PHASE 2
GROUND INVESTIGATION

Lidl Great Britain Ltd

Childwall Road, Wavertree

Client: Lidl Great Britain Ltd

Remada Ltd
www.remada.co.uk

714.02.01
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Executive Summary

Remada Ltd was commissioned by Lidl Great Britain Ltd to conduct a Phase 2 Ground Investigation for a proposed store on the site of an existing Coop retail store at Childwall Road, Wavertree, Liverpool, L15 6TE, at the location indicated in ***Figure 1****. This report follows a Phase 1 Preliminary Risk Assessment (Remada report reference 714.01.01 issued in December 2019).*

Summary of Phase 1 Desk Study

Historically, the site was developed as a Sports Ground with a pavilion building constructed in the north-eastern area between 1909 and 1927. Redevelopment of the site occurred during the late-1930s, with the Abbey Cinema being opened in March 1939. At the start of 1964, the cinema was converted into a Cinerama theatre, which continued until its final performance in August 1979. After closure, the stall area (ground floor level) was converted into a supermarket, with the upper levels being historically used as a bingo club and snooker club. At the time of Remada's investigation, a Coop retail store occupied the ground floor level of the building, but this ceased trading in mid-April 2020.

Geological mapping indicates that the site is directly underlain by Chester Formation sandstone bedrock, a designated Principal Aquifer.

Intrusive Investigation

The investigation comprised the drilling of eight (5 No) window sample holes (WS1 – WS5) at locations indicated on ***Figure 2*** *on 2nd April 2020. The Coop retail store on-site was still active at the time of Remada's intrusive investigation, restricting access to just the existing store's car park area to minimise disruption.*

Across the Coop store car park area, made ground was found to extend to depths of between 0.27m and 0.8m bgl, resting directly upon weathered sandstone bedrock. SPT refusals (N value> 50) were recorded within this latter stratum at depths of between 0.6m and 0.9m bgl. The corresponding corrected N60 values for the full 300mm penetration ranged between 813 (WS2) and 3250 (WS1, WS3 and WS4).

It should be noted that deeper made ground deposits are anticipated underlying the existing four-storey building on-site. The position of the historic pavilion building in the north-eastern area of the site was also inaccessible at the time of Remada's investigation.

Human Health Assessment

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

Water Resources Assessment

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

Waste Classification

In general, the results of the chemical analysis indicate that the material would be classified as non-hazardous waste. While Waste Acceptance Criteria (WAC) analysis has not been undertaken, the assessment has included determination of the fraction of organic carbon (FOC) which can be converted to TOC by multiplying the result by 100. A TOC limit of 3% is placed on waste destined for disposal in an inert landfill. All chemical analyses

produced a TOC values of less than 3%. WAC testing is not required for disposal of non-hazardous waste to landfill.

Two samples of bituminous surfacing were analysed for concentrations of PAH compounds. The results indicated that while the concentrations of PAHs were below the method detection limit of 2.0mg/kg, which is also below the 50mg/kg limit defined in WM3. Therefore, the bituminous surfacing represented by this sample would be classified as non-hazardous waste and assigned the List of Wastes code 17 03 02 for bituminous mixtures other than those mentioned in 17 03 01.

Geotechnical Assessment

Either pad foundation or stiffened raft down stands bearing directly on the sandstone of N > 50 and encountered at less than one metre depth is considered a suitable foundation solution. Removal and recompaction of the existing shallow made ground as observed outside the existing footprint may provide a suitable formation for a ground bearing floor slab if correctly engineered. In the event that deeper made ground is encountered following demolition of the existing building, proposed foundations should be deepened as necessary to bear on the underlying sandstone.

Finished floor levels are not known at the time of writing this report and it is assumed that these will be close to existing levels. It is important that any voids resulting from the removal of existing foundations are compacted to an appropriate engineering standard prior to the construction of the raft foundation or ground bearing floor slab.

It is recommended that further intrusive investigation is undertaken within the footprint of the Coop retail building post-demolition, in order to ascertain the composition and depth of potential made ground within this area.

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

Soakaway testing was outside the scope of this investigation, although the weathered sandstone bedrock has been identified as potentially facilitating soakaway drainage. If the use of soakaways is considered, Remada recommends that infiltration testing is undertaken in accordance with BRE365.

Ground Gas

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

TABLES

FIGURES

EXPLORATORY LOGS

APPENDICES

Issue No /	*Date*	*Prepared By*	*Technical Review*	*Authorised*
01	*06.05.2020*	*P Dickinson*	*G Jones*	*G Jones*

1 INTRODUCTION

Remada Ltd was commissioned by Lidl Great Britain Ltd ('the client') to undertake a Phase 2 Ground Investigation for a proposed store on the site of an existing Coop retail store at Childwall Road, Wavertree, Liverpool, L15 6TE, at the location indicated in **Figure 1.**

1.1 Objectives

The objectives of this assessment are as follows:

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

1.2 Scope of Work

The scope 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.

The scope of work comprised:

- Five (5 No.) window sample boreholes externally to target depths of 6m including SPTs;
- Suite of geotechnical classification and strength tests;
- Five (5 No.) soil sample suites for chemical analysis of CLEA metals, asbestos, speciated hydrocarbons, cyanide and phenols;
- 2 No. samples of the existing bituminous or tarmacadam surfacing to be tested for PAH(17);
- 4 No ground gas and groundwater monitoring visits to satisfy planning requirements; and
- Combined Factual & Interpretative Geoenvironmental Report.

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 714.01.01 issued in December 2019.

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 topographically flat and currently occupies an irregular plot to the south of B5178 Childwall Road and east of Church Road North. The majority of the site is occupied by a four-storey building of brick construction, of which the ground floor appears to be in use as a Coop retail store. The remainder of the site area forms the store car park.

The site boundary to the north and west is marked by low (<1.0 metre) brick walls and raised soft landscaping beds. The eastern and southern boundaries appear to be formed by brick walls separating the site from adjacent residential properties.

Site History

The earliest available mapping of 1851 records the site to be undeveloped. Between 1909 and 1927, the site was developed as a Sports Ground with a pavilion building constructed in the north-eastern area of the site. By 1953, the Abbey Cinema complex had been constructed on-site and the building was subsequently during the 1980s to accommodate the current Coop retail store. A snooker club is believed to occupy one floor of the current building.

Geological Mapping

Published geological maps record that the site is directly underlain by Chester Formation, a Principal Aquifer.

Environmental Risk Assessment

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 site;*
- *Collection of soil and groundwater samples from the areas identified above for contaminants of concern; and*
- *Ground gas monitoring.*

Geotechnical Assessment

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
<u>On-site Sources</u> **Historic Sports Ground & Pavilion** **Historic Cinema complex** **Existing retail store and car parking** ***<u>Off-site Sources</u>*** **Residential housing** **Tramway** **Brewery** **Electrical Sub-Station** **Garage / Petrol Filling Station** **Transport Depot**	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, Va, Zn, Boron, TPH /PAH.	Disturbance due to construction plant causing direct contact, dusts, vapours. Direct Contact with occupants of the proposed development Inhalation of fibres / vapours / gases by occupants of proposed development Permeation of water supply pipework	Occupants of the development / building fabric Adjacent residents during construction	• Direct Soil Ingestion	• Yes	To be assessed (TBA)	Potential risk	(To be assessed (TBA)	(To be assessed (TBA)
				• Indoor Dust ingestion	• 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
				• Inhalation of Outdoor Dust	• Yes	As above	Potential risk	TBA	TBA
				• Inhalation of Outdoor Vapours	• Yes	As above	Potential risk	TBA	TBA
				• Inhalation of Indoor Vapours	• Yes	As above	Potential risk	TBA	TBA
				• Inhalation of ground gas	• Yes	As above	Potential risk	TBA	TBA
				• Inhalation of radon gas	• No	N/A	Negligible	Negligible	Negligible
				• Ingestion via permeated water supply pipework	• Yes	As above	Potential risk	TBA	TBA
		Leachate	Principal Aquifer	• In-direct contact with Principal Aquifer in bedrock	• Yes	As above	Potential risk	TBA	TBA

Table 1: Outline Conceptual Site Model

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

3 SITE WALKOVER

The opportunity was taken to inspect the proposed Lidl store site on 2nd April 2020 by Peter Dickinson of Remada Ltd prior to the commencement of the intrusive works, as recorded in the photographs below. There were no visual or olfactory indicators of contamination.

View towards the north-west from Church Road North, showing the western and southern elevations of the existing Coop building (former Abbey Cinema complex).

A view southward showing the Coop retail store entrance on the north-western corner of the building. The building itself appears to accommodate four storeys.

The northern façade of the existing Coop retail building, viewed from the B5178 Childwall Road

Details of the paving slabs and raised bedding at the store entrance, with the car park beyond.

4 ENVIRONMENTAL & GEOTECHNICAL INVESTIGATION METHODOLOGY

4.1 Sampling Strategy & Methodology

4.1.1 Sampling Methodology

The Coop retail store on-site was still active at the time of Remada's intrusive investigation, restricting access to just the existing store's car park area to minimise disruption. A total of five (5 No.) window sample holes were planned to provide site coverage for preliminary geotechnical purposes and to target zones of potential soil and groundwater contamination. Four (4 No) ground gas monitoring visits were scheduled to provide the minimum required by C665.

