



**EARTH ENVIRONMENTAL
& GEOTECHNICAL**

Geo-Environmental Investigation

Proposed Aldi Store

Abbey Road

Neath

Report Ref: B0786/19

May 2019



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**GEO-ENVIRONMENTAL
INVESTIGATION REPORT**

PROPOSED ALDI STORE

ABBAY ROAD

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Prepared on Behalf of:

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GEO-ENVIRONMENTAL INVESTIGATION REPORT**PROPOSED ALDI STORE, ABBEY ROAD, NEATH**

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Date: 29th May 2019

Prepared for: Aldi Stores Limited

Prepared by: Earth Environmental & Geotechnical (Southern) Ltd
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Written by:



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Director

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1.0 INTRODUCTION

1.1 Background

A Geo-Environmental Investigation has been commissioned by Craddys, acting on behalf of Aldi Stores Ltd (the 'Client'), to examine ground conditions and retrieve soil samples for chemical and geotechnical testing for a proposed new ALDI retail store in Neath.

1.2 Terms of Reference

Earth Environmental and Geotechnical (Southern) Ltd (EEGSL) was commissioned by the Client to undertake a Geo-Environmental Investigation of the site in accordance with a proposal B0786 dated 17th April 2019.

The objectives of this investigation are as follows:

- *Assessment of ground conditions for design of foundations.*
- *Assess the presence and likely extent of any potential environmental hazards associated within the areas of the site investigated and in particular around buried fuel tanks.*

This report presents full factual records of the site work carried out, the ground conditions encountered in the exploratory holes, the in situ and laboratory test results and the results of any monitoring of ground installations. All information collected has been used to provide an interpretation of the ground conditions, with recommendations on geotechnical design and potential ground contamination risks for the proposed development.

1.3 Limitations of the Study

The report is written in the context of an agreed scope of work and budget and should not be used in a different context. New information, improved practices or changes in legislation may require a reinterpretation of the report in whole or in part. EEGSL reserve the right to amend either conclusions or recommendations in light of any further information that may become available. The report is provided for the sole use by the client and is confidential to them.

Recommendations within this report are also based on exploratory records and examination of samples and, where applicable, laboratory tests. No liability can be accepted for conditions not revealed by the boreholes, particularly at intervening locations. Whilst every effort is made to ensure accuracy of data supplied, all opinions expressed as to the spatial distribution of strata between sampling locations is for guidance only and no responsibility is accepted as to its accuracy.

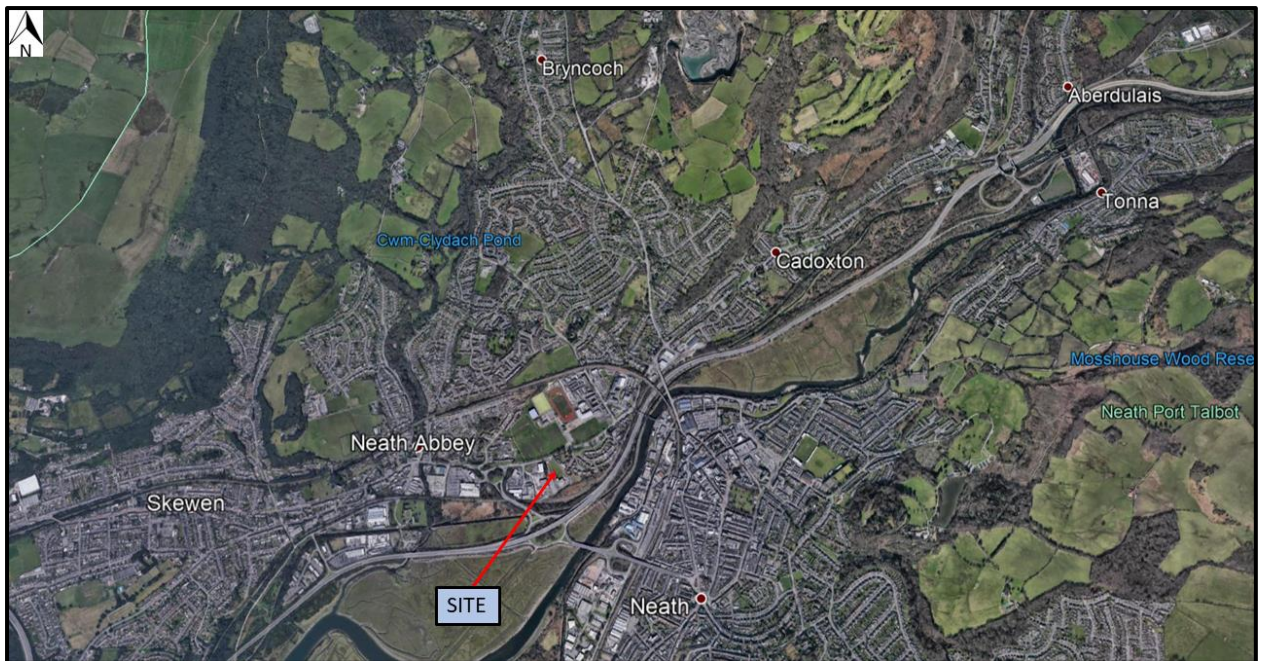
2.0 THE SITE

2.1 Site Location & Description

The site is located on a grass field associated with an existing office/workshop (CSN Precision Engineering) immediately south of Neath Abbey Road, in Neath, South Wales at National Grid Reference 274510, 197575 and postcode SA10 7BR.

The site location is shown in the aerial photograph below.

Figure 1: Aerial photograph Showing Site Location



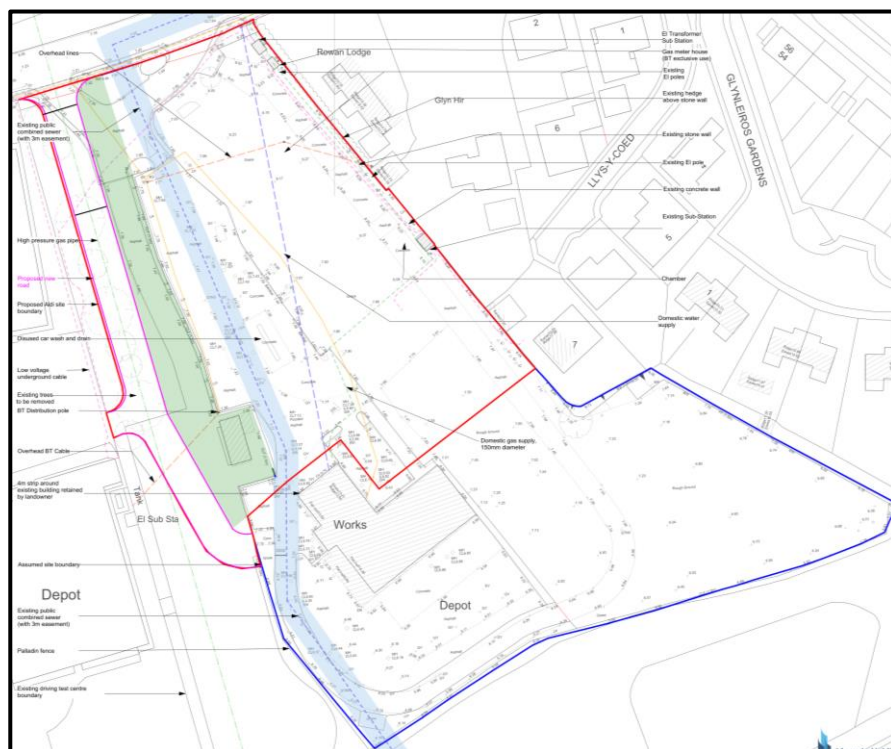
At the time of the investigation the site was disused/unoccupied. Situated at the southern edge of the site is a one-storey office block with associated office space and workshop/machinery. The site is bounded to the east by residential properties and to the north by Neath Sports Centre and Dwr Y Felin Comprehensive School, to the south is derelict woodland, railway tracks and the A465, to the west the site is bounded by a series of commercial stores including a builder's merchant, embroidery and printing and cars sale showroom.

The current site is shown in Figures 2 and 3 overleaf.

Figure 2 – Aerial Photograph of Site



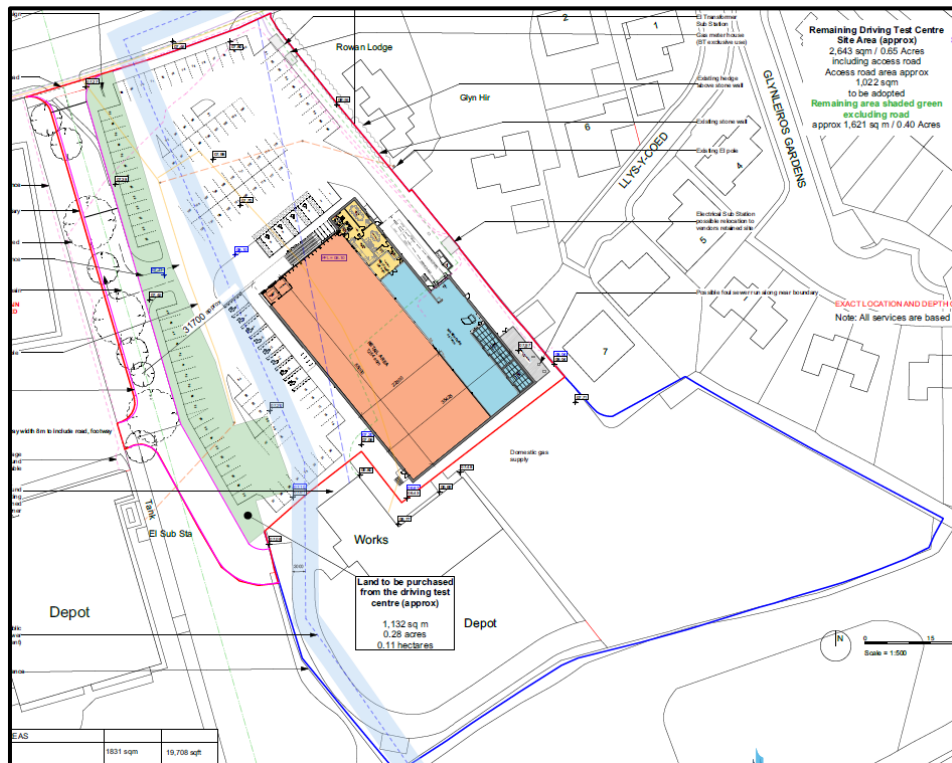
Figure 3 – Existing Site Plan



2.2 Proposed Development

It is proposed to construct a new Aldi Store with associated infrastructure. The proposed redevelopment layout is shown in Figure 4 below.

Figure 4 – Proposed Development Details

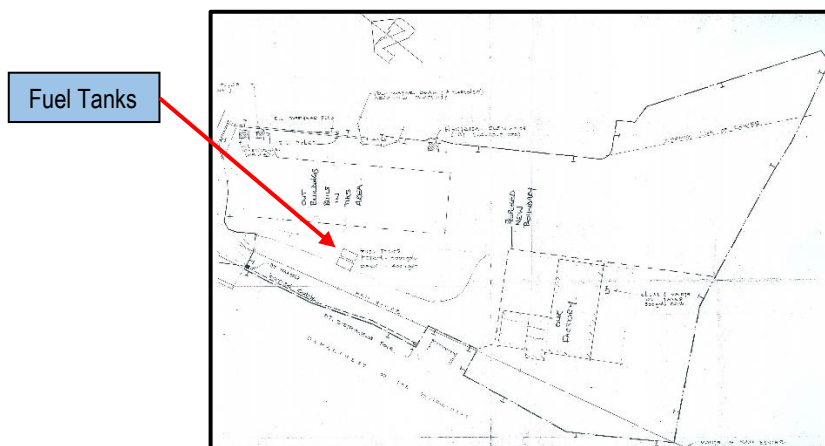


2.3 Utilities & Fuel Tanks

A plan showing the location of buried services, associated with the existing building and infrastructure on the eastern and north-eastern site boundary is shown in Figure 4 above. Services included water, electrical, foul sewer and gas mains.

The location of the buried fuel tanks on site is shown in Figure 5 below.

Figure 5 – Location of Buried Fuel Tanks



2.4 Published Geology

According to the British Geological Survey (BGS) the site is underlain by Glaciofluvial Sheet Deposits of Quaternary Age. These deposits are described as sand and gravel, locally with lenses of silt, clay or organic material.

The superficial Glaciofluvial Sheet Deposits are underlain by the Swansea Member of the Carboniferous Period comprising a sedimentary bedrock typically described as green-grey, lithic arenites (Pennant sandstones) with thin mudstone/siltstone and seatearth interbeds and mainly thin coals.

2.5 Previous Investigation

A Geo-Environmental Investigation has previously been carried out on site by Ground Investigation Limited in 2007, the findings of which are presented in their report '*Proposed Retail Store and Residential Development, Neath Abbey Road, Neath Abbey, Geo-Environmental Assessment Report*' reference 641-1.1 (August 2007).

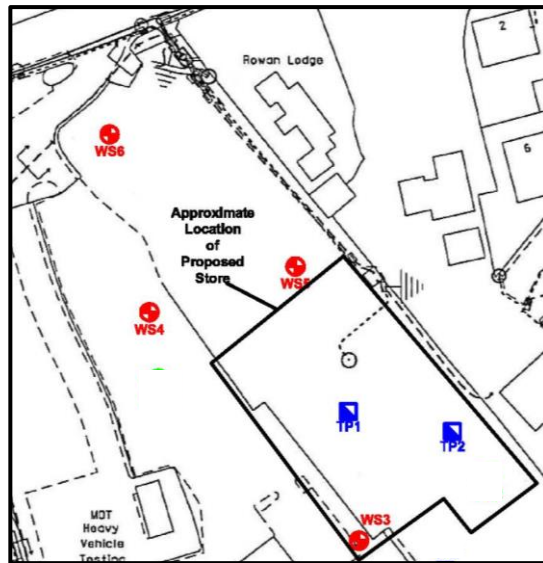
The findings of the report are summarised in the following Table:

Table 1 – Summary of Findings from Previous Investigation

Ground Conditions Encountered	The exploratory holes have identified that the site is underlain by a thin veneer of Topsoil, hardcore gravel or hardstanding, overlying thicknesses of Made Ground, fine-grained Possible Head Deposits and Fluvio-Glacial Gravels.
Groundwater Conditions	The site is underlain by a minor aquifer. Groundwater is apparently present within the Fluvio-glacial Gravels at depths of around 3.5m.
Potentially Contaminative Land Uses	The site was open pasture until the 1950s, when it was developed as a TA Centre. BY 1970, it had been redeveloped as a maintenance depot. The present owners moved to the site in around 1990. Three underground fuel/oil storage tanks are understood to be present at the site.
Risk to Human Health	No elevated levels of contamination were encountered in excess of guidelines for commercial/industrial end use.
Contamination migrating off-site	Given the presence of the underground fuel/oil storage tanks and coarse-grained fluvio-glacial deposits at shallow depth, the groundwater may have been impacted by contamination, which could migrate off-site to impact on local surface water courses. Further investigation is recommended.
Abandoned mine workings and mine entries	There are coal workings beneath the site, but they are at sufficient depth that the risk from subsidence is considered to be low.
Flooding	The Environment Agency's indicative flood plain maps shows the site lies in an area of extreme flooding from rivers or the sea without defences.

Location of exploratory holes from the previous investigation are shown in Figure 6 overleaf.

Figure 6 – Location of Exploratory Holes from Previous Investigation



3.0 SITE INVESTIGATION

3.1 Exploratory Fieldwork

The fieldwork was carried out by EEGSL between 29th April and 14th May 2019 and comprised:

- Thirteen window sample boreholes (designated WS1 to WS13 inclusive) were sunk to depths of 0.70m to 2.00m below existing ground level. Window sampler boring is carried out with a small, track-mounted rig which uses a chain-driven trip hammer to drive sampling tubes or penetrometers into the ground. These tools are coupled to the anvil of the hammer by solid drill rods. Sampling tubes comprise “windowless samplers”, which are plain sampler tubes in which a continuous disturbed sample is recovered within a semi-rigid plastic liner. In order to reduce friction within the borehole, sampling tubes of progressively smaller diameter are used as the borehole depth increases. Sampler diameters generally range from between approximately 90mm to 50mm. Standard penetration tests were conducted at regular intervals. Exploratory Hole logs are included in Appendix 1.
- One trial pit (designated TP1) was excavated to a depth of 2.00m below ground level using a wheeled excavator under the direct and continuous supervision of EEGSL. Representative disturbed samples were recovered from the excavated material as pitting proceeded. Details of groundwater conditions were noted. In situ soakaway testing was carried out in TP1, generally in accordance with the methods described in BRE Digest 365⁽²⁰⁰⁷⁾. Trial pit log, photographs and soakaway tests results are included in Appendix 2.
- The California Bearing Ratio (CBR) of near surface materials was examined using hand-held dynamic cone penetrometer. Four tests were performed at locations of the proposed car park from ground level. The test is performed by using an 8kg weight dropping a height of 575mm to drive a 20mm diameter 60 degree cone into the subsoil. The blow counts are recorded against penetration achieved and the results are plotted graphically. The CBR value of the various layers is then determined by reading from a graph showing the DCP-CBR relationship by Kleyne and Van Heerde⁽¹⁹⁸³⁾. Test results are included in Appendix 3.
- Gas/groundwater monitoring standpipes were installed in WS2, WS5 and WS10 to depths of between 1.8m and 2.0m below existing ground level. Installation details are shown on the exploratory hole logs in Appendix 1. EEGSL carried out gas/groundwater monitoring in standpipes after the fieldwork period, the results of which are included in Appendix 4.

Each exploratory location was scanned using a Cable Avoidance Tool (CAT) in order to locate unrecorded underground services, and the exploratory locations were repositioned if necessary. On completion, all samples recovered from the site were taken to a specialist laboratory for testing.

All site investigation work was supervised full time by a representative of EEGSL. The logging of soils and rocks has been carried out in accordance with BS5930⁽²⁰¹⁵⁾ except where superseded by the soil and rock description methodology in BS EN14688-1⁽²⁰⁰²⁾, BS EN 14688-2⁽²⁰⁰⁴⁾ and BS EN 14689-1⁽²⁰⁰³⁾.

A summary of exploratory holes undertaken is presented in Table 3 below.

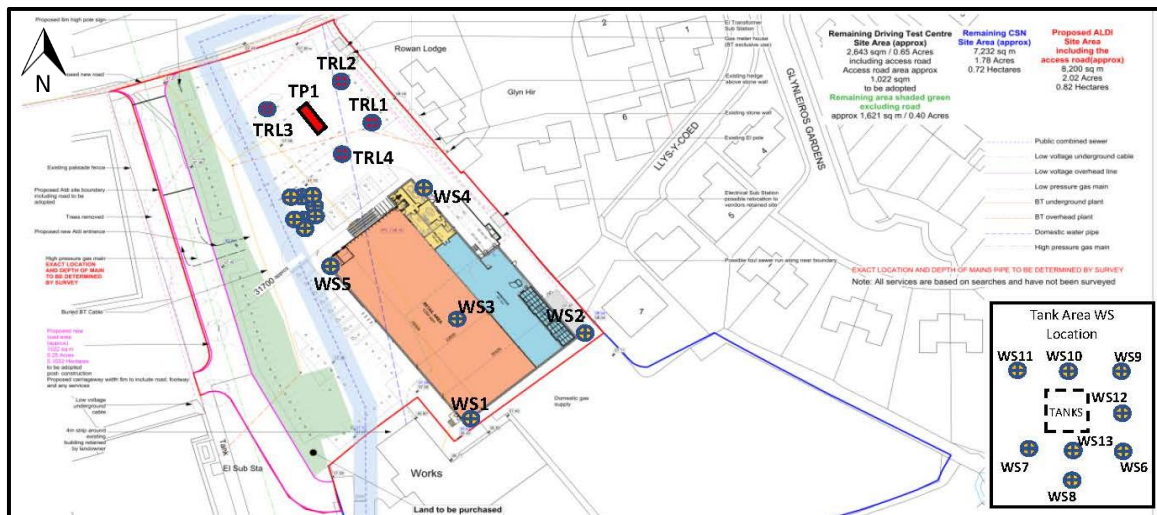
Table 2 - Summary of Exploratory Holes Undertaken

Location	Hole	Type*	Depth (m)	Date Started	Date Finished	Backfill Details**
Proposed Store Footprint	WS1	WS	2.00	29/04/2019	29/04/2019	A
	WS2	WS	2.00	29/04/2019	29/04/2019	SP
	WS3	WS	2.00	29/04/2019	29/04/2019	A
	WS4	WS	2.00	29/04/2019	29/04/2019	A
	WS5	WS	1.80	29/04/2019	29/04/2019	SP
Around Buried Fuel Tanks	WS6	WS	1.40	29/04/2019	29/04/2019	A
	WS7	WS	0.70	29/04/2019	29/04/2019	A
	WS8	WS	2.00	29/04/2019	29/04/2019	A
	WS9	WS	2.00	30/04/2019	30/04/2019	A
	WS10	WS	2.00	30/04/2019	30/04/2019	SP
	WS11	WS	1.40	30/04/2019	30/04/2019	A
	WS12	WS	1.40	30/04/2019	30/04/2019	A
Proposed Car Park	WS13	WS	1.20	30/04/2019	30/04/2019	A
	TP1	TP	2.00	01/05/2019	01/05/2019	A
	DCP1	DCP	0.90	14/05/2019	14/05/2019	-
	DCP2	DCP	0.55	14/05/2019	14/05/2019	-
	DCP3	DCP	0.89	14/05/2019	14/05/2019	-
	DCP4	DCP	0.95	14/05/2019	14/05/2019	-

*WS = Window Sample, TP = Trial Pit, DCP = TRL Probe **A = Arisings, SP = Standpipe

The exploratory hole locations were determined on site by EEGSL and are shown approximately on the Exploratory Hole Location Plan below.

Figure 7 - Exploratory Hole Location Plan



3.2 Laboratory Testing Programme

3.2.1 Geotechnical Testing

A programme of laboratory testing was carried out on samples taken from the various strata to assist in classification and determine the engineering properties of the materials underlying the site. The testing was scheduled by EEGSL and carried out by CJ Associates Geotechnical Ltd and Envirolab. The test procedures used were generally in accordance with the methods described in BS EN 17892-1:2014 and BS1377:1990. Details of the specific tests used in each case are given below in Table 3. The results of the laboratory geotechnical tests are included in Appendix 5.

Table 3 - Summary of Geotechnical Laboratory Tests Undertaken

TEST	STANDARD	No.
Moisture Content	BS EN 17892-1 : 2014	5
Liquid Limit, Plastic Limit, Plasticity Index	BS1377:1990 Part 2, Clause 4/5	5
Particle size distribution (wet sieve)	BS1377:1990 Part 2, Clause 9.2	2
Particle size distribution (hydrometer)	BS1377:1990 Part 2, Clause 9.5	2
Sulphate content of soil (acid soluble)	BS1377:1990 Part 3, Clause 5	5
Sulphate content of 2:1 soil:water extract	BS1377:1990 Part 3, Clause 5	5
pH value	BS1377:1990 Part 3, Clause 9	5

3.2.2 Environmental Testing

The environmental chemistry of the ground was investigated by specialist chemical analysis of selected samples, scheduled by EEGSL and carried out by DETS Ltd. Chemical analyses were carried out on 7 soil samples and were submitted for the following suite of determinants:

Asbestos Screen, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc, Cyanide, Thiocyanate, Sulphate (SO₄), Sulphide, pH, Sulphur, Soil Organic Matter, Phenol, Extractable Petroleum Hydrocarbons (EPH) and speciated Polyaromatic Hydrocarbons (PAH).

In addition, 2 samples were submitted for Waste Acceptance Criteria (WAC) testing and a further 16 samples for speciated PAH and speciated TPH around the area of the buried tanks.

The results of the laboratory contamination tests are included in Appendix 5.

4.0 GROUND CONDITIONS ENCOUNTERED

4.1 Soil Profile Encountered

The sequence of strata encountered beneath the site was:

- Topsoil/Made Ground
- Glaciofluvial Deposits

The depths of the various materials encountered in each of the exploratory holes are summarised in the following table.

Table 5 - Summary of Ground Conditions Encountered

Location	Investigation	Hole	Depth to Stratum (m)										GROUNDWATER
			TOPSOIL	MADE GROUND						GLCIOFLUVIAL DEPOSITS			
				Asphalt	Concrete	Sandy Gravel	Gravelly sand with brick	Sandy gravelly clay with brick	Clayey ashy sand	Sandy/ gravelly/ cobbly CLAY	Clayey/ Gravelly SAND	Sandy GRAVEL	
Proposed Store	EEGSL 2019	WS1	GL-0.1							0.1-1.2 1.3-2.0	1.2-1.3		Dry
		WS2	-					GL-0.2		0.2-2.0			Dry
		WS3	GL-0.3					0.3-0.8		0.8-2.0	-		Dry
		WS4	GL-0.1				0.1-0.3	0.3-0.6		0.6-1.8	1.8-2.0		Dry
		WS5	GL-0.1	-			0.1-0.65	-	-	0.65-1.7		1.7-2.0	Dry
	GIL 2007	WS3	GL-0.25									0.25-1.7	Dry
		TP1	GL-0.1							0.1-0.7		0.7-3.5	Dry
		TP2				GL-0.6 1.2-2.0		0.6-1.2				2.0-3.5	Dry
Fuel Tank Area	EEGSL 2019	WS6	-	GL-0.05	0.05-0.15	0.15-0.35				0.35-1.4	-	-	Dry
		WS7	-	GL-0.05	0.05-0.15			0.15-0.7	-		-	-	Dry
		WS8	-	GL-0.05	0.05-0.15			0.15-0.8	-	0.8-2.0	-	-	Dry
		WS9	-	GL-0.05	0.05-0.15					0.15-2.0	-	-	Dry
		WS10	-	GL-0.05	0.05-0.15		0.15-0.3		-	0.3-2.0	-	-	Dry
		WS11	-	GL-0.05	0.05-0.15		0.15-0.35		-	0.35-1.4	-	-	Dry
		WS12	-	GL-0.05	0.05-0.15		0.15-0.35		-	0.35-1.4	-	-	Dry
		WS13	-	GL-0.05	0.05-0.15		0.15-0.35		-	0.35-1.2	-	-	Dry
Proposed Car Park	EEGSL 2019	TP1	-	-				GL-0.4	0.40-0.60	0.6-1.7		1.7-2.0	Dry
	GIL 2007	WS4		GL-0.15		0.15-0.4						0.4-1.5	Dry
		WS5	GL-0.15							0.15-0.7		0.7-1.6	Dry
		WS6	GL-0.15							0.16-1.6		1.6-2.4	Dry

4.2 Observable Indications of Contamination

No olfactory evidence of contamination was identified during the investigation.

Visual evidence of contamination was identified in WS9 and WS10 where a small area of black staining was observed. Made Ground across the site was observed containing redbrick, plastic and wood.

4.3 Obstructions

No underground man-made obstructions were encountered in any of the exploratory holes other than WS7 which encountered a concrete slab at 0.70m at which point excavation ceased due to the close proximity to foul sewer and old underground storage tanks.

All the window sample boreholes refused at relatively shallow depths of between 1.2m and 2.0m below existing ground level. This is likely to represent 'dense' glaciofluvial gravel deposits.

4.4 Groundwater

Groundwater was not observed in any of the exploratory holes or within standpipes during subsequent monitoring.

4.5 Land Gas

Results obtained during the initial monitoring visit indicated Methane (CH₄) levels in the range 0.2% to 0.3% by volume, Carbon Dioxide (CO₂) levels ranging from 0.6% to 1.6% by volume, and Oxygen (O₂) levels ranging from 17.7% to 18.4% by volume. Hydrogen Sulphide levels of 0ppm and Carbon Monoxide levels ranging from 0ppm to 2ppm were recorded together with peak VOC readings in the range 12.0ppm to 13.9ppm. Maximum borehole pressures of 0.4Pa and maximum gas flows of 0.2l/hr were recorded together with an atmospheric pressure reading = 990mb.

Results obtained during subsequent monitoring visits indicated Methane levels in the range 0.2% to 0.4% by volume, Carbon Dioxide levels ranging from 0.6% to 1.1% by volume, and Oxygen levels ranging from 17.8% to 18.5% by volume. Hydrogen Sulphide levels of 0ppm to 1ppm and Carbon Monoxide levels of 0ppm were recorded together with peak VOC readings in the range 1.3ppm to 15.8ppm. Maximum borehole pressures of -0.22Pa and maximum gas flows of 0.01l/hr were recorded together with an atmospheric pressure readings in the range 1015mb to 1033mb.

It should be noted that the concentrations and levels of mobile liquid and gaseous materials are likely to vary with time. The results obtained may therefore be representative of the conditions only at the time of sampling.

5.0 ENGINEERING PROPERTIES OF SOILS ENCOUNTERED

5.1 General

This section discusses the engineering properties of the soils encountered based on results of in situ testing and laboratory testing obtained during the investigation.

The results of laboratory geotechnical testing are summarised in the following table:

Table 6 – Summary of Laboratory Geotechnical Test Results

Location	Depth	Stratum*	CLASSIFICATION									CHEMICAL		
			Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	PSD Cobbles (%)	PSD Gravel (%)	PSD Sand (%)	PSD Silt (%)	PSD Clay (%)	pH Value	Total Sulphate Content (%)	Water Soluble Sulphate (mg/l)
WS1	1.00	GFDc	12.4	47	27	20								
WS1	2.00	GFDc										7.58	<0.02	<10
WS2	1.00	GFDc										7.24	<0.02	<10
WS2	2.00	GFDc	7.9	36	23	13								
WS3	1.00	GFDc	26.7	51	30	21								
WS4	1.00	GFDc	11.7	34	22	12								
WS4	1.70	GFDc										7.16	<0.02	<10
WS5	1.00	GFDc										7.08	0.04	<10
WS5	2.00	GFDc	9.2	33	22	11								
TP1	0.40	MG										7.43	0.96	24
TP1	0.70	GFDc					0	30	18	36	16			
TP1	1.60	GFDg					0	83	10	5	2			

* MG = Made Ground, GFDc = Cohesive Glaciofluvial Deposits, GFDg = Granular Glaciofluvial Deposits

5.2 Made Ground

Laboratory tests have given values of **Total Sulphate** = 0.96%, **Water Soluble Sulphate** = 24mg/l and a **pH Value** = 7.43

5.3 Cohesive Glaciofluvial Deposits

A single laboratory **particle size distribution** (PSD) test suggests the sample tested (TP1, 0.70m) is a slightly sandy slightly gravelly clay/silt, as shown on the PSD Plot, included in the Appendices.

Atterberg Limit tests have given values of **liquid limit** in the range 33% to 51% and **plastic limit** values in the range 22% to 30%, resulting in values of **plasticity index** in the range 11% to 20%. These results suggest the samples tested are clay/silt of variably low to high plasticity. For design purposes, a value of plasticity index = 20% is recommended, based on the upper quartile value of the results.

In accordance with NHBC Chapter 4.2 Building Near Trees⁽²⁰⁰³⁾ soils can be classified in terms of **volume change potential**, using the relationship:

$$Ip' = Ip \times \frac{\% \text{ less than } 425\mu\text{m}}{100\%}$$

...where Ip' = modified plasticity index, Ip = plasticity index.

Based on the laboratory test results, the above relationship and Table 1 of NHBC Chapter 4.2, the samples tested are shown to have low volume change potential.

SPT N values range from 10 to >50, as can be seen on the exploratory hole logs included in the Appendices. These results suggest the cohesive Glaciofluvial Deposits are firm to very stiff. For design purposes, a value of 25 seems reasonable based on the lower quartile value of the results.

Shear strength may also be estimated from a correlation by Stroud and Butler⁽¹⁹⁷⁵⁾: for a clay with a plasticity index of 20%,

$$c_u = 4.8 \times \text{SPT N value} = 4.8 \times 25 = 120 \text{ kN/m}^2.$$

Based on all the above, a design value of undrained shear strength of 120 kN/m² is recommended for the cohesive Glaciofluvial Deposits.

The **coefficient of volume compressibility**, m_v may also be estimated from a correlation by Stroud and Butler⁽¹⁹⁷⁵⁾: for a clay with a plasticity index of 20%;

$$m_v = 1 / (0.55 \times \text{N value}) = 1 / (0.55 \times 20) = 0.09 \text{ m}^2/\text{MN}$$

Laboratory tests have given values of **Total Sulphate** in the range <0.02% to 0.04%, **Water Soluble Sulphate** = <10 mg/l and **pH Values** in the range 7.08 to 7.58.

5.3 Granular Glaciofluvial Deposits

A single laboratory **particle size distribution** (PSD) tests suggests the sample tested (TP1, 1.6m) is slightly clayey/silty sandy gravel.

SPT N values are generally high and range from 42 to >50 with the majority of values = >50 (i.e. refusal). These results suggest the granular Glaciofluvial Deposits are dense to very dense.

For design purposes, a value of 42 seems reasonable. Based on the correlation by Peck, Hanson and Thornburn⁽¹⁹⁷⁴⁾, this gives an **angle of shearing resistance** of $\phi = 39.2^\circ$.

5.4 Results of In Situ Testing

In situ soakaway testing has given values of **soil infiltration rate** in the range $2.45 \times 10^{-5} \text{ m/s}$ to $3.08 \times 10^{-5} \text{ m/s}$.

Results of in situ CBR testing are summarised in Table 7 below.

Table 7 - Summary of In Situ CBR Test Results

Location	Depth (m)	CBR Value (%)	Location	Depth (m)	CBR Value (%)
DCP1	0.00-0.06	26	DCP3	0.00-0.23	5.2
	0.06-0.36	9.9		0.23-0.38	10
	0.36-0.50	54		0.38-0.58	3.6
	0.50-0.90	8.0		0.58-0.89	15
DCP2	0.00-0.24	3.9	DCP4	0.00-0.34	7.2
	0.24-0.48	13		0.34-0.45	20
	0.48-0.67	4.9		0.45-0.69	8.3
	0.67-0.84	9.0		0.69-0.95	12
	0.84-0.88	29			

6.0 GEOTECHNICAL ASSESSMENT

6.1 Proposed Development

It is proposed to redevelop the site for commercial purposes with a proposed new ALDI store and associated areas of hardstanding for car parking and soft landscaping. At the time of writing this report anticipated structural loadings were not known.

6.2 Ground Conditions Encountered

The following sections discuss the ground conditions encountered across the site.

6.2.1 *Proposed Building Footprint*

The exploratory holes have encountered topsoil and made ground, (maximum 2.0m thickness in TP1 from 2007) overlying firm to stiff sandy gravelly clay or generally dense clayey sandy gravel. Groundwater was not encountered in any of the exploratory holes. Significantly raised levels of land gas or VOCs were not encountered in any of the standpipes during monitoring.

6.2.2 *Area of Buried Fuel Tanks*

The exploratory holes have encountered a thin veneer of hardstanding and made ground (up to 0.8m thickness) overlying firm to stiff sandy gravelly clay or generally dense clayey sandy gravel. Groundwater was not encountered in any of the exploratory holes. Significantly raised levels of land gas or VOCs were not encountered.

6.2.3 *Proposed Car Park*

The exploratory holes have encountered topsoil and made ground, (up to 0.6m thickness) overlying firm to stiff sandy gravelly clay or generally dense clayey sandy gravel. Groundwater was not encountered in any of the exploratory holes.

6.3 Proposed Building Foundations

Based on the ground conditions encountered conventional strip/pad foundations will be suitable at this site.

Foundations should be taken down a minimum 1.0m depth and placed in the natural Glaciofluvial Deposits. If any Made Ground, particularly loose or soft material is encountered at foundation level, this should either be excavated and replaced with suitable granular fill, or the foundations extended to suitable material. In this context attention is drawn to the 2.0m thickness of Made Ground encountered in TP1 during the previous investigation in 2007.

In addition it is recommended foundations are placed in materials of similar bearing and consolidation characteristics to avoid differential settlement. The natural Glaciofluvial Deposits have been encountered at variable depths beneath the site (see Table 5). Placing adjacent pad foundations in different materials (i.e. sandy/gravelly clay or clayey sandy gravel) could cause different magnitude and rates of settlement between the pads.

Table 8 overleaf summarises anticipated allowable bearing pressures for strip and pad foundations placed at different depths in the natural Glaciofluvial Deposits. Based on ground conditions encountered in exploratory holes it is assumed cohesive Glaciofluvial Deposits will be encountered at 1.0m depth and granular Glaciofluvial Deposits will be encountered at 2.0m depth.

The bearing capacities are calculated based on Hansen's⁽¹⁹⁷⁸⁾ method and assuming a factor of safety against bearing capacity failure of 3. Ground water is assumed to be at 2.0m below existing ground level.

Table 8 - Summary of Allowable Bearing Pressures

Foundation Depth	Strata	Design Value (Section 5)	Foundation Type	Foundation Size	Allowable Bearing Pressure
1.0m	Sandy gravelly CLAY	$c_u = 120\text{kN/m}^2$	Strip	0.40m	300kN/m ²
				0.90m	275kN/m ²
			Pad	1.0m x 1.0m	325kN/m ²
				2.0m x 2.0m	295kN/m ²
2.0m	SAND/ GRAVEL	$\phi = 39.2^\circ$	Strip	0.40m	450kN/m ²
				0.90m	480kN/m ²
			Pad	1.0m x 1.0m	>500kN/m ²
				2.0m x 2.0m	>500kN/m ²

Table 9 below summarises anticipated settlements of strip and pad foundations, using design parameters discussed in Section 5. For the purposes of the calculations, the structural loading has been assumed as equal to the allowable bearing pressure above (to give a worse-case scenario).

Table 9 - Summary of Anticipated Settlements

Foundation Depth	Strata	Foundation Type	Foundation Size	Foundation Loading	Settlement (mm)		
					At Centre	At Corner	Average
1.0m	CLAY	Strip	0.40m	300kN/m ²	-	-	10-15
			0.90m	275kN/m ²	-	-	15-20
		Pad	1.0m x 1.0m	325kN/m ²	25-30	5-10	20-25
			2.0m x 2.0m	295kN/m ²	45-50	10-15	30-35
Foundation Depth	Strata	Foundation Type	Foundation Size	Foundation Loading	Lower Limit*	Upper Limit*	Best Estimate*
2.0m	SAND /GRAVEL	Strip	0.40m	450kN/m ²	<5	5-10	<5
			0.90m	480kN/m ²	<5	10-15	5-10
		Pad	1.0m x 1.0m	>500kN/m ²	<5	5-10	<5
			2.0m x 2.0m	>500kN/m ²		15-20	5-10

*Settlements in sand/gravel are immediate

Settlements for other bearing pressures may be estimated on a pro-rata basis but bearing pressures should not exceed the allowable net bearing pressure based on ultimate bearing capacity.

Floor slabs should be designed as suspended where Topsoil/Made Ground is of 600mm thickness or greater. Floor slabs may be designed as ground bearing where Topsoil/Made Ground is excavated and replaced with suitable granular fill.

All foundation excavations should be inspected by a suitable qualified engineer to prove that the founding strata is suitable and uniform along the length of the foundation, and capable of taking the anticipated structural loadings.

It is understood the site is in an area at risk from flooding. Flood protection measures will need to be considered. If site levels are to be raised, it is still recommended foundations are taken down to levels/strata indicated above.

6.4 Pavement Design

Results of in-situ testing have given values of CBR in the range 3.9% to 54% for strata within 1m of the existing site surface.

Based on the above results and ground conditions encountered, it is recommended for preliminary design purposes a CBR value = 3% is adopted for near surface Made Ground and clay and 10% for natural gravel.

Consideration should also be given to the use of geotextiles to allow reduction of capping thickness. For example, biaxial geogrids such as Tensar SSLA20 and SSLA30 are often used to reduce capping thickness. The advice of a suitable contractor should be sought as to the most appropriate type of geotextile to use in the ground conditions encountered at this site. For guidance, the following table gives a comparison of granular layer thickness with and without the use of a geotextile, in accordance with the requirement of HA25/94 Part 2.

Table 10 - Comparison of Capping Thickness with and without Geotextile

CBR	Unreinforced			Reinforced with Tensar Geogrid				
	Sub-base	Capping	Total	Sub-base	Capping	No. of grids	Total	Thickness saving
0.5%	Design not suitable			200mm	400mm	2	600mm	-
1.0%	150mm	600mm	750mm	400mm	0	1	400mm	350mm
1.5%	150mm	600mm	750mm	310mm	0	1	310mm	440mm
2.0%	150mm	600mm	750mm	260mm	0	1	260mm	490mm
3.0%	150mm	350mm	500mm	210mm	0	1	210mm	290mm
4.0%	150mm	300mm	450mm	175mm	0	1	175mm	275mm
5.0%	150mm	250mm	400mm	160mm	0	1	160mm	240mm
These figures are suitable for light access roads and car parks, based on 1000 standard axles. For heavier loaded pavements the advice of specialist contractor should be sought.								

It should be noted the type of construction will depend on proposed finished pavement levels across the site and it is recommended the pavement design is reviewed once these levels are known. In this context, it is essential further in situ CBR testing is carried out once formation levels are known to confirm design CBR values.

All formation excavations should be examined by a suitably experienced engineer or inspector to check for soft or unsuitable material, which should be removed and replaced with compacted granular fill. Also, to ensure good compaction and remove unevenness, the formation should be compacted with equipment suitable for use in the ground conditions encountered. Careful inspection of this work will also help identify any soft spots at or just below formation level.

6.5 Chemical Attack on Buried Concrete

Chemical tests (see Appendices) show low levels of water soluble sulphates and slightly alkaline conditions. Based on these conditions it is recommended that for concrete placed in made ground the Design Sulphate Class for the site, as defined in BRE Special Digest 1⁽²⁰⁰⁵⁾, be taken as DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification be taken as AC-1s. The recommendations of BRE Special Digest 1 should be followed for concrete foundations and ground bearing floor slabs.

6.6 Suitability of Excavated Materials

Concrete hardstanding could be re-used as structural fill, subject to processing (mechanic breakdown etc.) and providing it is not contaminated.

Acceptability criteria and testing, and methods of compaction/placement will depend on the type of contract and specification used for the construction of the proposed development and it is recommended that earthworks specifications are reviewed by a suitably qualified engineer, once these have been prepared by the relevant parties.

Granular Made Ground and granular Glaciofluvial Deposits could be suitable for re-use, providing it is not contaminated and does not contain excessive amounts of clay and providing moisture contents are controlled during placement. The control of moisture contents will be important as the cohesive content of this stratum is likely to be sensitive to moisture content changes.

The cohesive Made Ground is unlikely to be suitable for re-use as fill, and should be used for landscaping purposes, providing it is not contaminated.

The firm to stiff cohesive Glaciofluvial Deposits could be re-used as structural fill, subject to additional compliance testing.

6.7 Temporary Works

Formations will be susceptible to damage both by weather and trafficking, and should be protected immediately on exposure, particularly in areas where construction plant will access the site.

Excavations in the Made Ground and granular Glaciofluvial Deposits are likely to be unstable and should be battered back to an angle of 1 in 2, or a system of close sheeting and shoring adopted to ensure stability, and in particular where personnel are required to enter excavations. Vertically sided excavation in the cohesive Glaciofluvial Deposits should be stable in the short term. All excavations should be adequately supported where personnel are required to enter.

Groundwater seepages could be encountered in excavations, particularly during wetter periods. If required pumping of excavations from a suitable located sump should be adequate to keep excavations dry.

All natural soils on site should capable of being excavated using conventional excavating machinery.

6.8 Drainage

Based on the ground conditions encountered, depth to groundwater and results of in-situ soakaway testing, soakaway drainage will be acceptable at this site. The results obtained from the in situ testing can be used for preliminary design of soakaways. Oil interceptors will be required where soakaways are draining car parking areas.

7.0 SOIL CONTAMINATION RISK ASSESSMENT

7.1 General

The following sections provide a Human Health Soil Assessment for groundworkers during development and future site users.

7.2 Tier I Human Health Soil Risk Assessment – Groundworkers During Development

To assess the risk of soil contamination to construction and ground workers during development, guidelines from the HSE Document 'Protection of workers and the general public during development of contaminated land'⁽¹⁹⁹¹⁾ are used. The document assesses soil contamination test results and classifies the site as being uncontaminated or contaminated with varying degrees of contamination from 'slight' to 'unusually heavy'.

The guideline values and laboratory test results are summarised in the following table:

Table 11 - Summary of Guideline Values for Protection of Workers and the General Public during Development of Contaminated Land

Contaminant	Typical Values* for:					Test Results	Class
	Uncontaminated Soils	Slight Contamination	Contaminated	Heavy Contamination	Unusually Heavy Contamination		
	Class A	Class B	Class C	Class D	Class E		
pH (alkaline)	7 - 8	8 - 9	9 - 10	10 - 12	12	7.2-6.6	A
pH (acid)	6 - 7	5 - 6	4 - 5	2 - 4	<2	7.2-6.6	A
Arsenic	0 - 30	30 - 50	50 - 100	100 - 500	500	9-91	A-C
Cadmium	0 - 1	1 - 3	3 - 10	10 - 50	50	<0.2-2.4	A-B
Chromium	0 - 100	100 - 200	200 - 500	500 - 2500	2500	15-18	A
Copper	0 - 100	100 - 200	200 - 500	500 - 2500	2500	31-262	A
Lead	0 - 500	500 - 1000	1000 - 2000	2000 - 1%	1.0%	18-751	A-B
Mercury	0 - 1	1 - 3	3 - 10	10 - 50	50	<1	A
Nickel	0 - 20	20 - 50	50 - 200	200 - 1000	1000	13-24	A-B
Zinc	0 - 250	250 - 500	500 - 1000	1000 - 5000	5000	73-1090	A-D
Boron	0 - 2	2 - 5	5 - 50	50 - 250	250	<1	A
Selenium	0 - 1	1 - 3	3 - 10	10 - 50	50	<3	A
Beryllium	0 - 5	5 - 10	10 - 20	20 - 50	50	0.6-1.0	A
Vanadium	0 - 100	100 - 200	200 - 500	500 - 2500	2500	20-29	A
Sulphate	0 - 2000	2000 - 5000	5000 - 1%	1% - 5%	5.05%	<200-839	A-B
Sulphide	0 - 10	10 - 20	20 - 100	100 - 500	500	<5	A
Cyanide (free)	0 - 1	1 - 5	5 - 50	50 - 100	100	<2	A
Coal Tar	0-500	500-1000	1000-2000	2000-1.0%	1.0%	<6-38	A
Phenol	0 - 2	2 - 5	5 - 50	50 - 250	250	<2	A

Based on the above results there is a low to moderate potential risk from soil contamination to construction workers, ground workers during construction, and appropriate measures, such as PPE, site health plans, appropriate disposal of material arisings will be required to mitigate this risk.

7.3 Tier I Human Health Soil Risk Assessment – Future Site Users

As part of the contamination assessment, the chemical results obtained by EEGSL have been screened against accepted compliance criteria, namely:

- Defra C4SL Health Criteria Values^(May 2014), where available; and
- Tier 1 assessment values - based on LQM/CIEH Suitable 4 Use Levels⁽²⁰¹⁵⁾ (S4ULs).

As a preliminary screening assessment, all results have been compared to commercial/Industrial end use criteria for areas of hardstanding/hard cover development.

The samples around abandoned UST area have been given an assumed 1.0% SOM value (WS6 to WS13 inclusive) adhering the results to more stringent S4UL values than higher SOM values.

The comparison of results is summarised in the following table:

Table 12 - Soil Results Comparison with C4SL/S4UL Levels (Proposed Store Area)

Determinand	C4SL/S4UL Levels Commercial (mg/kg)*	WS1	WS2	WS3	WS4	WS5	No of Exceedences
Metals							
Arsenic	640	9	74	15	16	91	None
Beryllium	12	1	0.7	0.7	0.6	0.8	None
Boron	240000	<1	<1	<1	<1	<1	None
Cadmium	190	<0.2	2.2	<0.2	<0.2	2.4	None
Chromium	8600	17	15	16	16	16	None
Chromium VI	33	<2	<2	<2	<2	<2	None
Copper	68000	31	128	33	38	262	None
Lead	2300	23	751	49	37	189	None
Mercury	58	<1	<1	<1	<1	<1	None
Nickel	980	24	18	13	13	19	None
Selenium	12000	<3	<3	<3	<3	<3	None
Vanadium	9000	29	26	27	26	29	None
Zinc	730000	84	1090	102	73	535	None
Polycyclic Aromatic Hydrocarbons							
Naphthalene	190	<0.1	<0.1	<0.1	<0.1	<0.1	None
Acenaphthylene	83000	<0.1	<0.1	<0.1	<0.1	<0.1	None
Acenaphthene	84000	<0.1	<0.1	<0.1	<0.1	<0.1	None
Fluorene	63000	<0.1	<0.1	<0.1	<0.1	<0.1	None
Phenanthrene	22000	<0.1	0.52	0.18	<0.1	0.38	None
Anthracene	520000	<0.1	<0.1	<0.1	<0.1	0.18	None
Fluoranthene	23000	<0.1	0.67	0.19	<0.1	0.54	None
Pyrene	54000	<0.1	0.52	0.15	<0.1	0.43	None
Benz(a)anthracene	170	<0.1	0.29	<0.1	<0.1	0.49	None
Chrysene	350	<0.1	0.36	<0.1	<0.1	0.19	None
Benzo(a)pyrene	35	<0.1	0.22	<0.1	<0.1	0.29	None
Benzo(b)fluoranthene	44	<0.1	0.39	<0.1	<0.1	0.20	None
Benzo(k)fluoranthene	1200	<0.1	<0.1	<0.1	<0.1	<0.1	None
Indeno(1,2,3-cd)pyrene	500	<0.1	0.16	<0.1	<0.1	0.26	None
Dibenz(a,h)anthracene	3.5	<0.1	<0.1	<0.1	<0.1	<0.1	None
Benzo(ghi)perylene	3900	<0.1	<0.1	<0.1	<0.1	<0.1	None
Phenols							
Phenol	760	<2	<2	<2	<2	<2	None

Table 13 - Soil Results Comparison with C4SL/S4UL Levels - Fuel Tank Area

Determinand	C4SL/S4UL Levels Commercial (mg/kg)	WS6	WS11	No of Exceedences
Metals				
Arsenic	640	9	9	None
Beryllium	12	0.6	0.7	None
Boron	240000	<1	<1	None
Cadmium	190	<0.2	<0.2	None
Chromium	8600	16	18	None
Chromium VI	33	<2	<2	None
Copper	68000	26	28	None
Lead	2300	18	29	None
Mercury	58	<1	<1	None
Nickel	980	19	20	None
Selenium	12000	<3	<3	None
Vanadium	9000	9	9	None
Zinc	730000	0.6	0.7	None
Polycyclic Aromatic Hydrocarbons				
Naphthalene	190	<0.1	<0.1	None
Acenaphthylene	83000	<0.1	<0.1	None
Acenaphthene	84000	<0.1	<0.1	None
Fluorene	63000	<0.1	<0.1	None
Phenanthrene	22000	<0.1	<0.1	None
Anthracene	520000	<0.1	<0.1	None
Fluoranthene	23000	<0.1	<0.1	None
Pyrene	54000	<0.1	<0.1	None
Benz(a)anthracene	170	<0.1	<0.1	None
Chrysene	350	<0.1	<0.1	None
Benzo(a)pyrene	35	<0.1	<0.1	None
Benzo(b)fluoranthene	44	<0.1	<0.1	None
Benzo(k)fluoranthene	1200	<0.1	<0.1	None
Indeno(1,2,3-cd)pyrene	500	<0.1	<0.1	None
Dibenz(a,h)anthracene	3.5	<0.1	<0.1	None
Benzo(ghi)perylene	3900	<0.1	<0.1	None
Phenols				
Phenol	760	<2	<2	None

**Table 14 - Soil Results Comparison with C4SL/S4UL Levels around Fuel Tanks
(PAHs, TPHs and BTEX)**

Determinand	C4SL/S4UL Levels Commercial (mg/kg)	Minimum Value (mg/kg)	Maximum Value (mg/kg)	No of Exceedences
Polycyclic Aromatic Hydrocarbons				
Naphthalene	190	<0.1	<0.1	None
Acenaphthylene	83000	<0.1	<0.1	None
Acenaphthene	84000	<0.1	<0.1	None
Fluorene	63000	<0.1	<0.1	None
Phenanthrene	22000	<0.1	<0.1	None
Anthracene	520000	<0.1	<0.1	None
Fluoranthene	23000	<0.1	<0.1	None
Pyrene	54000	<0.1	<0.1	None
Benz(a)anthracene	170	<0.1	<0.1	None
Chrysene	350	<0.1	<0.1	None
Benzo(a)pyrene	35	<0.1	<0.1	None
Benzo(b)fluoranthene	44	<0.1	<0.1	None
Benzo(k)fluoranthene	1200	<0.1	<0.1	None
Indeno(1,2,3-cd)pyrene	500	<0.1	<0.1	None
Dibenz(a,h)anthracene	3.5	<0.1	<0.1	None
Benzo(ghi)perylene	3900	<0.1	<0.1	None
Total Petroleum Hydrocarbons				
TPH CWG - Aliphatic >C5 - C6	3200	<0.01	<0.01	None
TPH CWG - Aliphatic >C6 - C8	7800	<0.05	<0.05	None
TPH CWG - Aliphatic >C8 - C10	2000	<2	<2	None
TPH CWG - Aliphatic >C10 - C12	9700	<2	<2	None
TPH CWG - Aliphatic >C12 - C16	59000	<3	<3	None
TPH CWG - Aliphatic >C16 - C34	1600000	<13	198	None
TPH CWG - Aromatic >C5 - C7	26000	<0.01	<0.01	None
TPH CWG - Aromatic >C7 - C8	56000	<0.05	<0.05	None
TPH CWG - Aromatic >C8 - C10	3500	<2	<2	None
TPH CWG - Aromatic >C10 - C12	16000	<2	<2	None
TPH CWG - Aromatic >C12 - C16	26000	<2	<2	None
TPH CWG - Aromatic >C16 - C21	28000	<3	<3	None
TPH CWG - Aromatic >C21 - C35	28000	<13	211	None
BTEX				
Benzene	27	<0.002	<0.002	None
Toluene	56000	<0.005	<0.005	None
Ethylbenzene	5700	<0.002	<0.002	None
p-xylene	5900	<0.002	<0.002	None
m-xylene	62000	<0.002	<0.002	None
o-xylene	6600	<0.002	<0.002	None

The samples have shown contaminants at levels below the recommended C4SLs/S4ULs for commercial/industrial end use.

Asbestos was not encountered within any of the samples.

7.4 Soil Disposal Waste Assessment

Environment Agency Technical Guidance WM3.1: Hazardous Waste; "Guidance on the classification and assessment of waste", May 2018, published by Environment Agency of England and Wales, SEPA, NIEA and Natural Resources Wales has been used to characterise soil materials.

HazWasteOnline™ a cloud-based software application for the management, analysis and reporting of hazardous waste materials has been used to make this assessment.

The Hazardous Waste Assessment confirms that all the samples tested were Non-Hazardous, with the exception of WS2^(0.40-0.60m) and WS5^(0.30-0.60m) which are classified as **Hazardous** due to elevated levels of zinc.

For Waste Acceptance Criteria (WAC) testing, results have compared solid waste and leachate values with guideline values in the Landfill Regulations. The two samples scheduled for WAC testing fall within the inert guidance levels.

8.0 LAND GAS RISK ASSESSMENT

The potential risk associated with gases being generated in the ground (whether from natural or man-made sources) depends on the concentrations of gas and its flow rate to the surface. These factors are assessed by monitoring of the gas installations in the boreholes. The variable nature of gas generation and the effect of barometric pressure on gas flow, means that the volume of gas potentially reaching the ground surface is normally inconsistent over time.

For the assessment of sites, in terms of the potential for ground gas to present a hazard, the risk based methodology detailed in CIRIA Report C665⁽²⁰⁰⁷⁾ is used. This is a risk based approach that is designed to allow quick and easy design of gas protection for development by comparing the measured gas emission rates to Characteristic Situations, based on risk based Gas Screening Values (GSVs). The GSVs equate to the borehole gas volume flow rate as defined by Wilson and Card⁽¹⁹⁹⁹⁾ as the borehole flow rate multiplied by the concentration in the air stream of the particular gas being considered.

For the purposes of this evaluation the calculations will be carried out for both carbon dioxide and methane encountered in the boreholes on site, and a peak flow rate of 0.2l/hr (as measured) in order to establish the appropriate protection measures, as follows:

- Carbon dioxide: maximum flow rate = 0.2l/hr, max concentration = 1.6%
- Methane: maximum flow rate = 0.2l/hr, max concentration = 0.3%.

Based on the above figures, the GSV is calculated as:

- Carbon dioxide: $GSV = 0.2 \times 0.016 = 0.0032 \text{ l/hr}$
- Methane: $GSV = 0.2 \times 0.003 = 0.0006 \text{ l/hr}$.

The above results suggest the site can be given a Characteristic Situation of (1), i.e. 'very low risk', in accordance with the table below.

Table 15 - Modified Wilson & Card Classification (CIRIA Report 665)

<i>Characteristic Situation (CIRIA Report 149)</i>	<i>Risk Classification</i>	<i>GSV (CH₄ or CO₂) (l/hr)</i>	<i>Additional Factors</i>	<i>Typical Source of Generation</i>
1	Very Low Risk	<0.07	Typically methane ≤1%v/v and/or carbon dioxide ≤5% v/v. Otherwise consider increase to Situation 2.	Natural Soils with low organic content. "Typical" Made Ground.
2	Low Risk	<0.7	Borehole flow rate not to exceed 70l/hr. Otherwise increase to Situation 3.	Natural soil, high peat/organic content. "Typical" Made Ground.
3	Moderate Risk	<3.5		Old landfill, inert waste, mineworking flooded.
4	Moderate to High Risk	<15	Quantitative risk assessment required to evaluate scope of measures required.	Mineworking susceptible to flooding, completed landfill (WMP 26B criteria)
5	High Risk	<70		Mineworking unflooded inactive with shallow workings near surface.
6	Very High Risk	>70		Recent landfill site.

According to Table 8.6 of CIRIA Report 665, no special precautions will be required in commercial/industrial developments for Characteristic Situation 1.

9.0 ENVIRONMENTAL CONCLUSIONS AND RECOMMENDATIONS

The following section provides a summary of the conclusions and recommendations based on the findings of the contamination testing and gas monitoring.

9.1 Soil Contamination

Based on available soil contamination test results there is a low to moderate potential risk from soil contamination to construction workers and ground workers and appropriate measures, such as PPE, site health plans, appropriate disposal of material arisings will be required to mitigate this risk. The groundworks contractor must provide a soil management plan including methods of dealing with known and unanticipated soil contamination encountered during groundworks.

As discussed in the above sections, the contamination tests indicate generally low concentrations of the potential contaminants. It is therefore considered that, based on the information available, remedial action should not generally be required at this site. Nevertheless, the presence of higher levels of contamination on areas of the site not covered by the current exploratory holes should not be discounted and additional spot checks would be prudent, particularly during groundworks or in any proposed soft landscaped areas. This testing can be carried out as part of the Soil Management Plan for the site.

Should any elevated levels of contamination be found in such areas, remedial measures, such as excavation/removal or the replacement of the upper zone of contaminated soil with a suitable thickness of clean soil, may need to be undertaken.

9.2 Remediation of Buried Fuel Tanks

The ground conditions and laboratory test results from around the buried fuel tanks do not indicate there has been any significant leakage from the tanks.

The remediation of these tanks could include either filling with concrete (once emptied of any remnant fuel) or excavated and removed from site. The remediation of these tanks should be carried out by a specialist contractor.

9.3 Soil Disposal

Soils should be disposed of at a suitable site, registered to take the levels of contamination encountered (see Section 7.4).

9.4 Land Gas

Based on the results of monitoring, gas protection measures will not be required for the proposed development.

9.5 Risk to Buried (Water) Services

It is considered that, due to the levels of contamination on the site, non-standard materials may be required for new water pipes. Further advice should be sought from the local water company.

Previous guidance on buried water pipes was contained in Water Regulations Advisory Scheme (WRAS) Guidance Note No. 9-04-03⁽²⁰⁰²⁾, however this has been superseded by the UK Water

Industry Research Report 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' Ref 10/WM/03/21 (January 2011).

9.6 Site Personnel

As with all construction sites, personnel working on the site during the construction period should be encouraged to maintain a high standard of personal hygiene and on site washing facilities should be available.

9.7 Other Matters

Due diligence is required during the construction period, and should any further evidence of contamination be found, appropriate investigation and / or action should be taken. The significance of any contamination not discovered by this investigation is outside the scope of this report.

The following section provides a summary of the conclusions and recommendations based on the findings of the contamination testing and gas monitoring.

APPENDIX 1

EXPLORATORY HOLE LOGS

Borehole Log

Borehole No.

WS1

Sheet 1 of 1

Project Name: ALDI Neath

Project No.
B0786

Co-ords: -

Hole Type
WS

Location: Neath

Level: 0.00

Scale
1:25

Client: ALDI Stores Ltd

Dates: 29/04/2019 - 29/04/2019

Logged By
JS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description				
		Depth (m)	Type	Results								
		0.40 - 0.60	ES		0.10	-0.10		Dark brown TOPSOIL.	1			
					0.40	-0.40		Soft dark brown slightly sandy CLAY. Sand is fine to coarse.				
								Soft becoming firm dark brown sandy CLAY. Sand is fine to coarse. Occasional gravel angular to subangular fine to coarse of dark grey crystalline rock and flint.				
		1.00	D	N=42 (13,10/12,9,10,11)	1.20	-1.20		Dense yellow brown slightly clayey fine to coarse SAND with occasional gravel angular to subangular fine to coarse of various lithic fragments.				
		1.20			1.30	-1.30						
		2.00 2.00	D	N=50 (11,12/50 for 230mm)	2.00	-2.00		Firm becoming stiff dark brown very sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint.				
					2.00							
										End of borehole at 2.00 m	2	
												3
												4
									5			

Remarks

Borehole Log

Borehole No.

WS2

Sheet 1 of 1

Project Name: ALDI Neath

Project No.
B0786

Co-ords: -

Hole Type
WS

Location: Neath

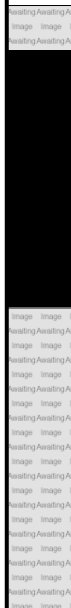
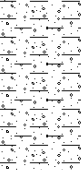
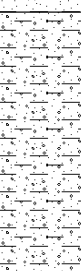
Level: 0.00

Scale
1:25

Client: ALDI Stores Ltd

Dates: 29/04/2019 - 29/04/2019

Logged By
JS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40 - 0.50	ES		0.20	-0.20		MADE GROUND of soft dark brown slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of redbrick and various lithic fragments.	
					0.80	-0.80		Soft becoming firm dark brown black slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint, siltstone and sandstone.	
		1.00	D		1.10	-1.10		Soft dark brown very sandy CLAY with occasional gravel angular to subangular fine to medium of flint and sandstone. Sand is fine to coarse.	1
		1.20		N=31 (3,4/5,6,10,10)				Firm becoming stiff dark brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint and sandstone.	
		2.00 2.00	D	N=50 (25 for 115mm/50 for 250mm)	2.00	-2.00		End of borehole at 2.00 m	2
									3
									4
									5

Remarks

Project Name: ALDI Neath

Project No.
B0786

Co-ords: -

Hole Type	WS
-----------	----

Location: Neath

Level: 0.00

Scale
1:25

Client: ALDI Stores Ltd

Dates: 29/04/2019 - 29/04/2019

Logged By
JS

[illegible]

Remarks	
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**EARTH ENVIRONMENTAL
& GEOTECHNICAL**

Borehole Log

Borehole No.

WS5

Sheet 1 of 1

Project Name: ALDI Neath

Project No.
B0786

Co-ords: -

Hole Type
WS

Location: Neath

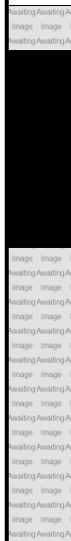
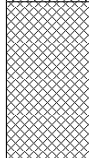
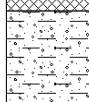
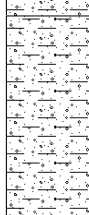
Level: 0.00

Scale
1:25

Client: ALDI Stores Ltd

Dates: 29/04/2019 - 29/04/2019

Logged By
JS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.60	ES		0.10	-0.10		Dark brown TOPSOIL.	1
					0.65	-0.65		MADE GROUND of soft becoming firm dark brown black gravelly clay with occasional fine to coarse sand. Gravel is angular to subangular fine to coarse of flint.	
								Firm dark brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint and grey sandstone.	
		1.00	D	N=52 (3,7/52 for 265mm)	1.00	-1.00		Firm becoming very stiff dark brown very gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint and grey sandstone.	
		1.20							
		1.70	D	N=50 (10,14/50 for 165mm)	1.70	-1.70		Dense becoming very dense grey sandy angular to subangular fine to coarse GRAVEL of grey sandstone. Sand is fine to coarse.	
		1.80			1.80	-1.80		End of borehole at 1.80 m	
									2
									3
									4
									5

Remarks

Borehole Log

Borehole No.

WS6

Sheet 1 of 1

Project Name: ALDI Neath

Project No.
B0786

Co-ords: -

Hole Type
WS

Location: Neath

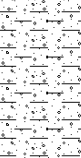
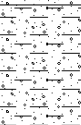
Level: 0.00

Scale
1:25

Client: ALDI Stores Ltd

Dates: 29/04/2019 - 29/04/2019

Logged By
JS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40 - 0.60	ES		0.05	-0.05		ASPHALT.	1
					0.15	-0.15		CONCRETE.	
		0.50	ES		0.35	-0.35		MADE GROUND of dense dark grey slightly sandy angular to subangular fine to coarse gravel of grey sandstone and various lithic fragments.	
								Firm becoming stiff gravelly slightly sandy clay with frequent cobbles angular to subangular 180mm to 250mm of flint and sandstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint.	
		1.40	ES		1.00	-1.00		Stiff becoming very stiff dark brown gravelly slightly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint and grey sandstone.	
					1.40	-1.40		End of borehole at 1.40 m	2
									3
									4
									5

Remarks



**EARTH ENVIRONMENTAL
& GEOTECHNICAL**

Borehole Log

Borehole No.

WS8

Sheet 1 of 1

Project Name: ALDI Neath

Project No.
B0786

Co-ords: -

Hole Type
WS

Location: Neath

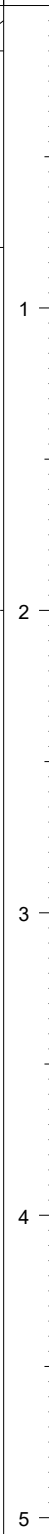
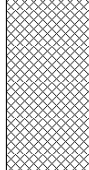
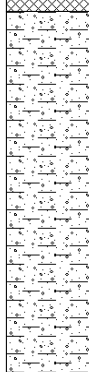
Level: 0.00

Scale
1:25

Client: ALDI Stores Ltd

Dates: 29/04/2019 - 29/04/2019

Logged By
JS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.05	-0.05		ASPHALT.	
					0.15	-0.15		CONCRETE.	
		0.70	ES					MADE GROUND of soft becoming firm dark brown slightly sandy very gravelly clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint and redbrick. Occasional cobbles angular to subangular 200mm to 350mm of flint and sandstone.	
		1.20	ES		0.80	-0.80		Firm becoming very stiff dark brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint and sandstone.	
		2.00	ES		2.00	-2.00		End of borehole at 2.00 m	

Remarks

Borehole Log

Borehole No.

WS9

Sheet 1 of 1

Project Name: ALDI Neath

Project No.
B0786

Co-ords: -

Hole Type
WS

Location: Neath

Level: 0.00

Scale
1:25

Client: ALDI Stores Ltd

Dates: 30/04/2019 - 30/04/2019

Logged By
JS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50 - 0.70	ES		0.05	-0.05		ASPHALT.	1
					0.15	-0.15		CONCRETE.	
		1.00	ES		0.75	-0.75		Soft becoming firm slightly gravelly CLAY with occasional fine to coarse sand and cobbles angular to subangular 200mm to 320mm of flint. Gravel is angular to subangular fine to coarse of flint.	
								Soft grey brown gravelly slightly sandy CLAY with occasional cobble subangular to subrounded of flint and sandstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint and grey sandstone. Small black stain at 1.85m.	
		1.85	ES		2.00	-2.00		End of borehole at 2.00 m	2
									4

Remarks

Borehole Log

Borehole No.

WS10

Sheet 1 of 1

Project Name: ALDI Neath

Project No.
B0786

Co-ords: -

Hole Type
WS

Location: Neath

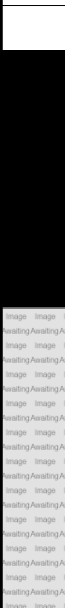
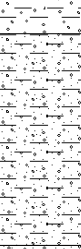
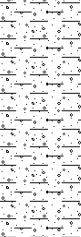
Level: 0.00

Scale
1:25

Client: ALDI Stores Ltd

Dates: 30/04/2019 - 30/04/2019

Logged By
JS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.05	-0.05		ASPHALT.	1
					0.15	-0.15		CONCRETE.	
					0.30	-0.30		MADE GROUND of dense grey slightly sandy angular to subangular gravel of various lithic fragments. Sand is fine to coarse.	
					0.50	-0.50		Firm brown slightly gravelly CLAY with occasional fine to coarse sand. Gravel is angular to subangular fine to coarse of flint and grey sandstone.	
								Firm becoming stiff brown gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint and grey sandstone. Occasional cobble angular to subangular 200mm to 350mm of flint and sandstone.	
					1.20	-1.20		Very stiff brown very gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithic fragments including flint and grey sandstone.	
					2.00	-2.00		End of borehole at 2.00 m	2
									3
									4
									5

Remarks

Borehole Log

Borehole No.

WS11

Sheet 1 of 1

Project Name: ALDI Neath

Project No.
B0786

Co-ords: -

Hole Type
WS

Location: Neath

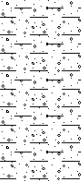
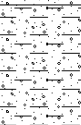
Level: 0.00

Scale
1:25

Client: ALDI Stores Ltd

Dates: 30/04/2019 - 30/04/2019

Logged By
JS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50 - 0.60	ES		0.05	-0.05		ASPHALT.	1
					0.15	-0.15		CONCRETE.	
					0.35	-0.35		MADE GROUND of dense grey slightly sandy angular to subangular fine to coarse gravel of various lithic fragments. Sand is fine to coarse.	
					1.00	-1.00		Firm becoming stiff brown slightly sandy gravelly CLAY with frequent cobbles angular to subangular 210mm to 380mm of flint and sandstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithic fragments including flint.	
		1.40	ES		1.40	-1.40		Very stiff brown slightly sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithic fragments.	2
								End of borehole at 1.40 m	3
									4
									5

Remarks

Borehole Log

Borehole No.

WS12

Sheet 1 of 1

Project Name: ALDI Neath

Project No.
B0786

Co-ords: -

Hole Type
WS

Location: Neath

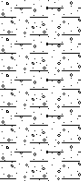
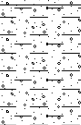
Level: 0.00

Scale
1:25

Client: ALDI Stores Ltd

Dates: 30/04/2019 - 30/04/2019

Logged By
JS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.05	-0.05		ASPHALT.	1
					0.15	-0.15		CONCRETE.	
					0.35	-0.35		MADE GROUND of dense grey slightly sandy angular to subangular fine to coarse gravel of sandstone and various lithic fragments. Sand is fine to coarse.	
		1.00	ES		1.00	-1.00		Firm becoming stiff brown slightly sandy gravelly CLAY with occasional cobble angular to subangular 210mm to 260mm of flint and sandstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint and grey sandstone.	
		1.40	ES		1.40	-1.40		Very stiff brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint and grey sandstone.	2
								End of borehole at 1.40 m	3
									4
									5

Remarks

Borehole Log

Borehole No.

WS13

Sheet 1 of 1

Project Name: ALDI Neath

Project No.
B0786

Co-ords: -

Hole Type
WS

Location: Neath

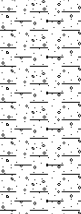
Level: 0.00

Scale
1:25

Client: ALDI Stores Ltd

Dates: 30/04/2019 - 30/04/2019

Logged By
JS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.05	-0.05		ASPHALT.	1
					0.15	-0.15		CONCRETE.	
					0.35	-0.35		MADE GROUND of dense grey slightly sandy angular to subangular fine to coarse gravel of sandstone and various lithic fragments. Sand is fine to coarse.	
		0.80	ES					Firm becoming very stiff brown slightly sandy gravelly CLAY with occasional cobble angular to subangular 200mm to 340mm of flint. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint and grey sandstone.	
		1.20	ES		1.20	-1.20		End of borehole at 1.20 m	2
									3
									4
									5

Remarks

APPENDIX 2

TRIAL PIT & SOAKAWAY TEST RESULTS

Borehole Log

Borehole No.

TP01

Sheet 1 of 1

Project Name: ALDI Neath

Project No.
B0786

Co-ords: 364861.00 - 174626.00

Hole Type
TP

Location: Neath

Level:

Scale
1:50

Client: ALDI Stores Ltd

Dates: 01/05/2019 - 01/05/2019

Logged By
RM

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description					
		Depth (m)	Type	Results									
		0.00 - 0.15	B		0.15			Grass on top of soft to firm dark brown slightly silty, slightly gravelly CLAY with occasional roots. Gravels are subrounded to subangular, fine to coarse of various lithologies including mudstone, quartzite and red brick (MADEGROUND).					
		0.15 - 0.40	B										
		0.40 - 0.60	B				0.40						
		0.60 - 1.60	B				0.60						
		1.60 - 1.70 1.70 - 2.00	B		1.60					Soft dark brown, slightly sandy, slightly silty, slightly gravelly CLAY with rare roots and cobbles. Sand is fine to coarse. Gravels are subangular to angular, fine to coarse of various lithologies including mudstone, igneous rock, red brick, plastic. Cobbles are subangular of igneous rock and quartzite (MADEGROUND).	1		
			B							Reddish purple brown slightly silty slightly clayey gravelly fine to coarse ASH SAND. Gravels are angular to subangular, fine to coarse of various lithologies including red brick, clinker, coal and quartzite (MADEGROUND).	2		
					2.00			Firm dark brown slightly silty CLAY. <i>Becoming brown colour at 0.70m.</i> <i>Becoming stiff at 1.50m.</i>	3				
								Soft dark brown slightly sandy gravelly CLAY with rare angular to subangular cobbles of quartzite. Sand is fine to medium. Gravel sare subangular to subangular, fine to coarse of various lithologies including quartzite, mudstone and igneous rock. <i>Becoming sandy GRAVEL at 1.70m.</i>	4				
		End of borehole at 2.00 m											

Remarks



SOIL INFILTRATION RATE TEST

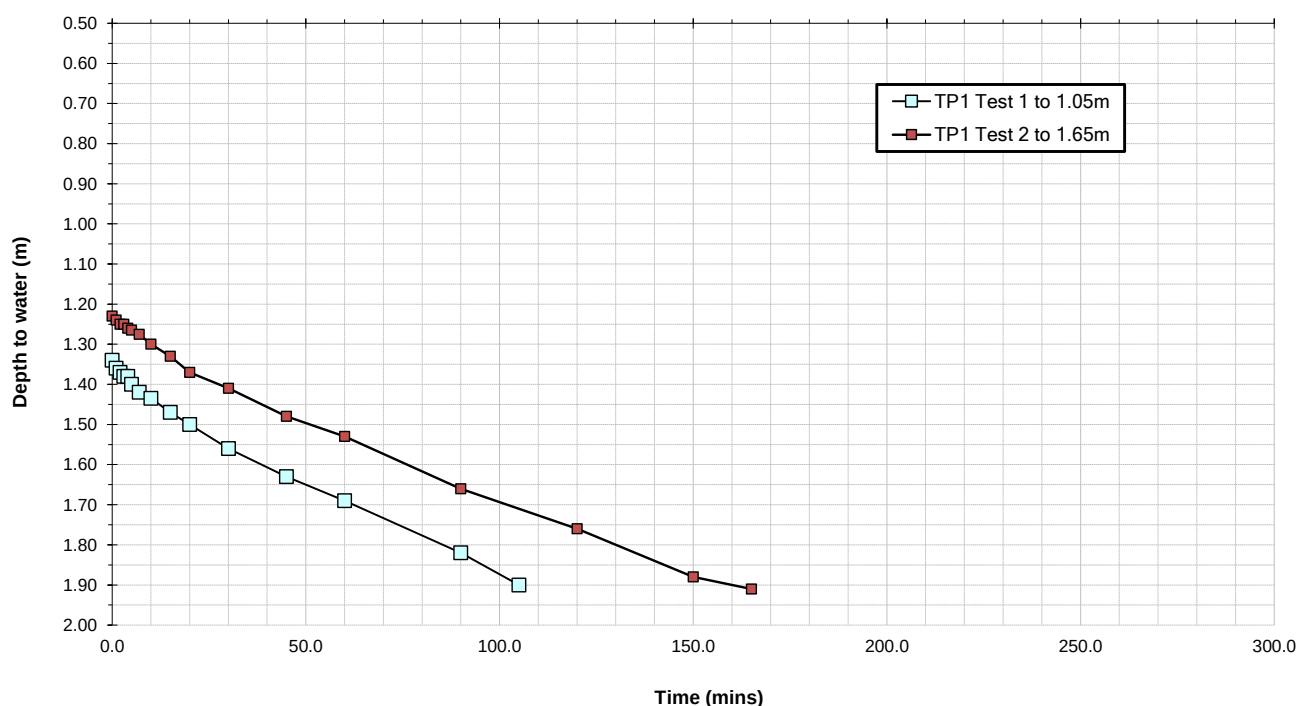
See BRE Digest 365, 2007, Soakaway Design.

Site: Neath ALDI
Job Number: B0786
Client: ALDI
Date of Test: 01/05/2019

Trial Pit Number..... TP01
Length..... 1.18 m
Width: 0.80 m
Depth..... 2.00 m
Groundwater Level..... N/A m

Remarks -	TEST 1		TEST 2		TEST 3	
	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
	0.0	1.34	0.0	1.23	0.0	
	1.0	1.36	1.0	1.24	1.0	
	2.0	1.37	2.0	1.25	2.0	
	3.0	1.38	3.0	1.25	3.0	
	4.0	1.38	4.0	1.26	4.0	
	5.0	1.40	5.0	1.27	5.0	
	7.0	1.42	7.0	1.28	7.0	
	10	1.44	10	1.30	10	
	15	1.47	15	1.33	15	
	20	1.50	20	1.37	20	
	30	1.56	30	1.41	30	
	45	1.63	45	1.48	45	
	60	1.69	60	1.53	60	
	90	1.82	90	1.66	90	
	105	1.90	120	1.76	120	
			150	1.88	180	
			165	1.91	270	
Effective Storage Depth	m	0.66		0.77		
75% Effective Storage Depth	m	0.50		0.58		
(i.e. depth below GL)	m	1.51		1.42		
25% Effective Storage Depth	m	0.17		0.19		
(i.e. depth below GL)	m	1.84		1.81		
Effective Storage Depth 75%-25%	m	0.33		0.39		
Time to fall to 75% effective depth	mins	20.00		30.00		
Time to fall to 25% effective depth	mins	95.00		130.00		
V (75%-25%)	m3	0.31		0.36		
a (50%)	m2	2.25		2.47		
t (75%-25%)	mins	75.00		100.00		
SOIL INFILTRATION RATE	m/s	3.08E-05		2.45E-05		

DESIGN SOIL INFILTRATION RATE, f 2.45E-05

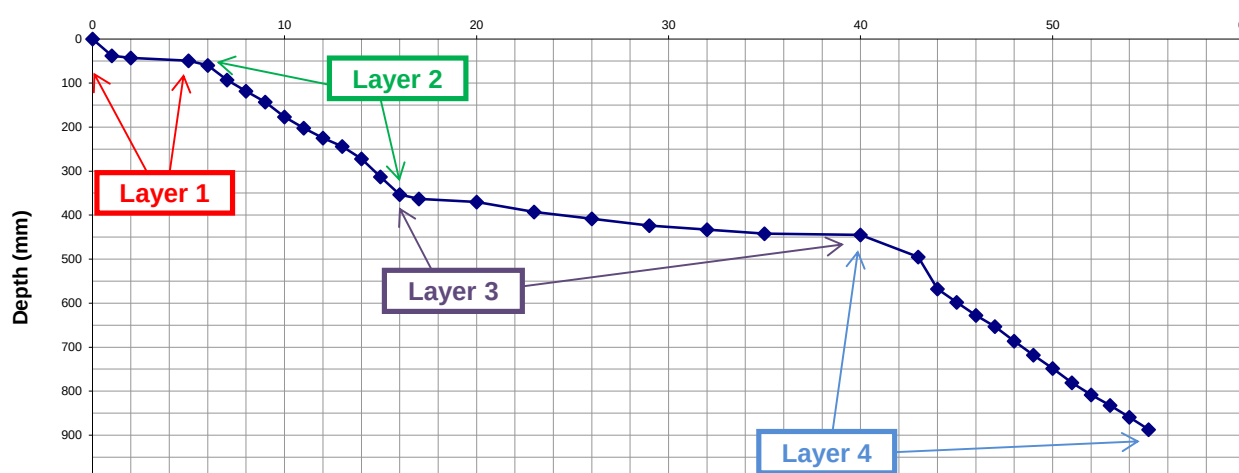


APPENDIX 3

IN SITU CBR TEST RESULTS

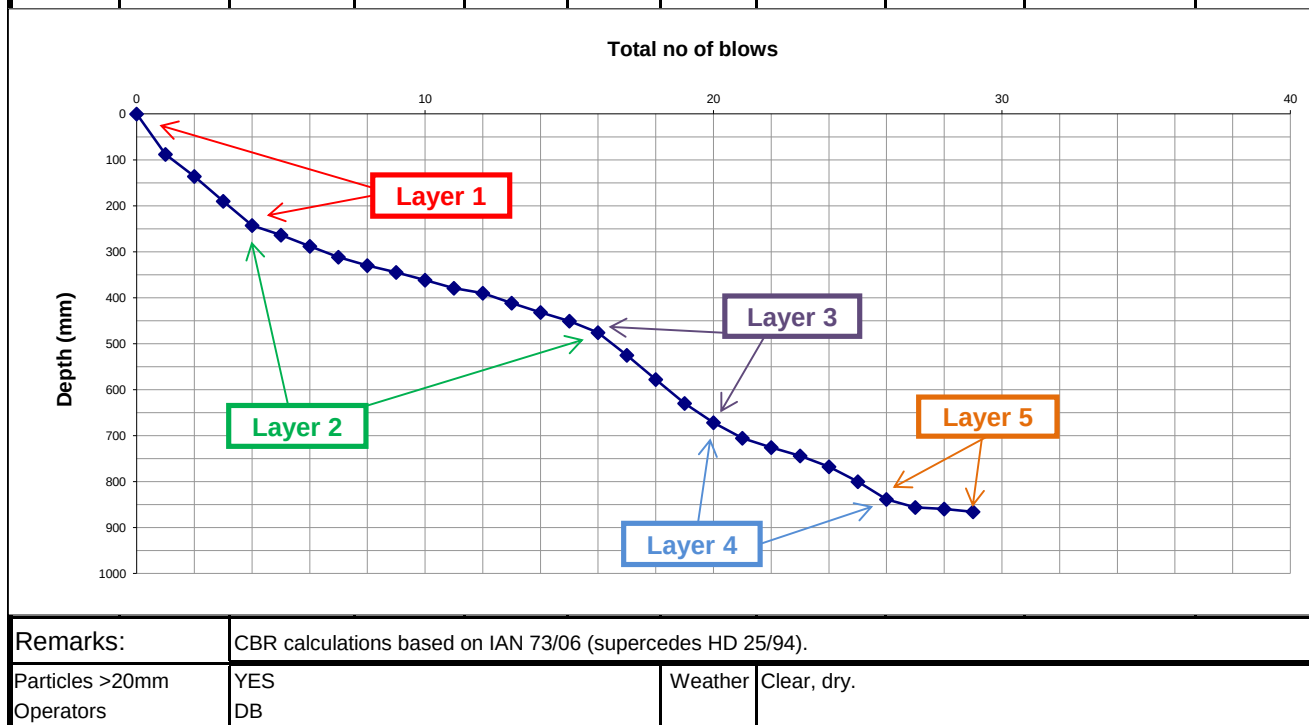
DYNAMIC CONE PENETRATION TEST RESULTS						Date Job No.		14/05/2019 B0768		 EARTH ENVIRONMENTAL & GEOTECHNICAL	
Client Name Job Name		ALDI Stores Limited Abbey Road, Neath				Zero Reading Test No.		62 1		Depth (mm) Location	
No. of Blows	Depth Reading (mm)	Total depth (mm)	Mean penetration per blow (mm)	Layer	Top of layer (mm)	Base of layer (mm)	Blows at top of layer	Blows at base of layer	Mean penetration per blow (mm)	CBR of layer (%)	
0	62	0	0	1	0	60	0	6	10.0	26	
1	100	38	38.00	2	60	363	5	17	25.3	9.9	
2	105	43	21.50	3	363	495	17	43	5.1	54	
5	111	49	9.80	4	495	898	43	56	31.0	8.0	
6	122	60	10.00								
7	155	93	13.29								
8	180	118	14.75								
9	205	143	15.89								
10	239	177	17.70								
11	264	202	18.36								
12	287	225	18.75								
13	306	244	18.77								
14	334	272	19.43								
15	375	313	20.87								
16	415	353	22.06								
17	425	363	21.35								
20	432	370	18.50								
23	455	393	17.09								
26	470	408	15.69								
29	486	424	14.62								
32	495	433	13.53								
35	504	442	12.63								
40	507	445	11.13								
43	557	495	11.51								
44	630	568	12.91								
45	660	598	13.29								
46	690	628	13.65								
47	715	653	13.89								
48	748	686	14.29								
49	780	718	14.65								
50	810	748	14.96								
51	843	781	15.31								
52	870	808	15.54								

Total no of blows



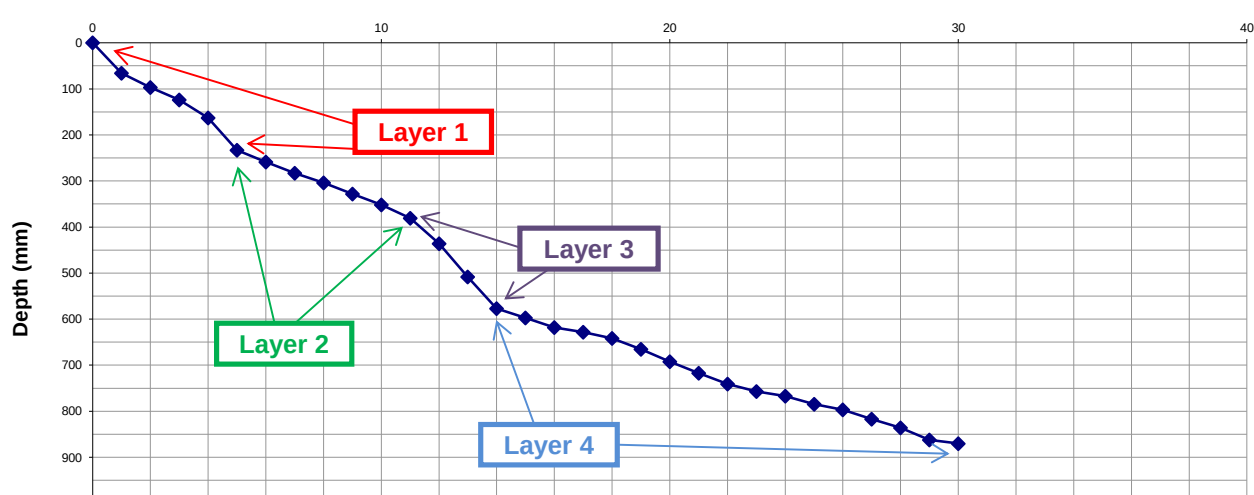
Remarks:		CBR calculations based on IAN 73/06 (supercedes HD 25/94).	
Particles >20mm	YES	Weather	Clear, dry.
Operators	DB		

DYNAMIC CONE PENETRATION TEST RESULTS						Date Job No.		14/05/2019 B0768	 EARTH ENVIRONMENTAL & GEOTECHNICAL	
Client Name Job Name		ALDI Stores Limited Abbey Road, Neath				Zero Reading Test No.		64 1	Depth (mm) Location	0 DCP2
No. of Blows	Depth Reading (mm)	Total depth (mm)	Mean penetration per blow (mm)	Layer	Top of layer (mm)	Base of layer (mm)	Blows at top of layer	Blows at base of layer	Mean penetration per blow (mm)	CBR of layer (%)
0	64	0	0	1	0	243	0	4	60.8	3.9
1	152	88	88.00	2	243	476	4	16	19.4	13
2	200	136	68.00	3	476	672	16	20	49.0	4.9
3	254	190	63.33	4	672	839	20	26	27.8	9.0
4	307	243	60.75	5	839	876	26	30	9.3	29
5	328	264	52.80							
6	352	288	48.00							
7	376	312	44.57							
8	394	330	41.25							
9	409	345	38.33							
10	426	362	36.20							
11	443	379	34.45							
12	454	390	32.50							
13	476	412	31.69							
14	496	432	30.86							
15	515	451	30.07							
16	540	476	29.75							
17	589	525	30.88							
18	642	578	32.11							
19	694	630	33.16							
20	736	672	33.60							
21	770	706	33.62							
22	790	726	33.00							
23	808	744	32.35							
24	832	768	32.00							
25	864	800	32.00							
26	903	839	32.27							
27	920	856	31.70							
28	924	860	30.71							
29	930	866	29.86							
30	940	876	29.20							



DYNAMIC CONE PENETRATION TEST RESULTS						Date Job No.		14/05/2019 B0768			
Client Name Job Name		ALDI Stores Limited Abbey Road, Neath				Zero Reading Test No.		68 1		Depth (mm) Location	
No. of Blows	Depth Reading (mm)	Total depth (mm)	Mean penetration per blow (mm)	Layer	Top of layer (mm)	Base of layer (mm)	Blows at top of layer	Blows at base of layer	Mean penetration per blow (mm)	CBR of layer (%)	
0	68	0	0	1	0	233	0	5	46.6	5.2	
1	134	66	66.00	2	233	381	5	11	24.7	10	
2	165	97	48.50	3	381	577	11	14	65.3	3.6	
3	192	124	41.33	4	577	890	13	31	17.4	15	
4	231	163	40.75								
5	301	233	46.60								
6	327	259	43.17								
7	351	283	40.43								
8	372	304	38.00								
9	396	328	36.44								
10	420	352	35.20								
11	449	381	34.64								
12	504	436	36.33								
13	576	508	39.08								
14	645	577	41.21								
15	665	597	39.80								
16	686	618	38.63								
17	696	628	36.94								
18	710	642	35.67								
19	733	665	35.00								
20	760	692	34.60								
21	785	717	34.14								
22	809	741	33.68								
23	825	757	32.91								
24	835	767	31.96								
25	853	785	31.40								
26	865	797	30.65								
27	885	817	30.26								
28	904	836	29.86								
29	930	862	29.72								
30	938	870	29.00								
31	958	890	28.71								

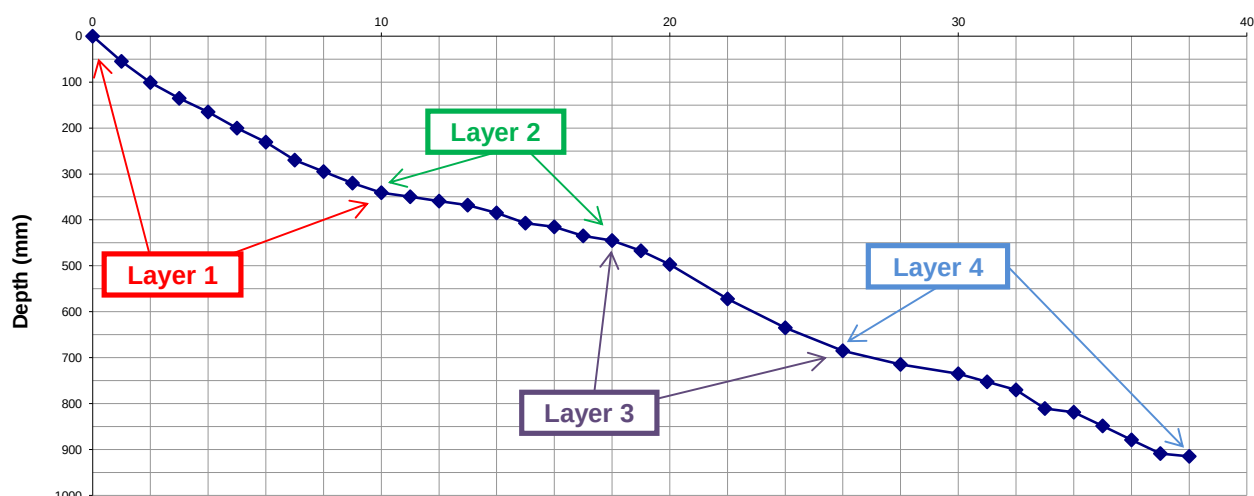
Total no of blows



Remarks:	CBR calculations based on IAN 73/06 (supercedes HD 25/94).		
Particles >20mm	YES	Weather	Clear, dry.
Operators	DB		

DYNAMIC CONE PENETRATION TEST RESULTS						Date Job No.		14/05/2019 B0768			
Client Name Job Name		ALDI Stores Limited Abbey Road, Neath				Zero Reading Test No.		45 1		Depth (mm) Location	
No. of Blows	Depth Reading (mm)	Total depth (mm)	Mean penetration per blow (mm)	Layer	Top of layer (mm)	Base of layer (mm)	Blows at top of layer	Blows at base of layer	Mean penetration per blow (mm)	CBR of layer (%)	
0	45	0	0	1	0	341	0	10	34.1	7.2	
1	100	55	55.00	2	341	445	10	18	13.0	20	
2	146	101	50.50	3	445	685	18	26	30.0	8.3	
3	180	135	45.00	4	685	945	26	38	21.7	12	
4	210	165	41.25								
5	245	200	40.00								
6	276	231	38.50								
7	315	270	38.57								
8	340	295	36.88								
9	365	320	35.56								
10	386	341	34.10								
11	395	350	31.82								
12	404	359	29.92								
13	413	368	28.31								
14	430	385	27.50								
15	452	407	27.13								
16	460	415	25.94								
17	480	435	25.59								
18	490	445	24.72								
19	512	467	24.58								
20	542	497	24.85								
22	617	572	26.00								
24	680	635	26.46								
26	730	685	26.35								
28	760	715	25.54								
30	780	735	24.50								
31	798	753	24.29								
32	815	770	24.06								
33	856	811	24.58								
34	864	819	24.09								
35	894	849	24.26								
36	924	879	24.42								

Total no of blows



Remarks:		CBR calculations based on IAN 73/06 (supercedes HD 25/94).								
Particles >20mm		YES				Weather	Clear, dry.			
Operators		DB								

APPENDIX 4

MONITORING RESULTS

Project Number:	B0786
Project Name:	Abbey Road, Neath
Date:	08/05/2019
Logger	DB

Weather:	Fine and dry
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[illegible]

Gas Monitoring Record

Project Number:	B0786
Project Name:	Abbey Road, Neth
Date:	14/05/2019
Logger	DB

Weather:	Fine and dry
----------	--------------

*mbgl - Meters below Ground Level

			Initial	10 secs	20 secs	30 secs	40 secs	50 secs	60 secs	70 secs	80 secs	90 secs	100 secs	110 secs	120 secs	130 secs	140 secs	150 secs	180 secs	300 secs	Groundwater Level (mbgl*)	Borehole Base (mbgl*)	Comments
Borehole ID	WS2	CH4 (%)	0.2	0.2	0.2	0.2	0.2	0.2	0.2												DRY	2.03	
Flow Rate (l/hr)	0.01	CO2 (%)	0.8	0.8	0.8	0.8	0.8	0.8	0.8														
Atmospheric Pressure (mbar)	1033	O2 (%)	18	18	18	18	18	18	18														
Borehole Pressure (Pa)	-0.34	LEL (%)	3	3	3	3	3	3	3														
Time	11:34	H2S (ppm)	0	0	0	0	0	0	0														
Peak VOC	14.6	CO (ppm)	0	0	0	0	0	0	0														
			Initial	10 secs	20 secs	30 secs	40 secs	50 secs	60 secs	70 secs	80 secs	90 secs	100 secs	110 secs	120 secs	130 secs	140 secs	150 secs	180 secs	300 secs	Groundwater Level (mbgl*)	Borehole Base (mbgl*)	Comments
Borehole ID	WS5	CH4 (%)	0.2	0.2	0.2	0.2	0.2	0.2	0.2												DRY	1.85	
Flow Rate (l/hr)	0.01	CO2 (%)	0.8	1.1	1.1	1.1	1.1	1.1	1.1														
Atmospheric Pressure (mbar)	1033	O2 (%)	18.1	18.2	18.1	18.1	18.1	18.1	18.1														
Borehole Pressure (Pa)	-0.28	LEL (%)	3	3	3	3	3	3	3														
Time	11:44	H2S (ppm)	0	0	0	0	0	0	0														
Peak VOC	14.9	CO (ppm)	0	0	0	0	0	0	0														
			Initial	10 secs	20 secs	30 secs	40 secs	50 secs	60 secs	70 secs	80 secs	90 secs	100 secs	110 secs	120 secs	130 secs	140 secs	150 secs	180 secs	300 secs	Groundwater Level (mbgl*)	Borehole Base (mbgl*)	Comments
Borehole ID	WS10	CH4 (%)	0.2	0.2	0.2	0.2	0.2	0.2	0.2												DRY	1.98	
Flow Rate (l/hr)	-0.01	CO2 (%)	1.1	0.6	0.6	0.6	0.6	0.6	0.6														
Atmospheric Pressure (mbar)	1033	O2 (%)	18.2	18.3	18.3	18.3	18.3	18.3	18.3														
Borehole Pressure (Pa)	-0.22	LEL (%)	4	4	4	4	4	4	4														
Time	11:52	H2S (ppm)	0	0	0	0	0	0	0														
Peak VOC	14.6	CO (ppm)	0	0	0	0	0	0	0														
			Initial	10 secs	20 secs	30 secs	40 secs	50 secs	60 secs	70 secs	80 secs	90 secs	100 secs	110 secs	120 secs	130 secs	140 secs	150 secs	180 secs	300 secs	Groundwater Level (mbgl*)	Borehole Base (mbgl*)	Comments
Borehole ID		CH4 (%)																					
Flow Rate (l/hr)		CO2 (%)																					
Atmospheric Pressure (mbar)		O2 (%)																					
Borehole Pressure (Pa)		LEL (%)																					
Time		H2S (ppm)																					
Peak VOC		CO (ppm)																					

Gas Monitoring Record

Project Number:	B0786
Project Name:	Neath
Date:	21/05/2019
Logger	DB

Weather:	Fine and dry
----------	--------------

*mbgl - Meters below Ground Level

			Initial	10 secs	20 secs	30 secs	40 secs	50 secs	60 secs	70 secs	80 secs	90 secs	100 secs	110 secs	120 secs	130 secs	140 secs	150 secs	180 secs	300 secs	Groundwater Level (mbgl*)	Borehole Base (mbgl*)	Comments
Borehole ID	WS2	CH4 (%)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3										dry	2.03	
Flow Rate (l/hr)	-0.1	CO2 (%)	0	0.3	0.7	0.7	0.7	0.7	0.7	0.7	0.7												
Atmospheric Pressure (mbar)	1020	O2 (%)	14.1	19	18.6	18.4	18.4	18.4	18.4	18.3	18.4												
Borehole Pressure (Pa)	-0.24	LEL (%)	5	5	5	5	5	5	6	6	6												
Time	12:47	H2S (ppm)	0	0	1	0	0	0	0	0	0												
Peak VOC	15.8	CO (ppm)	0	0	0	0	0	0	0	0	0												
			Initial	10 secs	20 secs	30 secs	40 secs	50 secs	60 secs	70 secs	80 secs	90 secs	100 secs	110 secs	120 secs	130 secs	140 secs	150 secs	180 secs	300 secs	Groundwater Level (mbgl*)	Borehole Base (mbgl*)	Comments
Borehole ID	WS5	CH4 (%)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2										dry	1.85	
Flow Rate (l/hr)	0.01	CO2 (%)	0.7	0.6	0.9	0.9	0.9	0.9	0.9	0.9	0.9												
Atmospheric Pressure (mbar)	1020	O2 (%)	18.4	18.6	18.5	18.5	18.4	18.4	18.4	18.5	18.5												
Borehole Pressure (Pa)	-0.18	LEL (%)	4	4	4	4	4	4	4	4	4												
Time	12:56	H2S (ppm)	0	0	0	0	0	0	0	0	0												
Peak VOC	3.2	CO (ppm)	0	0	0	0	0	0	0	0	0												
			Initial	10 secs	20 secs	30 secs	40 secs	50 secs	60 secs	70 secs	80 secs	90 secs	100 secs	110 secs	120 secs	130 secs	140 secs	150 secs	180 secs	300 secs	Groundwater Level (mbgl*)	Borehole Base (mbgl*)	Comments
Borehole ID	WS10	CH4 (%)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2										dry	1.97	
Flow Rate (l/hr)	0.01	CO2 (%)	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7												
Atmospheric Pressure (mbar)	1020	O2 (%)	18.4	18.2	17.8	17.8	17.8	17.8	17.8	17.8	17.8												
Borehole Pressure (Pa)	-0.15	LEL (%)	3	3	3	3	3	3	3	3	3												
Time	13:05	H2S (ppm)	0	0	0	0	0	0	0	0	0												
Peak VOC	1.3	CO (ppm)	0	0	0	0	0	0	0	0	0												
			Initial	10 secs	20 secs	30 secs	40 secs	50 secs	60 secs	70 secs	80 secs	90 secs	100 secs	110 secs	120 secs	130 secs	140 secs	150 secs	180 secs	300 secs	Groundwater Level (mbgl*)	Borehole Base (mbgl*)	Comments
Borehole ID		CH4 (%)																					
Flow Rate (l/hr)		CO2 (%)																					
Atmospheric Pressure (mbar)		O2 (%)																					
Borehole Pressure (Pa)		LEL (%)																					
Time		H2S (ppm)																					
Peak VOC		CO (ppm)																					

Project Number:	B0786
Project Name:	Neath
Date:	28/05/2019
Logger	DB

	Fine and dry
--	--------------

*mbgl - Meters below Ground Level

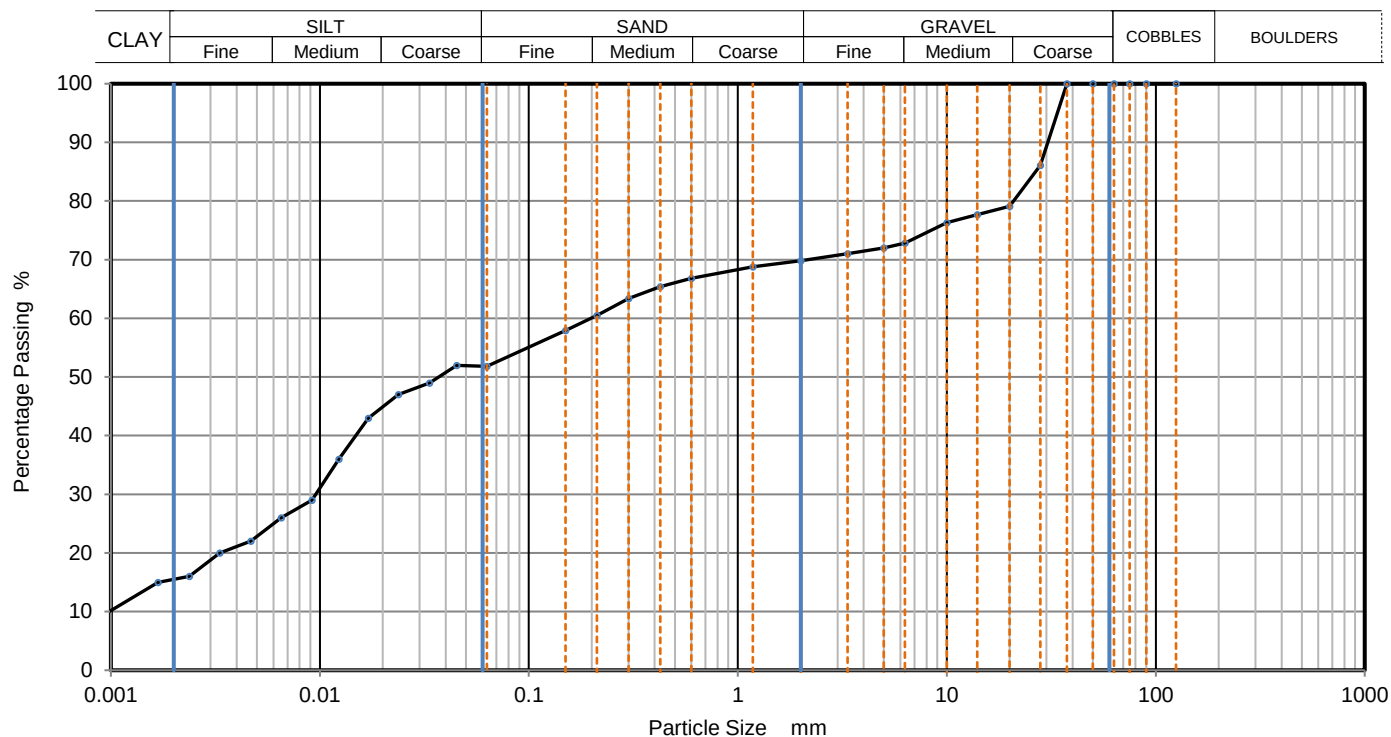
[illegible]

APPENDIX 5

LABORATORY TEST RESULTS

All tests performed in accordance with BS1377:1990 unless specified otherwise						
Water Content Performed in accordance with BS EN ISO 17892-1 : 2014						
Key			Date Printed	Approved By	Table	
Density test	Liquid Limit	Particle density	20/05/2019	L Logan	1	
Linear measurement unless :	4pt cone unless :	sp - small pyknometer			sheet	
wd - water displacement	cas - Casagrande method	gj - gas jar			1	
wi - immersion in water	1pt - single point test					

PARTICLE SIZE DISTRIBUTION		Job Ref	2070585
		Borehole/Pit No.	TP01
Site Name	Abbey Road, Neath		Sample No.
Soil Description			Depth, m
Specimen Reference		Specimen Depth	m
		Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5		KeyLAB ID
			CJA_2019050710



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0451	52
90	100	0.0334	49
75	100	0.0238	47
63	100	0.0171	43
50	100	0.0123	36
37.5	100	0.0092	29
28	86	0.0065	26
20	79	0.0047	22
14	78	0.0033	20
10	76	0.0024	16
6.3	73	0.0017	15
5	72	0.0010	10
3.35	71	0.0007	8
2	70		
1.18	69		
0.6	67	Particle density (assumed) 2.65 Mg/m3	
0.425	65		
0.3	63		
0.212	61		
0.15	58		
0.063	52		

Dry Mass of sample, g

1238

Sample Proportions	% dry mass
Very coarse	0
Gravel	30
Sand	18
Silt	36
Clay	16

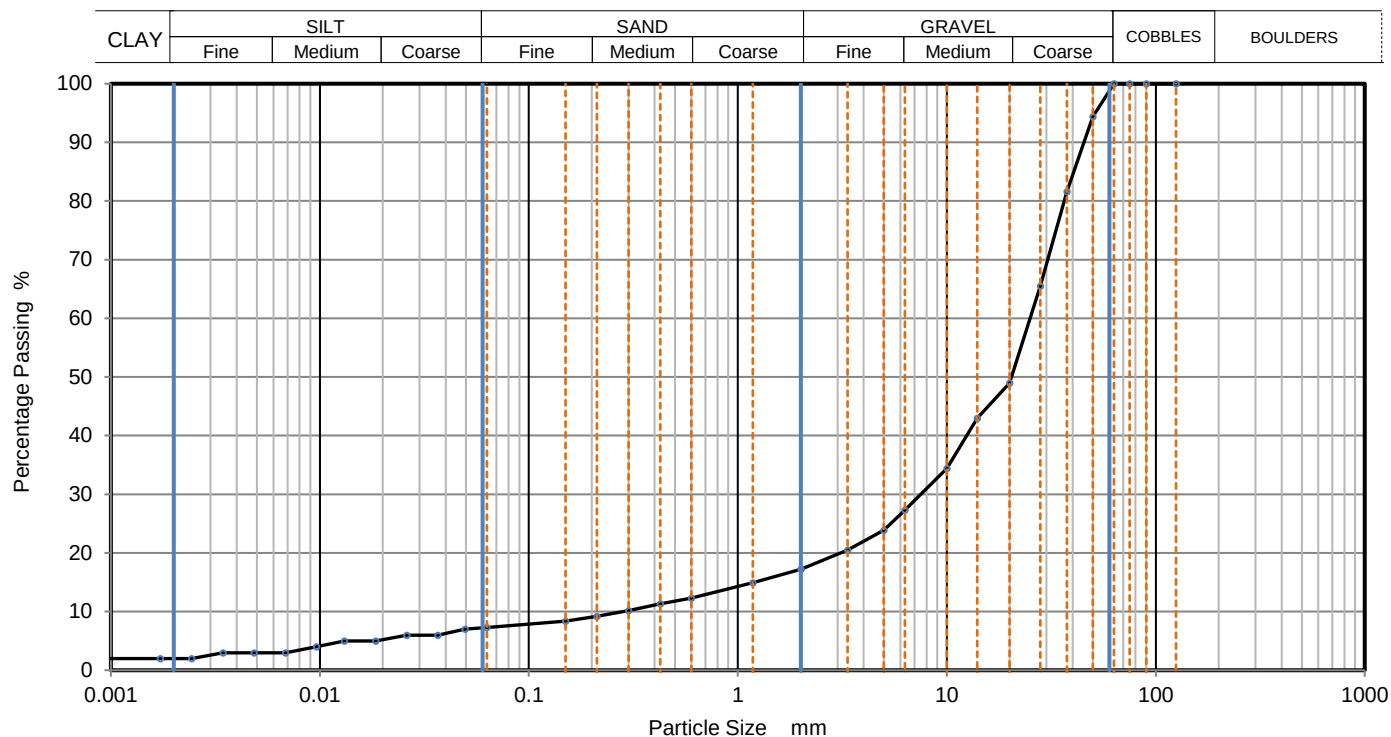
Grading Analysis		
D100	mm	
D60	mm	0.198
D30	mm	0.00966
D10	mm	0.000932
Uniformity Coefficient		210
Curvature Coefficient		0.5

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1 Sheet
		L Logan	20/05/2019 16:51	

PARTICLE SIZE DISTRIBUTION		Job Ref	2070585
		Borehole/Pit No.	TP02
Site Name	Abbey Road, Neath		Sample No.
Soil Description			Depth, m
Specimen Reference		Specimen Depth	m
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5		Sample Type
			B
			KeyLAB ID
			CJA_2019050711



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0495	7
90	100	0.0366	6
75	100	0.0261	6
63	100	0.0185	5
50	94	0.0131	5
37.5	82	0.0096	4
28	66	0.0068	3
20	49	0.0048	3
14	43	0.0034	3
10	34	0.0024	2
6.3	27	0.0017	2
5	24	0.0010	2
3.35	21	0.0007	1
2	17		
1.18	15		
0.6	12	Particle density (assumed) 2.65 Mg/m3	
0.425	11		
0.3	10		
0.212	9		
0.15	8		
0.063	7		

Dry Mass of sample, g

6401

Sample Proportions	% dry mass
Very coarse	0
Gravel	83
Sand	10
Silt	5
Clay	2

Grading Analysis		
D100	mm	
D60	mm	25
D30	mm	7.5
D10	mm	0.28
Uniformity Coefficient		89
Curvature Coefficient		8

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1 Sheet
		L Logan	20/05/2019 16:51	

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 19/04512
Issue Number: 1

Date: 15 May, 2019

Client: CJ Associates
King Road
Bristol
BS11 9HF

Project Manager: Admin/Lorna Logan
Project Name: Abbey Road, Neath
Project Ref: 2070585-L13664-S7428
Order No: P7721675
Date Samples Received: 13/05/19
Date Instructions Received: 13/05/19
Date Analysis Completed: 15/05/19

Prepared by:



Gill Walker
Director/Laboratory Manager

Approved by:



John Gustafson
Managing Director

Envirolab Job Number: 19/04512

Client Project Name: Abbey Road, Neath

Client Project Ref: 2070585-L13664-S7428

Lab Sample ID	19/04512/1	19/04512/2	19/04512/3	19/04512/4	19/04512/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS4	WS5	TP1					
Depth to Top	2.00	1.00	1.70	1.00	0.40					
Depth To Bottom					0.70					
Date Sampled	01-May-19	01-May-19	01-May-19	01-May-19	01-May-19					
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - B					
Sample Matrix Code	4A	4A	4A	4A	4A					
% Stones >10mm _A	42.6	4.4	44.2	12.4	4.6			% w/w	0.1	A-T-044
pH BRE _D ^{M#}	7.58	7.24	7.16	7.08	7.43			pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1) _D ^{M#}	<10	<10	<10	<10	24			mg/l	10	A-T-026s
Sulphate BRE (acid sol) _D ^{M#}	<0.02	<0.02	<0.02	0.04	0.96			% w/w	0.02	A-T-028s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.

The results reported herein relate only to the material supplied to the laboratory.

The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: CJ Associates, King Road , Bristol, BS11 9HF

Project No: 19/04512

Project: Abbey Road, Neath

Date Received: 13/05/2019 (am)

Clients Project No: 2070585-L13664-S7428

Cool Box Temperatures (oC): 13.4

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.



Simon Leat
Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business Centre
Houldsworth Street
Reddish
Stockport
Cheshire
SK5 6DA

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Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 19-06171

Site Reference: Abbey Road, Neath

Project / Job Ref: B0786

Order No: B0786

Sample Receipt Date: 02/05/2019

Sample Scheduled Date: 02/05/2019

Report Issue Number: 1

Reporting Date: 09/05/2019

Authorised by:

A handwritten signature in black ink, appearing to read "Dave Ashworth".

Dave Ashworth
Deputy Quality Manager

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.



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Soil Analysis Certificate						
DETS Report No: 19-06171	Date Sampled	30/04/19	30/04/19	30/04/19	30/04/19	30/04/19
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Abbey Road, Neath	TP / BH No	WS1	WS2	WS3	WS4	WS5
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: B0786	Depth (m)	0.40 - 0.60	0.40 - 0.50	0.40 - 0.60	0.40 - 0.60	0.30 - 0.60
Reporting Date: 09/05/2019	DETS Sample No	405802	405803	405804	405806	405807

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.2	7.1	6.6	6.7	6.6
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Complex Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Free Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Total Sulphate as SO ₄	mg/kg	< 200	NONE	< 200	839	256	228	599
Total Sulphate as SO ₄	%	< 0.02	NONE	< 0.02	0.08	0.03	0.02	0.06
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	60	253	16	29	< 10
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.06	0.25	0.02	0.03	< 0.01
Sulphide	mg/kg	< 5	NONE	< 5	< 5	< 5	< 5	< 5
Organic Matter	%	< 0.1	MCERTS	1.7	3.4	1.7	2.1	4.3
Arsenic (As)	mg/kg	< 2	MCERTS	9	74	15	16	91
Barium (Ba)	mg/kg	< 5	NONE	36	151	52	50	155
Beryllium (Be)	mg/kg	< 0.5	NONE	1	0.7	0.7	0.6	0.8
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	2.2	< 0.2	< 0.2	2.4
Chromium (Cr)	mg/kg	< 2	MCERTS	17	15	16	16	16
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	31	128	33	38	262
Lead (Pb)	mg/kg	< 3	MCERTS	23	751	49	37	189
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	24	18	13	13	19
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 2	NONE	29	26	27	26	29
Zinc (Zn)	mg/kg	< 3	MCERTS	84	1090	102	73	535
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
EPH (C10 - C40)	mg/kg	< 6	MCERTS	< 6	38	< 6	< 6	15

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C
Subcontracted analysis (S)



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Soil Analysis Certificate					
DETS Report No: 19-06171	Date Sampled	30/04/19	30/04/19		
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied		
Site Reference: Abbey Road, Neath	TP / BH No	WS6	WS11		
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied		
Order No: B0786	Depth (m)	0.40 - 0.60	0.50 - 0.60		
Reporting Date: 09/05/2019	DETS Sample No	405808	405820		

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected			
pH	pH Units	N/a	MCERTS	6.8	6.9			
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2			
Complex Cyanide	mg/kg	< 2	NONE	< 2	< 2			
Free Cyanide	mg/kg	< 2	NONE	< 2	< 2			
Total Sulphate as SO ₄	mg/kg	< 200	NONE	< 200	< 200			
Total Sulphate as SO ₄	%	< 0.02	NONE	< 0.02	< 0.02			
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	< 10	< 10			
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	< 0.01	< 0.01			
Sulphide	mg/kg	< 5	NONE	< 5	< 5			
Organic Matter	%	< 0.1	MCERTS	1.6	1.4			
Arsenic (As)	mg/kg	< 2	MCERTS	9	9			
Barium (Ba)	mg/kg	< 5	NONE	26	29			
Beryllium (Be)	mg/kg	< 0.5	NONE	0.6	0.7			
W/S Boron	mg/kg	< 1	NONE	< 1	< 1			
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2			
Chromium (Cr)	mg/kg	< 2	MCERTS	16	18			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	26	28			
Lead (Pb)	mg/kg	< 3	MCERTS	18	29			
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	19	20			
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3			
Vanadium (V)	mg/kg	< 2	NONE	20	25			
Zinc (Zn)	mg/kg	< 3	MCERTS	73	94			
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2			
EPH (C10 - C40)	mg/kg	< 6	MCERTS	12	< 6			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C
Subcontracted analysis (S)



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 19-06171	Date Sampled	30/04/19	30/04/19	30/04/19	30/04/19	30/04/19
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Abbey Road, Neath	TP / BH No	WS1	WS2	WS3	WS4	WS5
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: B0786	Depth (m)	0.40 - 0.60	0.40 - 0.50	0.40 - 0.60	0.40 - 0.60	0.30 - 0.60
Reporting Date: 09/05/2019	DETS Sample No	405802	405803	405804	405806	405807

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	0.52	0.18	< 0.1	0.38
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.18
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.67	0.19	< 0.1	0.54
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.52	0.15	< 0.1	0.43
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.29	< 0.1	< 0.1	0.49
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	0.36	< 0.1	< 0.1	0.19
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.39	< 0.1	< 0.1	0.20
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.22	< 0.1	< 0.1	0.29
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.16	< 0.1	< 0.1	0.26
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	3.1	< 1.6	< 1.6	3

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 19-06171	Date Sampled	30/04/19	30/04/19	30/04/19	30/04/19	30/04/19
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Abbey Road, Neath	TP / BH No	WS6	WS6	WS6	WS7	WS8
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: B0786	Depth (m)	0.40 - 0.60	0.50	1.40	0.70	0.70
Reporting Date: 09/05/2019	DETS Sample No	405808	405809	405810	405811	405812

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.13	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.20	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.25	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 19-06171	Date Sampled	30/04/19	30/04/19	30/04/19	30/04/19	30/04/19
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Abbey Road, Neath	TP / BH No	WS8	WS8	WS9	WS9	WS10
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: B0786	Depth (m)	1.20	2.00	1.00	1.85	1.00
Reporting Date: 09/05/2019	DETS Sample No	405813	405814	405816	405817	405818

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 19-06171	Date Sampled	30/04/19	30/04/19	None Supplied	30/04/19	30/04/19
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Abbey Road, Neath	TP / BH No	WS10	WS11	WS11	WS11	WS12
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: B0786	Depth (m)	2.00	0.50 - 0.60	1.00	1.40	1.00
Reporting Date: 09/05/2019	DETS Sample No	405819	405820	405821	405822	405823

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 19-06171	Date Sampled	30/04/19	30/04/19	30/04/19		
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Abbey Road, Neath	TP / BH No	WS12	WS13	WS13		
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: B0786	Depth (m)	1.40	0.80	1.20		
Reporting Date: 09/05/2019	DETS Sample No	405824	405825	405826		

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 19-06171	Date Sampled	30/04/19	30/04/19	30/04/19	30/04/19	30/04/19
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Abbey Road, Neath	TP / BH No	WS6	WS6	WS7	WS8	WS8
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: B0786	Depth (m)	0.50	1.40	0.70	0.70	1.20
Reporting Date: 09/05/2019	DETS Sample No	405809	405810	405811	405812	405813

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	198	< 10	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	198	< 21	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	211	< 10	< 10
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	211	< 21	< 21
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	408	< 42	< 42

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 19-06171	Date Sampled	30/04/19	30/04/19	30/04/19	30/04/19	30/04/19
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Abbey Road, Neath	TP / BH No	WS8	WS9	WS9	WS10	WS10
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: B0786	Depth (m)	2.00	1.00	1.85	1.00	2.00
Reporting Date: 09/05/2019	DETS Sample No	405814	405816	405817	405818	405819

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	< 42

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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 19-06171	Date Sampled	None Supplied	30/04/19	30/04/19	30/04/19	30/04/19
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Abbey Road, Neath	TP / BH No	WS11	WS11	WS12	WS12	WS13
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: B0786	Depth (m)	1.00	1.40	1.00	1.40	0.80
Reporting Date: 09/05/2019	DETS Sample No	405821	405822	405823	405824	405825

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	33
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	33
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	< 42

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Soil Analysis Certificate - TPH CWG Banded

DETS Report No: 19-06171	Date Sampled	30/04/19				
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied				
Site Reference: Abbey Road, Neath	TP / BH No	WS13				
Project / Job Ref: B0786	Additional Refs	None Supplied				
Order No: B0786	Depth (m)	1.20				
Reporting Date: 09/05/2019	DETS Sample No	405826				

Determinand	Unit	RL	Accreditation				
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01			
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05			
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2			
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2			
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3			
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3			
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10			
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21			
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01			
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05			
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2			
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2			
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2			
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3			
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10			
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21			
Total >C5 - C35	mg/kg	< 42	NONE	< 42			

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 19-06171	Date Sampled	30/04/19	30/04/19	30/04/19	30/04/19	30/04/19
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Abbey Road, Neath	TP / BH No	WS6	WS6	WS7	WS8	WS8
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: B0786	Depth (m)	0.50	1.40	0.70	0.70	1.20
Reporting Date: 09/05/2019	DETS Sample No	405809	405810	405811	405812	405813

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 19-06171	Date Sampled	30/04/19	30/04/19	30/04/19	30/04/19	30/04/19
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Abbey Road, Neath	TP / BH No	WS8	WS9	WS9	WS10	WS10
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: B0786	Depth (m)	2.00	1.00	1.85	1.00	2.00
Reporting Date: 09/05/2019	DETS Sample No	405814	405816	405817	405818	405819

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 19-06171	Date Sampled	None Supplied	30/04/19	30/04/19	30/04/19	30/04/19
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Abbey Road, Neath	TP / BH No	WS11	WS11	WS12	WS12	WS13
Project / Job Ref: B0786	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: B0786	Depth (m)	1.00	1.40	1.00	1.40	0.80
Reporting Date: 09/05/2019	DETS Sample No	405821	405822	405823	405824	405825

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 19-06171	Date Sampled	30/04/19				
Earth Environmental & Geotechnical Ltd	Time Sampled	None Supplied				
Site Reference: Abbey Road, Neath	TP / BH No	WS13				
Project / Job Ref: B0786	Additional Refs	None Supplied				
Order No: B0786	Depth (m)	1.20				
Reporting Date: 09/05/2019	DETS Sample No	405826				

Determinand	Unit	RL	Accreditation				
Benzene	ug/kg	< 2	MCERTS	< 2			
Toluene	ug/kg	< 5	MCERTS	< 5			
Ethylbenzene	ug/kg	< 2	MCERTS	< 2			
p & m-xylene	ug/kg	< 2	MCERTS	< 2			
o-xylene	ug/kg	< 2	MCERTS	< 2			
MTBE	ug/kg	< 5	MCERTS	< 5			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/3									
DETS Report No: 19-06171		Date Sampled		30/04/19		Inert Waste Landfill Stable Non- reactive HAZARDOUS waste in non- hazardous Landfill Hazardous Waste Landfill			
Earth Environmental & Geotechnical Ltd		Time Sampled		None Supplied					
Site Reference: Abbey Road, Neath		TP / BH No		WS3					
Project / Job Ref: B0786		Additional Refs		None Supplied					
Order No: B0786		Depth (m)		0.60 - 0.70					
Reporting Date: 09/05/2019		DETS Sample No		405805					
Determinand		Unit		MDL					
TOC ^{MD}		%		< 0.1		0.8			
Loss on Ignition		%		< 0.01		4.20			
BTEx ^{MD}		mg/kg		< 0.05		< 0.05			
Sum of PCBs		mg/kg		< 0.1		< 0.1			
Mineral Oil ^{MD}		mg/kg		< 10		< 10			
Total PAH ^{MD}		mg/kg		< 1.7		< 1.7			
pH ^{MD}		pH Units		N/a		6.4			
Acid Neutralisation Capacity		mol/kg (+/-)		< 1		< 1			
Eluate Analysis				2:1 mg/l		8:1 mg/l		Cumulative 10:1 mg/kg	
Arsenic ^U				< 0.01		< 0.01		< 0.2	
Barium ^U				< 0.02		< 0.02		< 0.1	
Cadmium ^U				< 0.0005		< 0.0005		< 0.02	
Chromium ^U				< 0.005		< 0.005		< 0.20	
Copper ^U				< 0.01		< 0.01		< 0.5	
Mercury ^U				< 0.005		< 0.005		< 0.01	
Molybdenum ^U				< 0.001		< 0.001		< 0.1	
Nickel ^U				< 0.007		< 0.007		< 0.2	
Lead ^U				< 0.005		< 0.005		< 0.2	
Antimony ^U				< 0.006		< 0.006		< 0.06	
Selenium ^U				< 0.005		< 0.005		< 0.1	
Zinc ^U				< 0.005		< 0.005		< 0.2	
Chloride ^U				< 1		< 1		< 12	
Fluoride ^U				1.1		0.9		9.1	
Sulphate ^U				< 1		< 1		< 20	
TDS				25		17		174	
Phenol Index				< 0.01		< 0.01		< 0.5	
DOC				5.3		8.1		79.8	
Leach Test Information									
Sample Mass (kg)				0.23					
Dry Matter (%)				77.1					
Moisture (%)				29.8					
Stage 1									
Volume Eluate L2 (litres)				0.30					
Filtered Eluate VE1 (litres)				0.10					

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

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

M Denotes MCERTS accredited test

U Denotes ISO17025 accredited test



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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/3

DETS Report No: 19-06171		Date Sampled	30/04/19			Landfill Waste Acceptance Criteria Limits		
Earth Environmental & Geotechnical Ltd		Time Sampled	None Supplied					
Site Reference: Abbey Road, Neath		TP / BH No	WS9					
Project / Job Ref: B0786		Additional Refs	None Supplied					
Order No: B0786		Depth (m)	0.50 - 0.70					
Reporting Date: 09/05/2019		DETS Sample No	405815					
Determinand	Unit	MDL				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
TOC ^{MD}	%	< 0.1	0.7			3%	5%	6%
Loss on Ignition	%	< 0.01	3.70			--	--	10%
BTEX ^{MD}	mg/kg	< 0.05	< 0.05			6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1			1	--	--
Mineral Oil ^{MD}	mg/kg	< 10	< 10			500	--	--
Total PAH ^{MD}	mg/kg	< 1.7	< 1.7			100	--	--
pH ^{MD}	pH Units	N/a	6.8			--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1			--	To be evaluated	To be evaluated
Eluate Analysis			2:1 mg/l	8:1 mg/l	Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U		< 0.01	< 0.01		< 0.2	0.5	2	25
Barium ^U		< 0.02	< 0.02		< 0.1	20	100	300
Cadmium ^U		< 0.0005	< 0.0005		< 0.02	0.04	1	5
Chromium ^U		< 0.005	< 0.005		< 0.20	0.5	10	70
Copper ^U		< 0.01	< 0.01		< 0.5	2	50	100
Mercury ^U		< 0.005	< 0.005		< 0.01	0.01	0.2	2
Molybdenum ^U		< 0.001	< 0.001		< 0.1	0.5	10	30
Nickel ^U		< 0.007	< 0.007		< 0.2	0.4	10	40
Lead ^U		< 0.005	< 0.005		< 0.2	0.5	10	50
Antimony ^U		< 0.006	< 0.006		< 0.06	0.06	0.7	5
Selenium ^U		< 0.005	< 0.005		< 0.1	0.1	0.5	7
Zinc ^U		< 0.005	< 0.005		< 0.2	4	50	200
Chloride ^U		2	< 1		< 12	800	15000	25000
Fluoride ^U		< 0.5	< 0.5		< 1	10	150	500
Sulphate ^U		4	1		< 20	1000	20000	50000
TDS		60	24		273	4000	60000	100000
Phenol Index		< 0.01	< 0.01		< 0.5	1	-	-
DOC		2.7	5.6		53.1	500	800	1000
Leach Test Information								
Sample Mass (kg)		0.20						
Dry Matter (%)		85.7						
Moisture (%)		16.6						
Stage 1								
Volume Eluate L2 (litres)		0.32						
Filtered Eluate VE1 (litres)		0.16						

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation
M Denotes MCERTS accredited test
U Denotes ISO17025 accredited test



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Soil Analysis Certificate - Sample Descriptions

DETS Report No: 19-06171
Earth Environmental & Geotechnical Ltd
Site Reference: Abbey Road, Neath
Project / Job Ref: B0786
Order No: B0786
Reporting Date: 09/05/2019

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
405802	WS1	None Supplied	0.40 - 0.60	8	Brown loamy sand with stones
405803	WS2	None Supplied	0.40 - 0.50	12.9	Brown loamy sand with vegetation and concrete
405804	WS3	None Supplied	0.40 - 0.60	11	Brown loamy sand with stones
405805	WS3	None Supplied	0.60 - 0.70	22.9	Brown loamy sand
405806	WS4	None Supplied	0.40 - 0.60	15	Brown loamy sand with concrete
405807	WS5	None Supplied	0.30 - 0.60	20.7	Brown loamy sand with stones
405808	WS6	None Supplied	0.40 - 0.60	6.4	Brown loamy sand with stones
405809	WS6	None Supplied	0.50	8.3	Brown loamy sand with stones
405810	WS6	None Supplied	1.40	7.4	Brown loamy sand with stones
405811	WS7	None Supplied	0.70	10.4	Brown loamy sand with stones
405812	WS8	None Supplied	0.70	7.6	Brown loamy sand with stones
405813	WS8	None Supplied	1.20	6.8	Brown loamy sand with stones and brick
405814	WS8	None Supplied	2.00	5.3	Brown loamy sand with stones
405815	WS9	None Supplied	0.50 - 0.70	14.2	Brown clay
405816	WS9	None Supplied	1.00	6.9	Brown loamy sand with stones and concrete
405817	WS9	None Supplied	1.85	6.9	Brown loamy sand with stones and concrete
405818	WS10	None Supplied	1.00	8	Brown loamy sand with stones and concrete
405819	WS10	None Supplied	2.00	4.6	Brown loamy sand with stones and concrete
405820	WS11	None Supplied	0.50 - 0.60	9.8	Brown loamy sand with stones
^ 405821	WS11	None Supplied	1.00	8.6	Brown loamy sand with stones and concrete
405822	WS11	None Supplied	1.40	6.1	Brown loamy sand with stones and concrete
405823	WS12	None Supplied	1.00	8.2	Brown loamy sand with stones
405824	WS12	None Supplied	1.40	5.1	Brown loamy sand with stones and concrete
405825	WS13	None Supplied	0.80	9.3	Brown loamy sand with stones
405826	WS13	None Supplied	1.20	6.4	Brown loamy sand with stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{1/5}

^ no sampling date provided; unable to confirm if samples are within acceptable holding times



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 19-06171

Earth Environmental & Geotechnical Ltd

Site Reference: Abbey Road, Neath

Project / Job Ref: B0786

Order No: B0786

Reporting Date: 09/05/2019

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphencylcarbazine followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

APPENDIX 6

REPORT LIMITATIONS

REPORT LIMITATIONS

This contract was completed by Earth Environmental & Geotechnical Ltd on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill, and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget and staff resources allocated to the project.

Other than that expressly contained in the above paragraph, Earth Environmental & Geotechnical Ltd provides no other representation or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Earth Environmental & Geotechnical Ltd.

If a third party relies on this report, it does so wholly at its own and sole risk and Earth Environmental & Geotechnical Ltd disclaims any liability to such parties.

It is Earth Environmental & Geotechnical Ltd understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was an important factor in determining the scope and level of the services. Should the purpose for which the report is used, or the proposed use of the site change, this report will no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without Earth Environmental & Geotechnical Ltd review and advice shall be at the client's sole and own risk.

The report was written in 2019 and should be read in light of any subsequent changes in legislation, statutory requirements and industry best practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of Earth Environmental & Geotechnical Ltd. In the absence of such written advice of Earth Environmental & Geotechnical Ltd, reliance on the report in the future shall be at the client's own and sole risk. Should Earth Environmental & Geotechnical Ltd be requested to review the report in the future, Earth Environmental & Geotechnical Ltd shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between Earth Environmental & Geotechnical Ltd and the client.

The observations and conclusions described in this report are based solely upon the services that were provided pursuant to the agreement between the client and Earth Environmental & Geotechnical Ltd. Earth Environmental & Geotechnical Ltd has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report.

Earth Environmental & Geotechnical Ltd is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, Earth Environmental & Geotechnical Ltd did not seek to evaluate the presence on or off the site of electromagnetic fields, lead paint, radon gas or other radioactive materials.

The services are based upon Earth Environmental & Geotechnical Ltd observations of existing physical conditions at the site gained from a walkover survey of the site together with Earth

Environmental & Geotechnical Ltd interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Earth Environmental & