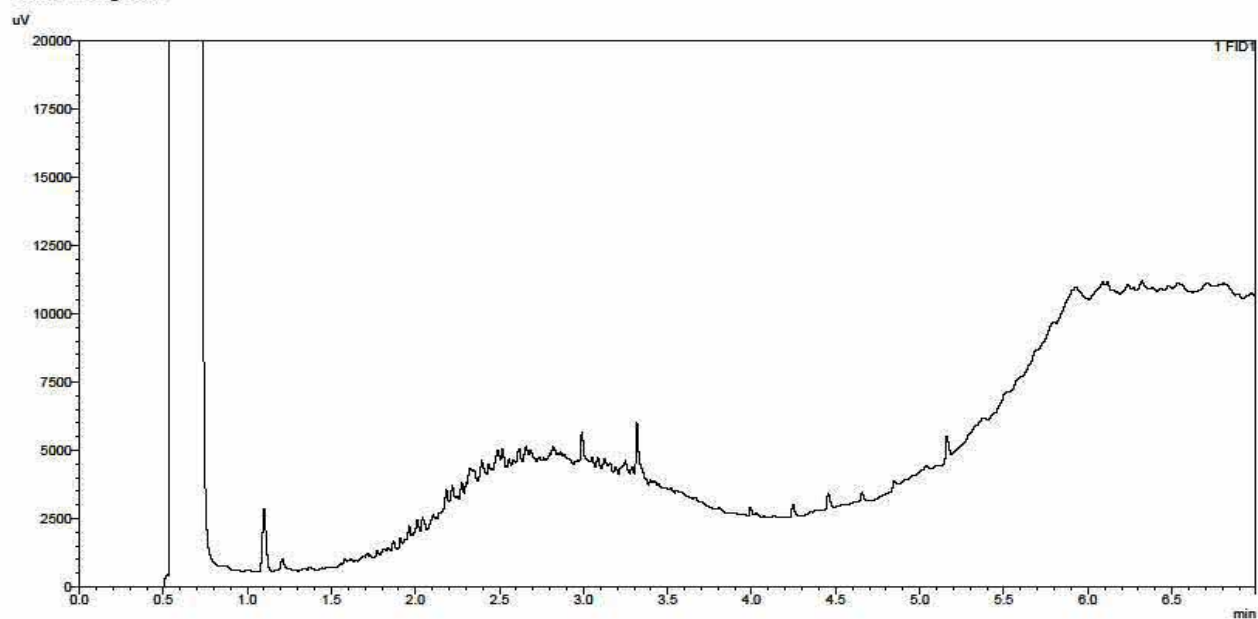
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Sample Name : 1048004 20-21350
Data Filename : 14 August 2020_17082020_1048004 20-21350_014.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 39
Date Acquired : 17/08/2020 13:09:31
Date Processed : 17/08/2020



Chemtest

<Chromatogram>



TPH Chromatogram on Soil Sample: 1048005

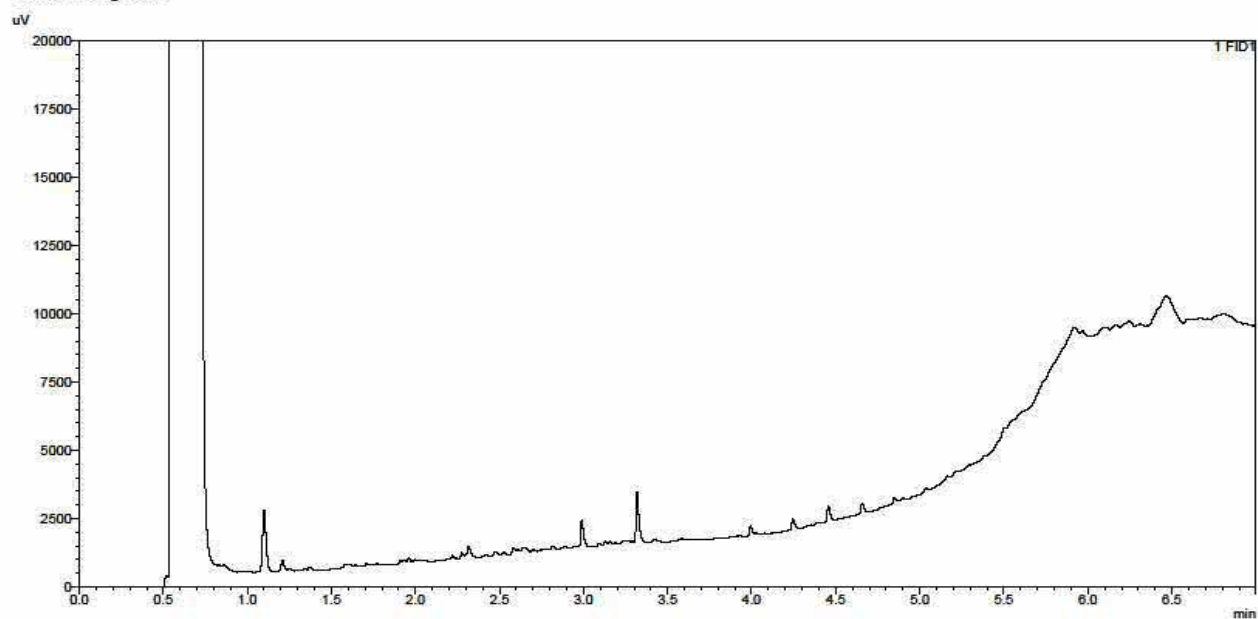
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Sample Name : 1048005 20-21350
Data Filename : 14 August 2020_17082020_1048005 20-21350_016.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 40
Date Acquired : 17/08/2020 13:22:18
Date Processed : 17/08/2020



Chemtest

<Chromatogram>



TPH Chromatogram on Soil Sample: 1048006

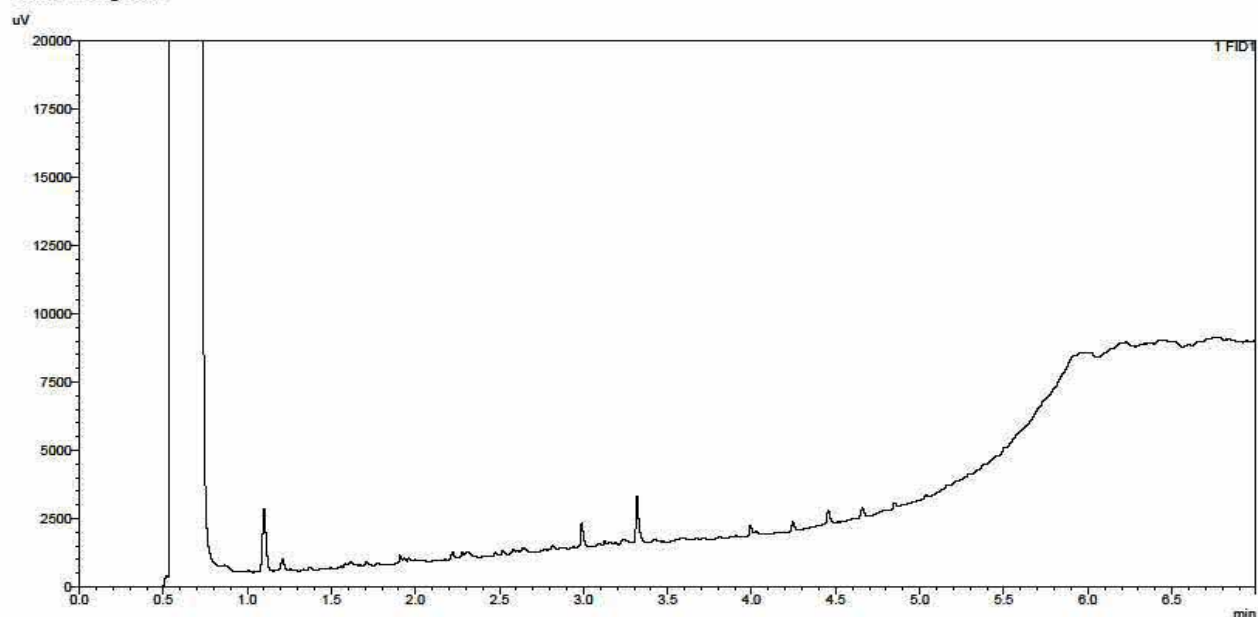
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Sample Name : 1048006 20-21350
Data Filename : 14 August 2020_17082020_1048006 20-21350_018.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 41
Date Acquired : 17/08/2020 13:35:08
Date Processed : 17/08/2020