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), BTEX, phenols, sulphates and chlorides. Separate soil samples were scheduled for geotechnical classification and strength testing as appropriate to recovered soils.

4.1.2 Investigation Methodology

The investigation comprised the drilling of five (5 No.) window sample holes (WS1 – WS5) at locations indicated on **Figure 2** on 2nd April 2020.

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.

4.2 Intrusive Investigation

All five of the window samples were advanced to a target depth of 6m below ground level (m bgl). However, as bedrock was encountered at relatively shallow depths all window samples holes were drilled to refusal which was between 0.6m and 0.9m bgl. Combined Groundwater and Ground Gas monitoring standpipes were installed in WS1, WS3 and WS5.

It had been proposed to undertake Standard Penetration Tests (SPTs) in the window samples at 1.0m intervals. However, due to the presence of shallow bedrock, SPTs were undertaken at the base of each borehole where further progress could not be achieved using a window sampling rig.

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

4.3 Soil Sampling

4.3.1 Environmental

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

4.3.2 Geotechnical

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

4.4 Gas and Groundwater Monitoring

4.4.1 Installations

Combined ground gas and groundwater monitoring standpipes were installed in three of the window sample boreholes. The standpipes consisted of high-density polyethylene (HDPE) pipe. A bentonite seal was made around the plain pipe and a clean gravel pack was placed around the slotted pipe. A summary of the installation construction is tabulated below:

Location and Depth	Internal Diameter Pipe	Response Zone (m bgl)	Targeted Strata
WS1 – 0.9m bgl	50mm HDPE	0.3 – 0.9	Made Ground & Natural Sand
WS3 – 0.6m bgl	50mm HDPE	0.3 – 0.6	Made Ground & Natural Sand
WS5 – 0.6m bgl	50mm HDPE	0.3 – 0.6	Natural Sand

Table 2: Monitoring Well Installation Details

4.4.2 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 ground gas monitoring visits have been undertaken on-site; these being carried out on 9th, 16th, 20th and 27th April 2020 at WS1, WS3 & WS5. The results are presented on **Table 3.**

4.5 Quality Assurance and Quality Control

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

4.6 Laboratory Testing

4.6.1 Soil Chemical Analysis

Five (5 No.) soil samples were scheduled for the analysis of asbestos, arsenic, barium, beryllium, cadmium, chromium (III & VI), copper, mercury, nickel, lead, selenium, zinc, fraction of organic carbon, Total Petroleum Hydrocarbons (TPHCWG), Polyaromatic Hydrocarbons (PAH), BTEX compounds (benzene, toluene, ethylbenzene and xylene) and phenols.

In addition, two samples of bituminous surfacing were analysed for PAH compounds.

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

4.6.2 Geotechnical

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

- Three (3 No.) Particle Size Distribution tests; and
- Three (3 No.) BRE SD1 suites.

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

5 GEOTECHNICAL & ENVIRONMENTAL INVESTIGATION FINDINGS

5.1 Ground Conditions

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

5.1.1 Published Geology

The geological mapping suggests that indicates that no made ground or superficial deposits have been recorded directly beneath the site. Made ground is not expected to be encountered according to the mapping; however, taking consideration of the site's historic use and satellite imagery it is likely that made ground will be encountered underlying the site.

The bedrock directly underlying the site is formed of Chester Formation sandstone of the Sherwood Sandstone Group. The British Geological Survey (BGS) describe the Chester Formation as typically comprising 'conglomerates and reddish brown, cross-bedded pebbly sandstones with subordinate beds of red-brown mudstone. The conglomerates have a reddish-brown sandy matrix and consist mainly of pebbles of brown or purple quartzite'.

The Chester Formation is classified as a Principal Aquifer. The site is not located within a Source Protection Zone.

5.1.2 Made Ground

Made Ground was encountered in all five window sample locations and was present to depths of between 0.27m (WS4) and 0.8m bgl (WS1). In four of these locations (WS1 – WS4), the made ground comprised bituminous surfacing underlying by a thin veneer of gravelly sand with localised brick and coal fragments. The bituminous surfacing was between 0.09m and 0.15m thick in all four locations.

In WS5, located within the south-western area of the site, the entire 0.3m thickness of the made ground was comprised of concrete surfacing.

5.1.3 Natural Deposits

Dense becoming very dense, reddish-brown, medium-grained sand was encountered underlying the made ground within all five window sample boreholes. Sandstone lithorelicts were noted within the recovered soils. Consequently, this stratum is considered to be representative of weathered Chester Formation sandstone bedrock.

5.2 In-situ Testing

5.2.1 Standard Penetration Tests (SPTs)

In-situ SPTs were undertaken to assist with the interpretation of strata encountered. Within all five exploratory holes, SPT refusals (uncorrected N-value>50) were recorded within the natural sand at depths of between 0.6m and 0.9m bgl.

5.2.2 Hand Shear Vanes

No cohesive soils were encountered during this intrusive investigation.

5.3 Soil Observations

Made Ground was recovered in four of the window sample boreholes (all except WS5) as a heterogeneous granular material containing brick fragments, along with gravels of sandstone, quartz and coal fragments.

There were no visible indicators of contamination including asbestos within the sampled soils.

5.4 Groundwater Observations

No groundwater was encountered within any of the exploratory holes during this intrusive investigation.

5.5 Chemical Analysis

Results of the soil chemical analysis are presented in **Table 4** at the end of the report and full laboratory certificates are presented in **Appendix A**. Results of the chemical analyses are summarised as follows.

The average FOC and pH were 0.0117 and 8.7 respectively. Asbestos was not detected in the samples analysed. Detectable concentrations of metals were identified, although these are generally within the range that would typically be expected for made ground. Concentrations of TPH were detected above method detection limit (MDL) in two of the samples analysed (from WS2 and WS4). The hydrocarbons were generally heavy end hydrocarbons within the range C21 to C35 carbon range.

Concentrations of PAHs were detected above method detection limit (MDL) in two of the made ground samples analysed (also from WS2 and WS4), with a maximum concentration (excluding the bituminous surfacing samples) of 150 mg/kg was encountered in WS2 at 0.3 – 0.4m.

The concentrations of PAHs within the two bituminous samples tested from the site indicates that coal tar is unlikely to be present within this surfacing (WS), as summarised in the table below:

Location	Depths (m bgl)	Benzo(a)pyrene (mg/kg)	Coronene (mg/kg)	Total of 17 PAHs (mg/kg)
WS1	0.0 – 0.02	<0.10	<0.10	<2.0
WS3	0.0 – 0.02	<0.10	<0.10	<2.0

Table 5: Asphalt PAH Analysis

5.6 Geotechnical Testing

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

Laboratory test results produced:

The PSD tests revealed the following:

- The made ground deposits in WS1 between 0.12m and 0.80m bgl comprised brown silty gravelly SAND;
- The made ground deposits in WS3 between 0.15m and 0.57m bgl comprised brown slightly silty sandy GRAVEL; and
- The natural deposits in WS5 between 0.3m and 0.6m bgl comprised brown slightly silty gravelly SAND.

The water-soluble sulphate contents were <0.01g/l in all three soil samples analysed, with pH varying from 8.3 to 8.6. The total sulphur content varied from <0.01% to 0.016% and acid soluble sulphate varied from <0.01 to 0.024%.

5.7 Ground Gas Monitoring Results

Ground gas monitoring was undertaken on 9th, 16th, 20th and 27th April 2020 at WS1, WS3 & WS5. Results are presented in **Table 3** and summarised below:

- Methane concentrations were recorded within all three standpipes over the course of the monitoring programme, with a maximum of 0.2% v/v being recorded;
- Carbon dioxide concentrations were recorded at a maximum concentration of 2.6%v/v in WS1 on 27th April 2020;
- Oxygen concentrations were recorded at a minimum concentration of 17.7% v/v in WS1 on 27th April 2020;
- Positive ground gas flow rates were recorded at a maximum of 0.2 litres per hour (l/hr) within both WS1 and WS5 over the course of the monitoring programme;
- Groundwater was encountered within the monitoring wells during the last visit (27th April 2020) only. In WS1 and WS5, the groundwater was recorded at 0.65m and 0.3m bgl respectively. In WS3, the headworks and entire monitoring well were flooded, prohibiting analysis of the ground gas within the standpipe during this visit.
- Atmospheric pressure at the time of sampling varied between a high of 1025 millibar (mbar) on 9th April 2020 and a low of 993 mbar on 27th April 2020.

6 GENERIC QUANTITATIVE RISK ASSESSMENT

6.1 Human Health Risk Assessment

In order to provide an up to date assessment of the risks to human health, Remada has adopted the most recent Generic Assessment Criteria (GAC) published by LQM/CIEH (S4ULs) and CL:AIRE/EIC/AGS for the assessment of potential risks5to human health. The derivation of GAC, methodology, input parameters and technical guidance (CLEA) be downloaded from https://remada.sharepoint.com/:b:/g/ESlWX7s4iOhOubgCGxJJF7cB70ehj0L4cGkxKzJKwr3DpQ?e=OdHlXE.

Default parameters have been adopted for sandy loam of pH 7 and commercial land use. FOC ranged from <0.0010 to 0.015, giving a Soil Organic Matter (SOM) content range of between <0.17 and 2.59% with an average result of 1.28%. In order to present a conservative assessment, the SOM content of 1% has been adopted for the assessment.

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

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

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

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

6.2 Comparison of Soil Analysis Results with Human Health GAC

A comparison of soil chemical analysis with GAC is presented as **Table 4** and is summarised below.

