Phase 2
Ground Investigation

Client: Lidl Great Britain Ltd

London Road, Pembroke Dock

Report No: 1360.02.01

June / 2025

REMADA GEO CONSULTANTS

Executive Summary

Remada Ltd was commissioned by Lidl Great Britain Ltd (hereafter 'the Client') to undertake a Phase 2 Ground Investigation off London Road, Pembroke Dock. This report follows a Phase 1 Preliminary Risk Assessment (Remada report reference 1360.01 dated February 2025).

Summary of Phase 1 Desk Study

The earliest available mapping of 1866 shows the site to be occupied by two fields, which extend off-site towards the south, west and east, and the site appears to be devoid of structures. A roadway occupying the same footprint as the present-day London Road forms the northern boundary of the site. Although the historical mapping is vague, the site appears to have been developed between 1909 and 1953, with two buildings erected on-site although their purpose is unclear. The mapping of 1968 shows the majority of the site is occupied by the footprint of a Woollen Factory, with associated tank and chimney in the western area. An Electricity Sub Station is first labelled adjacent to the western boundary in 1992, although the building footprint appears to have been present for some time prior to this date. Between the mapping of 2006 and 2024, there appears to have been a clearance of all previous structures on-site.

Published geological maps record that the site is directly underlain by Pembroke Limestone Group bedrock, designated as a Principal Aquifer.

Intrusive Investigation

The investigation comprised the drilling of eight (8 No) window sample holes (WS01 – WS09) with WS06 omitted and replaced with a trial pit, excavation of one (1 No) trial pit and execution of four (4 No) plate bearing tests, four (4 No) CBR tests and two (2 No) soakage tests at locations indicated on Figure 1 between 7th May and 6th June 2025.

A variable thickness of Made Ground was encountered beneath the site which varied from between 0.2 and at least 1.0m in thickness. The Made Ground was generally granular and contained fragments of concrete, tarmac brick with localised cobbles and boulders and localised in situ concrete foundations present.

The geological mapping suggested that there were no superficial deposits beneath the site and no superficial deposits were encountered during the ground investigation.

Bedrock geology was found to comprise shallow limestone. The bedrock has been interpreted as the Pembroke Limestone Group which is classified as a Principal Aquifer.

Human Health Assessment

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

Water Resources Assessment

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

Waste Classification

Waste Acceptance Criteria (WAC) analysis was undertaken on two samples of Made Ground and a sample of natural CLAY soil. The assessment of all samples indicated that they met the requirements for disposal in an Inert landfill.

Two samples of bituminous surfacing were analysed for concentrations of PAH compounds, however these results are pending and will be issued separately.

Geotechnical Assessment

For pad, strip or raft foundations bearing on the surface of the limestone a Presumed Allowable Bearing Value of 250 kN/m2 is considered appropriate. If pad foundations are chosen, the floor slab should be underlain by layer of compacted 6F2 capping bearing existing bedrock as necessary to create the required formation level.

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.

CBR values estimated from the DCP tests indicated that, near surface (<500mm) the CBR values were generally greater than 8%, however, localised soft spots may be present where the depth to bedrock deepens.

Two soakaway tests were conducted within trial pits within the proposed car park which produced infiltration rates of 8.01 x 10-5 and 4.31 x 10-5 m/s.

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.

Contents

1 INTRODUCTION 4
1.1 OBJECTIVES 4
1.2 SCOPE OF WORK 4
1.3 PROPOSED DEVELOPMENT 5
1.4 PREVIOUS REPORTS 5
1.5 LIMITATIONS 5
2 SUMMARY OF PHASE 1 DESK STUDY 6
3 SITE WALKOVER 8
4 ENVIRONMENTAL & GEOTECHNICAL INVESTIGATION METHODOLOGY 9
4.1 INVESTIGATION STRATEGY 9
4.2 INTRUSIVE INVESTIGATION 9
4.3 IN-SITU TESTING 9
4.4 SOIL SAMPLING 10
4.5 GAS & GROUNDWATER 10
4.6 QUALITY ASSURANCE AND QUALITY CONTROL 11
4.7 LABORATORY ANALYSIS & TESTING 11
5 GEOTECHNICAL & ENVIRONMENTAL INVESTIGATION FINDINGS 12
5.1 GROUND CONDITIONS 12
5.2 IN-SITU TESTING 13
5.3 SOIL OBSERVATIONS 14
5.4 GROUNDWATER OBSERVATIONS 14
5.5 CHEMICAL ANALYSIS 14
5.6 GEOTECHNICAL TESTING 15
5.7 GROUND GAS MONITORING RESULTS 16
6 GENERIC QUANTITATIVE RISK ASSESSMENT 17
6.1 HUMAN HEALTH RISK ASSESSMENT 17
6.2 COMPARISON OF SOIL ANALYSIS RESULTS WITH HUMAN HEALTH GAC 17
6.3 CONTROLLED WATERS RISK ASSESSMENT 17
6.4 GROUND GAS ASSESSMENT 18
6.5 REVISED CONCEPTUAL SITE MODEL 19
6.6 WASTE CLASSIFICATION & WASTE ACCEPTANCE 19
6.7 HEALTH & SAFETY CONSIDERATIONS 20
7 GEOTECHNICAL SITE ASSESSMENT 22
7.1 GEOTECHNICAL CONSIDERATIONS 22
7.2 DESIGN APPROACH 22
7.3 SHRINKAGE AND SWELLING 22
7.4 FLOOR SLAB 23
7.4 IMPORTED FILL 23
7.5 EXCAVATIONS AND TEMPORARY WORKS 23
7.6 EXTERNAL CAR PARK CONSTRUCTION 23
7.7 PROTECTION OF BURIED CONCRETE 23
7.8 SOAKAWAY TESTS 23
7.9 GENERAL CONSTRUCTION ADVICE 23
8 CONCLUSIONS & RECOMMENDATIONS 24
8.1 CONCLUSIONS 24
8.2 RECOMMENDATIONS 25
8.3 GROUND GAS 25
STUDY LIMITATIONS 27

TABLES (not presented within text)
Table 1 Outline Conceptual Site Model
Table 2 Gas & Groundwater Monitoring Data

Table 3 Comparison of Soil Chemical Analyses with GAC
Table 4 Plasticity Indices and Volume Change Potentials of the Cohesive Strata
Table 5 Refined Conceptual Site Model

GRAPHS

Graph 1 Plot of Corrected SPT N Values vs Depth

FIGURES

Figure 1 Site Location Plan
Figure 2 Exploratory Hole Location Plan
Figure 3 Proposed Layout

EXPLORATORY HOLE LOGS

APPENDICES

Appendix A SPT Hammer Energy Test Certificate
Appendix B Soakaway Test Results
Appendix C Plate Bearing Test Results
Appendix D Dynamic Cone Penetrometer Test Results
Appendix E Gas Analyser Calibration Certificate
Appendix F Laboratory Chemical Analyses
Appendix G Laboratory Geotechnical Tests

Issue No	*Date*	*Prepared By*	*Technical Review*	*Authorised*
01	*13.06.2025*	*K Szybut*	*G Jones*	*G Jones*

1 INTRODUCTION

Remada Ltd was commissioned by Lidl Great Britain Ltd (hereafter 'the Client') to undertake a Phase 2 Ground Investigation off London Road, Pembroke Dock, SA72 4RW at the location indicated in Figure 1.

Due to the study site's positioning within Wales, the scope was also designed in line with the Welsh Land Contamination Working Group's Development of Land Affected by Contamination: A Guide for Developers version 3: May 2017. This guidance represents the culmination of a co-operative effort involving the Welsh Local Government Association (WLGA) and Natural Resources Wales (NRW). For the purpose of this report, any references to the Environment Agency (EA) should be seen as interchangeable with NRW.

1.1 Objectives

The objectives of this assessment are as follows:

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

1.2 Scope of Work

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

The scope of work comprised:

- 5 No window sample boreholes to target depths of 7m including SPTs;
- 3 No window sample boreholes to target depths of 5m including SPTs;
- 3 No combined groundwater and gas monitoring standpipes installed with window sample boreholes;
- 1 No Trial pit
- 2 No Soakaway Infiltration tests
- 4 No plate bearing tests using 600mm diameter plate;
- 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 delineate any potential soil contamination;
- 4 No ground gas and groundwater monitoring visits to satisfy planning requirements; and
- Combined Factual & Interpretative Geoenvironmental Report.

The investigation methodology is presented in Section 3, Findings in Section 4 and the Exploratory

Locations are indicated on **Figure 2.**

1.3 Proposed Development

It is understood that the proposed use for the site will be a Lidl retail store with associated car park and soft landscaping. This development will comprise a site area of 10848m^2 fronting onto London Road as shown in **Figure 3**.

1.4 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 ref: 1360.01.01, issued in February 2025.

1.5 Limitations

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

2 SUMMARY OF 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 occupies an irregular plot to the south of A477 London Road. The site boundary to the north is marked by London Road, whilst the boundaries to the east, south and west are predominantly open. Only one structure is indicated to be present on-site; this comprises a blockwork structure on the western boundary of the site with a gable roof. This appears to be an electricity sub-station, complete with three locked doors on the western façade. The remainder of the site appears to be partially overgrown with shrubs, bushes and juvenile / semi-mature vegetation.

Site History

The earliest available mapping of 1866 shows the site to be occupied by two fields, which extend off-site towards the south, west and east, and the site appears to be devoid of structures. A roadway occupying the same footprint as the present-day London Road forms the northern boundary of the site. Although the historical mapping is vague, the site appears to have been developed between 1909 and 1953, with two buildings erected on-site although their purpose is unclear. The mapping of 1968 shows the majority of the site is occupied by the footprint of a Woollen Factory, with associated tank and chimney in the western area. An Electricity Sub Station is first labelled adjacent to the western boundary in 1992, although the building footprint appears to have been present for some time prior to this date. Between the mapping of 2006 and 2024, there appears to have been a clearance of all previous structures on-site.

Geology / Hydrogeology

Published geological maps record that the site is directly underlain by Pembroke Limestone Group bedrock, designated as a Principal Aquifer.

Mining

The site is located within an area which might not be affected by coal mining activity. Consequently, no further action is considered necessary at this stage relating to coal mining at and beneath the site.

Radon

The site is located in a Higher Probability Radon Area as 10% to 30% of properties are estimated to be at or above the Action Level. Consequently, full radon protective measures are considered necessary for the site.

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 proposed store;*
- *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
On-site Sources • **General Made Ground** • **Woollen Factory and associated chimney & tank** • **Kingswood Industrial Estate** • **Electricity Sub-Station** ***Off-site Sources*** • **Old Quarries** • **Factories / Mills** • **Gas Control Centre** • **Electricity Sub-Station** • **Railway** • **Industrial Estates** • **Cemetery**	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, Va, Zn, *Boron, TPH /PAH, PCBs*	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 Leachate	Occupants of the development / building fabric Adjacent residents during construction Principal Aquifer Kingswood Pill watercourse	• Direct Soil Ingestion	• No	N/A	N/A	N/A	N/A
				• Indoor Dust ingestion	• Yes	To be assessed (TBA)	Potential risk	(To be assessed (TBA)	(To be assessed (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
				• Ingestion of home grown produce	• No	N/A	N/A	N/A	N/A
				• 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	Higher Probability Area	Moderate	Full Radon Protection Measures	Low
				• Ingestion via permeated water supply pipework	• Yes	As above	Potential risk	TBA	TBA
				• Direct contact with Aquifer in Superficial Deposits	• No	No superficial deposits indicated on BGS mapping	N/A	N/A	N/A
				• In-direct contact with Principal Aquifer in bedrock	• Yes	TBA	Potential risk	TBA	TBA

Table 1: Outline Conceptual Site Model

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

3 SITE WALKOVER

The opportunity was taken to inspect the proposed Lidl store site on 6th May 2025 by Krysia Szybut of Remada Ltd during the intrusive works, as recorded in the photographs below. There were no visual or olfactory indicators of contamination.

Photo 1: A view from the south looking approximately north-west.

Photo 2: A view towards the south-western corner of the site. An old road is present along the boundary with a metal fence present behind the hedgerows to the right.

Photo 3: A view of the sidewall from SA02 showing minimal Made Ground overlying very shallow limestone bedrock fractured and locally oxidised.

Photo 4: A view looking approximately westwards showing the sub-station.

4 ENVIRONMENTAL & GEOTECHNICAL INVESTIGATION METHODOLOGY

4.1 Investigation Strategy

In accordance with Lidl Ground Investigation standard 05.2023, five (5 No). window sample holes were required beneath the proposed store footprint to a depth of 7m or refusal, and four (4 No) beneath the delivery bay, HGV access and car park. Four (4 No) plate bearing tests were required beneath the store footprint for raft foundation design, and four (4 No) CBR tests were conducted in the proposed car park. Four (4 No) ground gas monitoring visits were scheduled for the site to provide the minimum required by C665.

The investigation comprised the drilling of eight (8 No) window sample holes (WS01 – WS09 with the exception of WS06), execution of four (4 No) plate bearing tests, four (4 No) CBR tests and two (2 No) soakage tests at locations indicated on **Figure 2** between 5th May and 6th June 2025.

Exploratory locations were selected to enable an investigation of ground conditions beneath the proposed retail store, car park, and delivery bay. The site had previously comprised a warehouse/factory that had been extended and subsequently demolished. It was therefore anticipated that there would be a variable thickness of Made Ground at the site associated with the former warehouse.

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

The weather conditions at the site during the fieldwork period were generally warm and dry, with no standing water nor slippery ground conditions being noted.

4.2 Intrusive Investigation

4.2.1 Window Sample Holes

Five of the window samples were advanced to a target depth of 7m and three to a target depth of 5m. However, as bedrock was encountered at relatively shallow depths all window samples holes were drilled to refusal which was between 0.25 and 2.0m bgl. Combined Groundwater and Ground Gas monitoring standpipes were installed in WS01, WS03 and WS08.

4.2.2 Trial Pits

One trial pit was excavated in the location of WS06 as an alternative intrusive investigation method to a maximum depth of 0.5m bgl.

4.3 In-Situ Testing

4.3.1 Standard Penetration Tests

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

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

The SPT N-values have been corrected based on the Energy Ratio of 64% for the SPT hammer on the window sampling rig. The SPT Hammer Energy Test Report, undertaken in accordance with BS EN ISO 22476-3:2005 is presented in **Appendix A.**

4.3.2 Hand Shear Vane

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

4.3.3 Soakaway Tests

Two soakaway tests were undertaken in general in accordance with BRE Digest DG365, Soakaway Design, 2016, at the locations in **Figure 2**.

Test results are presented in **Appendix B.**

4.3.4 Plate Bearing Tests

Four plate bearing tests were carried in general accordance with BS EN 1997:2007 Annex K or IAN 73/06 to a minimum pressure of 300kN/m^2 using a 600mm diameter plate, at the locations in **Figure 2**. A 14-tonne 360 tracked excavator provided the reaction load. Test results are presented in **Appendix C.**

4.3.5 Dynamic Cone Penetrometer (DCP) Tests

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

4.4 Soil Sampling

4.4.1 Environmental

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

4.4.2 Geotechnical

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

4.5 Gas & Groundwater

4.5.1 Installations

Combined ground gas and groundwater monitoring standpipes were installed in selected wells with a 50mm diameter slotted HDPE pipe and packed with gravel surround as recorded on the exploratory logs. Wells were completed with 0.5 – 1.0m of plain HDPE pipe and bentonite seal, with a gas bung and tap being installed at the top of the pipe.

4.5.2 Monitoring

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

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

- Pressure difference between the monitoring well and the atmosphere,

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

Four ground gas monitoring visits were undertaken as a minimum required for a commercial development in accordance with CIRIA C665. Ground gas concentrations were recorded on 12th, 19th and 28th May 2025 and 6th June 2025 at WS01, WS03 and WS08 and the results are presented in **Table 2**. The corresponding Calibration Certificate for the GA5000 gas analyser is presented as **Appendix E**.

4.6 Quality Assurance and Quality Control

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

4.7 Laboratory Analysis & Testing

4.7.1 Chemical Analysis – Soil

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.

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

4.7.2 Geotechnical

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

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

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

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 indicates that there are no superficial deposits present directly beneath the site.

Bedrock geology is indicated to comprise the Pembroke Limestone Group, a limestone from the Carboniferous Period which is described as 'skeletal and ooidal limestones with some calcite- and dolomite-mudstones, sandstones and mudstones, and a few coals and cherts. Waulsortian reef limestones occur in the south'.

The Pembroke Limestone Group is classified as a Principal aquifer. The site is not located within a Source Protection Zone.

5.1.2 Made Ground

A large part of the site was within the footprint of the former warehouse. Made Ground was found to extend to depths of between 0.25m in (WS08) to 1.0m (in WS02), however, in WS02 the Made Ground was not fully penetrated. The Made Ground generally comprised locally clayey slightly sand gravel of concrete, brick, sandstone, tarmac, glass and limestone with occasional cobbles.

In situ concrete foundations are still present, which will require breaking out and removing prior to the development, see Photos 5 and 6 below.

5.1.3 Superficial Deposits

According to the published geology superficial deposits are not present beneath the site and superficial deposits were not encountered during the ground investigation.

5.1.4 Bedrock

Bedrock was encountered in all of the exploratory holes except WS02. In general, near surface the bedrock comprised locally slightly clayey, sandy angular to subangular fine to coarse GRAVEL of limestone encountered to a depth of between 0.25 and 2.0m. Alternatively, the bedrock was found as weathered slightly gravelly CLAY with the gravel content comprising limestone with a localised sand layer in WS01 at 0.8 to 1.3m bgl. The CLAY was found to depths of between 0.8 and 2.0m bgl.

5.1.5 Existing Foundations

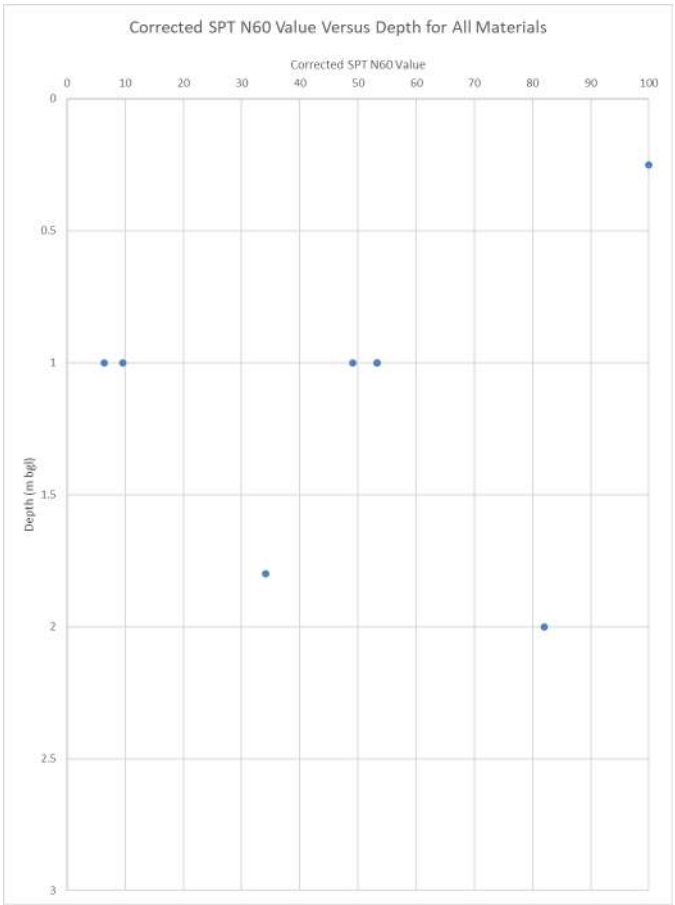
Photo 5: A view approximately west from the west of the site where the concrete slab of the former building is still present.

Photo 6: A view of the concrete slab from Photo 5 looking north-west.

5.2 In-situ Testing

5.2.1 Standard Penetration Tests (SPTs)

In-situ SPTs were undertaken to assist with the interpretation of strata encountered. The results of corrected N-values versus depth are plotted in the graph below:



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

The following graph depicts the uncorrected SPT N values undertaken within the granular materials (excluding those assumed to be bedrock). The graph also shows the design lines used by Remada during the geotechnical assessment.

5.2.2 Hand Shear Vane

The results ranged between 50kPa (in WS01 at 1.8m and WS05 at 1.3m bgl) and 77kPa (in WS03 at 0.6m bgl). The hand shear vane test results have been plotted along with the results interpreted from the SPT N values in **Graph 3**.

5.2.3 Plate Bearing Test

The results of four plate bearing tests produced values of 64.9, 49.2, 101.3 and 42.2 kN/m^2 at 1.25mm settlement.

5.2.4 Soakaway Test

The results of Soakaway tests SA01 and SA02 produced minimum values of 8.01 x 10^{-5} and 4.31 x 10^{-5} m/s respectively.

5.2.5 CBR Tests

The results of the four DCP tests within the proposed car park area produced values of not less than 8% within the upper 500mm.

5.3 Soil Observations

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

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

5.4 Groundwater Observations

Groundwater was not encountered during the ground investigation.