Chemtest

<Chromatogram>



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
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
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 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	Aliphatic: >C5±C6, >C6±C8, >C8±C10, >C10±C12, >C12±C16, >C16±C21, >C21±C35, >C35±C44 Aromatic: >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; Dibenz[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 Trimethylphenols Note: 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"

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 45 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



Final Report

Report No.: 20-22074-1

Initial Date of Issue: 27-Aug-2020

Client Remada Ltd

Client Address: Forward House
17 High Street
Henley in Arden
B95 5AA

Contact(s): Greg Jones

Project 770.02 Havant

Quotation No.: **Date Received:** 20-Aug-2020

Order No.: **Date Instructed:** 20-Aug-2020

No. of Samples: 7

Turnaround (Wkdays): 5 **Results Due:** 26-Aug-2020

Date Approved: 27-Aug-2020

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Soil

Project: 770.02 Havant

Client: Remada Ltd	Chemtest Job No.:				20-22074	20-22074	20-22074	20-22074	20-22074	20-22074	20-22074
Quotation No.:	Chemtest Sample ID.:				1051524	1051525	1051526	1051527	1051528	1051529	1051530
	Sample Location:				CP3B	CP3B	CP2	CP2	CP2	CP1	CP1
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	1.50	0.50	1.50	3.00	0.50	2.00
	Bottom Depth (m):				0.70	2.00	0.70	2.00	3.50	0.70	2.50
	Date Sampled:				17-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD							
ACM Type	U	2192		N/A	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	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	2192		N/A	-	-	-	-	-	-	-
Moisture	N	2030	%	0.020	8.0	13	11	14	15	8.5	9.3
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	None	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Clay	Sand	Sand
Chromatogram (TPH)	N			N/A	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
pH	M	2010		4.0	8.5	8.4	8.5	8.2	6.4	8.0	6.3
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.56	0.50	0.68	< 0.40	0.51	0.55	< 0.40
Arsenic	M	2450	mg/kg	1.0	13	9.2	13	10	12	10	6.3
Beryllium	U	2450	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.3	< 1.0	< 1.0
Cadmium	M	2450	mg/kg	0.10	0.36	0.10	0.17	< 0.10	< 0.10	0.14	< 0.10
Copper	M	2450	mg/kg	0.50	13	12	14	9.9	22	12	6.9
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	20	21	23	13	41	19	6.2
Lead	M	2450	mg/kg	0.50	27	18	24	16	31	20	6.6
Selenium	M	2450	mg/kg	0.20	0.30	0.42	0.41	0.41	0.60	0.33	0.31
Vanadium	U	2450	mg/kg	5.0	40	35	43	30	33	36	20
Zinc	M	2450	mg/kg	0.50	57	49	66	42	89	54	29
Chromium (Trivalent)	N	2490	mg/kg	1.0	28	25	29	24	30	25	13
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fraction of Organic Carbon	M	2625		0.0010	0.015	0.0057	0.0073	0.0019	0.0027	0.010	0.0089
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: 770.02 Havant

Client: Remada Ltd	Chemtest Job No.:				20-22074	20-22074	20-22074	20-22074	20-22074	20-22074	20-22074
Quotation No.:	Chemtest Sample ID.:				1051524	1051525	1051526	1051527	1051528	1051529	1051530
	Sample Location:				CP3B	CP3B	CP2	CP2	CP2	CP1	CP1
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	1.50	0.50	1.50	3.00	0.50	2.00
	Bottom Depth (m):				0.70	2.00	0.70	2.00	3.50	0.70	2.50
	Date Sampled:				17-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020	17-Aug-2020
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD							
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 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	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.55	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.44	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

TPH Chromatogram on Soil Sample: 1051524

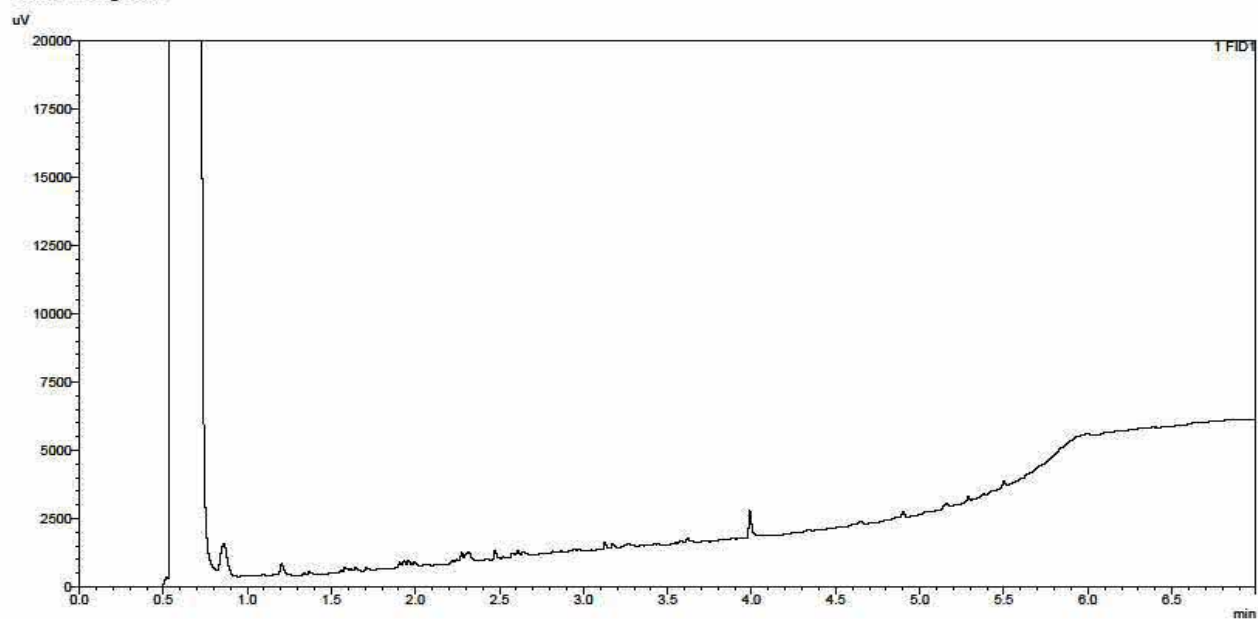
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Sample Name : 1051524 20-22074
Data Filename : 21 August 2020_21082020_1051524 20-22074_071.god
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 36
Date Acquired : 21/08/2020 20:58:59
Date Processed : 21/08/2020



Chemtest

<Chromatogram>



TPH Chromatogram on Soil Sample: 1051525

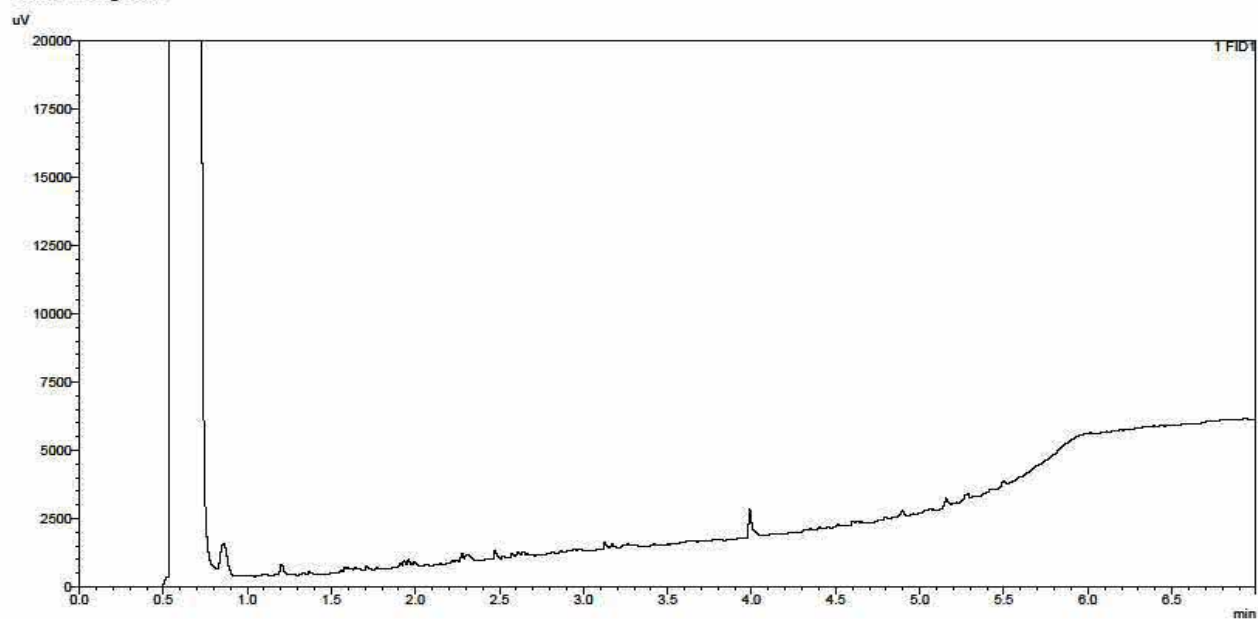
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Sample Name : 1051525 20-22074
Data Filename : 21 August 2020_21082020_1051525 20-22074_073.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 37
Date Acquired : 21/08/2020 21:11:53
Date Processed : 21/08/2020



Chemtest

<Chromatogram>



TPH Chromatogram on Soil Sample: 1051526

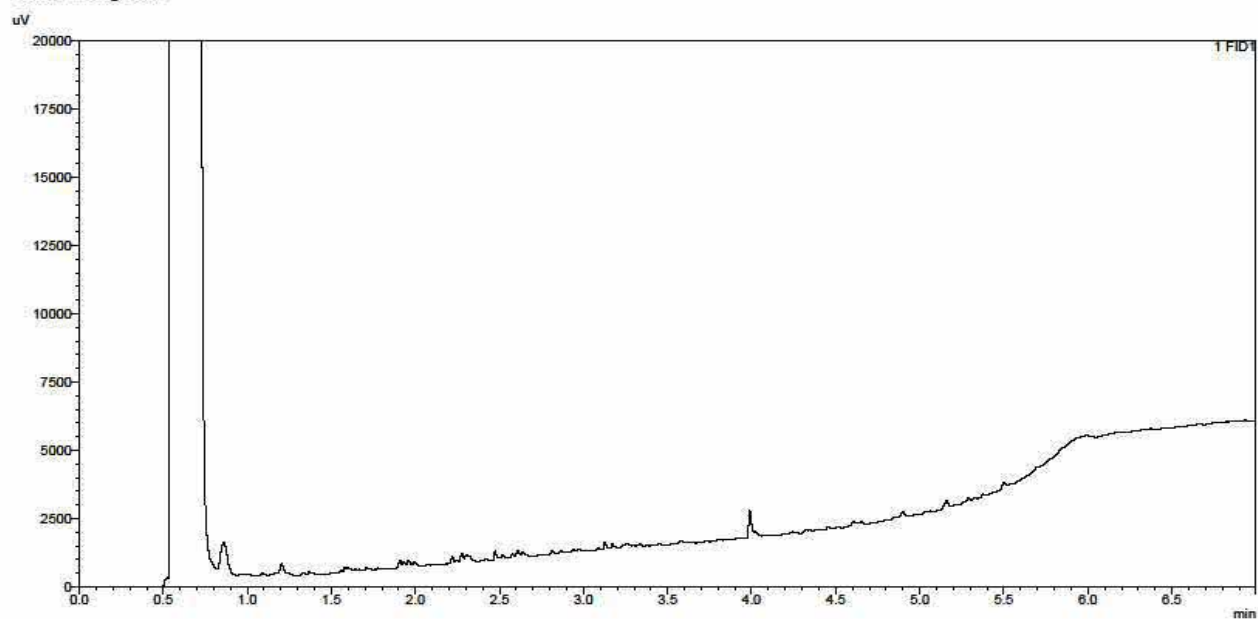
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Sample Name : 1051526 20-22074
Data Filename : 21 August 2020_21082020_1051526 20-22074_075.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 38
Date Acquired : 21/08/2020 21:24:50
Date Processed : 21/08/2020



Chemtest

<Chromatogram>



TPH Chromatogram on Soil Sample: 1051527

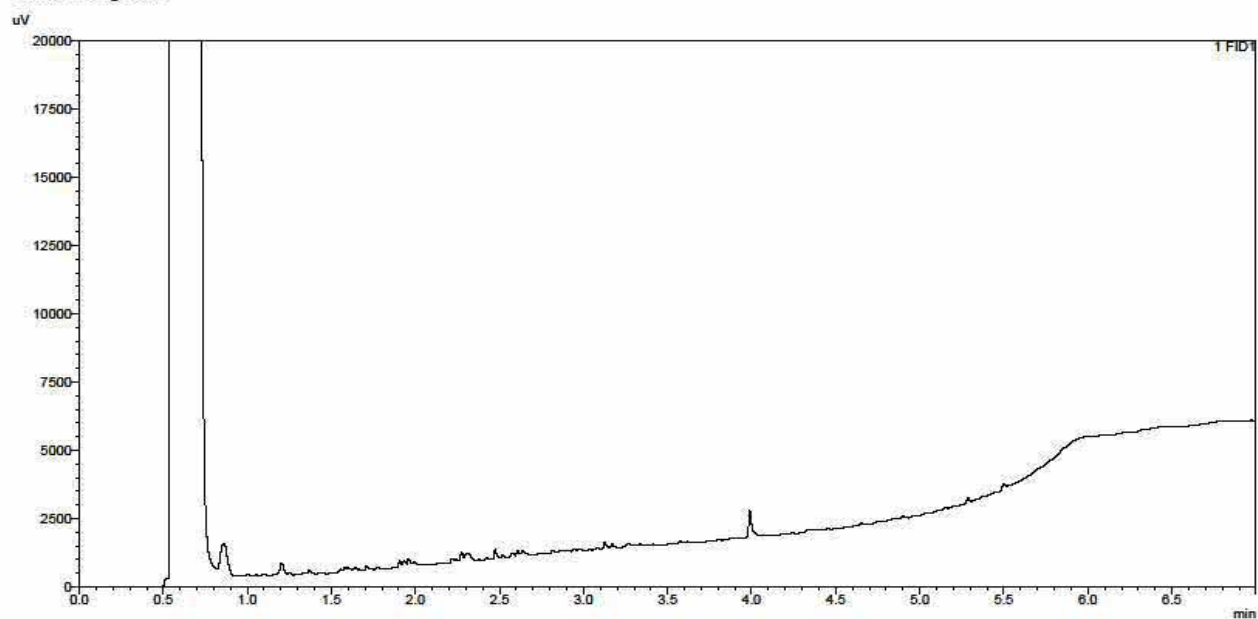
<Sample Information>

Sample Name : 1051527 20-22074
Data Filename : 21 August 2020_21082020_1051527 20-22074_077.god
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 39
Date Acquired : 21/08/2020 21:37:41
Date Processed : 21/08/2020



Chemtest

<Chromatogram>



TPH Chromatogram on Soil Sample: 1051528

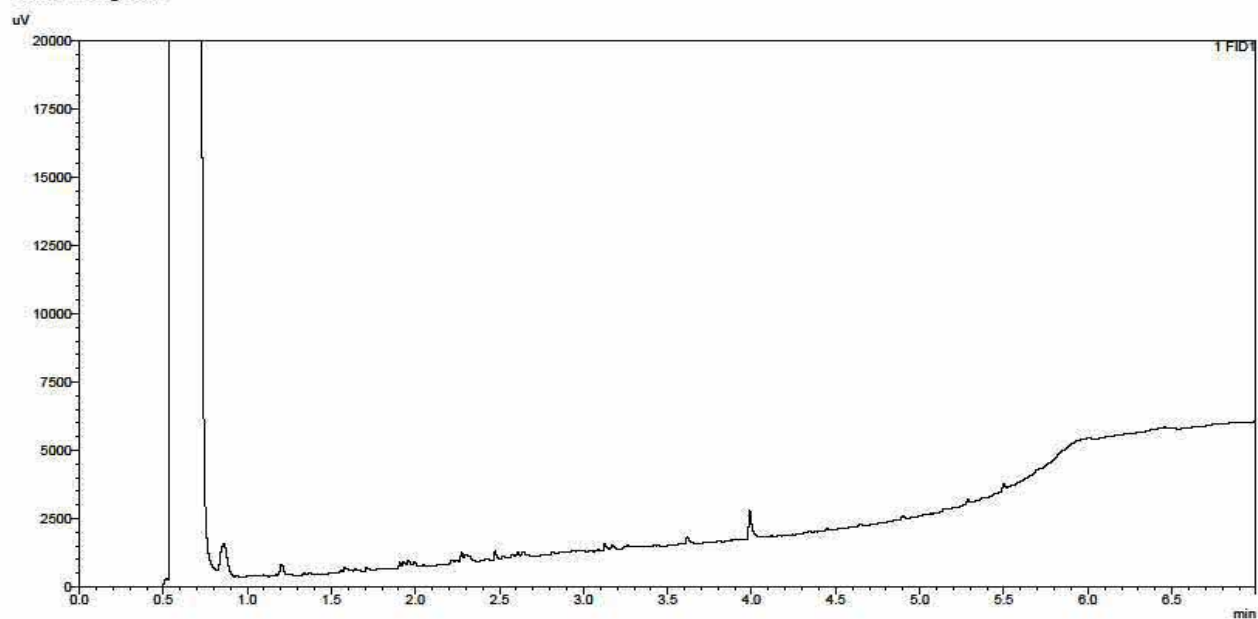
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Sample Name : 1051528 20-22074
Data Filename : 21 August 2020_21082020_1051528 20-22074_079.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 40
Date Acquired : 21/08/2020 21:50:31
Date Processed : 21/08/2020



Chemtest

<Chromatogram>



TPH Chromatogram on Soil Sample: 1051529

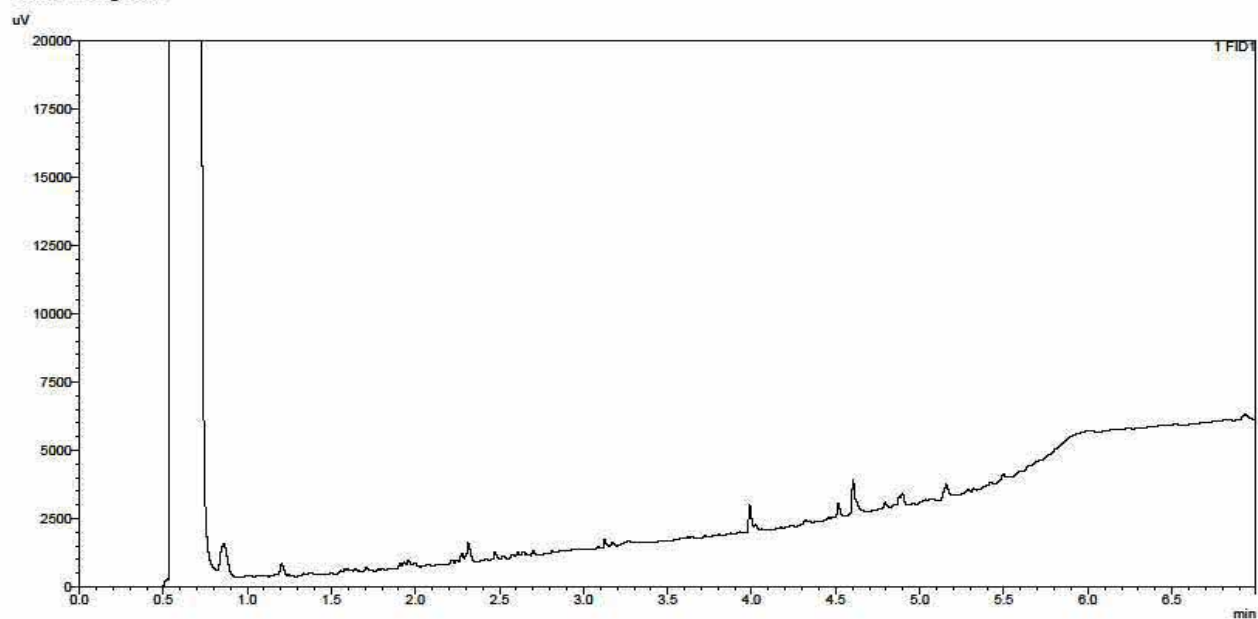
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Sample Name : 1051529 20-22074
Data Filename : 21 August 2020_21082020_1051529 20-22074_081.god
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 41
Date Acquired : 21/08/2020 22:03:20
Date Processed : 21/08/2020



Chemtest

<Chromatogram>



TPH Chromatogram on Soil Sample: 1051530

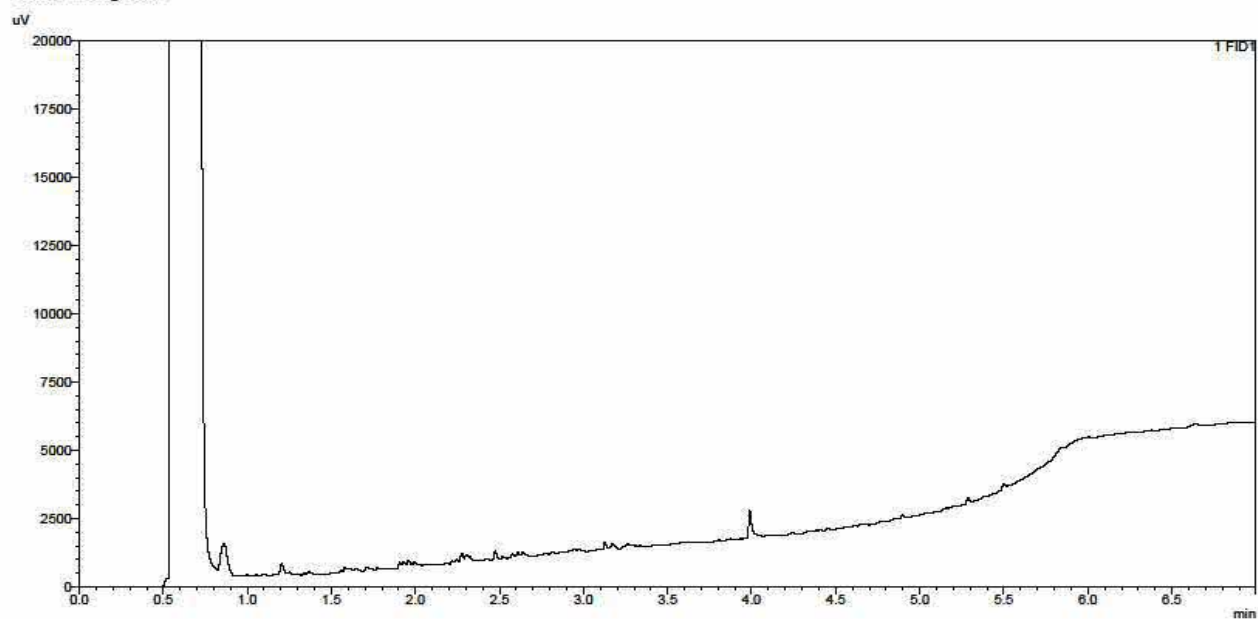
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Sample Name : 1051530 20-22074
Data Filename : 21 August 2020_21082020_1051530 20-22074_083.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 42
Date Acquired : 21/08/2020 22:16:06
Date Processed : 21/08/2020



Chemtest

<Chromatogram>



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
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
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 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	Aliphatic: >C5±C6, >C6±C8, >C8±C10, >C10±C12, >C12±C16, >C16±C21, >C21±C35, >C35±C44 Aromatic: >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 Trimethylphenols Note: 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"

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 45 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



Final Report

Report No.:	20-22121-1		
Initial Date of Issue:	28-Aug-2020		
Client	Remada Ltd		
Client Address:	Forward House 17 High Street Henley in Arden B95 5AA		
Contact(s):	Greg Jones		
Project	770.02 Havant		
Quotation No.:		Date Received:	20-Aug-2020
Order No.:		Date Instructed:	20-Aug-2020
No. of Samples:	3		
Turnaround (Wkdays):	7	Results Due:	28-Aug-2020
Date Approved:	28-Aug-2020		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - 2 Stage WAC

Project: 770.02 Havant

Chemtest Job No: 20-22121							Landfill Waste Acceptance Criteria			
Chemtest Sample ID: 1051757							Limits			
Sample Ref:							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill	
Sample ID:										
Sample Location: CP38										
Top Depth(m): 1.50										
Bottom Depth(m): 2.00										
Sampling Date: 17-Aug-2020										
Determinand	SOP	Accred.	Units							
Total Organic Carbon	2625	M	%				4.9	3	5	6
Loss On Ignition	2610	M	%				3.9	--	--	10
Total BTEX	2760	M	mg/kg				< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg				< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg				< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg				< 2.0	100	--	--
pH	2010	M					8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.040	--	To evaluate	To evaluate			
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg			
Arsenic	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	2	25	
Barium	1450	U	0.0086	0.0045	< 0.50	< 0.50	20	100	300	
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5	
Chromium	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	70	
Copper	1450	U	0.0032	0.0021	< 0.050	< 0.050	2	50	100	
Mercury	1450	U	0.0011	0.00083	0.0022	0.0085	0.01	0.2	2	
Molybdenum	1450	U	0.0011	0.0023	< 0.050	< 0.050	0.5	10	30	
Nickel	1450	U	0.0012	0.0011	< 0.050	< 0.050	0.4	10	40	
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50	
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5	
Selenium	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.1	0.5	7	
Zinc	1450	U	0.0044	0.0018	< 0.50	< 0.50	4	50	200	
Chloride	1220	U	7.7	5.5	15	56	800	15000	25000	
Fluoride	1220	U	0.70	0.75	1.4	7.5	10	150	500	
Sulphate	1220	U	24	6.2	47	73	1000	20000	50000	
Total Dissolved Solids	1020	N	200	91	400	980	4000	60000	100000	
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-	
Dissolved Organic Carbon	1610	U	9.7	4.2	< 50	< 50	500	800	1000	

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	14

Leachate Test Information	
Leachant volume 1st extract/l	0.322
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.112

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 770.02 Havant

Chemtest Job No: 20-22121							Landfill Waste Acceptance Criteria			
Chemtest Sample ID: 1051758							Limits			
Sample Ref:							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill	
Sample ID:										
Sample Location: CP2										
Top Depth(m): 0.50										
Bottom Depth(m): 0.70										
Sampling Date: 18-Aug-2020										
Determinand	SOP	Accred.	Units							
Total Organic Carbon	2625	M	%				3.0	3	5	6
Loss On Ignition	2610	M	%				4.7	--	--	10
Total BTEX	2760	M	mg/kg				< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg				< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg				< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg				< 2.0	100	--	--
pH	2010	M					8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.011	--	To evaluate	To evaluate			
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg			
Arsenic	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	2	25	
Barium	1450	U	0.0038	0.0017	< 0.50	< 0.50	20	100	300	
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5	
Chromium	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	70	
Copper	1450	U	0.0051	0.0018	< 0.050	< 0.050	2	50	100	
Mercury	1450	U	0.00060	< 0.00050	0.0012	< 0.0050	0.01	0.2	2	
Molybdenum	1450	U	0.0033	0.0027	< 0.050	< 0.050	0.5	10	30	
Nickel	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.4	10	40	
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50	
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5	
Selenium	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.1	0.5	7	
Zinc	1450	U	0.0082	0.0015	< 0.50	< 0.50	4	50	200	
Chloride	1220	U	4.7	1.0	< 10	12	800	15000	25000	
Fluoride	1220	U	1.3	1.1	2.6	11	10	150	500	
Sulphate	1220	U	6.9	< 1.0	14	< 10	1000	20000	50000	
Total Dissolved Solids	1020	N	140	78	280	820	4000	60000	100000	
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-	
Dissolved Organic Carbon	1610	U	14	5.0	< 50	55	500	800	1000	