TPH, PAH & BTEX

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

Metals & Inorganics Excluding Asbestos

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

Asbestos

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

6.3 Controlled Waters Risk Assessment

The site is not located within a designated Groundwater Source Protection Zone. The nearest groundwater abstraction licence is located over 1km to the south-east, with the abstracted water being used for a potable water supply. No groundwater was encountered during the intrusive works on-site. Remada's investigation

has revealed that the site is underlain directly by Chester Formation bedrock, classified as a Principal Aquifer.

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

6.4 Ground Gas Assessment

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

GSV = Gas Concentration (% v/v) x 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 carbon dioxide/methane concentration recorded in the boreholes which is multiplied by the maximum flow rate recorded during the same monitoring event.

- Methane GSV = 0.2 % x 0.2 l/hr = 0.0004 l/hr
- Carbon Dioxide GSV = 2.6 % x 0.2 l/hr = 0.0052 l/hr

The calculated GSV for methane and carbon dioxide places the site into Characteristic Situation 1. BS8485 states that for Characteristic Situation 1 the methane concentration would typically be less than 1% and carbon dioxide less than 5% and that if concentrations are above these limits then consideration should be given to placing the site into Characteristic Situation 2. As the concentrations of methane and carbon dioxide were both within these typical limits it is considered that the Characteristic Situation 1 classification is appropriate for the site. Therefore, gas protection measures are not deemed necessary for the proposed development.

6.5 Revised Conceptual Site Model

A revised Conceptual Site Model is presented as **Table 6** below.

6.6 Waste Classification

In general, the results of the chemical analysis indicate that the material would be classified as non-hazardous waste. While Waste Acceptance Criteria (WAC) analysis has not been undertaken, the assessment has included determination of the fraction of organic carbon (foc) which can be converted to TOC by multiplying the result by 100. A TOC limit of 3% is placed on waste destined for disposal in an inert landfill. All chemical analyses produced a TOC values of less than 3%.

Two samples of bituminous surfacing were analysed for concentrations of PAH compounds. The purpose of this analysis was to determine if the sample contained coal tar as this would result in a hazardous waste classification. The Environment Agency Technical Guidance document WM3 states that *"where the*

concentration of benzo(a)pyrene is at or above 50ppm (mg/kg) in the black top alone (excluding other material) then the amount of coal tar should be considered to be sufficient (0.1% or more) for the material to be hazardous".

The results indicated that while the concentrations of PAHs were below the method detection limit of 2.0mg/kg, which is also below the 50mg/kg limit defined in WM3. Therefore, the bituminous surfacing represented by this sample would be classified as non-hazardous waste and assigned the List of Wastes code 17 03 02 for bituminous mixtures other than those mentioned in 17 03 01.

6.7 Health & Safety Considerations

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

Potential Source Areas	Potential Contaminant of Concern	Pathways	Potential Receptor	Exposure Route (Human unless otherwise stated)	Potential Identified Linkage (unmitigated)	Findings of Ground investigation	Risk (Un-mitigated)	Proposed Remediation (Mitigation) Measures	Residual Risk Estimation
<u>On-site Sources</u> **Historic Sports Ground & Pavilion** **Historic Cinema complex** **Existing retail store and car parking** ***<u>Off-site Sources</u>*** **Residential housing** **Tramway** **Brewery** **Electrical Sub-Station** **Garage / Petrol Filling Station** **Transport Depot**	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, Va, Zn, Boron, TPH /PAH.	Disturbance due to construction plant causing direct contact, dusts, vapours. Direct Contact with occupants of the proposed development Inhalation of fibres / vapours / gases by occupants of proposed development Permeation of water supply pipework	Occupants of the development / building fabric Adjacent residents during construction	• Direct Soil Ingestion	• Yes	<GAC	Negligible	None	Negligible
				• Indoor Dust ingestion	• Yes	<GAC	Negligible	None	Negligible
				• Skin Contact with Soils	• Yes	<GAC	Negligible	None	Negligible
				• Skin Contact with Dust	• Yes	<GAC	Negligible	None	Negligible
				• Inhalation of Outdoor Dust	• Yes	<GAC	Negligible	None	Negligible
				• Inhalation of Outdoor Vapours	• Yes	<GAC	Negligible	None	Negligible
				• Inhalation of Indoor Vapours	• Yes	<GAC	Negligible	None	Negligible
				• Inhalation of ground gas	• Yes	CS1	Negligible	None	Negligible
				• Inhalation of radon gas	• No	<GAC	Negligible	None	Negligible
				• Ingestion via permeated water supply pipework	• Yes	<GAC	Negligible	None	Negligible
		Leachate	Principal Aquifer	• In-direct contact with Principal Aquifer in bedrock	• Yes	<GAC	Negligible	None	Negligible

Table 4: Refined Conceptual Site Model

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

7 GEOTECHNICAL SITE ASSESSMENT

7.1 Geotechnical Considerations

An indicative site layout has not been made available to Remada at the time of writing. However, it is understood that the footprint of the proposed Lidl retail store will be located within the footprint of the existing Coop food store / historic Abbey Cinema complex.

Due to the operational nature of the Coop food store at the time of Remada's investigation, all five exploratory holes were located within the car park area, as indicated in **Figure 2**. Across the Coop store car park area, made ground was found to extend to depths of between 0.27m and 0.8m bgl, resting directly upon weathered sandstone bedrock. SPT refusals (N value> 50) were recorded within this latter stratum at depths of between 0.6m and 0.9m bgl. Due to the minimal presentation, the corrected N-values for full depth would be more than ten times greater.

It should be noted that deeper made ground deposits are anticipated underlying the existing four-storey building on-site. The position of the historic pavilion building in the north-eastern area of the site was also inaccessible at the time of Remada's investigation.

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

7.2 Foundations

Either pad foundation or stiffened raft down stands bearing directly on the sandstone of N > 50 and encountered at less than one metre depth is considered a suitable foundation solution. Removal and recompaction of the existing shallow made ground as observed outside the existing footprint may provide a suitable formation for a ground bearing floor slab if correctly engineered. In the event that deeper made ground is encountered following demolition of the existing building, proposed foundations should be deepened as necessary to bear on the underlying sandstone.

Finished floor levels are not known at the time of writing this report and it is assumed that these will be close to existing levels. It is important that any voids resulting from the removal of existing foundations are compacted to an appropriate engineering standard prior to the construction of the raft foundation or ground bearing floor slab.

It is recommended that further intrusive investigation is undertaken within the footprint of the Coop retail building post-demolition, in order to ascertain the composition and depth of potential made ground within this area.

7.3 Imported Material

Any imported material should comply with an earthworks specification to be prepared by the engineer and not contain concentrations of contaminants at greater than the Generic Assessment Criteria (GAC) presented in **Table 4.**

7.4 Excavations and Temporary Works

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

No groundwater was encountered during the intrusive works, which was undertaken during a period of prolonged dry weather. However, during the fourth monitoring visit in late-April 2020, groundwater was detected in all three monitoring wells with one of these being entirely flooded. Therefore, it is considered likely that perched groundwater may be encountered within the shallow made ground deposits within the existing car park area.

7.5 Existing Car Park Surfacing

Hardstanding was encountered at ground level in all five of the window sample boreholes. Bituminous surfacing in four of these locations ranged in thickness between 0.09m and 0.15m.

Lidl standard detail LD(14)-SP-04 Rev 1 provides separate details for 3-layer HGV access roads and 2-layer car park areas. The overall bituminous construction is significantly less than the 200mm required by Lidl for a HGV route, although it is at least the 90mm required for car parking only.

Due to the demolition of the existing building on-site and the associated reprofiling of the car parking on-site, the existing car park surfacing is likely to be removed as part of the site's redevelopment.

7.6 Protection of Buried Concrete

In accordance with BRE SD1 for buried concrete in a brownfield site with mobile groundwater, analyse of selected samples for water soluble sulphate returned values of up <0.01 g/l and pH >8.3. Therefore, a Design Sulphate Class DS-1 is considered appropriate for buried concrete and an ACEC Class of AC-1 is considered appropriate for the location.

7.7 Soakaway Tests

Whilst soakaway testing was outside the scope of this investigation, the presence of weathered sandstone directly underlying the site indicates that soakaway drainage may be suitable for the proposed development. If the use of soakaways is considered, Remada recommends that infiltration testing is undertaken in accordance with BRE365.

7.8 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.

8 CONCLUSIONS & RECOMENDATIONS

8.1 Conclusions

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

8.1.1 Phase 2 Site Investigation

Historically, the site was developed as a Sports Ground with a pavilion building constructed in the north-eastern area between 1909 and 1927. Redevelopment of the site occurred during the late-1930s, with the Abbey Cinema being opened in March 1939. At the start of 1964, the cinema was converted into a Cinerama theatre, which continued until its final performance in August 1979. After closure, the stall area (ground floor level) was converted into a supermarket, with the upper levels being historically used as a bingo club and snooker club. At the time of Remada's investigation, a Coop retail store occupied the ground floor level of the building, but this ceased trading in mid-April 2020.

A variable thickness of made ground was encountered beneath the site which varied from between 0.27m and 0.8m in thickness. The made ground was generally granular and contained fragments of brick up to cobble size.

Bedrock geology was found to comprise sandstone directly underlying the made ground. This had weathered to a dense becoming very dense, reddish-brown, medium-grained sand. The bedrock has been interpreted as the Chester Formation which is classified as a Principal Aquifer.

8.1.2 Human Health Risk Assessment

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

8.1.3 Water Resources Risk Assessment

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

8.1.4 Waste Classification

In general, the results of the chemical analysis indicate that the material would be classified as non-hazardous waste. While Waste Acceptance Criteria (WAC) analysis has not been undertaken, the assessment has included determination of the fraction of organic carbon (FOC) which can be converted to TOC by multiplying the result by 100. A TOC limit of 3% is placed on waste destined for disposal in an inert landfill. All chemical analyses produced a TOC values of less than 3%. WAC testing is not required for disposal of non-hazardous waste to landfill.

Two samples of bituminous surfacing were analysed for concentrations of PAH compounds. The results indicated that while the concentrations of PAHs were below the method detection limit of 2.0mg/kg, which is also below the 50mg/kg limit defined in WM3. Therefore, the bituminous surfacing represented by this sample would be classified as non-hazardous waste and assigned the List of Wastes code 17 03 02 for bituminous mixtures other than those mentioned in 17 03 01.

8.2 Recommendations

Either pad foundation or stiffened raft down stands bearing directly on the sandstone of N > 50 and encountered at less than one metre depth is considered a suitable foundation solution. Removal and recompaction of the existing shallow made ground as observed outside the existing footprint may provide a suitable formation for a ground bearing floor slab if correctly engineered. In the event that deeper made ground is encountered following demolition of the existing building, proposed foundations should be deepened as necessary to bear on the underlying sandstone.

Finished floor levels are not known at the time of writing this report and it is assumed that these will be close to existing levels. It is important that any voids resulting from the removal of existing foundations are compacted to an appropriate engineering standard prior to the construction of the raft foundation or ground bearing floor slab.

It is recommended that further intrusive investigation is undertaken within the footprint of the Coop retail building post-demolition, in order to ascertain the composition and depth of potential made ground within this area.

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

Soakaway testing was outside the scope of this investigation, although the weathered sandstone bedrock has been identified as potentially facilitating soakaway drainage. If the use of soakaways is considered, Remada recommends that infiltration testing is undertaken in accordance with BRE365.

8.3 Ground Gas

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

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The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015

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' 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' 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 4: Comparison of Soil Chemical Analyses with GAC

Laboratory ID	**Commercial GAC 1% SOM**	996035	996036	996038	996039
Sample ID		1	2	3	4
Borehole		WS1	WS2	WS4	WS4
Depth		0.2 - 0.3	0.3 - 0.4	0.5	0.1 - 0.2
Sample Date		29/01/2020	29/01/2020	29/01/2020	29/01/2020
Determinand	**[mg/kg unless stated]**				
ACM Type		-	-	-	-
Asbestos Identification		Not-detected	Not-detected	Not-detected	Not-detected
ACM Detection Stage		-	-	-	-
Moisture		**16**	**9.4**	**9.5**	**13**
pH		**8.3**	**9.1**	**8.6**	**8.9**
Arsenic	640	2.6	17	2.2	6.9
Beryllium	12	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	190	< 0.10	0.22	< 0.10	0.10
Copper	68000	5.2	20	2.1	8.6
Mercury	58^{vap} (25.8)	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	980	5.9	19	7.1	13
Lead	2300	6.3	21	2.8	22
Selenium	12000	0.23	< 0.20	< 0.20	< 0.20
Vanadium	9000	15	28	12	18
Zinc	730000	11	25	10	27
Chromium (Trivalent)	8600	10	11	14	15
Chromium (Hexavalent)	33	< 0.50	< 0.50	< 0.50	< 0.50
Fraction of Organic Carbon		0.0081	0.015	< 0.0010	0.012
Calculated SOM from FOC		1.3966	2.5862	<0.1724	2.0690
Calculated TOC from FOC		**0.810**	**1.500**	**<0.1**	**1.200**
Aliphatic TPH >C5-C6	3200sol (304)	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	7800sol (144)	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	2000sol (78)	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	9700sol (48)	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	59000sol (24)	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	1600000	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	1600000	< 1.0	< 1.0	70	< 1.0
Total Aliphatic Hydrocarbons:		**< 5.0**	**< 5.0**	**70**	**< 5.0**
Aromatic TPH >C5-C7	26000sol (1220)	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	56000vap (869)	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	3500vap (613)	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	16000sol (364)	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	36000sol (169)	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	28000	< 1.0	8.1	< 1.0	< 1.0
Aromatic TPH >C21-C35	28000	< 1.0	1100	55	< 1.0
Total Aromatic Hydrocarbons		**< 5.0**	**1100**	**55**	**< 5.0**
Total Petroleum Hydrocarbons		**< 10**	**1100**	**130**	**< 10**
Naphthalene	190sol (76.4)	< 0.10	0.24	< 0.10	0.11
Acenaphthylene	83000sol (86.1)	< 0.10	0.62	< 0.10	0.38
Acenaphthene	84000sol (57)	< 0.10	0.54	< 0.10	0.18
Fluorene	63000sol (30.9)	< 0.10	0.89	< 0.10	0.34
Phenanthrene	22000	< 0.10	14	0.15	3.3
Anthracene	520000	< 0.10	3.8	< 0.10	0.91
Fluoranthene	23000	< 0.10	31	0.37	7.3
Pyrene	54000	< 0.10	29	0.39	6.9
Benzo[a]anthracene	170	< 0.10	11	< 0.10	2.9
Chrysene	350	< 0.10	11	< 0.10	2.9
Benzo[b]fluoranthene	44	< 0.10	13	< 0.10	3.3
Benzo[k]fluoranthene	1200	< 0.10	6.9	< 0.10	1.7
Benzo[a]pyrene	35	< 0.10	11	< 0.10	2.8
Indeno(1,2,3-c,d)Pyrene	500	< 0.10	7.0	< 0.10	1.9
Dibenz(a,h)Anthracene	3.5	< 0.10	2.0	< 0.10	0.57
Benzo[g,h,i]perylene	3900	< 0.10	6.4	< 0.10	1.7
Total Of 16 PAH's		**< 2.0**	**150**	**< 2.0**	**37**
Benzene	27	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	56000vap (869)	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	5700vap (518)	< 0.001	< 0.001	< 0.001	< 0.001
m-Xylene	6600sol (478)	< 0.001	< 0.001	< 0.001	< 0.001
p-Xylene	6200vap (625)	< 0.001	< 0.001	< 0.001	< 0.001
o-Xylene	5900sol (576)	< 0.001	< 0.001	< 0.001	< 0.001
Total Phenols	440dir (26000)	< 0.30	< 0.30	< 0.30	< 0.30

Determinand concentration below the GAC

Determinand concentration in exceedance 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 Coal Tar must be used instead of benzo(a)pyrene.

FIGURES

Notes

Project Title: Childwall Road, Wavertree	Scale: as shown	Drawn: PD	Size: A4
Drawing Title: Site Location Plan	Date: 15.12.19	Job No.: 714.01	Drawing /Rev No.: 01
Client: Lidl GB Ltd			

Remada

Legend

WS2 Window Sample Borehole

Notes

Project Title	Childwall Road, Wavertree
Drawing Title	Exploratory Hole Location Plan
Client	Lidl GB Ltd

Scale	Drawn	Size
as shown	PD	A4
Date	Job No.	Drawing /Rev No.
15.04.20	714.02	01

Remada

EXPLORATORY LOGS

Remada Ltd
Forward House
B95 5AA

BOREHOLE LOG

Project				BOREHOLE No
Childwall Road, Wavertree				WS1
Job No	Date	Ground Level (m)	Co-Ordinates ()	
714.02	02-04-20		E 339,176.0 N 389,441.0	
Contractor				Sheet
PM Sampling Ltd				1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thick-ness)	STRATA DESCRIPTION	Geology	Instrument/ Backfill
Depth	Type No	Test Result							
0.00-0.03	ES					(0.12) 0.12	MADE GROUND:Asphalt.		
0.12-0.80	B					(0.68) 0.80	MADE GROUND: Dark grey mottled reddish brown slightly clayey slightly gravelly fine sand. Gravel is angular to subangular fine of sandstone and rare coal fragments.		
0.20-0.30	ES								
0.90		N50/ 5 mm				(0.10) 0.90	Very dense reddish brown medium SAND with sandstone lithorelics.		

Boring Progress and Water Observations					
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

NVO - No Visual or Olfactory Evidence of Contamination.

No groundwater encountered.

Installation to 0.9m bgl; 0.3m plain pipe, 0.6m slotted pipe.

All dimensions in metres Scale 1:6.25	Client Lidl Great Britain Ltd	Method/ Plant Used Tracked Rig	Logged By PD

Report ID: AGS4 UK BH || Project: 714.02 LIDL WAVERTREE.GPJ || Library: GINT STD AGS 4_0.GLB || Date: 16 April 2020

Remada

Remada Ltd
Forward House
B95 5AA

BOREHOLE LOG

Project				BOREHOLE No
Childwall Road, Wavertree				WS2
Job No	Date	Ground Level (m)	Co-Ordinates ()	
714.02	02-04-20		E 339,158.0 N 389,434.0	
Contractor				Sheet
PM Sampling Ltd				1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thick-ness)	STRATA DESCRIPTION	Geology	Instrument/ Backfill
Depth	Type No	Test Result							
						0.02	MADE GROUND: Asphalt.		
						(0.10)	MADE GROUND: Asphalt.		
						0.12			
0.30-0.40	ES					(0.43)	MADE GROUND: Brown mottled grey gravelly sand with low to moderate cobble content. Gravel is angular to subangular fine to coarse of brick and quartz. Cobbles are angular of brick.		
						0.55			
0.60		N50/ 20 mm				(0.05) 0.60	Very dense reddish brown medium SAND with sandstone lithorelics.		