5.5 Chemical Analysis

5.5.1 Soils

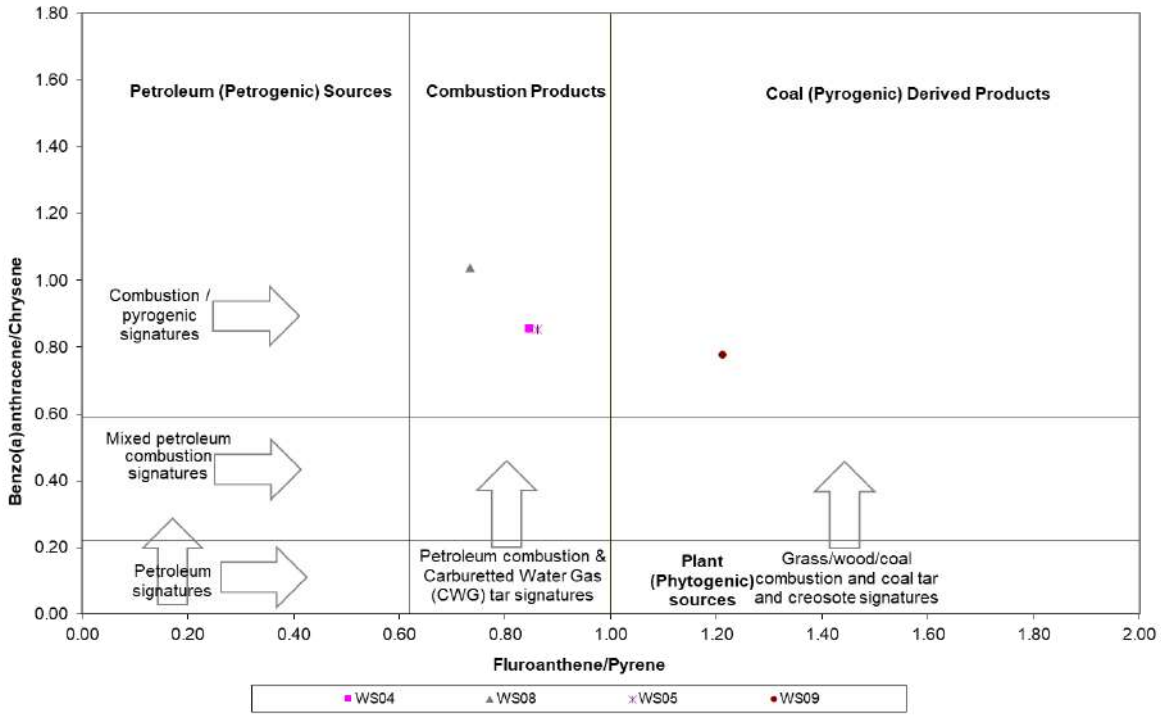
Results of the soil chemical analysis are presented in **Table 3** and summarised as follows.

The average FOC and pH were 0.012 and 11.2 respectively. Asbestos was detected in three of the samples analysed. Amosite and chrysotile fibres were detected at <0.001%. 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 four of the samples analysed (from WS04, WS05, WS08 and WS09). The hydrocarbons were generally heavy end hydrocarbons within the range C16 to C35 carbon range. However, hydrocarbons in the C12 to C16 carbon range were also encountered in WS05 and WS08 at 0.2m depth. These sample were taken from Made Ground and there was no visual or olfactory evidence of contamination.

Concentrations of PAHs were generally low (<2 mg/kg). A maximum concentration (excluding bituminous surfacing sample) of 10.1 mg/kg was encountered in WS03 at 0.3m.

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



Graph 4: PAH Double Ratio Plot

5.6 Geotechnical Testing

Results of the geotechnical testing are summarised below.

5.6.1 Plasticity Testing

Plasticity testing was undertaken on two (2 No.) samples of cohesive soils recovered from the window sample boreholes, with the results ranging between 27% and 28%. These indicate the soils to be of both intermediate plasticity (CI) and high (CH) plasticity, and low to medium volume change potential as summarised in **Table 4** below:

Location	Depth (m)	Plasticity Index (%)	Passing .425mm (%)	Modified Plasticity Index	Volume Change Potential
WS01	1.7	28	90	25.2	Medium
WS04	0.7	27	56	15.1	Low

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

5.6.2 Particle Size Distribution (PSD) Analysis

The PSD tests revealed the following:

- Natural deposits in WS01 at 1.3 – 2.0m comprised brown slightly gravelly, slightly silty, sandy CLAY.
- Natural deposits in WS03 at 1.3 – 1.8m comprised brown slightly gravelly slightly sandy SILT/CLAY.
- Natural deposits in WS01 at 1.3 – 2.0m comprised brown slightly gravelly, slightly sandy SILT/CLAY.

5.6.3 BRE SD1 Analysis

The water-soluble sulphate contents varied from 24 to 470 mg/l in the four soil samples analysed with pH varying from 8.1 to 12. The total sulphur content varied from 0.01 to 0.09% and total sulphate varied from 0.035 to 0.262%.

5.7 Ground Gas Monitoring Results

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

- A maximum steady state concentration of methane was recorded as of 0.1% v/v in all monitoring wells on 28th May 2025;
- A maximum steady state concentration of Carbon Dioxide was recorded as 0.4% v/v in WS03 and WS08 on 19th May 2025. Detectable concentrations of carbon dioxide were recorded in all the monitoring wells;
- A minimum steady stated concentration of Oxygen was recorded 20.9 % v/v in WS03 on 12th May 2025;
- Ground gas flow rates were recorded at a maximum of 0.7 litres per hour (l/hr) in WS03 on 12th May 2025;
- No groundwater was encountered within any of the standpipes over the course of the monitoring programme; and,
- Atmospheric pressure at the time of sampling varied between a high of 1024 millibar (mbar) on 19th May 2025 and a low of 1008 mbar on 28th May 2025. The monitoring visits were undertaken during periods of rising and falling pressure trends over the preceding forty-eight hours.

6 GENERIC QUANTITATIVE RISK ASSESSMENT

6.1 Human Health Risk Assessment

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

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

Default parameters have been adopted for sandy loam of pH 7 and commercial land use. FOC ranged from 0.001 to 0.21 giving a Soil Organic Matter (SOM) content range of between 0.17 to 3.62% with an average result of 2.1%. In order to present a conservative assessment, the SOM content of 2.5% has been adopted for the assessment.

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

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

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

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

6.2 Comparison of Soil Analysis Results with Human Health GAC

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

TPH, PAH & BTEX

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

Metals & Inorganics Excluding Asbestos

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

Asbestos

Asbestos was identified in three samples of Made Ground, from WS04, WS05 and WS08 at 0.3, 0.2 and 0.2m bgl respectively. However, subsequent quantification analysis on this sample revealed concentrations of loose fibres of <0.001% (i.e. 'trace').

6.3 Controlled Waters Risk Assessment

6.3.1 Sensitivity – Groundwater

The site is not indicated to be within a Groundwater Source Protection Zone. No superficial deposits are indicated to be present underlying the site. The Pembroke Limestone Group bedrock underlaying

the site is designated as a Principal Aquifer. There are no groundwater abstractions recorded within 1km of the site.

6.3.2 Sensitivity – Surface Waters

The nearest surface water feature is recorded 116m to the east and appears to be a surface watercourse associated with Kingswood Pill. There are no surface water abstractions recorded within 1km of the site.

Investigation has revealed that the site is underlain by a Principal Aquifer in the bedrock.

6.3.3 Risk Assessment

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

No groundwater was not encountered during the ground investigation and subsequent monitoring programme.

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

6.4 Ground Gas Assessment

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

- GSV = 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 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 0.7 l/hr = 0.0007 l/hr.
- Carbon Dioxide GSV = 0.4 % x 0.7 l/hr = 0.0028 l/hr.

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

the site. Therefore, gas protection measures are not deemed necessary for the proposed development.

6.5 Revised Conceptual Site Model

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

6.6 Waste Classification & Waste Acceptance

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

Once the waste has been classified as either hazardous or non-hazardous then the WAC testing determines if the waste meets the requirements for disposal in the required landfill. Therefore, If the waste is classified as hazardous waste, then the waste would also need to meet the hazardous waste WAC requirements to be disposed of in a hazardous waste landfill. However, if the final destination of the waste is not to landfill then WAC analysis is not required.

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

6.6.1 Waste Classification

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

Asbestos was detected within the Made Ground in WS104m WS105 and WS108 at 0.3, 0.2 and 0.2m bgl respectively at <0.001% (ie. trace) and therefore, present at non-hazardous concentrations

Metals

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

Hydrocarbons/PAHs/VOCs

The concentrations of TPHCWG, PAH(16) and VOCs indicate that arisings of the Made Ground would be classified as non-hazardous waste.

Bitumen / Coal Tars

The results of PAH(17) testing are pending and will be submitted separately once they have been received.

6.6.2 Waste Acceptance

Waste Acceptance Criteria (WAC) analysis was undertaken on two samples of Made Ground and a sample of natural CLAY soil. The assessment of all samples indicated that they met the requirements for disposal in an Inert landfill.

Two samples of bituminous surfacing were analysed for concentrations of PAH compounds, however these results are pending and will be issued separately.

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> • **General Made Ground** • **Woollen Factory and associated chimney & tank** • **Kingswood Industrial Estate** • **Electricity Sub-Station** ***<u>Off-site Sources</u>*** • **Old Quarries** • **Factories / Mills** • **Gas Control Centre** • **Electricity Sub-Station** • **Railway** • **Industrial Estates** • **Cemetery**	Asbestos / Metals As, Be, Cd, Cu, Cr (VI), Cr (III) Hg, Ni, Se, Va, Zn, *Boron, TPH /PAH, PCBs*	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 Leachate	Occupants of the development / building fabric Adjacent residents during construction Principal Aquifer Kingswood Pill watercourse	• Direct Soil Ingestion	• No	N/A	N/A	N/A	N/A
				• Indoor Dust ingestion	• Yes	< GAC	Very low risk	None required	Very low
				• Skin Contact with Soils	• Yes	< GAC	Very low risk	None required	Very low
				• Skin Contact with Dust	• Yes	< GAC	Very low risk	None required	Very low
				• Inhalation of Outdoor Dust	• Yes	< GAC	Very low risk	None required	Very low
				• Ingestion of home grown produce	• No	N/A	N/A	N/A	N/A
				• Inhalation of Outdoor Vapours	• Yes	< GAC	Very low risk	None required	Very low
				• Inhalation of Indoor Vapours	• Yes	< GAC	Very low risk	None required	Very low
				• Inhalation of ground gas	• Yes	CS1	Very low risk	None required	Very low
				• Inhalation of radon gas	• No	Higher Probability Area	Moderate	Full Radon Protection Measures	Low
				• Ingestion via permeated water supply pipework	• Yes	< GAC	Very low risk	None required	Very low
				• Direct contact with Aquifer in Superficial Deposits	• No	No superficial deposits indicated on BGS mapping	N/A	N/A	N/A
				• In-direct contact with Principal Aquifer in bedrock	• Yes	No exceedance of GAC threshold	Very low risk	None required	Very low

Table 5: Refined Conceptual Site Model

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

7 GEOTECHNICAL SITE ASSESSMENT

7.1 Geotechnical Considerations

An indicative site layout is indicated in **Figure 2** with the Lidl store zone being centre west of the overall site area with parking to the north, east and south of the site.

Published geological maps indicate that the site is underlain the Pembroke Limestone Group, described as skeletal and ooidal limestones with some calcite and dolomite-mudstones, sandstones and mudstones, and a few coals and cherts'.

WS01, WS02, WS04, WS07 & WS08 were located within the proposed store footprint. The depth to bedrock (SPT N = 50) was 2m at WS01 in the north-west of the proposed store footprint, but elsewhere less than 1m bgl. Due to shallow depth of SPT refusals, WS06 was replaced with trial pit (TP01) and similarly to the trial pits for soakaway tests SA01 and SA02 (Photo 3), limestone was exposed at less than 0.5m bgl.

At WS03, WS05 in the proposed car park to the east of the store footprint, SPT refusals were obtained at 1.8 to 2m depth, but at WS09 on the south-east the site area, SPT refusal was achieved at 0.4m bgl.

In general, whilst bedrock is very shallow at less than 1m bgl, it is locally deeper at specific locations.

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 Design Approach

The Presumed Allowable Bearing Value of a weak pure limestones is 250 to 750 kN/m^2 Tomlinson (2001). Tomlinson notes that the Presumed Allowable Bearing Values are for horizontal foundations under vertical static loading, settlement not to exceed 50mm and strip footings not exceeding 3m width, length not more than ten times width bearing surface of rock.

For pad, strip or raft foundations bearing on the surface of the limestone a Presumed Allowable Bearing Value of 250 kN/m^2 is considered appropriate.

7.3 Shrinkage and Swelling

All samples of CLAY were reported as being INTERMEDIATE and HIGH plasticity with between 56% and 90% passing a 0.425mm sieve. The modified plasticity index equates at Low to Medium Volume Change Potential.

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

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

Table 8: NHBC 2023 Table 4 Minimum Foundation Depths

7.4 Floor Slab

If pad foundations are chosen, the floor slab should be underlain by layer of compacted $6F_2$ capping bearing existing bedrock as necessary to create the required formation level.

7.4 Imported Fill

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

7.5 Excavations and Temporary Works

Excavations within bedrock are likely to require plant equipped with mechanical breakers. Where clay is found to locally deepened it may be necessary to provide temporary support to excavations however groundwater was not observed during the monitoring period.

7.6 External Car Park Construction

CBR values estimated from the DCP tests indicated that, near surface (<500mm) the CBR values were generally greater than 8%, however, localised soft spots may be present where the depth to bedrock deepens.

7.7 Protection of Buried Concrete

In accordance with BRE SD1 for buried concrete in a brownfield site with static groundwater, analysis of selected samples for water soluble sulphate returned values of up to 470 mg/l and pH >12. A total potential sulphate value of 0.27% was also calculated from the total sulphur results. 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.

7.8 Soakaway Tests

Two soakaway tests were conducted within trial pits within the proposed car park which produced infiltration rates of 8.01×10^{-5} and 4.31×10^{-5} m/s.

7.9 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.

In situ concrete foundations are still present locally within the site.

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

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

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

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

8 CONCLUSIONS & RECOMMENDATIONS

8.1 Conclusions

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

8.1.1 Phase 2 Site Investigation

The site was historically a Woollen Factory with associated tank and chimney, which, at the time of the investigation this had been demolished. However, part of the former concrete foundations remain in situ.

A variable thickness of Made Ground was encountered beneath the site which varied from between 0.2 and 0.5m in thickness where fully penetrated. Made Ground was encountered to 1.0m bgl in WS02 and was not fully penetrated. The Made Ground was generally granular and contained fragments of concrete, tarmac and brick with localised cobbles.

The geological mapping suggested that there were no superficial deposits beneath the site and no superficial deposits were encountered during the ground investigation.

Bedrock geology was found to comprise shallow limestone. The bedrock has been interpreted as the Pembroke Limestone Group which is classified as a Principal Aquifer.

WS01, WS02, WS04, WS07 & WS08 were located within the proposed store footprint. The depth to bedrock (SPT N = 50) was 2m at WS01 in the north-west of the proposed store footprint, but elsewhere less than 1m bgl. Due to shallow depth of SPT refusals, WS06 was replaced with trial pit (TP01) and similarly to the trial pits for soakaway tests SA01 and SA02 (Photo 3), limestone was exposed at less than 0.5m bgl.

At WS03, WS05 in the proposed car park to the east of the store footprint, SPT refusals were obtained at 1.8 to 2m depth, but at WS09 on the south-east the site area, SPT refusal was achieved at 0.4m bgl.

8.1.2 Human Health Risk Assessment

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

8.1.3 Water Resources Risk Assessment

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

8.1.4 Waste Classification

Waste Acceptance Criteria (WAC) analysis has been undertaken one two samples of Made Ground and one sample of shallow CLAY and the results indicate all samples are suitable for disposal in an inert landfill.

8.2 Recommendations

For pad, strip or raft foundations bearing on the surface of the limestone a Presumed Allowable Bearing Value of 250 kN/m^2 is considered appropriate. If pad foundations are chosen, the floor slab should be underlain by layer of compacted 6F$_2$ capping bearing existing bedrock as necessary to create the required formation level

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.

CBR values estimated from the DCP tests indicated that, near surface (<500mm) the CBR values were generally greater than 8%, however, localised soft spots may be present where the depth to bedrock deepens.

Two soakaway tests were conducted within trial pits within the proposed car park which produced infiltration rates of 8.01 x 10^{-5} and 4.31 x 10^{-5} m/s.

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.

REFERENCES & GUIDANCE

AGS, Guidance on the Waste Classification for Soils – A Practitioners' Guide 2019.
Barnes, G. 2010, Soil Mechanics Principles and Practice. 3rd Edition.
BRE, Special Digest 1:2005 (3rd Edition), Concrete in Aggressive Ground. 2005.
BR 211, Guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects), 2023.
BRE Digest 365 Soakaway Design, 2003.
BRE Digest 412 Desiccation in Clay Soils 1996
BRE465 Cover Systems for Land Regeneration 2004.
BS 10175:2011+A1:2013, Investigation of potentially contaminated sites: Code of practice.
BS 1377-2:2022. Methods of test for soils for civil engineering purposes.
BS 5930:2015+A1:2020, Code of practice for site investigations.
BS 8485:2015+A1 2019, Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
BS 8576:2013, Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs).
BS EN ISO 17892 Geotechnical Investigation & Testing. Laboratory Testing of Soil.
BS EN ISO 22476-3:2005, Geotechnical investigation and testing: Field testing - Standard penetration test.
CIRIA, C504, Engineering in glacial tills, 1999.
CIRIA 574 Engineering in Chalk, 2002
CIRIA, C665, Assessing risks posed by hazardous ground gases to buildings, 2007.
CIRIA, C682, The VOCs Handbook: Investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination, 2009.
CIRIA, C716, Remediating and mitigating risks from volatile organic compound (VOC) vapours from land affected by contamination, 2012.
CIRIA C733, Asbestos in Soil and Made Ground: A Guide to Understanding & Managing Risks.
CL:AIRE/EIC/AGS, The Soil Generic Assessment Criteria for Human Health Risk Assessment, 2009.
CL:AIRE, SP1010, Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination -Final Project Report. 2013.
CL:AIRE, The Definition of Waste: Development Industry Code of Practice Version 2
DEFRA, Circular 01/2006, Contaminated Land Environmental Protection Act 1990, Part 2A. 2006.
DEFRA, SP1010, Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document. March 2014.
Environment Agency, Verification of Remediation of Land Contamination Science Report – NC/00/38/SR
Environment Agency, Waste Classification, Guidance on the classification and assessment of waste (1st Edition V1.2GB) Technical Guidance WM3. October 2021.
EN 1997-1: 2004 & EN 1997-2 Geotechnical Design Part 1 - General Rules, Part 2 – Ground Investigation & Testing
Health & Safety Executive, HSG 66, Protection of Workers and the General Public During Redevelopment of Contaminated Land. 1991.
Highways Agency, IAN 73/06 Rev 1, Design of Pavement Foundations, 2009.
Land Contamination Risk Management www.gov.uk 08.10.2020.
LCM/CIEH, The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, S4UL3146, 2015.
NHBC Standards, 2025,
Tomlinson, M.J., 2001, Foundation Design and Construction, 7th Edition.
The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
The Definition of Waste: Development Industry Code of Practice, CL:AIRE 2011.
UKWIR, Guidance for the Selection of Water Supply Pipes to be Used in Brownfield Sites. 2011

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 (not presented within text).