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	10

Leachate Test Information	
Leachant volume 1st extract/l	0.330
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.114

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - 2 Stage WAC

Project: 770.02 Havant

Chemtest Job No: 20-22121							Landfill Waste Acceptance Criteria			
Chemtest Sample ID: 1051759							Limits			
Sample Ref:							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill	
Sample ID:										
Sample Location: CP1										
Top Depth(m): 0.50										
Bottom Depth(m): 0.70										
Sampling Date: 18-Aug-2020										
Determinand	SOP	Accred.	Units							
Total Organic Carbon	2625	M	%				5.2	3	5	6
Loss On Ignition	2610	M	%				4.4	--	--	10
Total BTEX	2760	M	mg/kg				< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg				< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg				< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg				< 2.0	100	--	--
pH	2010	M					8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.022	--	To evaluate	To evaluate			
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg			
Arsenic	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	2	25	
Barium	1450	U	0.0034	0.0014	< 0.50	< 0.50	20	100	300	
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5	
Chromium	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	10	70	
Copper	1450	U	0.0042	0.0013	< 0.050	< 0.050	2	50	100	
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2	
Molybdenum	1450	U	0.0031	0.0026	< 0.050	< 0.050	0.5	10	30	
Nickel	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.4	10	40	
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50	
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5	
Selenium	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.1	0.5	7	
Zinc	1450	U	0.0021	< 0.0010	< 0.50	< 0.50	4	50	200	
Chloride	1220	U	3.8	1.2	< 10	14	800	15000	25000	
Fluoride	1220	U	1.3	1.2	2.6	12	10	150	500	
Sulphate	1220	U	25	< 1.0	50	17	1000	20000	50000	
Total Dissolved Solids	1020	N	140	78	290	820	4000	60000	100000	
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-	
Dissolved Organic Carbon	1610	U	14	5.9	< 50	64	500	800	1000	

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	9.0

Leachate Test Information	
Leachant volume 1st extract/l	0.333
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.119

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using μ ATXakeP 600 $\parallel$ DiVcUeWe AQ
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
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
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6 $\pm$ C40); RSV $\overline{R}$ QaO caUbRQ baQdiQg, e.g. 3-baQd $\pm$ GRO, DRO & LRO*TPH C8 $\pm$ C40	Dichloromethane extraction / GC-FID
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; Dibenz[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.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

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N	Unaccredited
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N/E	not evaluated
<	"less than"
>	"greater than"

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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

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Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
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- 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 45 days from the date of receipt

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

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customerservices@chemtest.com



APPENDIX E

Laboratory Geotechnical Tests



Laboratory Report



Contract Number: 49960

Client Ref: **770.02**

Report Date: **30-09-2020**

Client PO:

Client **Remada Limited**

**Forward house, 17 high street, Henley in Arden
B95 5AA**

Contract Title: **Havant, Purbrook Way**
For the attention of: **Greg Jones**

Date Received: **26-08-2020**

Date Completed: **30-09-2020**

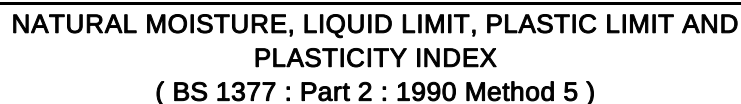
Test Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	9
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	9
BRE Reduced Suite includes pH, water & acid soluble sulphate and total sulphur BRE - BR279 - @ Non Accredited Test	2
Quick Undrained Triaxial Compression test - set of 3 - 38mm diameter specimens BS 1377:1990 - Part 7 : 8 - * UKAS	3
Disposal of samples for job	1

Notes: Observations and Interpretations are outside the UKAS Accreditation
* - denotes test included in laboratory scope of accreditation
- denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories:

Emma Sharp (Office Manager/Director) - Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager)
Sean Penn (Administrative/Accounts Assistant) - Shaun Jones (Laboratory manager) - Wayne Honey (Administrative/Quality Assistant)



Contract Number

49960

Site Name

Havant, Purbrook Way

Date Tested

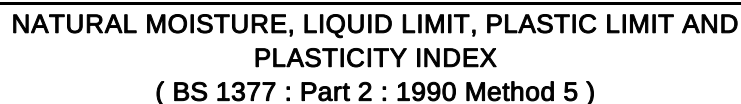
24/09/2020

DESCRIPTIONS

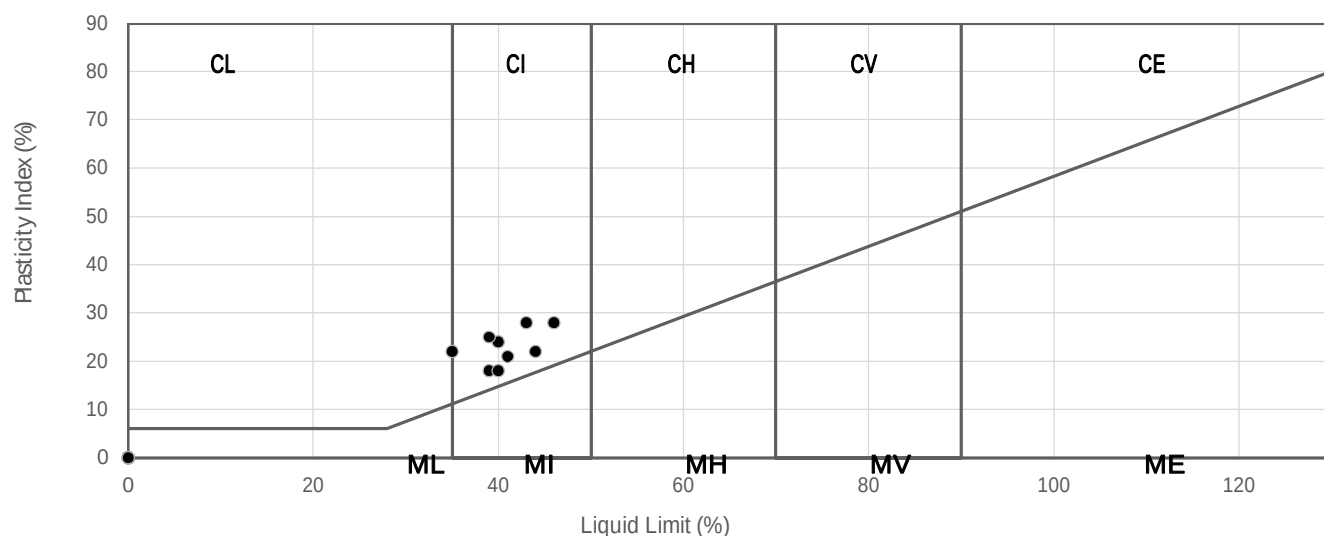
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Operators	Checked	30/09/2020	Wayne Honey (Administrative/Quality Assistant)
** Please Select Operator **	Approved	30/09/2020	Paul Evans (Quality/Technical Manager)



[illegible]

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





**Undrained Shear Strength in Triaxial Compression
BS1377 : Part 7 : Clause 8 : 1991 Set of Three 38 mm
without the measurement of Pore Pressure**

Contract Number 49960

Borehole/Pit No. CP1

Site Name Havant, Purbrook Way

Sample No.

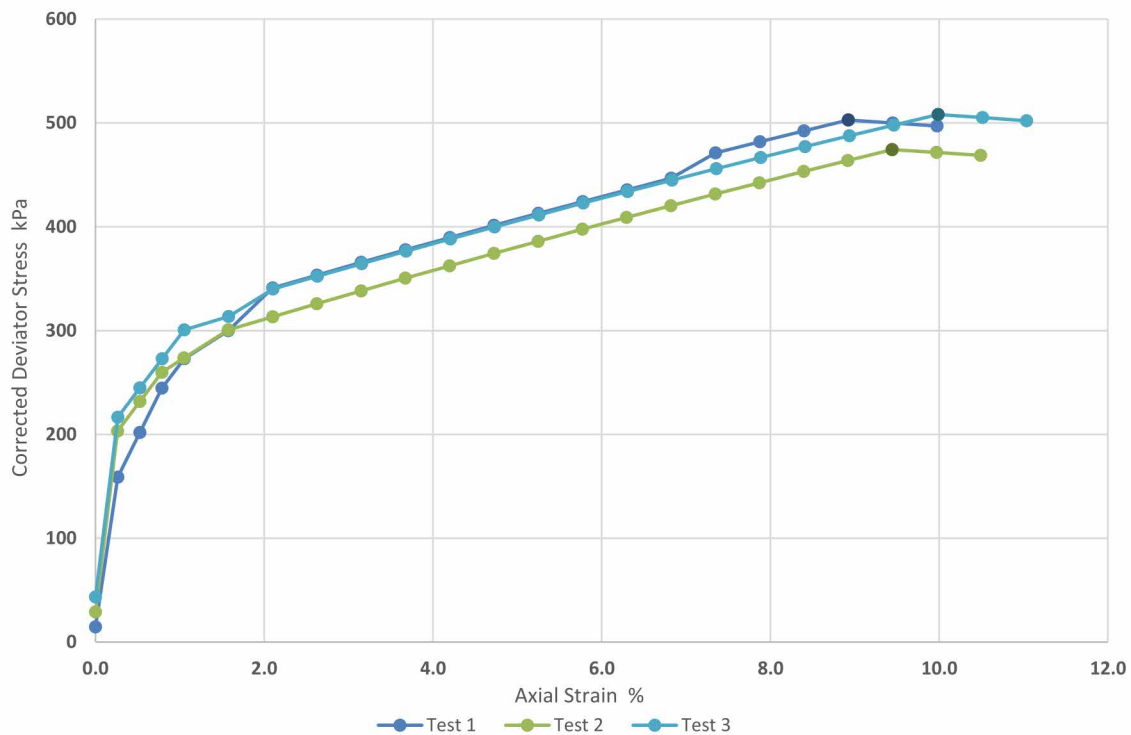
Soil Description Brown silty CLAY

Depth Top 4.00

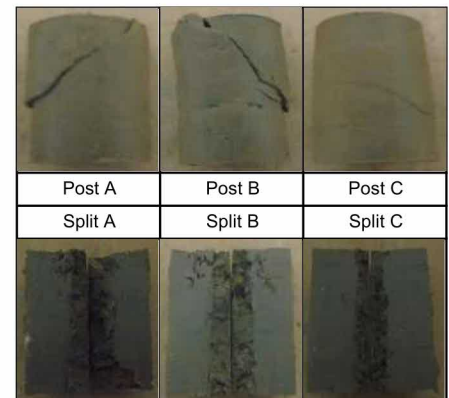
Depth Base 4.50

Date Tested 25/09/2020

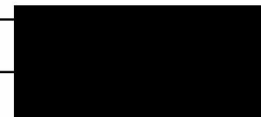
Sample Type UT



	Specimen 1	Specimen 2	Specimen 3
Moisture Content (%)	24	24	24
Bulk Density (Mg/m ³)	2.05	1.97	1.96
Dry Density (Mg/m ³)	1.65	1.59	1.58
Specimen Length (mm)	76	76	76
Specimen Diameter (mm)	38	38	38
Cell Pressures (kPa)	50	100	200
Deviator Stress (kPa)	503	474	508
Undrained Shear Strength (kPa)	251	237	254
Failure Strain (%)	8.9	9.4	10.0
Mode Of Failure	Brittle	Brittle	Brittle
Membrane Used/Thickness	Rubber/0.3mm	Rubber/0.3mm	Rubber/0.3mm
Rate of Strain (%/min)	1.97	1.97	1.97



Checked	29/09/2020	Emma Sharp
Approved	30/09/2020	Paul Evans





**Undrained Shear Strength in Triaxial Compression
BS1377 : Part 7 : Clause 8 : 1991 Set of Three 38 mm
without the measurement of Pore Pressure**

Contract Number 49960

Borehole/Pit No. CP1

Site Name Havant, Purbrook Way

Sample No.

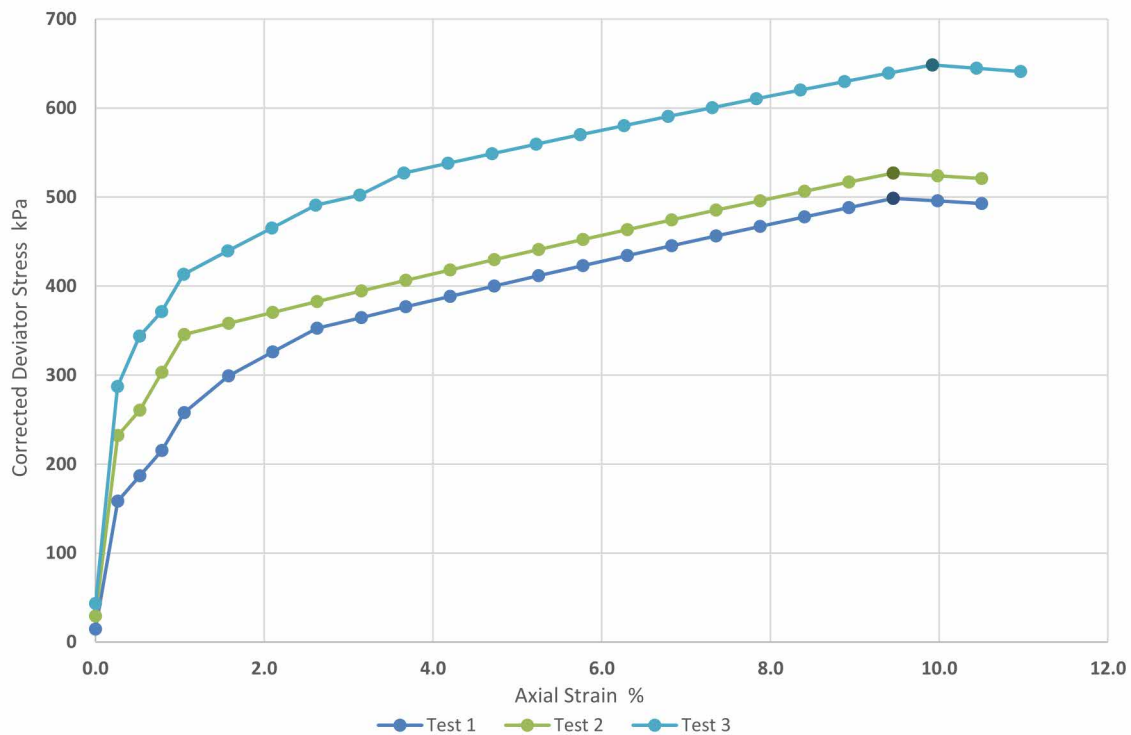
Soil Description Brown silty CLAY

Depth Top 7.00

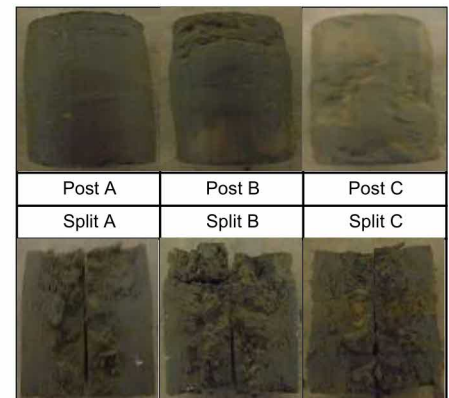
Depth Base 7.50

Date Tested 25/09/2020

Sample Type UT



	Specimen 1	Specimen 2	Specimen 3
Moisture Content (%)	21	21	21
Bulk Density (Mg/m ³)	2.01	1.91	1.86
Dry Density (Mg/m ³)	1.66	1.58	1.53
Specimen Length (mm)	76	76	77
Specimen Diameter (mm)	38	38	38
Cell Pressures (kPa)	100	200	400
Deviator Stress (kPa)	499	527	648
Undrained Shear Strength (kPa)	249	263	324
Failure Strain (%)	9.5	9.5	9.9
Mode Of Failure	Plastic	Plastic	Plastic
Membrane Used/Thickness	Rubber/0.3mm	Rubber/0.3mm	Rubber/0.3mm
Rate of Strain (%/min)	1.97	1.97	1.96



Checked	29/09/2020	Emma Sharp
Approved	30/09/2020	Paul Evans





**Undrained Shear Strength in Triaxial Compression
BS1377 : Part 7 : Clause 8 : 1991 Set of Three 38 mm
without the measurement of Pore Pressure**

Contract Number 49960

Borehole/Pit No. CP2

Site Name Havant, Purbrook Way

Sample No.

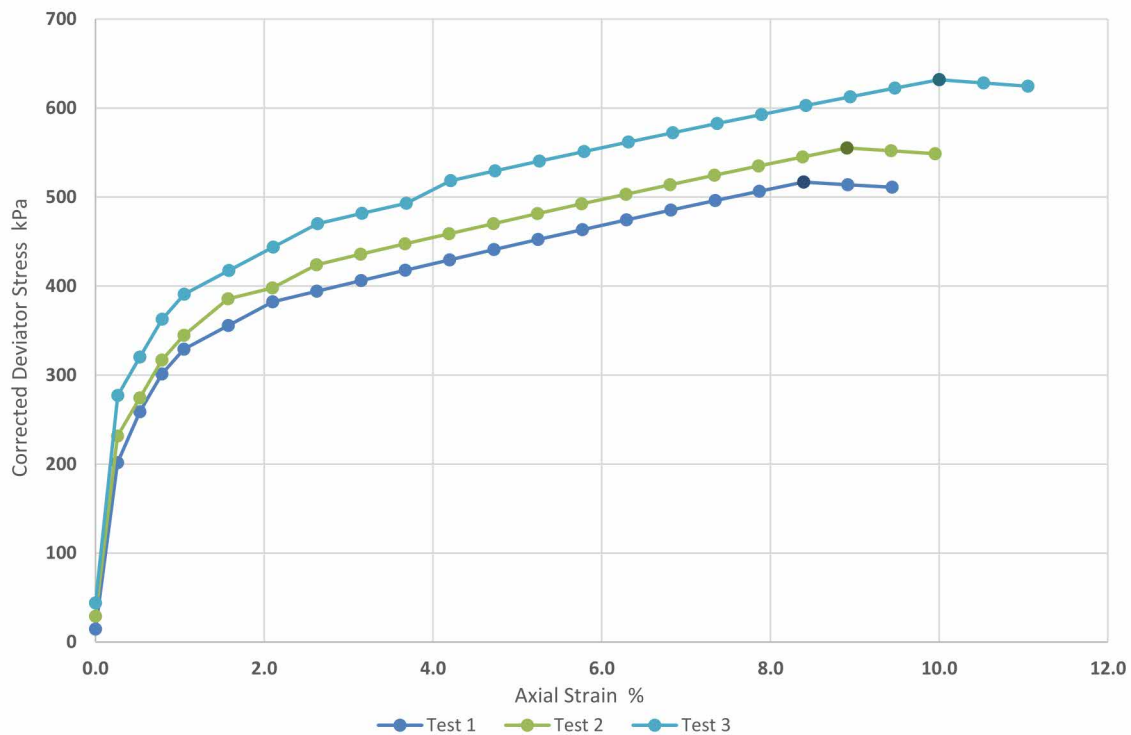
Soil Description Brown silty CLAY

Depth Top 2.20

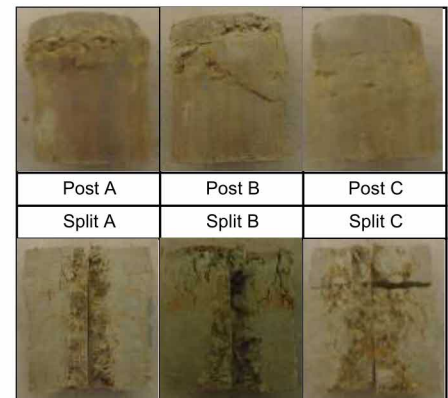
Depth Base 2.60

Date Tested 25/09/2020

Sample Type UT



	Specimen 1	Specimen 2	Specimen 3
Moisture Content (%)	19	19	19
Bulk Density (Mg/m ³)	1.95	1.89	1.90
Dry Density (Mg/m ³)	1.63	1.58	1.59
Specimen Length (mm)	76	76	76
Specimen Diameter (mm)	38	38	38
Cell Pressures (kPa)	50	100	200
Deviator Stress (kPa)	517	555	632
Undrained Shear Strength (kPa)	258	278	316
Failure Strain (%)	8.4	8.9	10
Mode Of Failure	Plastic	Plastic	Plastic
Membrane Used/Thickness	Rubber/0.3mm	Rubber/0.3mm	Rubber/0.3mm
Rate of Strain (%/min)	1.97	1.96	1.97



Checked	29/09/2020	Emma Sharp	
Approved	30/09/2020	Paul Evans	