Boring Progress and Water Observations					
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

NVO - No Visual or Olfactory Evidence of Contamination.

No groundwater encountered.

Backfilled with arisings.

All dimensions in metres Scale 1:6.25	Client Lidl Great Britain Ltd	Method/ Plant Used Tracked Rig	Logged By PD

Report ID: AGS4 UK BH || Project: 714.02 LIDL WAVERTREE.GPJ || Library: GINT STD AGS 4_0.GLB || Date: 16 April 2020

Remada

Remada Ltd
Forward House
B95 5AA

BOREHOLE LOG

Project				BOREHOLE No
Childwall Road, Wavertree				WS3
Job No	Date	Ground Level (m)	Co-Ordinates ()	
714.02	02-04-20		E 339,150.0 N 389,402.0	
Contractor				Sheet
PM Sampling Ltd				1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thick-ness)	STRATA DESCRIPTION	Geology	Instrument/ Backfill
Depth	Type No	Test Result							
						0.04	MADE GROUND: Asphalt.		
0.04-0.15	ES					(0.11)	MADE GROUND: Asphalt.		
						0.15			
0.15-0.57	B					(0.42)	MADE GROUND: Brown mottled grey gravelly sand with low to moderate cobble content. Gravel is angular to subangular fine to coarse of brick and quartz. Cobbles are angular of brick.		
						0.57			
0.60		N50/ 5 mm				0.60	Very dense reddish brown medium SAND with sandstone lithorelics.		

Boring Progress and Water Observations					
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

NVO - No Visual or Olfactory Evidence of Contamination.

No groundwater encountered.

Installation to 0.6m bgl; 0.3m plain pipe, 0.3m slotted pipe.

All dimensions in metres Scale 1:6.25	Client Lidl Great Britain Ltd	Method/ Plant Used Tracked Rig	Logged By PD

Report ID: AGS4 UK BH || Project: 714.02 LIDL WAVERTREE.GPJ || Library: GINT STD AGS 4_0.GLB || Date: 16 April 2020

Remada

Remada Ltd
Forward House
B95 5AA

BOREHOLE LOG

Project				BOREHOLE No
Childwall Road, Wavertree				WS4
Job No	Date	Ground Level (m)	Co-Ordinates ()	
714.02	02-04-20		E 339,164.0 N 389,389.0	
Contractor				Sheet
PM Sampling Ltd				1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thick-ness)	STRATA DESCRIPTION	Geology	Instrument/ Backfill
Depth	Type No	Test Result							
						0.03	MADE GROUND: Asphalt.		
						(0.06) 0.09	MADE GROUND: Asphalt.		
0.10-0.20	ES					(0.18) 0.27	MADE GROUND: Reddish brown mottled dark grey gravelly fine to medium sand. Gravel is angular to subangular fine to coarse of quartz and rare brick fragments.		
0.50	ES					(0.43) 0.70	Reddish brown fine to medium SAND.		
0.80		N50/ 5 mm				(0.10) 0.80	Very dense reddish brown medium SAND with sandstone lithorelics.		

Boring Progress and Water Observations						Chiselling			Water Added	
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To

GENERAL REMARKS

NVO - No Visual or Olfactory Evidence of Contamination.

No groundwater encountered.

Backfilled with arisings.

All dimensions in metres Scale 1:6.25	Client Lidl Great Britain Ltd	Method/ Plant Used Tracked Rig	Logged By PD

Remada

Remada Ltd
Forward House
B95 5AA

BOREHOLE LOG

Project				BOREHOLE No
Childwall Road, Wavertree				WS5
Job No	Date	Ground Level (m)	Co-Ordinates ()	
714.02	02-04-20		E 339,168.0 N 389,365.0	
Contractor				Sheet
PM Sampling Ltd				1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thick-ness)	STRATA DESCRIPTION	Geology	Instrument/ Backfill
Depth	Type No	Test Result							
						(0.29)	MADE GROUND: Concrete.		
						0.29			
0.30-0.60 0.30-0.40	B ES					(0.31)	Very dense reddish brown medium SAND with sandstone lithorelics.		
						0.60			
0.60		N50/ 10 mm							

Boring Progress and Water Observations						Chiselling			Water Added	
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To

GENERAL REMARKS

NVO - No Visual or Olfactory Evidence of Contamination.

No groundwater encountered.

Installation to 0.3m bgl; 0.3m plain pipe, 0.3m slotted pipe.

All dimensions in metres Scale 1:6.25	Client Lidl Great Britain Ltd	Method/ Plant Used Tracked Rig	Logged By PD

Report ID: AGS4 UK BH || Project: 714.02 LIDL WAVERTREE.GPJ || Library: GINT STD AGS 4_0.GLB || Date: 16 April 2020

APPENDIX A
Laboratory Chemical Analysis

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	20-10233-1
Initial Date of Issue:	17-Apr-2020
Client	Remada Ltd
Client Address:	Forward House 17 High Street Henley in Arden B95 5AA
Contact(s):	Greg Jones Peter Dickinson
Project	714.02

Quotation No.:		**Date Received:**	08-Apr-2020
Order No.:	714.02	**Date Instructed:**	09-Apr-2020
No. of Samples:	7		
Turnaround (Wkdays):	5	**Results Due:**	17-Apr-2020
Date Approved:	17-Apr-2020		

Approved By:

Details: Glynn Harvey, Technical Manager

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Results - Miscellaneous Solid

Project: 714.02

Client: Remada Ltd			**Chemtest Job No.:**		20-10233	20-10233
Quotation No.:			**Chemtest Sample ID.:**		996034	996037
			Client Sample ID.:		1	4
			Sample Location:		WS1	WS3
			Sample Type:		MISCSOLID	MISCSOLID
			Top Depth (m):		0.00	0.04
			Bottom Depth (m):		0.03	0.15
			Date Sampled:		02-Apr-2020	02-Apr-2020
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Naphthalene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Fluorene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Anthracene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Pyrene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]anthracene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Chrysene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Coronene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2700	mg/kg	2.0	< 2.0	< 2.0
Moisture	N		%	0.10	< 0.10	< 0.10

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Results - Soil

Project: 714.02

Client: Remada Ltd				**Chemtest Job No.:**	20-10233	20-10233	20-10233	20-10233	20-10233
Quotation No.:				**Chemtest Sample ID.:**	996035	996036	996038	996039	996040
				Client Sample ID.:	2	3	6	5	7
				Sample Location:	WS1	WS2	WS4	WS4	WS5
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.20	0.30	0.50	0.10	0.30
				Bottom Depth (m):	0.30	0.40		0.20	0.40
				Date Sampled:	02-Apr-2020	02-Apr-2020	02-Apr-2020	02-Apr-2020	02-Apr-2020
				Asbestos Lab:	COVENTRY	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	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-
Moisture	N	2030	%	0.020	16	9.4	9.5	13	6.1
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Sand
Chromatogram (TPH)	N			N/A	See Attached	See Attached	See Attached	See Attached	See Attached
pH	M	2010		4.0	8.3	9.1	8.6	8.9	8.6
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010		< 0.010		< 0.010
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010		< 0.010		< 0.010
Total Sulphur	M	2175	%	0.010	0.016		< 0.010		< 0.010
Chloride (Water Soluble)	M	2220	g/l	0.010	0.062		0.018		0.014
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010		< 0.010		< 0.010
Ammonium (Water Soluble)	M	2120	g/l	0.01	0.05		0.02		0.04
Sulphate (Acid Soluble)	M	2430	%	0.010	0.024		< 0.010		< 0.010
Arsenic	M	2450	mg/kg	1.0	2.6	17	2.2	6.9	< 1.0
Beryllium	U	2450	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	M	2450	mg/kg	0.10	< 0.10	0.22	< 0.10	0.10	< 0.10
Copper	M	2450	mg/kg	0.50	5.2	20	2.1	8.6	1.4
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	5.9	19	7.1	13	4.1
Lead	M	2450	mg/kg	0.50	6.3	21	2.8	22	1.8
Selenium	M	2450	mg/kg	0.20	0.23	< 0.20	< 0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	15	28	12	18	10
Zinc	M	2450	mg/kg	0.50	11	25	10	27	6.7
Chromium (Trivalent)	N	2490	mg/kg	1.0	10	11	14	15	6.6
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fraction of Organic Carbon	M	2625		0.0010	0.0081	0.015	< 0.0010	0.012	< 0.0010
Aliphatic TPH >C5-C6	N	2680	mg/kg	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
Aliphatic TPH >C8-C10	M	2680	mg/kg	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
Aliphatic TPH >C12-C16	M	2680	mg/kg	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