Table 2: Gas Groundwater Monitoring Data

GAS & GROUNDWATER MONITORING DATA																										
SITE	London Road, Pembroke Dock																									
PROJECT No.	1360.02														**Atmospheric & Ground Conditions**											
Visit 1 of 6															**Atmospheric Pressure Variations During Visit**									**Ground Surface Conditions**		
Carried Out by:	Vince Williams (GSTL)														1010mb									Dry		
Date:	12.05.2025																									
Instrument Details	GA5000														**Atmospheric Pressure Trend Over Previous 48hrs**									**Weather Conditions**		
															Falling									Sunny, Warm		
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)**		**H2S**		**CO**		**Duration (secs)^**	**Flow Rate (l/hr)**	**Relative Pressure (mb)**	**PID (ppm)**		**Atmospheric Pressure (mb)**	**Water Level (m bgl)**	**Water Level (m AoD)**	**Depth of Pipe (m bgl)**	**Comments**			
			Peak	**Steady**		**Peak**	**Steady**	**Minimum**	**Steady**	**Minimum**	**Steady**	**Minimum**	**Steady**				**Peak**	**Steady**								
WS01	-	50	0.1	0.1	2.0	0.1	0.1	21.8	21.8	0.0	-	1.0	1.0	30	0.6		-	-	1010	Dry	-	1.910				
WS03	-	50	0.0	0.0	-	0.4	0.4	20.9	20.9	0.0	-	1.0	1.0	30	0.7		-	-	1010	Dry	-	0.900				
WS08	-	50	0.0	0.0	-	0.4	0.4	21.2	21.2	0.0	-	1.0	1.0	30	0.6		-	-	1010	Dry	-	1.830				

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

GAS & GROUNDWATER MONITORING DATA																										
SITE	London Road, Pembroke Dock																									
PROJECT No.	1360.02														**Atmospheric & Ground Conditions**											
Visit 2 of 6															**Atmospheric Pressure Variations During Visit**									**Ground Surface Conditions**		
Carried Out by:	Vince Williams (GSTL)														1024mb									Dry		
Date:	19.05.2025																									
Instrument Details	GA5000														**Atmospheric Pressure Trend Over Previous 48hrs**									**Weather Conditions**		
															Falling									Sunny, Warm		
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)**		**H2S (ppm)**		**CO (ppm)**		**Duration (secs)^**	**Flow Rate (l/hr)**	**Relative Pressure (mb)**	**PID (ppm)**		**Atmospheric Pressure (mb)**	**Water Level (m bgl)**	**Water Level (m AoD)**	**Depth of Pipe (m bgl)**	**Comments**			
			Peak	**Steady**		**Peak**	**Steady**	**Minimum**	**Steady**	**Minimum**	**Steady**	**Minimum**	**Steady**				**Peak**	**Steady**								
WS01	-	50	0.0	0.0	-	0.1	0.1	21.7	21.7	0.0	-	1.0	1.0	30	0.3	0.12	-	-	1024	Dry	-	1.910				
WS03	-	50	0.0	0.0	-	0.3	0.3	21.1	21.1	0.0	-	1.0	1.0	30	0.1	0.14	-	-	1024	Dry	-	0.900				
WS08	-	50	0.0	0.0	-	0.2	0.2	21.3	21.3	0.0	-	1.0	1.0	30	0.1	0.03	-	-	1024	Dry	-	1.830				

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

GAS & GROUNDWATER MONITORING DATA																										
SITE	London Road, Pembroke Dock																									
PROJECT No.	1360.02														**Atmospheric & Ground Conditions**											
Visit 3 of 6															**Atmospheric Pressure Variations During Visit**									**Ground Surface Conditions**		
Carried Out by:	Vince Williams (GSTL)														1008mb									Wet		
Date:	28.05.2025																									
Instrument Details	GA5000														**Atmospheric Pressure Trend Over Previous 48hrs**									**Weather Conditions**		
															Rising									Raining		
Well No.	**Cover Height (m AOD)**	**Well Diameter (mm)**	**CH_4 (% v/v)**		**CH_4 Steady LEL (%)**	**CO_2 (% v/v)**		**O_2 (% v/v)**		**H2S (ppm)**		**CO (ppm)**		**Duration (secs)^**	**Flow Rate (l/hr)**	**Relative Pressure (mb)**	**PID (ppm)**		**Atmospheric Pressure (mb)**	**Water Level (m bgl)**	**Water Level (m AoD)**	**Depth of Pipe (m bgl)**	**Comments**			
			Peak	**Steady**		**Peak**	**Steady**	**Minimum**	**Steady**	**Minimum**	**Steady**	**Minimum**	**Steady**				**Peak**	**Steady**								
WS01	-	50	0.1	0.1	2.0	0.0	0.0	22.5	22.5	0.0	-	2.0	2.0	30	0.2	0.03	-	-	1008	Dry	-	1.910				
WS03	-	50	0.1	0.1	2.0	0.2	0.1	22.6	22.6	0.0	-	1.0	1.0	30	0.1	0.02	-	-	1008	Dry	-	0.900				
WS08	-	50	0.1	0.1	2.0	0.1	0.1	22.6	22.6	0.0	-	1.0	1.0	30	0.1	0.07	-	-	1008	Dry	-	1.830				

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

Monitoring vists 1 to 3 carried out by local geotechnical testing services

GAS & GROUNDWATER MONITORING DATA																										
SITE	London Road, Pembroke Dock																									
PROJECT No.	1360.02														**Atmospheric & Ground Conditions**											
Visit 4 of 6															**Atmospheric Pressure Variations During Visit**									**Ground Surface Conditions**		
Carried Out by:	Krysia Szybut														1009 - 1010mb									Dry		
Date:	06.06.25																									
Instrument Details	GFM 436														**Atmospheric Pressure Trend Over Previous 48hrs**									**Weather Conditions**		
															Rising									Clear		
Well No.	**Cover Height (m AOD)**	**Well Diameter (mm)**	**CH_4 (% v/v)**		**CH_4 Steady LEL (%)**	**CO_2 (% v/v)**		**O_2 (% v/v)**		**H2S (ppm)**		**CO (ppm)**		**Duration (secs)^**	**Flow Rate (l/hr)**	**Relative Pressure (mb)**	**PID (ppm)**		**Atmospheric Pressure (mb)**	**Water Level (m bgl)**	**Water Level (m AoD)**	**Depth of Pipe (m bgl)**	**Comments**			
			Peak	**Steady**		**Peak**	**Steady**	**Minimum**	**Steady**	**Minimum**	**Steady**	**Minimum**	**Steady**				**Peak**	**Steady**								
WS01	-	50	0.0	0.0	-	0.0	0.0	20.6	20.6	-	-	-	-	60	6.3		-	-	1009	Dry	-	1.910				
WS03	-	50	0.0	0.0	-	0.4	0.4	20.1	20.1	-	-	-	-	60	0.0		-	-	1010	Dry	-	0.900				
WS08	-	50	0.0	0.0	-	0.2	0.1	20.4	20.4	-	-	-	-	60	0.0		-	-	1010	Dry	-	1.830				

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

Table 4: Comparison of Soil Chemical Analyses with GAC

Lab Sample Number:				Commercial GAC 2.5% SOM	541772	541773	541774	541775	541776
Sample Reference:					WS03	WS04	WS08	WS05	WS09
Top Depth (m):					0.6	0.3	0.2	0.2	0.9
Basal Depth (m):									
Strata/Material Type					CLAY	Made Ground	Made Ground	Made Ground	GRAVEL
Date Sampled:					07/05/2025	07/05/2025	07/05/2025	07/05/2025	07/05/2025
Determinand	**Units**	**Limit of detection**	**Accreditation Status**	**[mg/kg unless stated]**					
Stones	**%**	**0.01**	**NONE**		< 0.1	68.4	75	57.8	57.5
Moisture	**%**	**0.01**	**NONE**	-	11	3	3.6	5	11
Asbestos in Soil	**Type**	**N/A**	**ISO 17025**	-	Not-detected	Detected	Detected	Detected	Not-detected
Asbestos % by hand picking/weighing	**%**				-	< 0.001	< 0.001	< 0.001	-
Asbestos Containing Material Types Detected (ACM	Type				-	Loose Fibres	Loose Fibres	Loose Fibres	-
pH	**pH Units**	**N/A**	**MCERTS**	-	7.6	11.5	11.1	10.9	11.5
Arsenic	mg/kg	1.00	MCERTS	640	27	6.4	5.9	7	9.7
Beryllium	mg/kg	0.06	MCERTS	12	3.5	0.4	0.37	0.47	1.8
Boron	mg/kg	0.20	MCERTS	240000	0.7	0.9	0.5	2.1	1.6
Cadmium	mg/kg	0.20	MCERTS	190	1.9	0.3	0.2	0.4	< 0.2
Chromium (Hexavalent)	mg/kg	1.80	MCERTS	33	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (Trivalent)	mg/kg	1.00	NONE	8600	47	10	9.7	11	17
Chromium (aqua regia extractable)	mg/kg	1.00	MCERTS	-	47	11	11	11	17
Copper	mg/kg	1.00	MCERTS	68000	67	32	13	13	52
Lead	mg/kg	1.00	MCERTS	NC	100	34	120	78	58
Mercury	mg/kg	0.30	MCERTS	58^{vap} (25.8)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel	mg/kg	1.00	MCERTS	980	57	9.8	9	8.6	34
Selenium	mg/kg	1.00	MCERTS	12000	< 1.0	< 1.0	1.2	< 1.0	1.7
Vanadium	mg/kg	1.00	MCERTS	9000	62	15	16	17	32
Zinc	mg/kg	1.00	MCERTS	730000	210	99	71	200	43
Total Cyanide	mg/kg	1.00	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Fraction Organic Carbon (FOC)	**N/A**	**0.001**	**MCERTS**	-	0.001	0.019	0.012	0.0078	0.021
Calculated TOC from FOC	-	-	-	-	*0.10*	*1.90*	*1.20*	*0.78*	*2.10*
Calculated SOM from FOC	-	-	-	-	*0.17*	*3.28*	*2.07*	*1.34*	*3.62*
Aliphatic TPH >C5-C6	mg/kg	0.01	NONE	5900sol (558)	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C6-C8	mg/kg	0.01	NONE	17000sol (322)	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C8-C10	mg/kg	0.01	NONE	4800vap (190)	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Aliphatic TPH >C10-C12	mg/kg	1.00	MCERTS	23000vap (118)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	mg/kg	2.00	MCERTS	82000sol (59)	< 2.0	< 2.0	4.3	< 2.0	< 2.0
Aliphatic TPH >C16-C21	mg/kg	8.00	MCERTS	1700000	< 8.0	< 8.0	19	25	< 8.0
Aliphatic TPH >C21-C35	mg/kg	8.00	MCERTS		< 8.0	64	140	230	100
Total Aliphatic Hydrocarbons:	**mg/kg**	**10.00**	**NONE**	-	**< 10**	**64**	**160**	**260**	**100**
Aromatic TPH >C5-C7	mg/kg	0.01	NONE	46000sol (2260)	< 0.010	< 0.010	< 0.010	< 0.010	0.017
Aromatic TPH >C7-C8	mg/kg	0.01	NONE	110000sol (1920)	< 0.010	< 0.010	< 0.010	< 0.010	0.011
Aromatic TPH >C8-C10	mg/kg	0.02	NONE	8100vap (1500)	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Aromatic TPH >C10-C12	mg/kg	1.00	MCERTS	28000sol (899)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	mg/kg	2.00	MCERTS	37000	< 2.0	< 2.0	3.3	5.7	< 2.0
Aromatic TPH >C16-C21	mg/kg	10.00	MCERTS	28000	< 10	11	15	11	< 10
Aromatic TPH >C21-C35	mg/kg	10.00	MCERTS	28000	< 10	300	96	87	46
Total Aromatic Hydrocarbons	**mg/kg**	**10.00**	**NONE**	-	**< 10**	**320**	**110**	**100**	46
Calculated Sum TPH (sum Aliphatic + sum Aromatic)					***< 20***	***384***	***270***	***360***	***146***
Naphthalene	mg/kg	0.05	MCERTS	460sol (183)	< 0.05	< 0.05	< 0.05	< 0.05	0.11
Acenaphthylene	mg/kg	0.05	MCERTS	97000sol (212)	< 0.05	0.23	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	97000sol (141)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	68000	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	22000	< 0.05	0.24	0.24	0.1	0.53
Anthracene	mg/kg	0.05	MCERTS	540000	< 0.05	0.07	0.07	< 0.05	0.06
Fluoranthene	mg/kg	0.05	MCERTS	23000	< 0.05	1.1	1.1	0.56	0.63
Pyrene	mg/kg	0.05	MCERTS	54000	< 0.05	1.3	1.5	0.65	0.52
Benzo[a]anthracene	mg/kg	0.05	MCERTS	170	< 0.05	0.83	0.84	0.46	0.38
Chrysene	mg/kg	0.05	MCERTS	350	< 0.05	0.97	0.81	0.54	0.49
Benzo[b]fluoranthene	mg/kg	0.05	ISO 17025	45	< 0.05	1.6	1.2	0.77	0.47
Benzo[k]fluoranthene	mg/kg	0.05	ISO 17025	1200	< 0.05	0.54	0.42	0.4	0.2
Benzo[a]pyrene	mg/kg	0.05	MCERTS	35	< 0.05	1.4	1	0.73	0.32
Indeno(1,2,3-c,d)Pyrene	mg/kg	0.05	MCERTS	510	< 0.05	0.75	0.54	0.39	0.16
Dibenz(a,h)Anthracene	mg/kg	0.05	MCERTS	3.6	< 0.05	0.15	0.11	0.1	< 0.05
Benzo[g,h,i]perylene	mg/kg	0.05	MCERTS	4000	< 0.05	0.9	0.64	0.48	0.18
Coronene	mg/kg	0.05	NONE		-	-	-	-	
Total Of 16 PAH's	**mg/kg**	**0.8**	**ISO 17025**	-	**< 0.80**	**10.1**	**8.54**	**5.18**	**4.04**
Total Of 17 PAH's	**mg/kg**	**0.85**	**ISO 17025**		**-**	**-**	**-**	**-**	
Benzene	µg/kg	5.00	MCERTS	47*	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5.00	MCERTS	110000vap (1920)*	< 5.0	< 5.0	< 5.0	< 5.0	16
Ethylbenzene	µg/kg	5.00	MCERTS	13000vap (1220)*	< 5.0	< 5.0	< 5.0	< 5.0	11
p & m-xylene	µg/kg	8.00	MCERTS	14000sol (1350)*	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
o-xylene	µg/kg	5.00	MCERTS	15000sol (1120)*	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5.00	NONE	13000	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Phenols	mg/kg	1.00	MCERTS	690dir (30000)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Determinand concentration below the GAC

Determinand concentration in exceedance of GAC

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

NC: No published criteria, U/S: Unsuitable sample.

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

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

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

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

** Value presented in mg/kg*

FIGURES

Notes

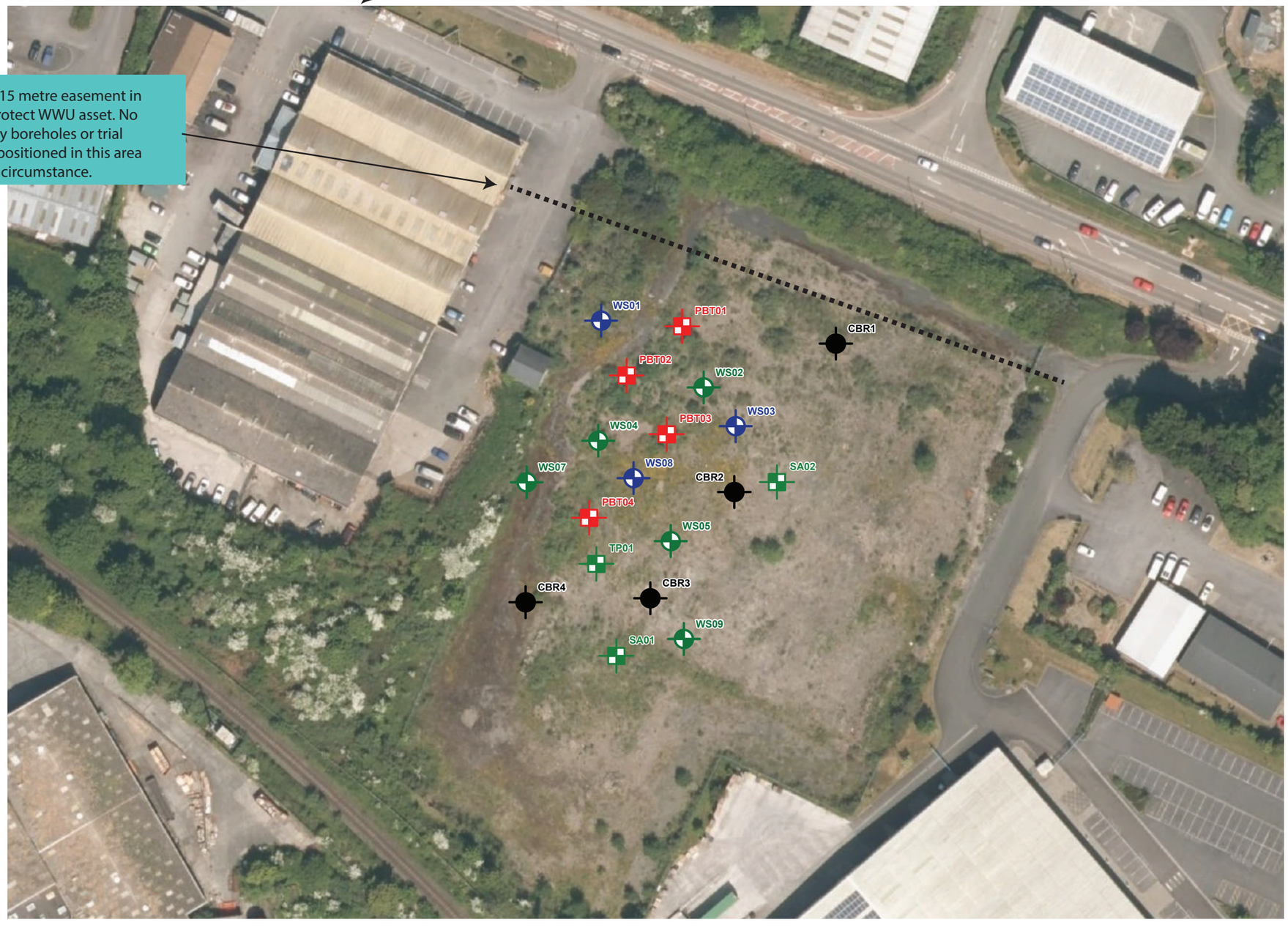
Revision	Approved	Date

Project Title: London Road, Pembroke Dock	Scale: as shown	Drawn: PD	Size: A4
Drawing Title: Site Location Plan	Date: 10.01.25	Job No.: 1360	Figure No.: 01
Client: Lidl Great Britain Ltd			

REMADA GEO CONSULTANTS

Approximate position of WWU's High Pressure Gas Main. See site specific utility survey for detail positioning.

Minimum 15 metre easement in place to protect WWU asset. No exploratory boreholes or trial pits to be positioned in this area under any circumstance.



Legend

- WS01 — Window Sample & Installation
- WS02 — Window Sample borehole (backfilled with arisings upon completion)
- TP01 — Trial Pit (for WS06)
- PBT01 — Plate Bearing Test
- 15m easement from gas main
- CBR1 — CBR Test

Revision	Approved	Date

Project Title
Lidl Pembroke Dock

Drawing Title
Exploratory Hole Location Plan

Client
Lidl Great Britain Ltd

Scale	Drawn	Size
as shown	KS	A4
Date	Job No.	Figure No.
09/05/25	1360	02

REMADA GEO CONSULTANTS

Approximate position of WWU's High Pressure Gas Main. See site specific utility survey for detail positioning.

Minimum 15 metre easement in place to protect WWU asset. No exploratory boreholes or trial pits to be positioned in this area under any circumstance.

TOTAL SITE AREA = 23294 SQ M OR 5.756 ACRES (RED AND BLUE)

E AREA = 10848 SQ M OR 2.681 ACRES

BLUE SITE AREA = 12447 SQ M OR 3.076 ACRES

10.5m WIDE SITE ACCESS AMENDED TO ACCOMODATE HGV'S

SCHEDULE OF AREAS (TYPE 1300)	
SALES =	1334 m²
WAREHOUSE=	410 m²*
ANCILLARY=	218 m²*
GIA =	1962 m²
*[AS PER LIDL'S LATEST SPECIFICATION DRAWING DATED FEB 2024]	

KEY

HIGH PRESSURE GAS MAIN

WS01 PBT01 CBR1 PBT02 WS02 WS03 PBT03 WS04 WS08 WS07 CBR2 SA02 PBT04 WS05 TP01 CBR3 CBR4 WS09 SA01

FURTHER DEVELOPMENT LAND

LONDON ROAD

HIGH PRESSURE MAIN

ISAAC WAY

Ambulance Station

Legend

- WS01 Window Sample & Installation
- WS02 Window Sample borehole (backfilled with arisings upon completion)
- TP01 Trial Pit (for WS06)
- PBT01 Plate Bearing Test
- 15m easement from gas main
- CBR1 CBR Test

Notes

Proposed site layout reproduced from client's supplied HTC Architects' Proposed Site Plan Option 8 (T13 & Further Development Land) drawing ref: 3305_F411 Rev D, dated April 2024.

The proposed site layout plan presented here is indicative only and may be subject to change following publication of Remada's report.

Revision	Approved	Date

Project Title: Lidl Pembroke Dock

Drawing Title: Proposed Layout Plan

Client: Lidl Great Britain Ltd

Scale	Drawn	Size
as shown	KS	A4
Date	Job No.	Figure No.
09/05/25	1360	03

REMADA GEO CONSULTANTS

EXPLORATORY HOLE LOGS

Percussion Drilling Log

Project Name: Pembroke Dock	Client: Lidl Great Britain Ltd	Date: 07/05/2025
Location: London Road	Contractor:	Co-ords: E198076.00 N203321.00
Project No. : 1360.02	Crew Name:	Drilling Equipment: Tracked rig

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS01	WS		KS	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			Grass over dark brown slightly clayey slightly gravelly sandy TOPSOIL. Gravel is subangular limestone.
		0.70	D					Firm/stiff slightly gravelly CLAY. Gravel is angular to subangular fine to coarse limestone.
		1.00	D		0.80			Light brown slightly gravelly SAND. Gravel is angular to subangular fine to coarse limestone.
		1.00	SPT	N=6 (1,1/1,2,1,2)				
		1.30 - 2.00	B		1.30			Firm/stiff brown slightly gravelly CLAY. Gravel is angular to subangular fine to coarse limestone.
		1.80		HVP=50				*Subangular limestone cobble.*
		1.90		HVP=65				*Subangular limestone cobble.*
		2.00		HVP=68	2.00			
		2.00	SPT	50 (2,11/50,,,)				End of Borehole at 2.000m

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

Remarks

1. Groundwater not encountered during drilling.
2. Terminated due to SPT refusal (N>50).
3. Combined gas and groundwater monitoring well installed on completion.

Percussion Drilling Log

Project Name: Pembroke Dock	Client: Lidl Great Britain Ltd	Date: 07/05/2025
Location: London Road	Contractor:	Co-ords: E198098.00 N203311.00
Project No. : 1360.02	Crew Name:	Drilling Equipment: Tracked rig

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS02	WS		KS	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.90 1.00	ES SPT	N=50 (2,2/50 for 290mm)	0.80 1.00			MADE GROUND: Brown and grey very sandy cobbly angular to subrounded fine to coarse limestone, sandstone, brick and concrete. MADE GROUND: Black and brown sand and gravel. Gravel is subangular to subrounded fine to coarse tarmac and sandstone. End of Borehole at 1.000m

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

Remarks

1. Groundwater not encountered during drilling.
2. Terminated due to SPT refusal (N>50).
3. Backfilled with arisings on completion.

Percussion Drilling Log

REMADA GEO CONSULTANTS

Project Name: Pembroke Dock	Client: Lidl Great Britain Ltd	Date: 07/05/2025
Location: London Road	Contractor:	Co-ords: E198108.00 N203298.00
Project No. : 1360.02	Crew Name:	Drilling Equipment: Tracked rig

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS03	WS		KS	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.50		HVP=70	0.50			MADE GROUND: Brown very sandy angular to subrounded fine to coarse gravel of limestone, concrete and brick.
		0.60	ES					*Subangular limestone cobbles.*
		0.60		HVP=77				Firm to stiff brown slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse limestone with occasional cobbles.
		0.70		HVP=70				
		0.80 - 1.80	B					
		1.00	SPT	N=9 (1,2/2,3,2,2)				
					1.80			Extremely strong medium bedded grey locally orange / oxidised LIMESTONE recovered as gravel and cobbles.
		2.00	SPT	N=50 (11,14/50 for 195mm)	2.00			End of Borehole at 2.000m

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

Remarks

1. Groundwater not encountered during drilling.
2. Terminated due to SPT refusal (N>50).
3. Combined gas and groundwater monitoring well installed on completion.

AGS

Percussion Drilling Log

Project Name: Pembroke Dock	Client: Lidl Great Britain Ltd	Date: 07/05/2025
Location: London Road	Contractor:	Co-ords: E198072.00 N203296.00
Project No. : 1360.02	Crew Name:	Drilling Equipment: Tracked rig

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS04	WS		KS	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES		0.45			MADE GROUND: Brown and grey very sandy angular to subrounded fine to coarse gravel if brick, concrete, limestone and sandstone.
		0.50	ES		0.60			MADE GROUND: Very dark grey sand and gravel. Gravel is angular to subrounded fine to coarse tarmac and sandstone.
		0.70	D		0.80			Stiff gravelly CLAY. Gravel is angular to subangular fine to coarse limestone.
		0.80	SPT	N=50 (1,15/50 for 230mm)				End of Borehole at 0.800m

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

Remarks

1. Groundwater not encountered during drilling.
2. Terminated due to SPT refusal (N>50).
3. Backfilled with arisings on completion.

Percussion Drilling Log

Project Name: Pembroke Dock	Client: Lidl Great Britain Ltd	Date: 08/05/2025
Location: London Road	Contractor:	Co-ords: E198089.00 N203268.00
Project No. : 1360.02	Crew Name:	Drilling Equipment: Tracked rig

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS05	WS		KS	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.50			MADE GROUND: Brown and grey very sandy angular to subrounded fine to coarse gravel of limestone, brick, tarmac and concrete.
		0.90 - 1.80	B		0.85			Brown and grey clayey angular to subangular fine to coarse GRAVEL of limestone with rare cobbles.
		0.90		HVP=63				Firm brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse limestone.
		1.00		HVP=64				
		1.00	SPT	N=48 (3,3/18,18,4,8)				
		1.20		HVP=64				
		1.30	D					
		1.30		HVP=50	1.80			
		1.80		HVP=52				End of Borehole at 1.800m
		1.80	SPT	N=32 (3,3/7,10,7,8)				

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

Remarks

1. Groundwater not encountered during drilling.
2. Terminated due to gravel or cobbles within the borehole causing the drilling barrel to bend over, attempted twice.
3. Backfilled with arisings on completion.

Percussion Drilling Log

Project Name: Pembroke Dock	Client: Lidl Great Britain Ltd	Date: 07/05/2025
Location: London Road	Contractor:	Co-ords: E198054.00 N203283.00
Project No. : 1360.02	Crew Name:	Drilling Equipment: Tracked rig

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS07	WS		KS	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.25	SPT	N=50 (8,6/50,0,0,0)	0.25			Extremely strong medium bedded grey locally orange / oxidised LIMESTONE recovered as gravel and cobbles.
								End of Borehole at 0.250m

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

Remarks

1. Groundwater not encountered during drilling.
2. Terminated due to SPT refusal (N>50).
3. Backfilled with arisings on completion.

Percussion Drilling Log

Project Name: Pembroke Dock	Client: Lidl Great Britain Ltd	Date: 08/05/2025
Location: London Road	Contractor:	Co-ords: E198080.00 N203290.00
Project No. : 1360.02	Crew Name:	Drilling Equipment: Tracked rig

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS08	WS		KS	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20 0.25 - 1.00	ES B		0.25			MADE GROUND: Brown very sandy angular to subrounded fine to coarse gravel of brick, glass, limestone and concrete.
		1.00	SPT	N=50 (3,6/10,16,12,12)	1.00			Extremely strong medium bedded grey locally orange / oxidised LIMESTONE recovered as gravel and cobbles.
								End of Borehole at 1.000m

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

Remarks

1. Groundwater not encountered during drilling.
2. Terminated due to SPT refusal (N>50).
3. Combined gas and groundwater monitoring well installed on completion.

Percussion Drilling Log

Project Name: Pembroke Dock	Client: Lidl Great Britain Ltd	Date: 08/05/2025
Location: London Road	Contractor:	Co-ords: E198091.00 N203246.00
Project No. : 1360.02	Crew Name:	Drilling Equipment: Tracked rig

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS09	WS		KS	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.40	SPT	N=50 (10,8/50 for 75mm)	0.40			Extremely strong medium bedded grey locally orange / oxidised LIMESTONE recovered as gravel and cobbles. End of Borehole at 0.400m

1 2 3 4 5 6 7 8 9 10

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

Remarks

1. Groundwater not encountered during drilling.
2. Terminated due to SPT refusal (N>50).
3. Backfilled with arisings on completion.

AGS

Trial Pit Log

Project Name: Pembroke Dock	Client: Lidl Great Britain Ltd	Date: 06/06/2025
Location: London Road	Contractor:	Co-ords: E198076.00 N203269.00
Project No. : 1360.02	Crew Name:	Equipment: 8 Tonne tracked excavator

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP01	TP		KS	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20			MADE GROUND: Brownish grey sandy angular to subrounded fine to coarse gravel of concrete, brick, sandstone and tarmac.
					0.40			Brown clayey angular to subangular fine to coarse GRAVEL of limestone.
					0.50			Extremely strong medium bedded grey locally orange / oxidised LIMESTONE recovered as cobbles and boulders.
								End of Borehole at 0.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

1. Groundwater not encountered
2. Backfilled with arisings upon completion.

APPENDIX A

SPT Hammer Energy Test Certificate

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

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

SPT Hammer Ref:	DART594
Test Date:	24/07/2024
Report Date:	24/07/2024
File Name:	DART594.spt
Test Operator:	JL

Instrumented Rod Data

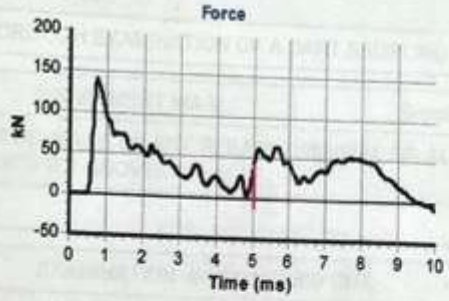
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.4
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	72572
Accelerometer No.2:	72572

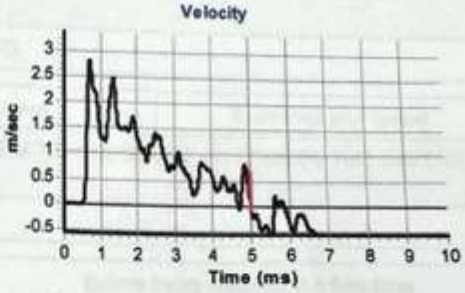
SPT Hammer Information

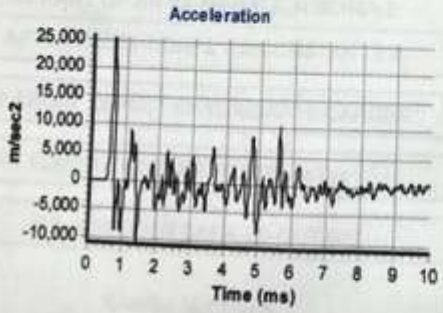
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

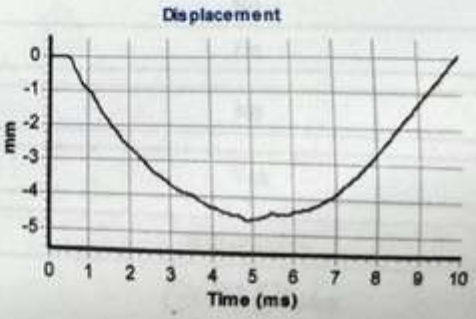
Comments / Location

GSTL -









Calculations

Area of Rod A (mm2):	957
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	304

Energy Ratio E_r (%): **64**

Signed: C.McCLUSKEY

Title: FITTER

The recommended calibration interval is 12 months

APPENDIX B

Soakaway Test Results

Soakaway Test Report

REMADA GEO CONSULTANTS

Client:	Lidl Great Britain Ltd
Job Name:	Pembroke Dock
Job No.:	1360.02

Trial Pit No.	SA1
Test No.	1
Coordinates:	198075, 203249

Test Date: 05.06.25

Soil Description: 0-0.15 sandy gravel Made Ground
0.15-1.0 gravel / cobble/ boulders of Limestone

Weather Conditions: Dry & sunny

Time	Elapsed Time	Depth to water from ground level	
	(min)	(m)	(mm)
10:29	0	0.520	520
10:30	1	0.555	555
10:31	2	0.610	610
10:32	3	0.650	650
10:33	4	0.680	680
10:34	5	0.710	710
10:35	6	0.760	760
10:36	7	0.785	785
10:37	8	0.820	820
10:38	9	0.870	870
10:39	10	0.920	920
10:40	11	0.960	960

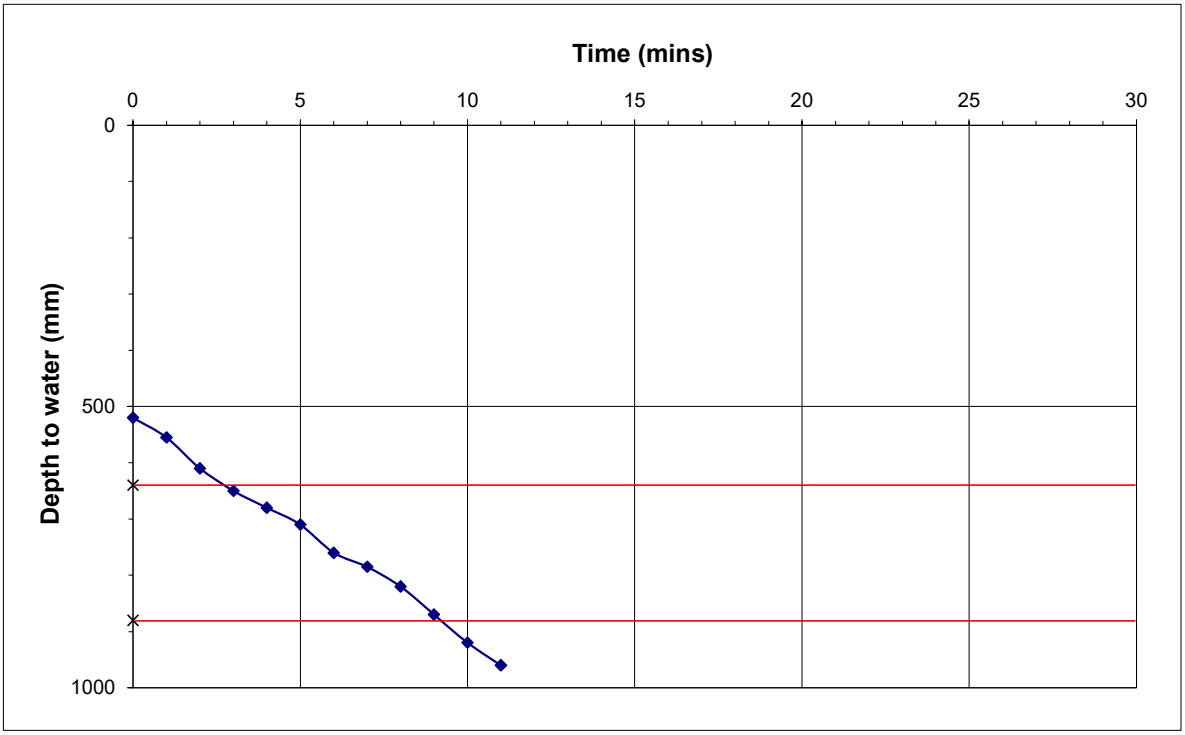
Soakaway Dimensions		(m)	(mm)
Length	=	0.90	900
Width	=	0.90	900
Depth	=	1.00	1000

Effective depth (empty)		m	mm
25%	=	0.88	880.0
50%	=	0.76	760.0
75%	=	0.64	640.0

Depth at start of test (mm)	=	520
Depth at end of test (mm)	=	960

Base area of pit	=	0.810
a_{p50} - 50% internal surface area inc. base	=	1.674
V_{p75-25} - Volume 75 - 25%	=	0.194

$t_{p\,75}$ (min) = (Read from graph)	3
$t_{p\,25}$ (min) = (Read from graph)	9
t_p values extrapolated from graph data =	6
t_p value (seconds) =	360



Soil infiltration rate, f, (m/s) = **3.23E-04** **(normal test)**

Soil infiltration rate, f, (m/s) = ~~***(pit filled with stone)***~~

Notes:

Logged By	*LH*	*Checked by*	*KS*

Soakaway Test Report

REMADA GEO CONSULTANTS

Client:	Lidl Great Britain Ltd
Job Name:	Pembroke Dock
Job No.:	1360.02

Trial Pit No.	SA1
Test No.	2
Coordinates:	198075, 203249

Test Date: 05.06.25

Soil Description: 0-0.15 sandy gravel Made Ground
0.15-1.0 gravel / cobble/ boulders of Limestone

Weather Conditions: Dry & sunny

Time	Elapsed Time	Depth to water from ground level	
	(min)	(m)	(mm)
10:42	0	0.520	520
10:43	1	0.550	550
10:44	2	0.575	575
10:45	3	0.615	615
10:46	4	0.635	635
10:47	5	0.650	650
10:48	6	0.675	675
10:49	7	0.690	690
10:50	8	0.710	710
10:51	9	0.740	740
10:52	10	0.750	750
10:53	11	0.765	765
10:54	12	0.780	780
10:55	13	0.805	805
10:56	14	0.845	845
10:57	15	0.890	890
10:58	16	0.920	920
10:59	17	0.955	955

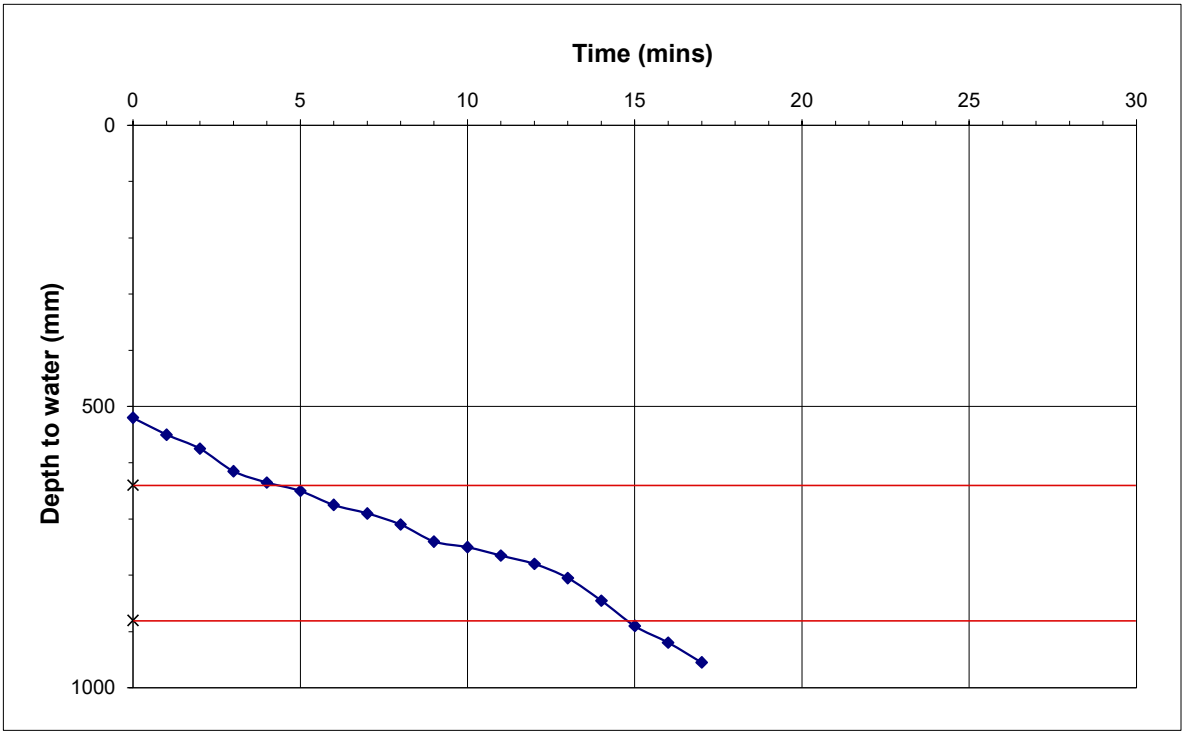
Soakaway Dimensions		(m)	(mm)
Length	=	0.90	900
Width	=	0.90	900
Depth	=	1.00	1000

Effective depth (empty)		m	mm
25%	=	0.88	880.0
50%	=	0.76	760.0
75%	=	0.64	640.0

Depth at start of test (mm)	=	520
Depth at end of test (mm)	=	955

Base area of pit	=	0.810
a_{p50} - 50% internal surface area inc. base	=	1.674
V_{p75-25} - Volume 75 - 25%	=	0.194

$t_{p\ 75}$ (min) = (Read from graph)	4.5
$t_{p\ 25}$ (min) = (Read from graph)	15
t_p values extrapolated from graph data =	10.5
t_p value (seconds) =	630



Soil infiltration rate, f, (m/s) = **1.84E-04** **(normal test)**

Soil infiltration rate, f, (m/s) = ~~***(pit filled with stone)***~~

Notes:

Logged By	*LH*	*Checked by*	*KS*

Soakaway Test Report

REMADA GEO CONSULTANTS

Client:	Lidl Great Britain Ltd
Job Name:	Pembroke Dock
Job No.:	1360.02

Test Date: 05.06.25

Soil Description: 0-0.15 sandy gravel Made Ground
0.15-1.0 gravel / cobble/ boulders of Limestone

Weather Conditions: Dry & sunny

Trial Pit No.	SA1
Test No.	3
Coordinates:	198075, 203249

Time	Elapsed Time	Depth to water from ground level	
	(min)	(m)	(mm)
13:00	0	0.485	485
13:01	1	0.525	525
13:02	2	0.560	560
13:03	3	0.590	590
13:04	4	0.610	610
13:05	5	0.630	630
13:06	6	0.650	650
13:07	7	0.670	670
13:08	8	0.680	680
13:09	9	0.690	690
13:10	10	0.695	695
13:12	12	0.710	710
13:14	14	0.730	730
13:16	16	0.745	745
13:18	18	0.760	760
13:20	20	0.780	780
13:22	22	0.800	800
13:24	24	0.815	815
13:26	26	0.835	835
13:28	28	0.860	860
13:30	30	0.880	880

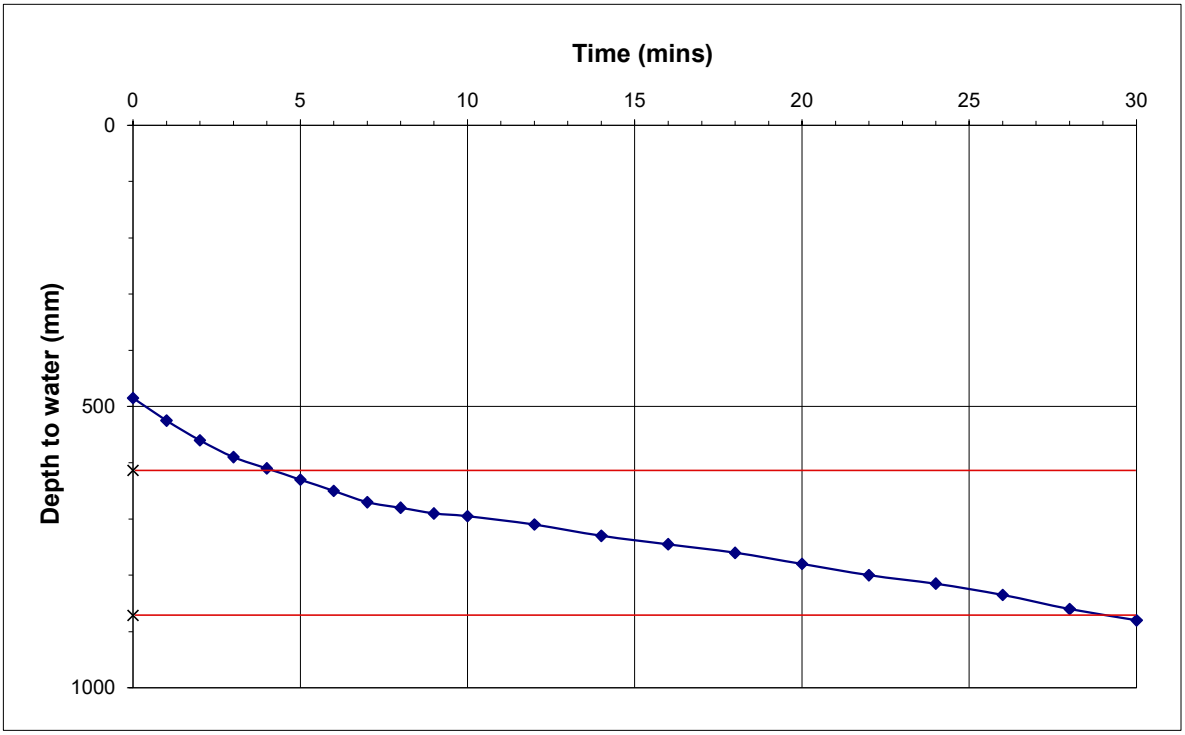
Soakaway Dimensions		(m)	(mm)
Length	=	0.90	900
Width	=	0.90	900
Depth	=	1.00	1000

Effective depth (empty)		m	mm
25%	=	0.87	871.3
50%	=	0.74	742.5
75%	=	0.61	613.8

Depth at start of test (mm)	=	485
Depth at end of test (mm)	=	880

Base area of pit	=	0.810
a_{p50} - 50% internal surface area inc. base	=	1.737
V_{p75-25} - Volume 75 - 25%	=	0.209

$t_{p\,75}$ (min) = (Read from graph)	4
$t_{p\,25}$ (min) = (Read from graph)	29
t_p values extrapolated from graph data =	25
t_p value (seconds) =	1500



Soil infiltration rate, f, (m/s) = **8.01E-05** **(normal test)**

Soil infiltration rate, f, (m/s) = ***~~(pit filled with stone)~~***

Notes: JCB could not break out Dolostone. Negligible Infiltration

0.3

Logged By	*LH*	*Checked by*	*KS*

Soakaway Test Report

REMADA GEO CONSULTANTS

Client:	Lidl Great Britain Ltd
Job Name:	Pembroke Dock
Job No.:	1360.02

Trial Pit No.	SA2
Test No.	1
Coordinates:	198114, 203290

Test Date: 05.06.25

Soil Description: 0-0.25 sandy gravel Made Ground
0.15-0.90 gravel / cobble/ boulders of Limestone

Weather Conditions: Dry & sunny

Time	Elapsed Time	Depth to water from ground level	
	(min)	(m)	(mm)
8:00	0	0.400	400
8:01	1	0.410	410
8:02	2	0.420	420
8:03	3	0.430	430
8:04	4	0.440	440
8:05	5	0.450	450
8:10	10	0.485	485
8:20	20	0.555	555
8:30	30	0.605	605
8:40	40	0.665	665
8:50	50	0.710	710
9:00	60	0.765	765
9:10	70	0.810	810
9:20	80	0.870	870

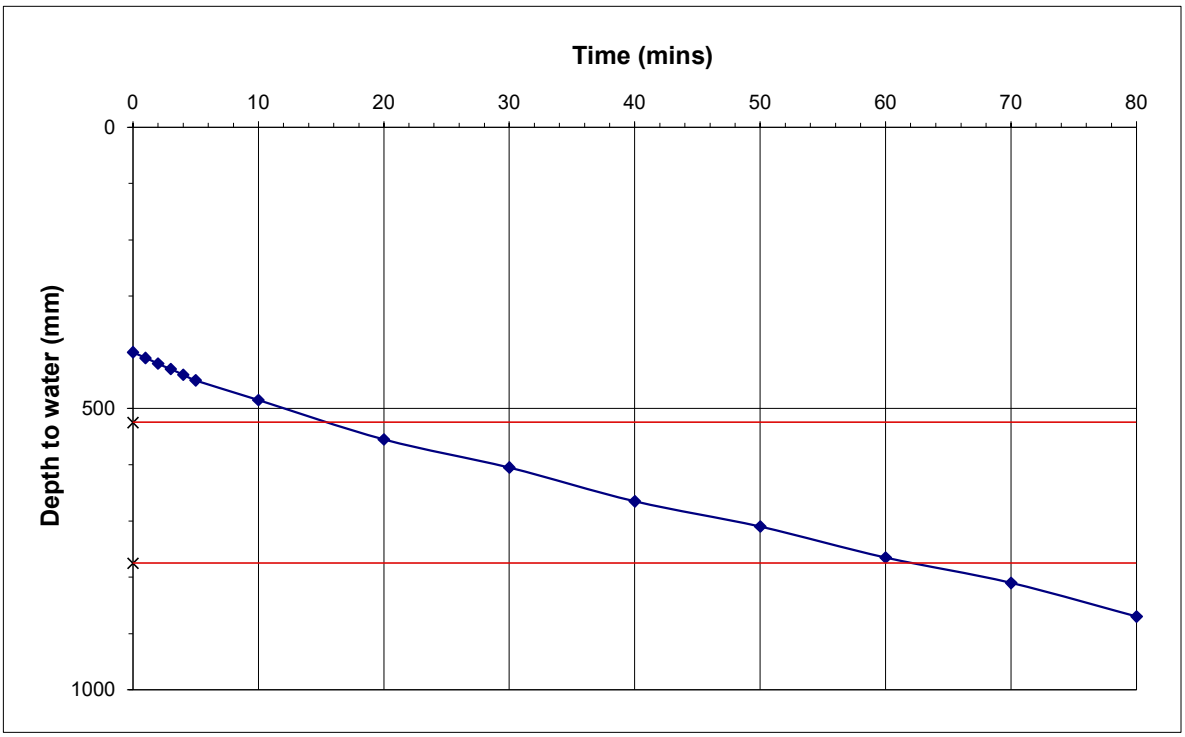
Soakaway Dimensions		(m)	(mm)
Length	=	1.00	1000
Width	=	0.90	900
Depth	=	0.90	900

Effective depth (empty)		m	mm
25%	=	0.78	775.0
50%	=	0.65	650.0
75%	=	0.53	525.0

Depth at start of test (mm)	=	400
Depth at end of test (mm)	=	870

Base area of pit	=	0.900
a_{p50} - 50% internal surface area inc. base	=	1.850
V_{p75-25} - Volume 75 - 25%	=	0.225

$t_{p\ 75}$ (min) = (Read from graph)	16
$t_{p\ 25}$ (min) = (Read from graph)	63
t_p values extrapolated from graph data =	47
t_p value (seconds) =	2820



Soil infiltration rate, f, (m/s) = **4.31E-05** **(normal test)**

Soil infiltration rate, f, (m/s) = ***~~(pit filled with stone)~~***

Notes:

Logged By	*LH*	*Checked by*	*KS*

Soakaway Test Report

REMADA GEO CONSULTANTS

Client:	Lidl Great Britain Ltd
Job Name:	Pembroke Dock
Job No.:	1360.02

Test Date: 05.06.25

Soil Description: 0-0.25 sandy gravel Made Ground
0.15-0.90 gravel / cobble/ boulders of Limestone

Weather Conditions: Dry & sunny

Trial Pit No.	SA2
Test No.	2
Coordinates:	198114, 203290

Time	Elapsed Time	Depth to water from ground level	
	(min)	(m)	(mm)
07:55	0	0.400	400
07:56	1	0.410	410
07:57	2	0.430	430
07:58	3	0.440	440
07:59	4	0.450	450
08:00	5	0.455	455
08:05	10	0.495	495
08:15	20	0.535	535
08:25	30	0.590	590
08:35	40	0.655	655
08:45	50	0.705	705
08:55	60	0.765	765
09:05	70	0.855	855

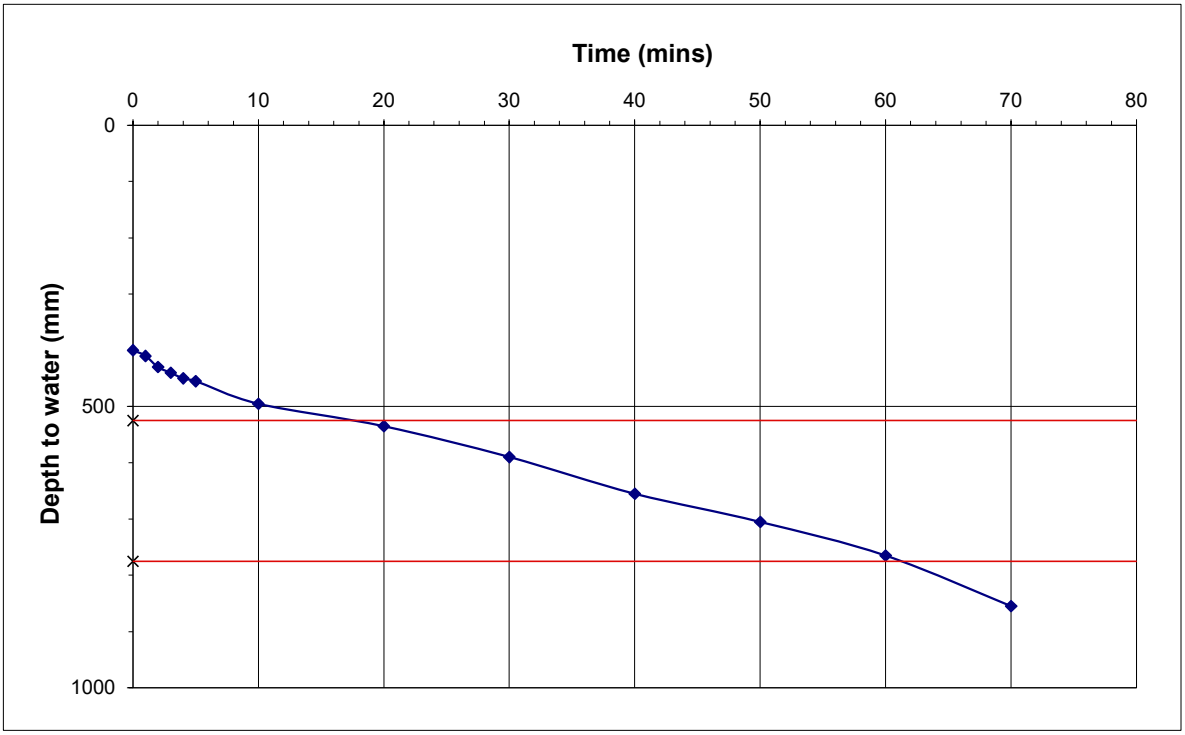
Soakaway Dimensions		(m)	(mm)
Length	=	1.00	1000
Width	=	0.90	900
Depth	=	0.90	900

Effective depth (empty)		m	mm
25%	=	0.78	775.0
50%	=	0.65	650.0
75%	=	0.53	525.0

Depth at start of test (mm)	=	400
Depth at end of test (mm)	=	855

Base area of pit	=	0.900
a_{p50} - 50% internal surface area inc. base	=	1.850
V_{p75-25} - Volume 75 - 25%	=	0.225

$t_{p\ 75}$ (min) = (Read from graph)	18
$t_{p\ 25}$ (min) = (Read from graph)	62
t_p values extrapolated from graph data =	44
t_p value (seconds) =	2640



Soil infiltration rate, f, (m/s) = **4.61E-05** **(normal test)**

Soil infiltration rate, f, (m/s) = ***~~(pit filled with stone)~~***

Notes:

Logged By	*LH*	*Checked by*	*KS*

Soakaway Test Report

REMADA GEO CONSULTANTS

Client:	Lidl Great Britain Ltd
Job Name:	Pembroke Dock
Job No.:	1360.02

Test Date: 05.06.25

Soil Description: 0-0.25 sandy gravel Made Ground
0.15-0.90 gravel / cobble/ boulders of Limestone

Weather Conditions: Dry & sunny

Trial Pit No.	SA2
Test No.	3
Coordinates:	198114, 203290

Time	Elapsed Time	Depth to water from ground level	
	(min)	(m)	(mm)
09:17	0	0.395	395
09:18	1	0.410	410
09:19	2	0.430	430
09:20	3	0.435	435
09:21	4	0.440	440
09:22	5	0.450	450
09:27	10	0.480	480
09:37	20	0.555	555
09:47	30	0.605	605
09:57	40	0.650	650
10:07	50	0.705	705
10:17	60	0.770	770
10:27	70	0.825	825
10:37	80	0.880	880

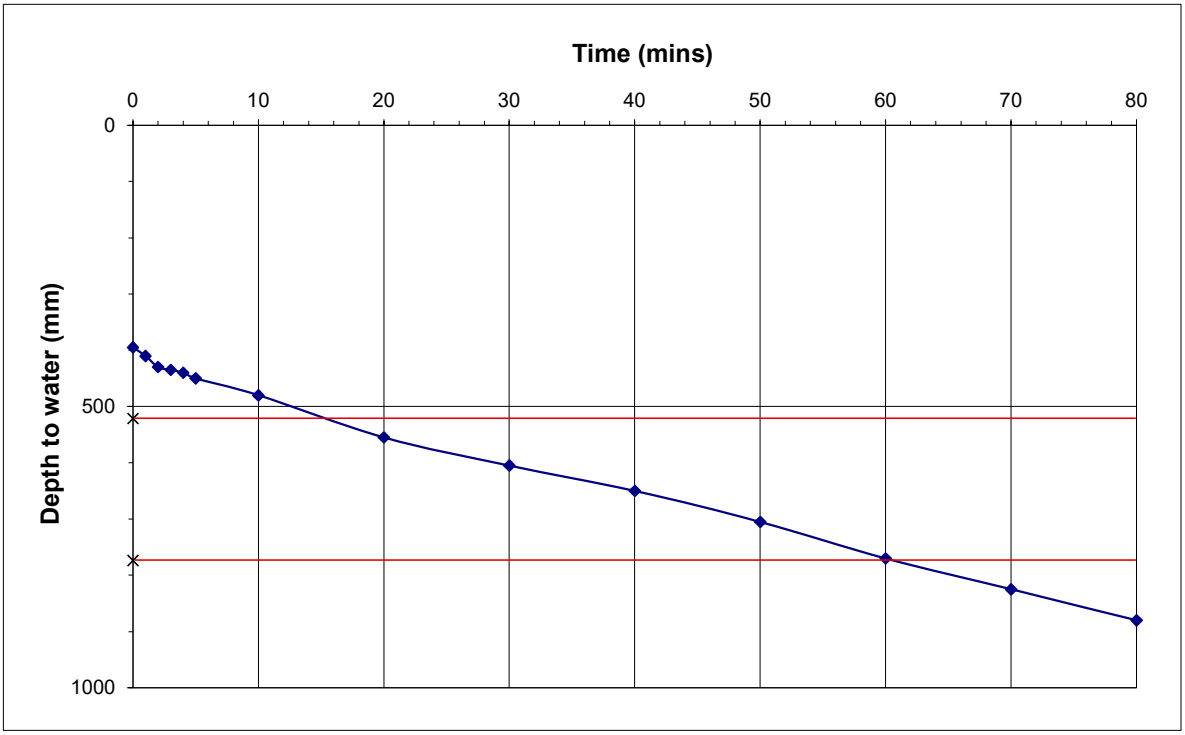
Soakaway Dimensions		(m)	(mm)
Length	=	1.00	1000
Width	=	0.90	900
Depth	=	0.90	900

Effective depth (empty)		m	mm
25%	=	0.77	773.8
50%	=	0.65	647.5
75%	=	0.52	521.3

Depth at start of test (mm)	=	395
Depth at end of test (mm)	=	880

Base area of pit	=	0.900
a_{p50} - 50% internal surface area inc. base	=	1.860
V_{p75-25} - Volume 75 - 25%	=	0.227

$t_{p\,75}$ (min) = (Read from graph)	15
$t_{p\,25}$ (min) = (Read from graph)	60
t_p values extrapolated from graph data =	45
t_p value (seconds) =	2700



Soil infiltration rate, f, (m/s) = **4.53E-05** **(normal test)**

Soil infiltration rate, f, (m/s) = ***~~(pit filled with stone)~~***

Notes: JCB could not break out Dolostone. Negligible Infiltration

0.3

Logged By	*LH*	*Checked by*	*KS*

APPENDIX C

Plate Bearing Test Results

Plate Bearing Test Report

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

Client :	Lidl Great Britain Ltd
Job Name:	Pembroke Dock
Job Number	1360.02
Site	Isaac Way, Pembroke Dock

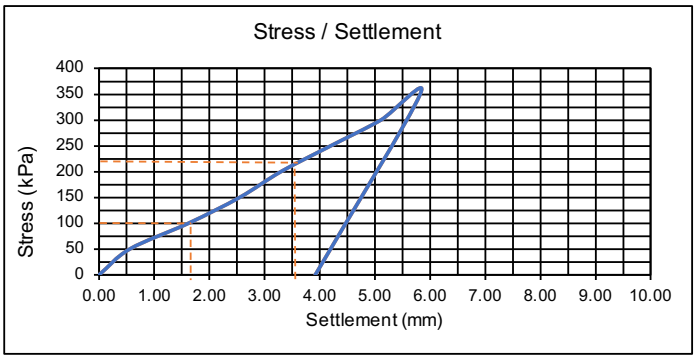
Test Date:	05.06.25
Reaction Load	16.5 tonne tracked exca
Plate Diameter (mm)	450
Layer Thickness (mm)	0

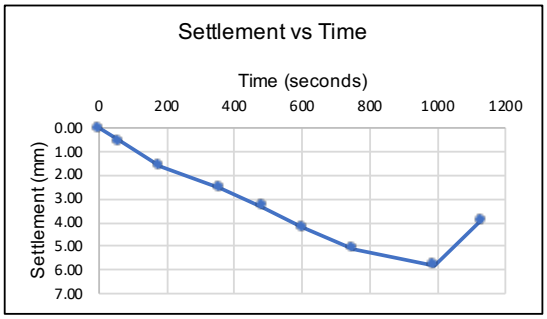
Test Location	PBT1
Test Strata	Sandy Gravel
Ground Condition	Dry
Material	Sandy Gravel
Weather	Dry Sunny

Equivalent CBR Value (%)	4.0
Maximum Applied Stress (kPa)	350.0
Maximum Settlement (mm)	5.82
Bearing Pressure at 1.25mm Settlement (kPa)	64.9
K762 (at 1.25mm settlement) kN/m2/m	32.37

Time (s)	Stress (kPa)	Settlement (mm)
0	0	0.00
60	50	0.56
180	100	1.62
360	150	2.55
480	200	3.30
600	250	4.20
750	300	5.11
990	350	5.82
1130	0	3.92

Remarks:





Deformation Modulus (EV) Calculation

Plate Diameter (mm)	Maximum σ [kN/m²]	0.3 σ [kN/m²]	0.7 σ [kN/m²]	s1 (mm)	s2 (mm)	Ev [MN/m²]
450	350.0	105.00	245.00	1.72	4.11	**19.71**

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

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

Report Prepared By: L Hillman Date: 09.06.25
Approved By: G Jones Date: 12.06.23

Plate Bearing Test Report

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

Client :	Lidl Great Britain Ltd
Job Name:	Pembroke Dock
Job Number	1360.02
Site	Isaac Way, Pembroke Dock

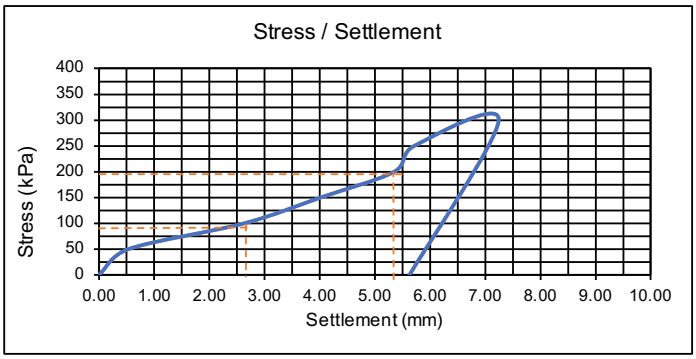
Test Date:	05.06.25
Reaction Load	16.5 tonne tracked exca
Plate Diameter (mm)	450
Layer Thickness (mm)	0

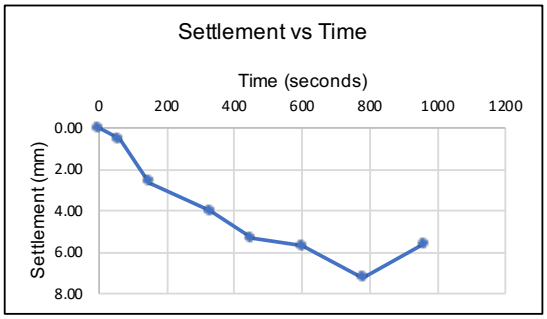
Test Location	PBT2
Test Strata	Sandy Gravel
Ground Condition	Dry
Material	Sandy Gravel
Weather	Dry Sunny