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Results - Soil

Project: 714.02

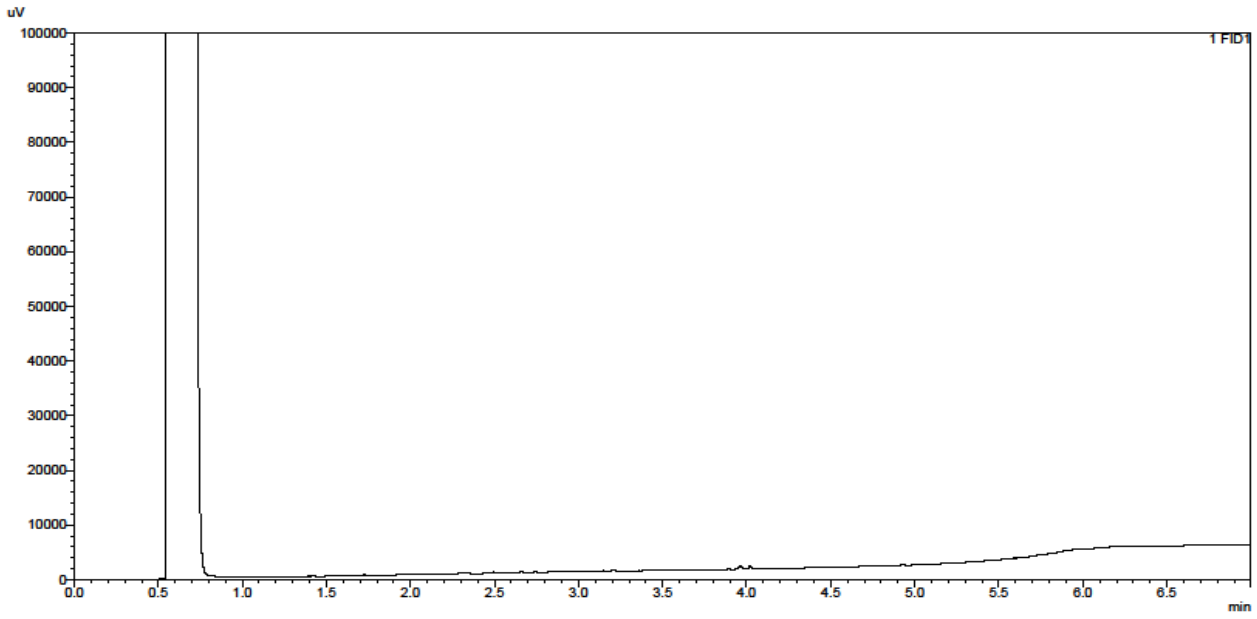
Client: Remada Ltd					**Chemtest Job No.:**	20-10233	20-10233	20-10233	20-10233	20-10233
Quotation No.:					**Chemtest Sample ID.:**	996035	996036	996038	996039	996040
					Client Sample ID.:	2	3	6	5	7
					Sample Location:	WS1	WS2	WS4	WS4	WS5
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.20	0.30	0.50	0.10	0.30
					Bottom Depth (m):	0.30	0.40		0.20	0.40
					Date Sampled:	02-Apr-2020	02-Apr-2020	02-Apr-2020	02-Apr-2020	02-Apr-2020
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0		< 1.0	< 1.0	70	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	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	70	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	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
Aromatic TPH >C8-C10	M	2680	mg/kg	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
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0		< 1.0	8.1	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0		< 1.0	1100	55	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0		< 5.0	1100	55	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0		< 10	1100	130	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10		< 0.10	0.24	< 0.10	0.11	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10		< 0.10	0.62	< 0.10	0.38	< 0.10
Acenaphthene	M	2700	mg/kg	0.10		< 0.10	0.54	< 0.10	0.18	< 0.10
Fluorene	M	2700	mg/kg	0.10		< 0.10	0.89	< 0.10	0.34	< 0.10
Phenanthrene	M	2700	mg/kg	0.10		< 0.10	14	0.15	3.3	< 0.10
Anthracene	M	2700	mg/kg	0.10		< 0.10	3.8	< 0.10	0.91	< 0.10
Fluoranthene	M	2700	mg/kg	0.10		< 0.10	31	0.37	7.3	< 0.10
Pyrene	M	2700	mg/kg	0.10		< 0.10	29	0.39	6.9	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10		< 0.10	11	< 0.10	2.9	< 0.10
Chrysene	M	2700	mg/kg	0.10		< 0.10	11	< 0.10	2.9	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10		< 0.10	13	< 0.10	3.3	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10		< 0.10	6.9	< 0.10	1.7	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10		< 0.10	11	< 0.10	2.8	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10		< 0.10	7.0	< 0.10	1.9	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10		< 0.10	2.0	< 0.10	0.57	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10		< 0.10	6.4	< 0.10	1.7	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0		< 2.0	150	< 2.0	37	< 2.0
Benzene	M	2760	µg/kg	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
Ethylbenzene	M	2760	µg/kg	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
o-Xylene	M	2760	µg/kg	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

TPH Chromatogram on Soil Sample: 996035

<Sample Information>

Sample Name : 996035 20-10233
Data Filename : 09 April 2020_09042020_996035 20-10233_034.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 34
Date Acquired : 09/04/2020 22:10:08
Date Processed : 09/04/2020

<Chromatogram>

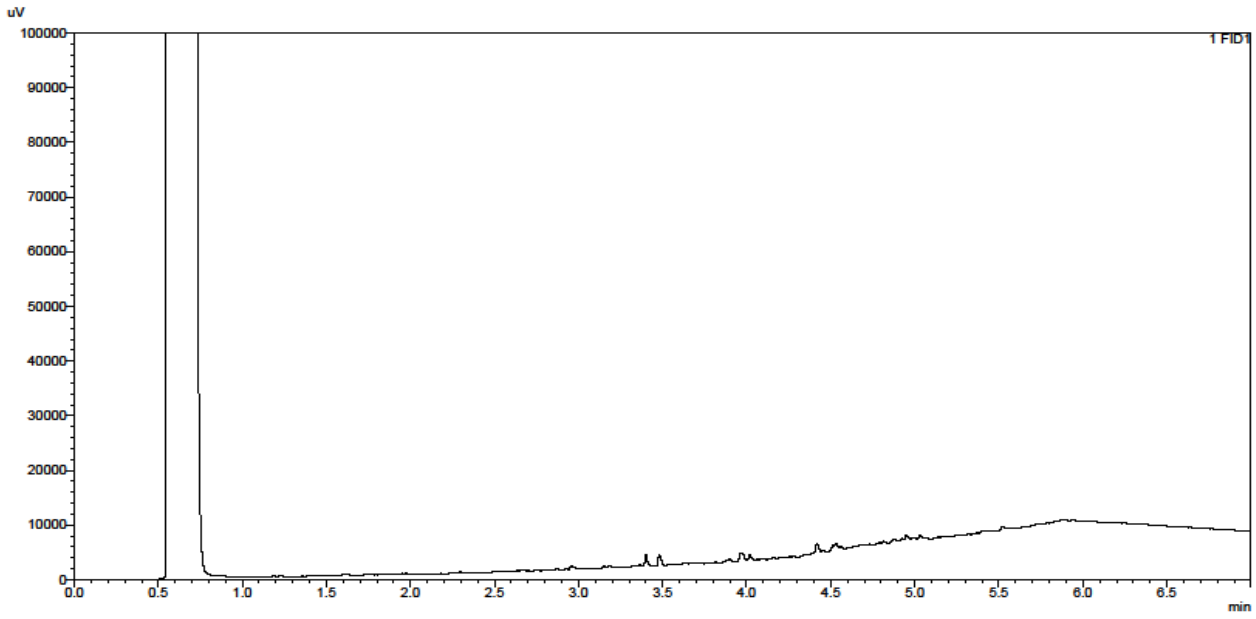


TPH Chromatogram on Soil Sample: 996036

<Sample Information>

Sample Name : 996036 20-10233
Data Filename : 09 April 2020_09042020_996036 20-10233_035.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 35
Date Acquired : 09/04/2020 22:22:16
Date Processed : 09/04/2020

<Chromatogram>

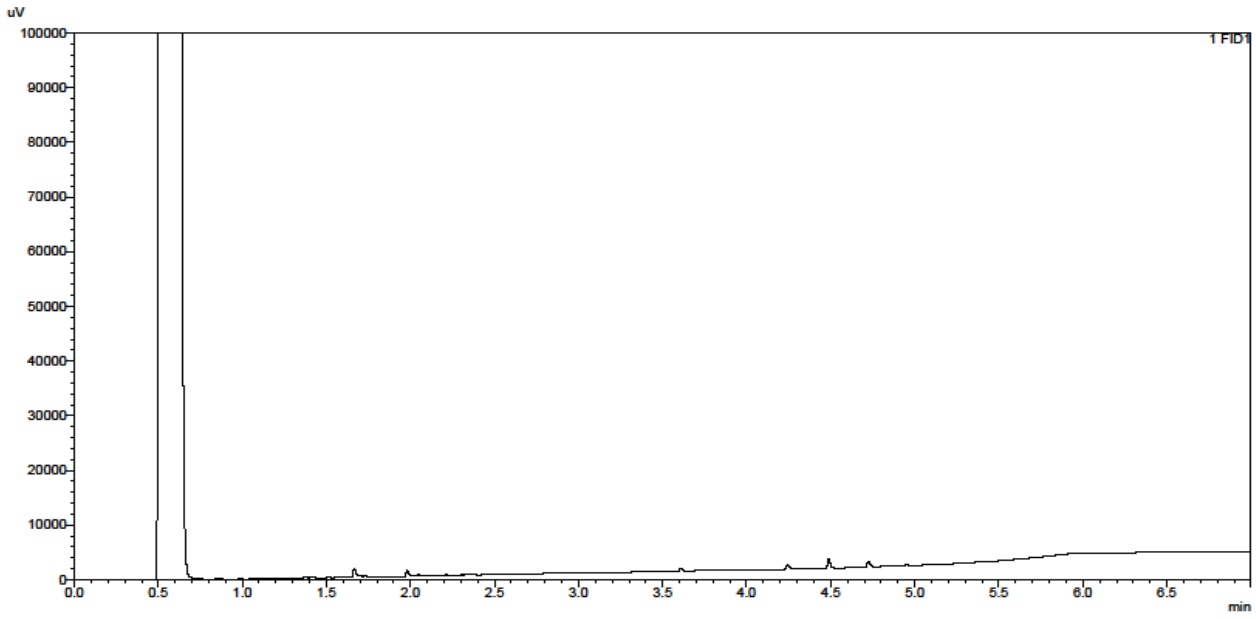


TPH Chromatogram on Soil Sample: 996038

<Sample Information>

Sample Name : 996038 20-10233
Data Filename : 14 April 2020_14042020_996038 20-10233_041.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 21
Date Acquired : 14/04/2020 18:49:14
Date Processed : 14/04/2020

<Chromatogram>



TPH Chromatogram on Soil Sample: 996039

<Sample Information>

Sample Name : 996039 20-10233
Data Filename : 14 April 2020_14042020_996039 20-10233_043.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 22
Date Acquired : 14/04/2020 19:01:59
Date Processed : 14/04/2020

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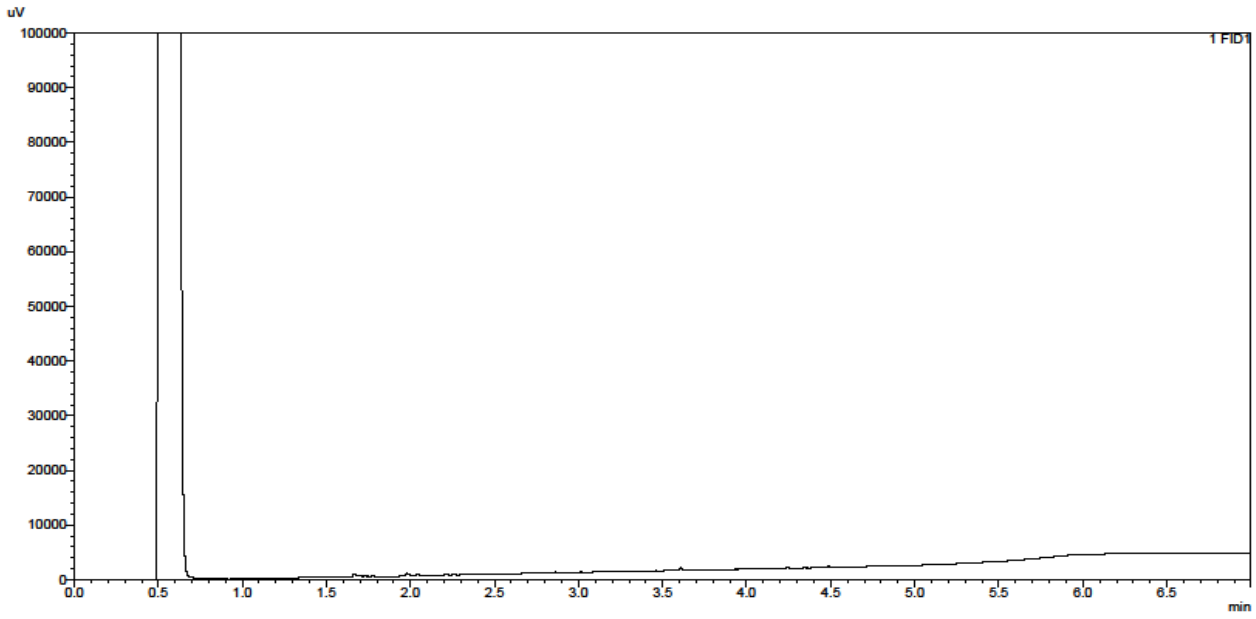

TPH Chromatogram on Soil Sample: 996040

<Sample Information>

Sample Name : 996040 20-10233
Data Filename : 14 April 2020_14042020_996040 20-10233_045.gcd
Method Filename : TPH 12m Fast OSv2.gcm
Sample # : 23
Date Acquired : 14/04/2020 19:14:32
Date Processed : 14/04/2020

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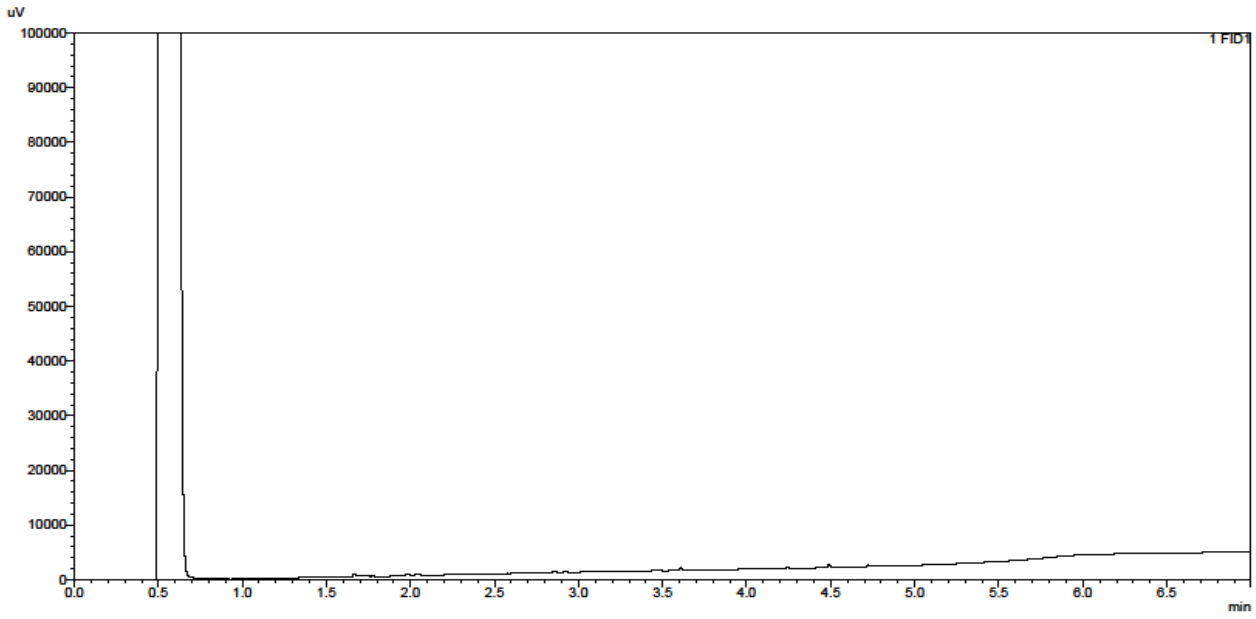

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurememrnt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
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 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; 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 TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

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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

APPENDIX B
Laboratory Geotechnical Tests

Laboratory Report

2788

GEO Site & Testing Services Ltd

Contract Number: 48409

Client Ref: **714.02**
Client PO:

Report Date: **28-04-2020**

Client **Remada Limited**
The Courtyard
Barston Lane
Eastcote
Solihull
B92 0HS

Contract Title: **Wavetree, Liverpool**
For the attention of: **Peter Dickinson**

Date Received: **09-04-2020**
Date Completed: **28-04-2020**

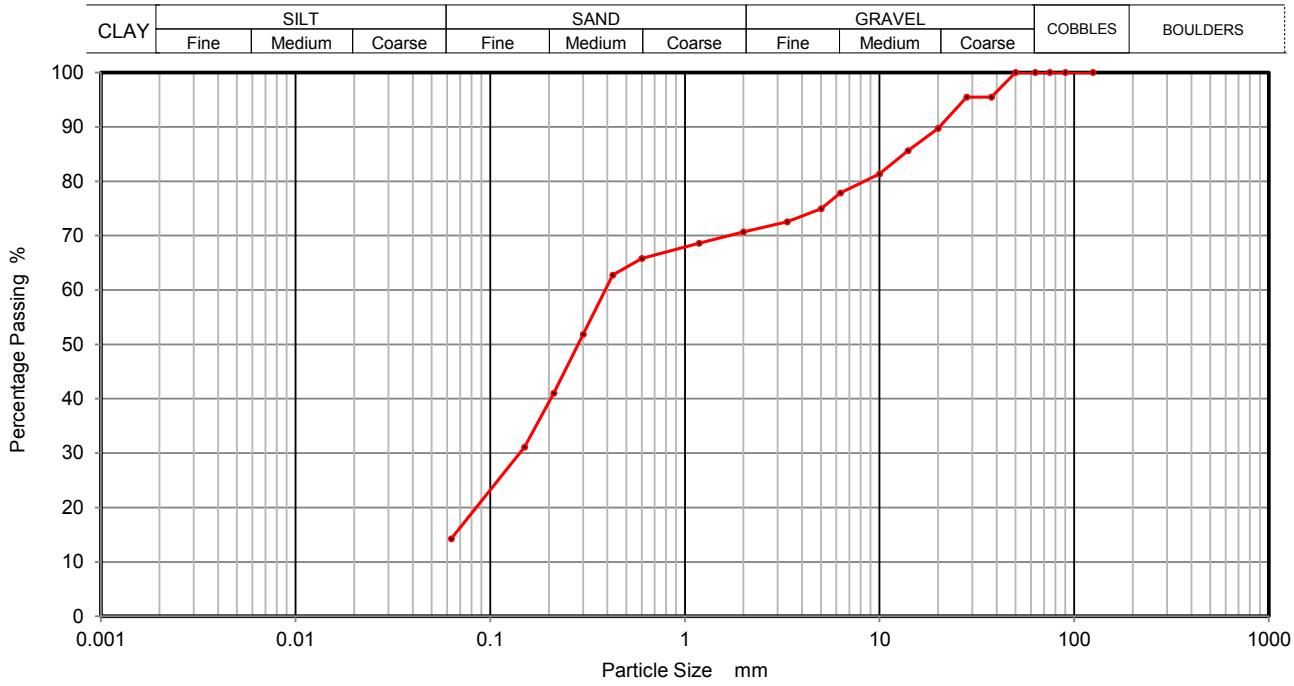
Test Description	Qty
PSD Wet Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	3
Disposal of samples for job	1

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

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

GEO Site & Testing Services Ltd
Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48409
		Borehole/Pit No.	WS1
Site Name	**Wavertree, Liverpool**	Sample No.	
Soil Description	Brown silty gravelly SAND.	Depth Top	**0.12**
		Depth Base	**0.80**
Date Tested	21/04/2020	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	95		
28	95		
20	90		
14	86		
10	81		
6.3	78		
5	75		
3.35	73		
2	71		
1.18	69		
0.6	66		
0.425	63		
0.3	52		
0.212	41		
0.15	31		
0.063	14		

Sample Proportions	% dry mass
Cobbles	0
Gravel	29
Sand	57
Silt and Clay	14

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	27/04/2020	Wayne Honey	W. Honey
RO/MH	Approved	28/04/2020	Paul Evans	P Evans

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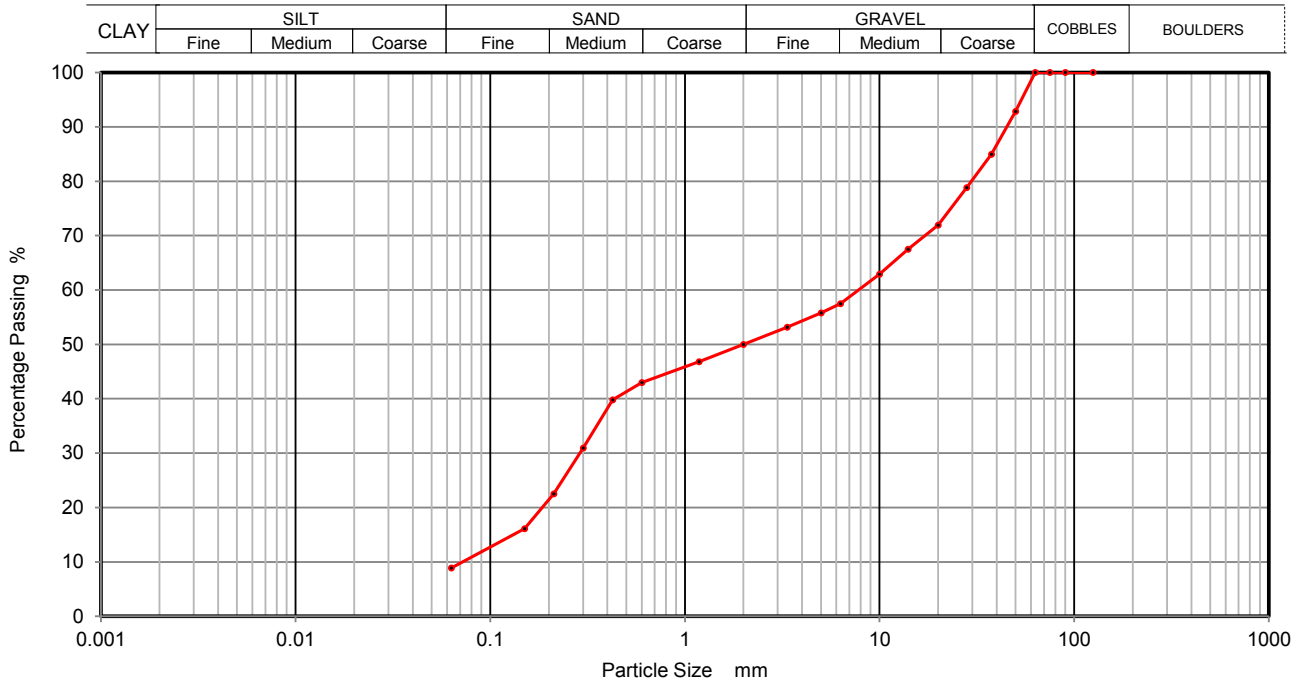
GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48409
		Borehole/Pit No.	WS3
Site Name	**Wavertree, Liverpool**	Sample No.	
Soil Description	Brown silty sandy GRAVEL.	Depth Top	**0.15**
		Depth Base	**0.57**
Date Tested	21/04/2020	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	93		
37.5	85		
28	79		
20	72		
14	68		
10	63		
6.3	57		
5	56		
3.35	53		
2	50		
1.18	47		
0.6	43		
0.425	40		
0.3	31		
0.212	23		
0.15	16		
0.063	9		

Sample Proportions	% dry mass
Cobbles	0
Gravel	50
Sand	41
Silt and Clay	9

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	27/04/2020	Wayne Honey	W. Honey
RO/MH	Approved	28/04/2020	Paul Evans	P Evans

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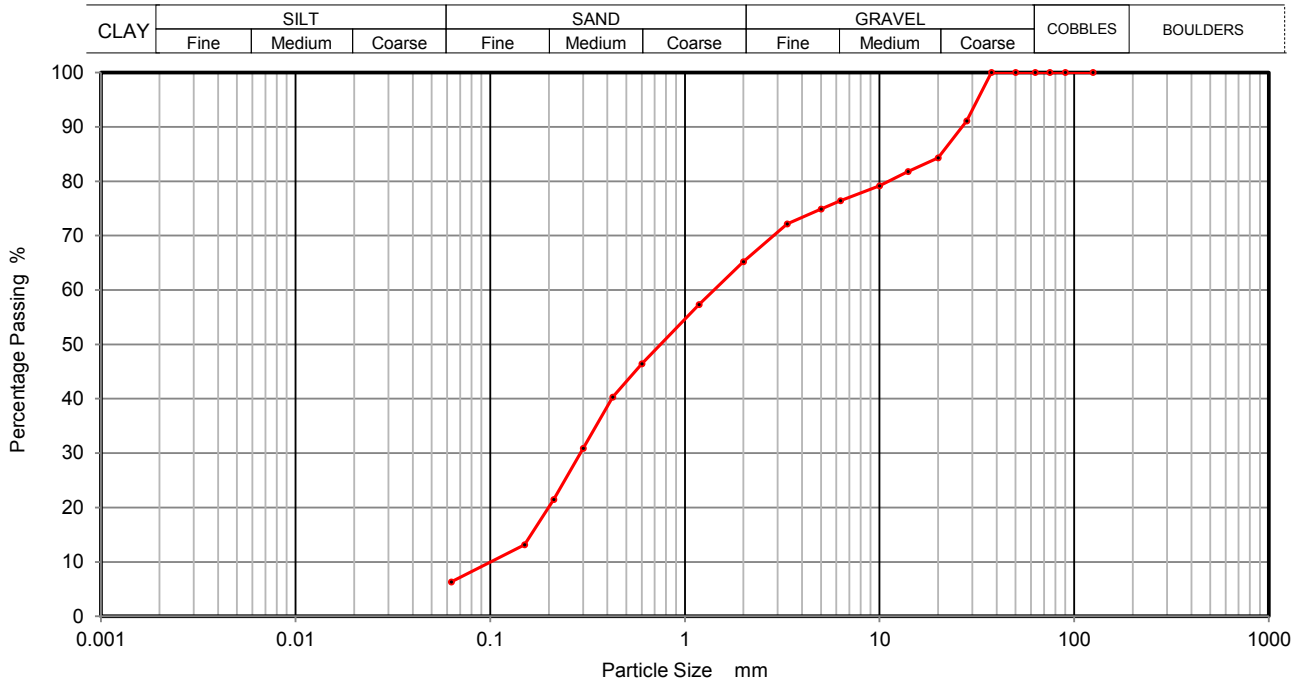
GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48409
		Borehole/Pit No.	WS5
Site Name	**Wavertree, Liverpool**	Sample No.	
Soil Description	Brown silty gravelly SAND.	Depth Top	**0.30**
		Depth Base	**0.60**
Date Tested	21/04/2020	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	91		
20	84		
14	82		
10	79		
6.3	76		
5	75		
3.35	72		
2	65		
1.18	57		
0.6	46		
0.425	40		
0.3	31		
0.212	21		
0.15	13		
0.063	6		

Sample Proportions	% dry mass
Cobbles	0
Gravel	35
Sand	59
Silt and Clay	6

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	27/04/2020	Wayne Honey	W. Honey
RO/MH	Approved	28/04/2020	Paul Evans	P Evans

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