Equivalent CBR Value (%)	2.5
Maximum Applied Stress (kPa)	300.0
Maximum Settlement (mm)	7.25
Bearing Pressure at 1.25mm Settlement (kPa)	49.2
K762 (at 1.25mm settlement) kN/m2/m	24.53

Time (s)	Stress (kPa)	Settlement (mm)
0	0	0.00
60	50	0.54
150	100	2.64
330	150	4.02
450	200	5.36
600	250	5.72
780	300	7.25
960	0	5.63

Remarks:





Deformation Modulus (EV) Calculation

Plate Diameter (mm)	Maximum σ [kN/m²]	0.3 σ [kN/m²]	0.7 σ [kN/m²]	s1 (mm)	s2 (mm)	Ev [MN/m²]
450	300.0	90.00	210.00	2.22	5.43	**12.62**

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

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

Report Prepared By: L Hillman Date: 09.06.25
Approved By: G Jones Date: 12.06.23

Plate Bearing Test Report

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

Client :	Lidl Great Britain Ltd
Job Name:	Pembroke Dock
Job Number	1360.02
Site	Isaac Way, Pembroke Dock

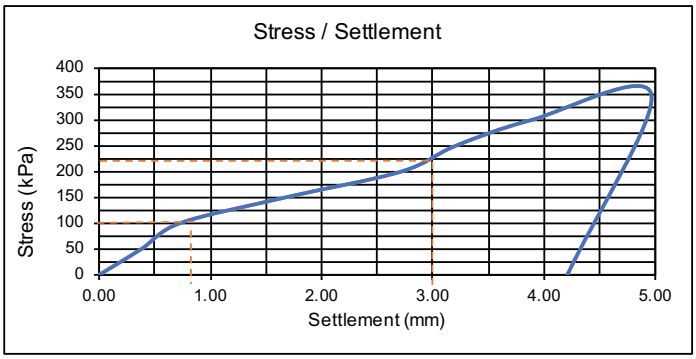
Test Date:	05.06.25
Reaction Load	8 tonne tracked excacat
Plate Diameter (mm)	450
Layer Thickness (mm)	0

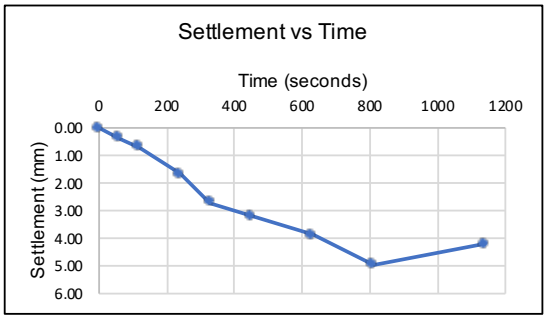
Test Location	PBT3
Test Strata	Sandy Gravel
Ground Condition	Dry
Material	Sandy Gravel
Weather	Dry Sunny

Equivalent CBR Value (%)	9
Maximum Applied Stress (kPa)	350.0
Maximum Settlement (mm)	4.96
Bearing Pressure at 1.25mm Settlement (kPa)	101.3
K762 (at 1.25mm settlement) kN/m2/m	50.51

Time (s)	Stress (kPa)	Settlement (mm)
0	0	0.00
60	50	0.38
120	100	0.73
240	150	1.68
330	200	2.72
450	250	3.21
630	300	3.89
810	350	4.96
1140	0	4.21

Remarks:





Deformation Modulus (EV) Calculation

Plate Diameter (mm)	Maximum σ [kN/m²]	0.3 σ [kN/m²]	0.7 σ [kN/m²]	s1 (mm)	s2 (mm)	Ev [MN/m²]
450	350.0	105.00	245.00	0.82	3.16	**20.23**

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

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

Report Prepared By: L Hillman Date: 09.06.25
Approved By: G Jones Date: 12.06.23

Plate Bearing Test Report

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

Client :	Lidl Great Britain Ltd
Job Name:	Pembroke Dock
Job Number	1360.02
Site	Isaac Way, Pembroke Dock

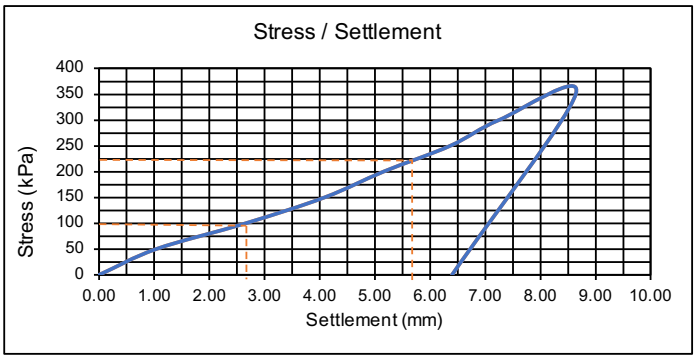
Test Date:	05.06.25
Reaction Load	16.5 tonne tracked exca
Plate Diameter (mm)	450
Layer Thickness (mm)	0

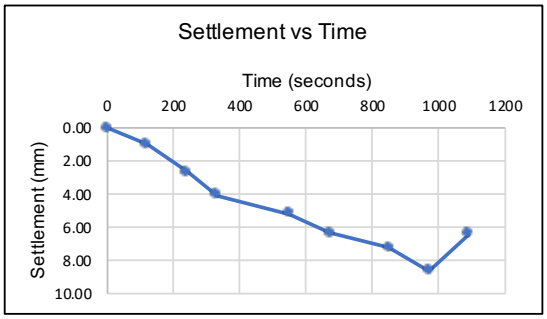
Test Location	PBT4
Test Strata	Sandy Gravel
Ground Condition	Dry
Material	Sandy Gravel
Weather	Dry Sunny

Equivalent CBR Value (%)	1.9
Maximum Applied Stress (kPa)	350.0
Maximum Settlement (mm)	8.64
Bearing Pressure at 1.25mm Settlement (kPa)	42.2
K762 (at 1.25mm settlement) kN/m2/m	21.02

Time (s)	Stress (kPa)	Settlement (mm)
0	0	0.00
120	50	1.04
240	100	2.66
330	150	4.09
550	200	5.16
670	250	6.37
850	300	7.26
970	350	8.64
1090	0	6.40

Remarks:





Deformation Modulus (EV) Calculation

Plate Diameter (mm)	Maximum σ [kN/m²]	0.3 σ [kN/m²]	0.7 σ [kN/m²]	s1 (mm)	s2 (mm)	Ev [MN/m²]
450	350.0	105.00	245.00	2.81	6.25	**13.72**

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

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

Report Prepared By: L Hillman Date: 09.06.25
Approved By: G Jones Date: 12.06.23

Lidl Runcorn RDC Yard Repairs

Test Location	Test No	Plate Diameter (mm)	Maximum σ [kN/m^2]	0.3 σ [kN/m^2]	0.7 σ [kN/m^2]	s1 (mm)	s2 (mm)	Ev1 [MN/m^2]	Ev2 [MN/m^2]	EV2/EV1
PBT1	Test 1	300	637.4	191.2	446.2	1.72	4.11	23.93		
Subbase	Test 2	300	637.4	191.2	446.2	#REF!	#REF!		#REF!	#REF!
PBT2	Test 1	300	637.4	191.2	446.2	#REF!	#REF!	#REF!		
Capping	Test 2	300	637.4	191.2	446.2	#REF!	#REF!		#REF!	#REF!

Notes:

Lidl Specification	Ev2/EV1 Subbase	<2.2	EV2 for Subbase = 150 MN/m2
	EV2/EV1 Capping		EV2 Capping = 120 MN/m2

APPENDIX D

Dynamic Cone Penetrometer (DCP) Test Results

CERTIFICATION OF CALIBRATION

PJLA Calibration
No. 66916

Date Of Calibration: 12-Nov-2024

Certificate Number: G501410_9/37069

Issued by: QED Environmental Systems Inc.

Customer: **Quantum Geotechnic LTD**
Plas Newydd Llanedi Pontarddulais, SA4 0FQ GB

Description:

Model: GA5000

Serial Number: G501410

Accredited Results:

Methane (CH4)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
5.0	4.8	0.42
15.0	14.8	0.66
60.0	59.5	1.03

Carbon Dioxide (CO2)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
5.0	4.7	0.43
15.0	14.5	0.71
39.9	39.7	1.19

Oxygen (O2)		
Certified Gas (%)	**Instrument Reading (%)**	**Uncertainty (%)**
21.6	21.7	0.25

Gas cylinders are traceable and details can be provided if requested.

CH4, CO2 readings recorded at: 32.1 °C/89.7 °F

O2 readings recorded at: 21.2 °C/70.2 °F

Barometric Pressure: 0991 mbar/29.25 "Hg

Method of Test : The analyzer is calibrated in a temperature controlled chamber using a series of reference gases, in compliance with procedure ISP17.

Instrument has passed calibration as the measurement result is within the specification limit. The specification limit takes into account the measurement uncertainty.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with NIST requirements.

www.qedenv.com (800) 624-2026 info@qedenv.com

QED Environmental Systems Inc. 2355 Bishop Circle West, Dexter, MI 48130

CERTIFICATION OF CALIBRATION

PJLA Calibration
No. 66916

Date Of Calibration: 12-Nov-2024

Certificate Number: G501410_9/37069

Issued by: QED Environmental Systems Inc.

Non Accredited results:

Pressure Transducers (Inches of water column)					
Transducer	Certified (Low)	Reading (Low)	Certified (High)	Reading (High)	Accuracy
Relative	0"	0"	40"	40.39"	2.0"

Barometer (mbar)	
Reference	Instrument Reading
0991 mbar / 29.25 "Hg	0991 mbar / 29.25 "Hg

Additional Gas Cells		
Gas	Certified Gas (ppm)	Instrument Reading (ppm)
CO/H_2 COMP	500	500
H_2S	256	256

Internal Flow	
Applied	Measured
25.2	25.2
10.0	10.0
5.0	5.1

As received gas check readings:

Methane (CH4)	
Certified Gas (%)	Instrument Reading (%)
5.0	5.5
15.0	15.9
60.0	62.7

Carbon Dioxide (CO2)	
Certified Gas (%)	Instrument Reading (%)
5.0	5.1
15.0	15.1
39.9	40.1

Oxygen (O2)	
Certified Gas (%)	Instrument Reading (%)
21.6	20.9

As received Gas readings recorded at: 32.1 °C/89.7 °F

www.qedenv.com (800) 624-2026 info@qedenv.com

QED Environmental Systems Inc. 2355 Bishop Circle West, Dexter, MI 48130

CERTIFICATION OF CALIBRATION

PJLA Calibration
No. 66916

Date Of Calibration: 12-Nov-2024

Certificate Number: G501410_9/37069

Issued by: QED Environmental Systems Inc.

As received Barometric Pressure recorded at: 21.2 °C/70.2 °F

As received gas check readings are only recorded if the instrument is received in a working condition.
Where the instrument is received damaged no reading can be taken.

Date of Issue : 12 Nov 2024

Approved By Signatory

Joe Nicholas
Laboratory Inspection

www.qedenv.com (800) 624-2026 info@qedenv.com

QED Environmental Systems Inc. 2355 Bishop Circle West, Dexter, MI 48130

CERTIFICATION OF CALIBRATION

Issued by: QED Environmental Systems Inc.

www.qedenv.com **(800) 624-2026** **info@qedenv.com**

QED Environmental Systems Inc. 2355 Bishop Circle West, Dexter, MI 48130

APPENDIX E

Gas Analyser Calibration Certificate

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

GFM436 Final Inspection & Calibration Check Certificate

GAS DATA LTD
Unit D
Earlplace Business Park
Fletchamstead Highway
Coventry
CV4 9XL
Tel 02476303311 Fax 02476307711

Customer	Remada Ltd
Certificate Number	126129
Order Number	342447

Serial Number	14048
Software Version	G436-00.0029/0010

Recalibration DUE Date
11/04/26

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

Gas Checks						
	CH_4		CO_2		O_2	
	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %
Sensor	59.8	60	39.5	40	20.9	20.9
	Accept ±3.0		*Accept ±3.0*		*Accept ±0.5*	
	5.0	5	5.0	5	6.0	6
	Accept ±0.3		*Accept ±0.3*		*Accept ±0.3*	
Zero Reading 100% N2	0.0	0	0.0	0	0.0	0
	Accept ±0.0		*Accept ±0.0*		*Accept ±0.1*	

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

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

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

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

Temperature Checks		
Calibration Temperature Applied Temperature °C	Instrument Temperature Reading °C	
-10	-10.0	*Accept ±2.0*
0	0.0	*Accept ±1.0*
30	30.0	*Accept ±1.0*
60	60.0	*Accept ±1.0*
100	100.0	*Accept ±1.0*

Technician:	Date Tested:
Jack Rutland	*11/04/2025*

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

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

TEST DATE AND CONDITIONS		
Date	11·4·25	
Atmospheric Pressure	1005	mB
Ambient Temperature	21.3	°C
Environics Serial No.	5089	

GAS DATA LTD
Unit D
Earlplace Business Park
Fletchamstead Highway
Coventry
CV4 9XL
UK +44 (0) 24 7630 3311

GAS DATA
LISTEN · ANALYSE · INFORM

GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS			
SO Number	Instrument Type	Instrument Serial Number + SW Version	Job Number(s)
342447	GFM436	140487 G436-29/10	126129

Calibration Technician ..... **Date** 11:4:25

Inspection Technician J. Williams **Date** 15-Cl-23

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable (NA)
Function Tests	Dust Caps Fitted	P
	Keyboard Test (All Keys)	P
	Backlight	P
	Clock Set / Running	P
	Comms Test	P
	Pump Flow Test (In & Out)	P
	Overall Leak Test (30mB)	n/a
	Battery Charge Test	P
	Service Date set to?	11/04/26
Channel Tests	Data Logging Enabled?	P
	Verify CH4/LEL/Hexane/PID	P
	Verify CO2	P
	Verify O2	P
	Verify H2S	P
	Verify CO	P
	Verify LEL	P
	Verify 1st Option Gas	N/A
	Verify Atmospheric pressure	P
	Verify differential pressure	P
	Verify flow	P
	Verify temperature probe input	P
	Verify vane anemometer input	P
DataBase Checks	Jobcard(s) completed and signed	P
	Jobcard(s) booked off database	P
	Calibration certificate completed	P
	Complete & print QI record	n/a
Label Checks	No. of Calibration label fitted	GDC 13791
	MCERTS label displayed	P
	Warranty label fitted	P
H2S Range	H2S Range from Sales Order	5000 ppm
	H2S Range from Cal Cert	5000 ppm
	Over-range value correct?	P
QA Cylinders Used	No. of High Range CH4/CO2	SIPCYL110 - 56779
	No. of Low Range CH4/CO2/O2	" - 69849
	No. of H2S	" CO37295
	No. of CO	" - 69834
	No. of Optional Cylinder	N/A

INSTRUMENT PACKING LIST			Tick if included
Instrument			✓
Leather Case			✓
Instrument Strap			✓
AC Battery Charger (UK)			✓
AC Battery Charger (EURO)			X
AC Battery Charger (US)			X
AC Battery Charger (AUS)			X
Gas Sample Pipe - *(new issue)*			✓
Flow Sample Pipe - *(new issue)*			✓
Hard Carry Case			✓
Spares Pot			✓
Allen Key			✓
Temperature Probe			X
Vane Anemometer			X
USB Cable			X
USB Memory stick			X
SM V5 Software	Ver	6.05	X
Internal Filter Pack	Qty		X
External Filter Pack	Qty		X
Field Guide			X

Extra Items:
USED TUBING.
TAG.

Comments:
N/A

Appendix F
Laboratory Chemical Analysis

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

e: krysia.szybut@remada.co.ukinfo@remada.co.uk

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

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

Analytical Report Number : 25-024070

Project / Site name:	Pembroke Dock	**Samples received on:**	09/05/2025
Your job number:	1360 02	**Samples instructed on/ Analysis started on:**	09/05/2025
Your order number:	1360 02	**Analysis completed by:**	20/05/2025
Report Issue Number:	1	**Report issued on:**	20/05/2025
Samples Analysed:	9 soil samples		

Signed:

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting
air	- once the analysis is complete

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

Retention period for records and reports is minimum 6 years from the date of issue of the final report.
Some records may be kept for longer according to other legal/best practice requirements.

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

Analytical Report Number: 25-024070
Project / Site name: Pembroke Dock
Your Order No: 1360 02

Lab Sample Number				541772	541773	541774	541775	541776
Sample Reference				WS03	WS04	WS08	WS05	WS09
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A	N/A
Depth (m)				0.6	0.3	0.2	0.2	0.9
Date Sampled				07/05/2025	07/05/2025	07/05/2025	07/05/2025	07/05/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	68.4	75	57.8	57.5
Moisture Content	%	0.01	NONE	11	3	3.6	5	11
Total mass of sample received	kg	0.1	NONE	1.6	1.6	1.6	0.8	0.8
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Detected	Detected	Detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	KWB	KWB	KWB	KWB	KWB
Analysis completed	N/A	N/A	N/A	20/05/2025	20/05/2025	20/05/2025	20/05/2025	20/05/2025
Actinolite detected	Type	N/A	ISO 17025	-	Not-detected	Not-detected	Not-detected	-
Amosite detected	Type	N/A	ISO 17025	-	Detected	Not-detected	Not-detected	-
Anthophyllite detected	Type	N/A	ISO 17025	-	Not-detected	Not-detected	Not-detected	-
Chrysotile detected	Type	N/A	ISO 17025	-	Not-detected	Detected	Detected	-
Crocidolite detected	Type	N/A	ISO 17025	-	Not-detected	Not-detected	Not-detected	-
Tremolite detected	Type	N/A	ISO 17025	-	Not-detected	Not-detected	Not-detected	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-	< 0.001	< 0.001	< 0.001	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-	Loose Fibres	Loose Fibres	Loose Fibres	-
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	7.6	11.5	11.1	10.9	11.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO_4	%	0.005	MCERTS	-	-	-	-	-
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-	-	-	-
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	-	-	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	-	-	-
Total Sulphur	mg/kg	50	MCERTS	-	-	-	-	-
Total Sulphur	%	0.005	MCERTS	-	-	-	-	-
Ammoniacal Nitrogen as NH_4^+	mg/kg	0.5	MCERTS	-	-	-	-	-
Ammonium as NH_4^+ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-	-	-	-	-
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	< 0.0010	0.019	0.012	0.0078	0.021
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	-	-	-	-	-
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent)	mg/l	5	NONE	-	-	-	-	-
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.11
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.23	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.24	0.24	0.1	0.53
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.07	0.07	< 0.05	0.06
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.1	1.1	0.56	0.63
Pyrene	mg/kg	0.05	MCERTS	< 0.05	1.3	1.5	0.65	0.52
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.83	0.84	0.46	0.38
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.97	0.81	0.54	0.49
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	1.6	1.2	0.77	0.47

Analytical Report Number: 25-024070
Project / Site name: Pembroke Dock
Your Order No: 1360 02

Lab Sample Number				541772	541773	541774	541775	541776
Sample Reference				WS03	WS04	WS08	WS05	WS09
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A	N/A
Depth (m)				0.6	0.3	0.2	0.2	0.9
Date Sampled				07/05/2025	07/05/2025	07/05/2025	07/05/2025	07/05/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.54	0.42	0.4	0.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	1.4	1	0.73	0.32
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.75	0.54	0.39	0.16
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.15	0.11	0.1	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.9	0.64	0.48	0.18
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	10.1	8.54	5.18	4.04
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	27	6.4	5.9	7	9.7
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	3.5	0.4	0.37	0.47	1.8
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	0.9	0.5	2.1	1.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.9	0.3	0.2	0.4	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (III)	mg/kg	1	NONE	47	10	9.7	11	17
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	47	11	11	11	17
Copper (aqua regia extractable)	mg/kg	1	MCERTS	67	32	13	13	52
Lead (aqua regia extractable)	mg/kg	1	MCERTS	100	34	120	78	58
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	57	9.8	9	8.6	34
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	1.2	< 1.0	1.7
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	62	15	16	17	32
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	210	99	71	200	43
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	-	-	-
Magnesium (water soluble)	mg/kg	5	NONE	-	-	-	-	-
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC10 - EC12 $_{EH\_CU\_1D\_AL}$	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPHCWG - Aliphatic >EC12 - EC16 $_{EH\_CU\_1D\_AL}$	mg/kg	2	MCERTS	< 2.0	< 2.0	4.3	< 2.0	< 2.0
TPHCWG - Aliphatic >EC16 - EC21 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	< 8.0	19	25	< 8.0
TPHCWG - Aliphatic >EC21 - EC35 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	64	140	230	100
TPHCWG - Aliphatic >EC5 - EC35 $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	< 10	64	160	260	100
TPHCWG - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	0.017
TPHCWG - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	0.011
TPHCWG - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	mg/kg	0.02	MCERTS	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPHCWG - Aromatic >EC10 - EC12 $_{EH\_CU\_1D\_AR}$	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 $_{EH\_CU\_1D\_AR}$	mg/kg	2	MCERTS	< 2.0	< 2.0	3.3	5.7	< 2.0
TPHCWG - Aromatic >EC16 - EC21 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	11	15	11	< 10
TPHCWG - Aromatic >EC21 - EC35 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	300	96	87	46
TPHCWG - Aromatic >EC5 - EC35 $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	< 10	320	110	100	46
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	16

Analytical Report Number: 25-024070
Project / Site name: Pembroke Dock
Your Order No: 1360 02

Lab Sample Number				541772	541773	541774	541775	541776
Sample Reference				WS03	WS04	WS08	WS05	WS09
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A	N/A
Depth (m)				0.6	0.3	0.2	0.2	0.9
Date Sampled				07/05/2025	07/05/2025	07/05/2025	07/05/2025	07/05/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	11
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

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

Analytical Report Number: 25-024070
Project / Site name: Pembroke Dock
Your Order No: 1360 02

Lab Sample Number				541777	541778	541779	541780
Sample Reference				WS01	WS01	WS05	WS08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A
Depth (m)				0.7	1	1.3	0.9
Date Sampled				07/05/2025	07/05/2025	07/05/2025	07/05/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	38.8	< 0.1	58.4
Moisture Content	%	0.01	NONE	14	5.6	15	4.6
Total mass of sample received	kg	0.1	NONE	0.7	0.7	0.7	0.7
Asbestos							
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	-	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	-	-	-	-
Analysis completed	N/A	N/A	N/A	-	-	-	-
Actinolite detected	Type	N/A	ISO 17025	-	-	-	-
Amosite detected	Type	N/A	ISO 17025	-	-	-	-
Anthophyllite detected	Type	N/A	ISO 17025	-	-	-	-
Chrysotile detected	Type	N/A	ISO 17025	-	-	-	-
Crocidolite detected	Type	N/A	ISO 17025	-	-	-	-
Tremolite detected	Type	N/A	ISO 17025	-	-	-	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-	-	-	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-	-	-	-
General Inorganics							
pH (L099)	pH Units	N/A	MCERTS	8.3	9.5	8.1	12
Total Cyanide	mg/kg	1	MCERTS	-	-	-	-
Total Sulphate as SO_4	%	0.005	MCERTS	0.035	0.262	0.035	0.179
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	24	470	45	51
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	11.9	237	22.7	25.3
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	2.1	3.2	1.4	9.3
Total Sulphur	mg/kg	50	MCERTS	170	880	96	690
Total Sulphur	%	0.005	MCERTS	0.017	0.088	0.01	0.069
Ammoniacal Nitrogen as NH_4^+	mg/kg	0.5	MCERTS	< 0.5	< 0.5	< 0.5	< 0.5
Ammonium as NH_4^+ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	-	-	-	-
Water Soluble Nitrate (2:1) as NO_3	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0
Water Soluble Nitrate (2:1) as NO_3 (leachate equivalent)	mg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Total Phenols							
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	-	-
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	-	-	-	-

Analytical Report Number: 25-024070
Project / Site name: Pembroke Dock
Your Order No: 1360 02

Lab Sample Number				541777	541778	541779	541780
Sample Reference				WS01	WS01	WS05	WS08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A
Depth (m)				0.7	1	1.3	0.9
Date Sampled				07/05/2025	07/05/2025	07/05/2025	07/05/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**				
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	-	-	-	-
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	-	-
Chromium (hexavalent)	mg/kg	1.8	MCERTS	-	-	-	-
Chromium (III)	mg/kg	1	NONE	-	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	2.7	4	< 2.5	< 2.5
Magnesium (water soluble)	mg/kg	5	NONE	5.3	8	< 5.0	< 5.0
Petroleum Hydrocarbons							
TPHCWG - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	-	-	-	-
TPHCWG - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	-	-	-	-
TPHCWG - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	mg/kg	0.01	MCERTS	-	-	-	-
TPHCWG - Aliphatic >EC10 - EC12 $_{EH\_CU\_1D\_AL}$	mg/kg	1	MCERTS	-	-	-	-
TPHCWG - Aliphatic >EC12 - EC16 $_{EH\_CU\_1D\_AL}$	mg/kg	2	MCERTS	-	-	-	-
TPHCWG - Aliphatic >EC16 - EC21 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	-	-	-	-
TPHCWG - Aliphatic >EC21 - EC35 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	-	-	-	-
TPHCWG - Aliphatic >EC5 - EC35 $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	-	-	-	-
TPHCWG - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	mg/kg	0.01	MCERTS	-	-	-	-
TPHCWG - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	mg/kg	0.01	MCERTS	-	-	-	-
TPHCWG - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	mg/kg	0.02	MCERTS	-	-	-	-
TPHCWG - Aromatic >EC10 - EC12 $_{EH\_CU\_1D\_AR}$	mg/kg	1	MCERTS	-	-	-	-
TPHCWG - Aromatic >EC12 - EC16 $_{EH\_CU\_1D\_AR}$	mg/kg	2	MCERTS	-	-	-	-
TPHCWG - Aromatic >EC16 - EC21 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	-	-	-	-
TPHCWG - Aromatic >EC21 - EC35 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	-	-	-	-
TPHCWG - Aromatic >EC5 - EC35 $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	-	-	-	-
VOCs							
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	MCERTS	-	-	-	-
Benzene	µg/kg	5	MCERTS	-	-	-	-

Analytical Report Number: 25-024070
Project / Site name: Pembroke Dock
Your Order No: 1360 02

Lab Sample Number				541777	541778	541779	541780
Sample Reference				WS01	WS01	WS05	WS08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A
Depth (m)				0.7	1	1.3	0.9
Date Sampled				07/05/2025	07/05/2025	07/05/2025	07/05/2025
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**				
Toluene	µg/kg	5	MCERTS	-	-	-	-
Ethylbenzene	µg/kg	5	MCERTS	-	-	-	-
p & m-Xylene	µg/kg	8	MCERTS	-	-	-	-
o-Xylene	µg/kg	5	MCERTS	-	-	-	-

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

4041

Analytical Report Number: **25-024070**
Project / Site name: **Pembroke Dock**
Your Order No: **1360 02**

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample	Analysis completed	Analyst ID
541773	WS04	0.30-	146	Loose Fibres	**Amosite**	< 0.001	**< 0.001**	20/05/2025	KWB
541774	WS08	0.20-	140	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**	20/05/2025	KWB
541775	WS05	0.20-	137	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**	20/05/2025	KWB

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 25-024070
Project / Site name: Pembroke Dock

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
541772	WS03	None Supplied	0.6	Brown clay and sand with gravel
541773	WS04	None Supplied	0.3	Brown loam and sand with vegetation and stones
541774	WS08	None Supplied	0.2	Brown loam and sand with vegetation and stones
541775	WS05	None Supplied	0.2	Brown loam and sand with vegetation and stones
541776	WS09	None Supplied	0.9	Brown loam and sand with gravel and stones
541777	WS01	None Supplied	0.7	Brown clay and loam with gravel and vegetation
541778	WS01	None Supplied	1	Brown sand with gravel and stones
541779	WS05	None Supplied	1.3	Brown clay and loam with gravel
541780	WS08	None Supplied	0.9	Brown clay and sand with gravel and stones

Analytical Report Number : 25-024070
Project / Site name: Pembroke Dock

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)
Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
TPH Chromatogram in soil	TPH Chromatogram in soil	In-house method	L064B	D	NONE
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088-PL	D/W	MCERTS
Chromium III in soil	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080-PL/L130B	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080-PL	W	MCERTS
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099-PL	D	MCERTS
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate	In-house method	L009B	D	MCERTS

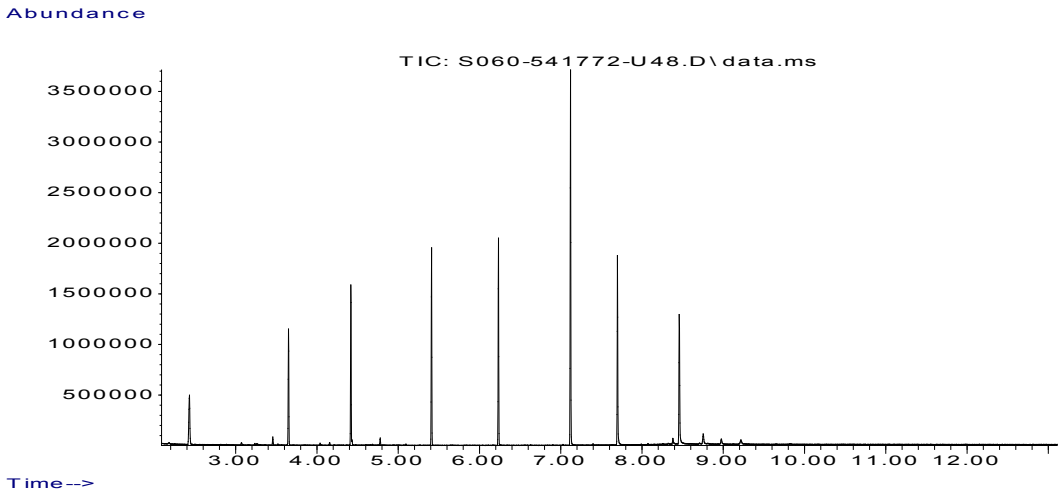
Analytical Report Number : 25-024070
Project / Site name: Pembroke Dock

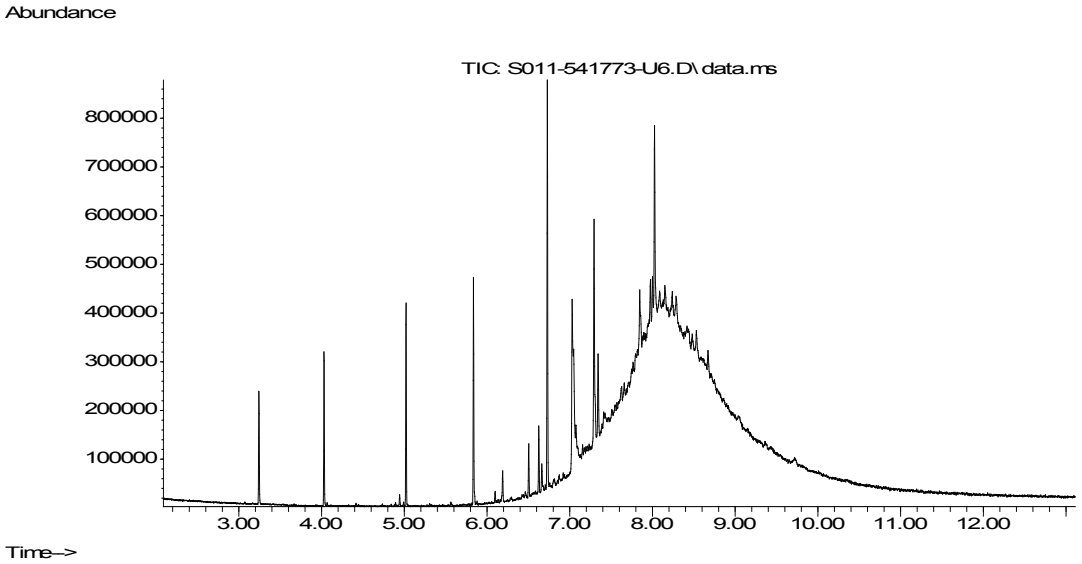
Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)
Final Sewage Effluent (FSE) Landfill Leachate (LL)

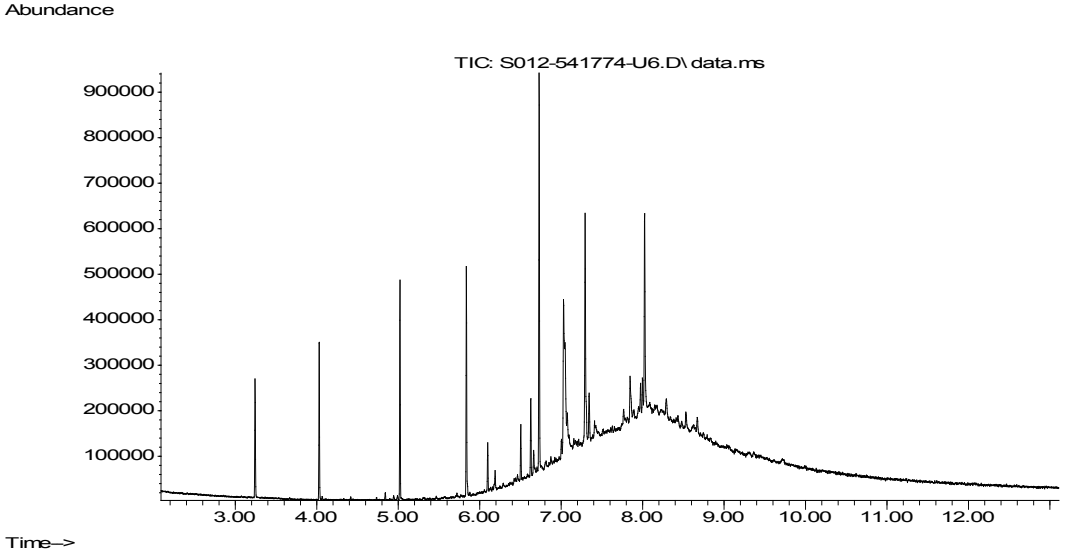
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Soil Descriptions	Textural classification	In-house method	L019B	W	NONE
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references	HSE Report No: 83/1996, HSG 248 (2021), HSG 264 (2012) & SCA Blue Book (draft)	A006B	D	ISO 17025
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES	In-house method based on TRL 447	L038B	D	NONE
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES	In-house method	L038B	D	MCERTS
Water Soluble Nitrate (leachate equivalent)	Determination of nitrate by reaction with sodium salicylate and colorimetry	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction	L078-PL	W	NONE
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser	In-house method	L082B	D	MCERTS
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082B	W	MCERTS

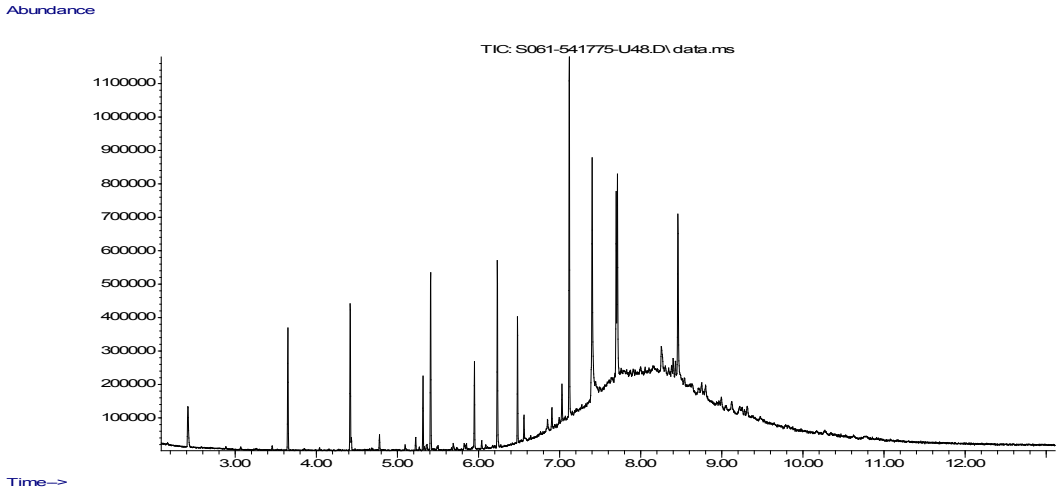
For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

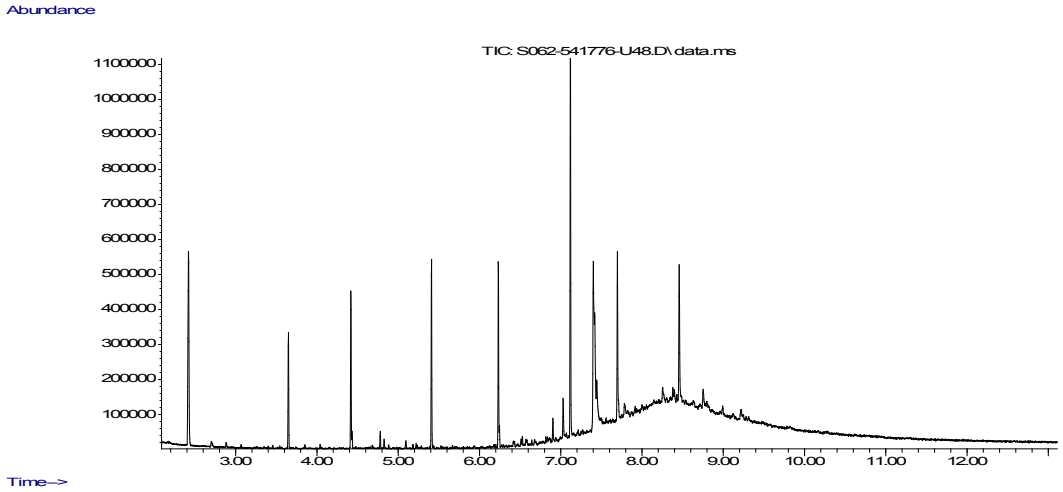
Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution


Abundance
TIC: S060-541772-U48.D\data.ms
3500000
3000000
2500000
2000000
1500000
1000000
500000
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
Time-->


Abundance
TIC: S011-541773-U6.D\data.ms
800000
700000
600000
500000
400000
300000
200000
100000
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
Time-->


Abundance
TIC: S012-541774-U6.D\ data.ms
900000
800000
700000
600000
500000
400000
300000
200000
100000
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
Time-->


Abundance
TIC: S061-541775-U48.D\data.ms
1100000
1000000
900000
800000
700000
600000
500000
400000
300000
200000
100000
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
Time-->


Abundance
TIC: S062-541776-U48.D\data.ms
1100000
1000000
900000
800000
700000
600000
500000
400000
300000
200000
100000
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
Time-->

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

e: krysia.szybut@remada.co.ukinfo@remada.co.uk

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

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

Analytical Report Number : 25-024074

Project / Site name:	Pembroke Dock	**Samples received on:**	09/05/2025
Your job number:	1360 02	**Samples instructed on/ Analysis started on:**	09/05/2025
Your order number:	1360 02	**Analysis completed by:**	20/05/2025
Report Issue Number:	1	**Report issued on:**	20/05/2025
Samples Analysed:	3 10:1 WAC samples		

Signed:

Joanna Wawrzeczko
Senior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting
air	- once the analysis is complete

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

Retention period for records and reports is minimum 6 years from the date of issue of the final report.
Some records may be kept for longer according to other legal/best practice requirements.

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

Analytical Report Number: 25-024074
Project / Site name: Pembroke Dock
Your Order No: 1360 02

Lab Sample Number				541787	541788	541789
Sample Reference				WS03	WS04	WS08
Sample Number				None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A
Depth (m)				0.6	0.3	0.2
Date Sampled				07/05/2025	07/05/2025	07/05/2025
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
Stone Content	%	0.1	NONE	< 0.1	68.4	75
Moisture Content	%	0.01	NONE	11	3	3.6
Total mass of sample received	kg	0.1	NONE	1.6	1.6	1.6
General Inorganics						
pH (L005B)	pH Units	N/A	MCERTS	8.7	8.6	8.2
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	< 0.1	1.9	1.2
Loss on Ignition @ 450°C	%	0.2	MCERTS	2.4	3.3	2.5
Acid Neutralisation Capacity	+/- mmol/kg	-9999	NONE	3.1	16	6
Speciated PAHs						
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.23	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.24	0.24
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.07	0.07
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.1	1.1
Pyrene	mg/kg	0.05	MCERTS	< 0.05	1.3	1.5
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.83	0.84
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.97	0.81
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	1.6	1.2
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.54	0.42
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	1.4	1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.75	0.54
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.15	0.11
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.9	0.64
Coronene	mg/kg	0.05	NONE	< 0.05	0.3	0.2
Total PAH						
Total WAC-17 PAHs	mg/kg	0.85	NONE	< 0.85	10.4	8.74
Petroleum Hydrocarbons						
Mineral Oil (EC10 - EC40) EH_CU_1D_AL	mg/kg	10	NONE	< 10	82	200
VOCs						
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Total BTEX	µg/kg	10	MCERTS	< 10	< 10	< 10

Analytical Report Number: 25-024074
Project / Site name: Pembroke Dock
Your Order No: 1360 02

Lab Sample Number				541787	541788	541789
Sample Reference				WS03	WS04	WS08
Sample Number				None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A
Depth (m)				0.6	0.3	0.2
Date Sampled				07/05/2025	07/05/2025	07/05/2025
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
PCBs by GC-MS						
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001
Total PCBs	mg/kg	0.007	MCERTS	< 0.007	< 0.007	< 0.007

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

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

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results

Report No:	**25-024074**						
					Client:	**REMADALT**	
Location	**Pembroke Dock**						
Lab Reference (Sample Number)	541787				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	07/05/2025				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS03						
Depth (m)	0.60						
Solid Waste Analysis							
TOC (%)**	< 0.1				3%	5%	6%
Loss on Ignition (%) **	2.4				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	8.7				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	3.1				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00333			0.0333	0.5	2	25
Barium *	0.0144			0.144	20	100	300
Cadmium *	0.000111			0.00111	0.04	1	5
Chromium *	0.0039			0.039	0.5	10	70
Copper *	0.0053			0.053	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00041			0.0041	0.5	10	30
Nickel *	0.0033			0.033	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.011			0.11	4	50	200
Chloride *	1.6			16	800	15000	25000
Fluoride*	0.19			1.9	10	150	500
Sulphate *	2.7			27	1000	20000	50000
TDS*	35			350	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	3.59			35.8	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.6						
Dry Matter (%)	89						
Moisture (%)	11						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

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

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

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results

Report No:	**25-024074**						
					Client:	**REMADALT**	
Location	**Pembroke Dock**						
Lab Reference (Sample Number)	541788				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	07/05/2025				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS04						
Depth (m)	0.30						
Solid Waste Analysis							
TOC (%)**	1.9				3%	5%	6%
Loss on Ignition (%) **	3.3				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	82				500	--	--
Total PAH (WAC-17) (mg/kg)	10.4				100	--	--
pH (units)**	8.6				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	16				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00412			0.0412	0.5	2	25
Barium *	0.0175			0.175	20	100	300
Cadmium *	0.000174			0.00174	0.04	1	5
Chromium *	0.0034			0.034	0.5	10	70
Copper *	0.0056			0.056	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.0011			0.011	0.5	10	30
Nickel *	0.0034			0.034	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.017			0.17	4	50	200
Chloride *	1.9			19	800	15000	25000
Fluoride*	0.096			0.96	10	150	500
Sulphate *	5.6			56	1000	20000	50000
TDS*	48			480	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	7.01			70	500	800	1000
Leach Test Information							
Stone Content (%)	68.4						
Sample Mass (kg)	1.6						
Dry Matter (%)	97						
Moisture (%)	3						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

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

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

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results

Report No:	**25-024074**						
					Client:	**REMADALT**	
Location	**Pembroke Dock**						
Lab Reference (Sample Number)	541789				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	07/05/2025				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS08						
Depth (m)	0.20						
Solid Waste Analysis							
TOC (%)**	1.2				3%	5%	6%
Loss on Ignition (%) **	2.5				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	200				500	--	--
Total PAH (WAC-17) (mg/kg)	8.74				100	--	--
pH (units)**	8.2				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	6				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00336			0.0336	0.5	2	25
Barium *	0.0157			0.157	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.0016			0.016	0.5	10	70
Copper *	0.0014			0.014	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.000451			0.00451	0.5	10	30
Nickel *	0.0021			0.021	0.4	10	40
Lead *	0.0044			0.044	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.016			0.16	4	50	200
Chloride *	2			20	800	15000	25000
Fluoride*	0.11			1.1	10	150	500
Sulphate *	6.3			63	1000	20000	50000
TDS*	56			560	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	7.15			71.4	500	800	1000
Leach Test Information							
Stone Content (%)	75						
Sample Mass (kg)	1.6						
Dry Matter (%)	96						
Moisture (%)	3.6						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

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

Analytical Report Number : 25-024074
Project / Site name: Pembroke Dock

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
541787	WS03	None Supplied	0.6	Brown clay and sand with gravel
541788	WS04	None Supplied	0.3	Brown loam and sand with vegetation and stones
541789	WS08	None Supplied	0.2	Brown loam and sand with vegetation and stones

Analytical Report Number : 25-024074
Project / Site name: Pembroke Dock

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)
Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20°C in soil	Determination of pH in soil by addition of water followed by electrometric measurement	In-house method	L005B	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	MCERTS
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031B	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination	L033B	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	NONE
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
One stage WAC 10:1 leachate preparation	One stage batch test at a liquid to solid ratio of 10 L/kg	BS EN 12457-2-2002	L043B	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046B	W	NONE
Loss on ignition of soil @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	In-house method	L047-PL	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088-PL	D/W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025

Analytical Report Number : 25-024074
Project / Site name: Pembroke Dock

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)
Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025
Soil Descriptions	Textural classification	In-house method	L019B	W	NONE

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

Analytical Report Number : 25-024074
Project / Site name: Pembroke Dock

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

Key: a - No sampling date b - Incorrect container/Insufficient material provided c - Holding time d - Headspace e -

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS03	N/A	L	541787	b	One stage WAC 10:1 leachate preparation	L043B	b
WS03	N/A	L	541787	b	WAC Leachate 10:1	L043B	b
WS04	N/A	L	541788	b	One stage WAC 10:1 leachate preparation	L043B	b
WS04	N/A	L	541788	b	WAC Leachate 10:1	L043B	b
WS08	N/A	L	541789	b	One stage WAC 10:1 leachate preparation	L043B	b
WS08	N/A	L	541789	b	WAC Leachate 10:1	L043B	b

Appendix G
Laboratory Geotechnical Tests

Laboratory Report

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES A PHENNA GROUP COMPANY

Contract Number: 78675

Client Ref: **1360.02**
Client PO: **1360.02**

Client: **Remada Limited**

Contract Title: **Pembroke dock**
For the attention of: **Krysia Szybut**

Date Received: **09-05-2025**
Date Completed: **27-05-2025**
Report Date: **27-05-2025**

This report has been checked and approved by:

Shaun Jones
Laboratory manager

Description	Qty
Determination of water content BS EN ISO 17892-1:2014 - @ Non Accredited Test	2
4 Point Liquid & Plastic Limit.. BS EN ISO 17892-12 - * UKAS	2
Particle Size Distribution BS EN ISO 17892-4 : 5.1 - * UKAS	3
Sedimentation by Pipette Method BS EN ISO 17892-4 : 5.4 - @ Non Accredited Test	1

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

Approved Signatories:
Brendan Evans (Senior Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)
Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)
Wayne Honey (HR & HSE Manager)

GEO Site & Testing Services Ltd
Unit 3-4 Heol Aur, Dafen Ind Est, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784 040 Fax: 01554 784 040 info@gstl.co.uk https://gstl.co.uk

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX** **BS EN ISO 17892-12:2018+A2:2022 4 Point Liquid Limit** **BS EN ISO 17892-1:2014+A1:2022 Determination of Water Content**	
Contract Number	78675	
Project Name	Pembroke dock	
Date Tested	21/05/2025	
	DESCRIPTIONS	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
WS01		D	1.70	-		Brown fine to medium gravelly silty CLAY
WS04		D	0.70	-		Brown fine to coarse gravelly silty CLAY
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		

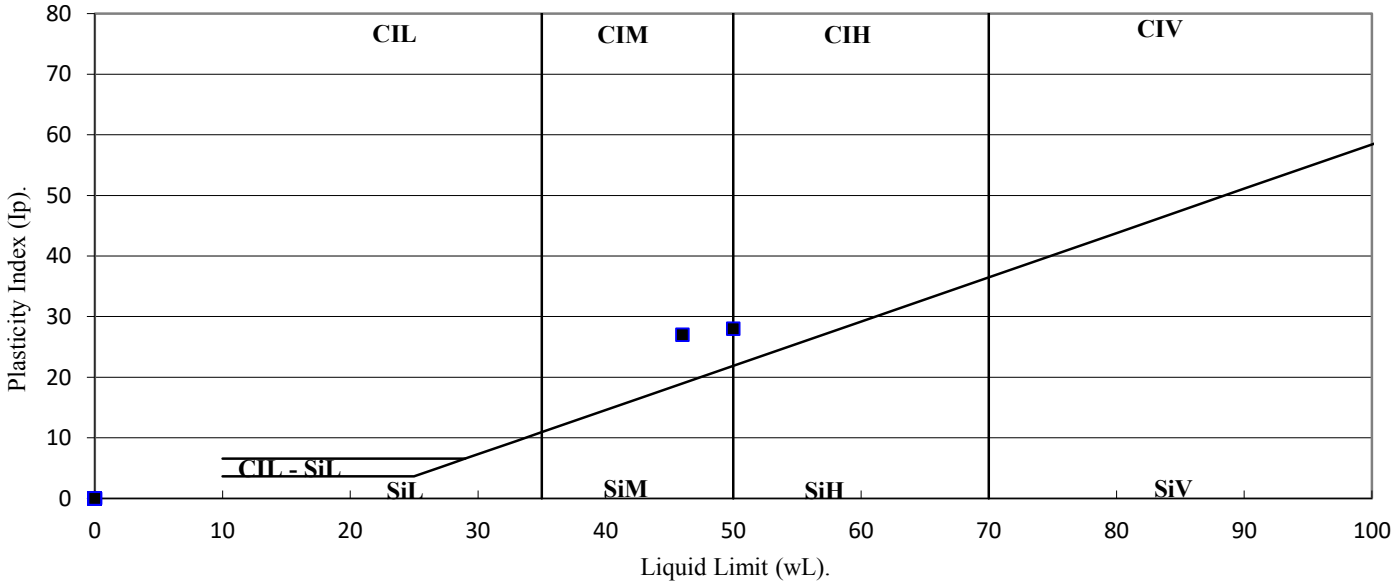
Operator
Owain D.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX BS EN ISO 17892-12:2018+A2:2022 4 Point Liquid Limit BS EN ISO 17892-1:2014+A1:2022 Determination of Water Content	
Contract Number	78675	
Project Name	Pembroke dock	
Date Tested	21/05/2025	
Test Comments	80g/30° Fall cone used with increasing water content	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Water Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
WS01		D	1.70	-		27.6	50	22	28	90	CI/H Inter/High Plasticity
WS04		D	0.70	-		23.6	46	19	27	56	CI Intermediate Plasticity
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							

SYMBOLS : NP = Non Plastic **NB: All liquid limits are 4 point and wet sieved**

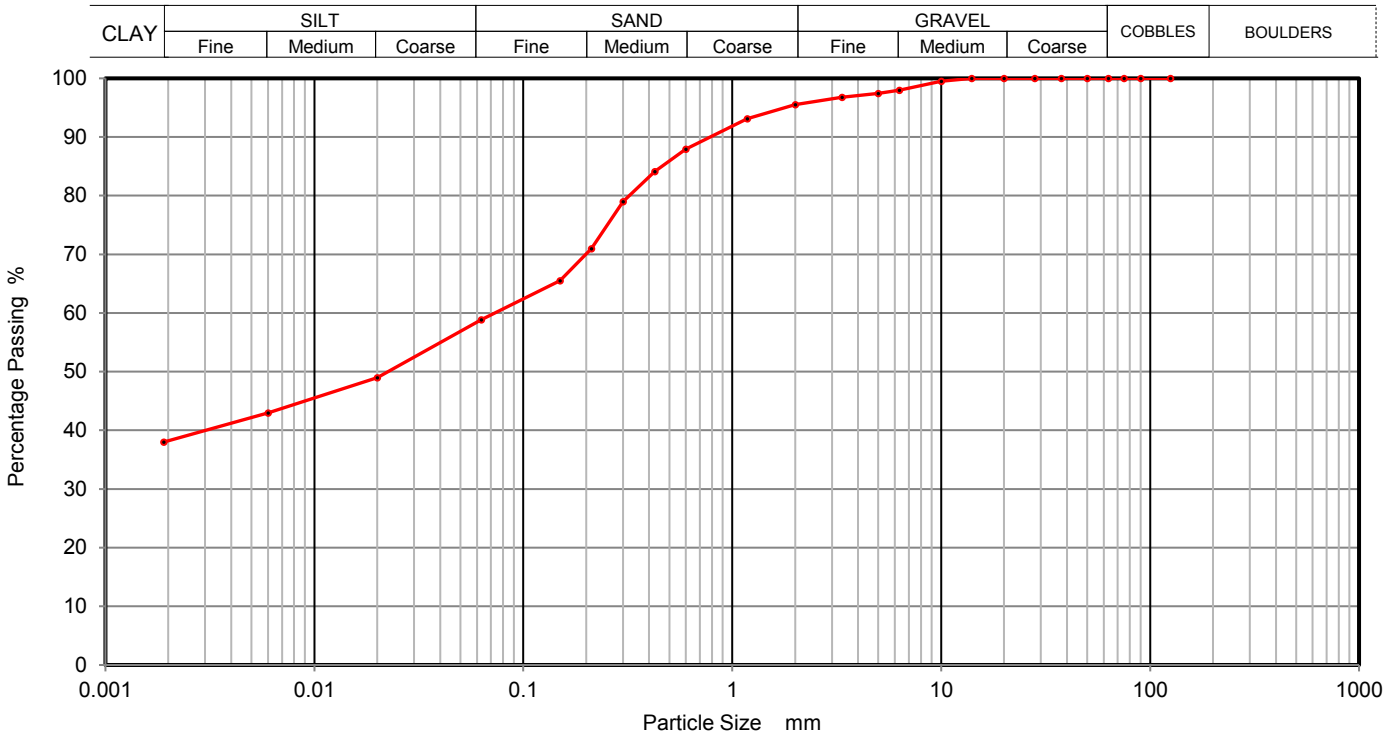
PLASTICITY CHART
BS EN ISO 14688-2:2018 Clause 4.4



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

Operator
Owain D.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve & Pipette Analysis, Clause 5.2 & 5.4**	Contract Number	**78675**
		Borehole/Pit No.	**WS01**
Project Name	**Pembroke dock**	Sample No.	
Sample Description	Brown slightly fine to medium gravelly fine to coarse sandy silty CLAY	Depth Top	**1.30**
		Depth Base	**2.00**
Date Tested	22/05/2025	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	49
90	100	0.0060	43
75	100	0.0020	38
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	98		
5	97		
3.35	97		
2	96		
1.18	93		
0.63	88		
0.425	84		
0.30	79		
0.20	71		
0.15	65		
0.063	59		

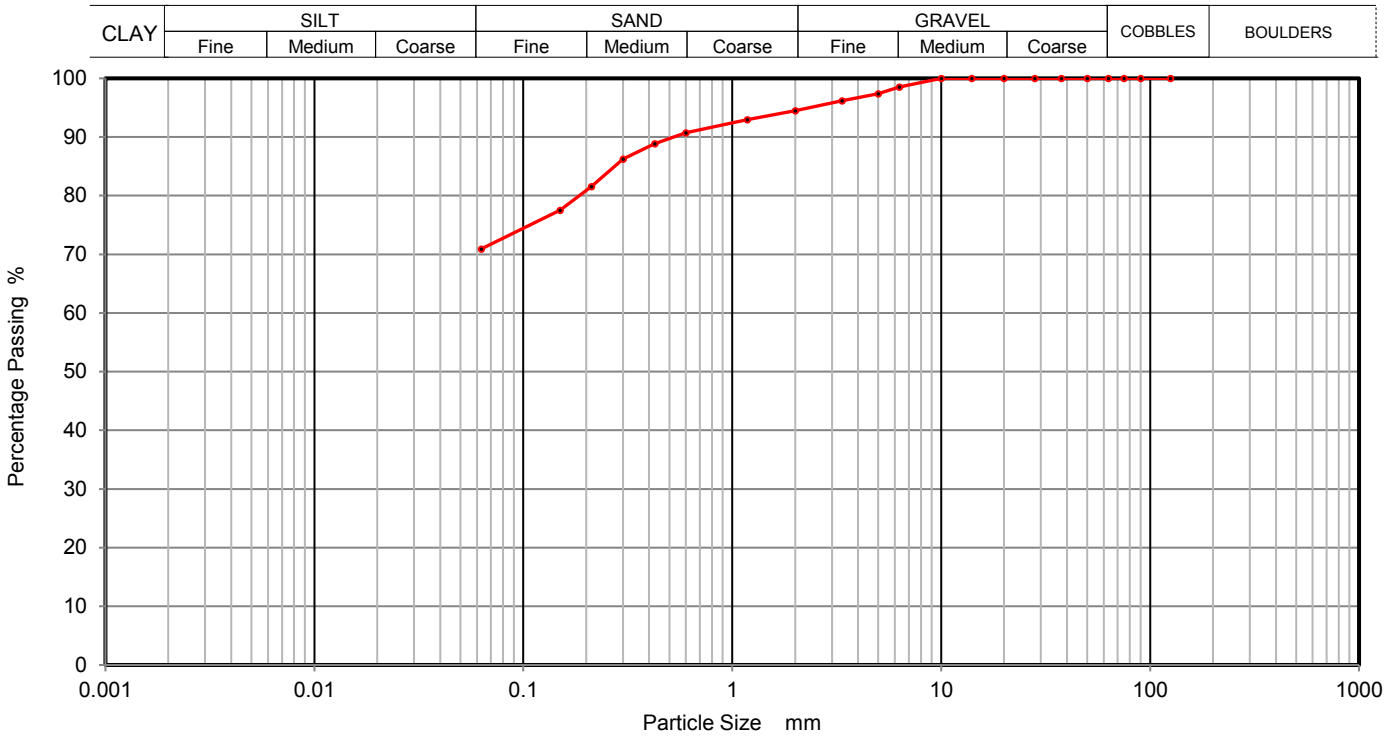
Sample Proportions	% dry mass
Cobbles	0
Gravel	4
Sand	37
Silt	21
Clay	38

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron T.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**78675**
		Borehole/Pit No.	**WS03**
Project Name	**Pembroke dock**	Sample No.	
Sample Description	Brown fine to medium gravelly fine to coarse sandy SILT/CLAY	Depth Top	**1.30**
		Depth Base	**1.80**
Date Tested	22/05/2025	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	97		
3.35	96		
2	94		
1.18	93		
0.63	91		
0.425	89		
0.30	86		
0.20	82		
0.15	78		
0.063	71		

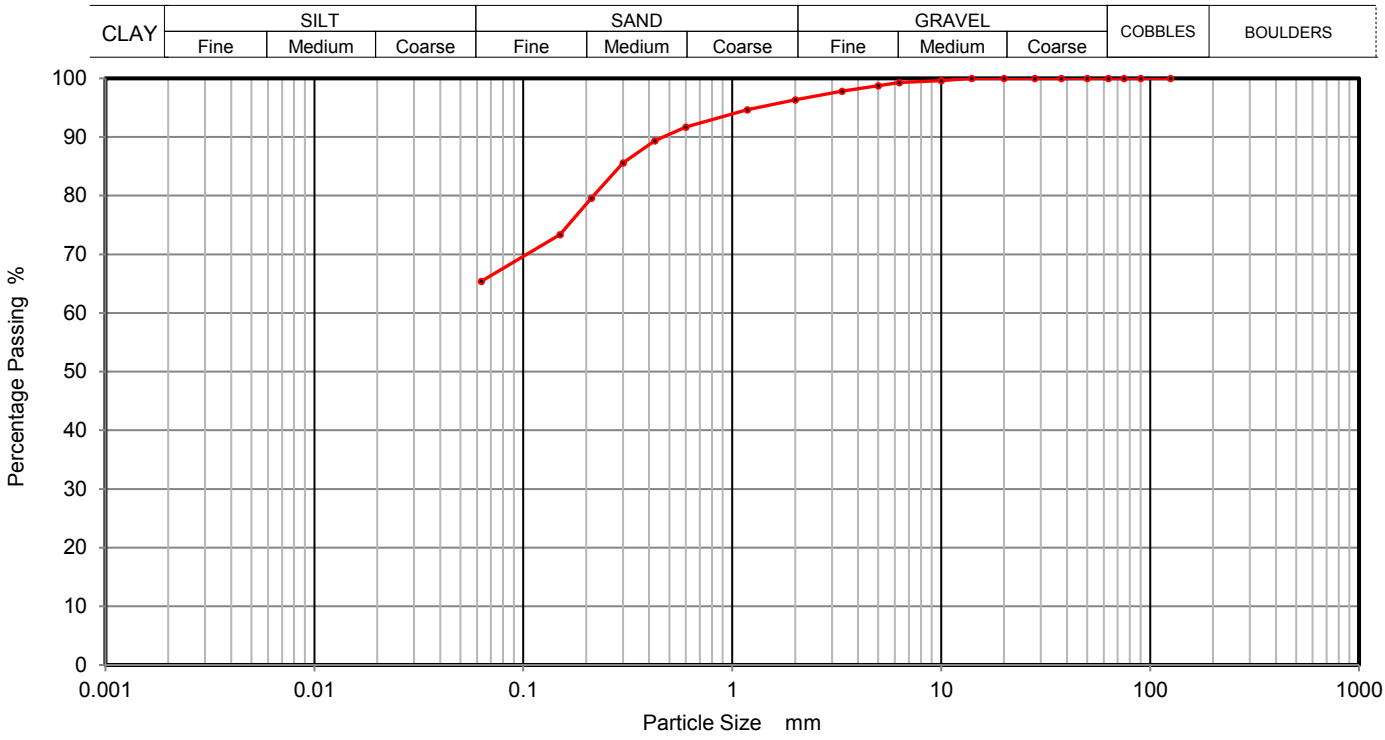
Sample Proportions	% dry mass
Cobbles	0
Gravel	6
Sand	23
Silt and Clay	71

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron T.

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS EN ISO 17892-4:2016** **Wet Sieve, Clause 5.2**	Contract Number	**78675**
		Borehole/Pit No.	**WS05**
Project Name	**Pembroke dock**	Sample No.	
Sample Description	Brown slightly fine to medium gravelly fine to coarse sandy SILT/CLAY	Depth Top	**0.90**
		Depth Base	**1.80**
Date Tested	22/05/2025	Sample Type	**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	98		
2	96		
1.18	95		
0.63	92		
0.425	89		
0.30	86		
0.20	80		
0.15	73		
0.063	65		

Sample Proportions	% dry mass
Cobbles	0
Gravel	4
Sand	31
Silt and Clay	65

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Operator
Cameron T.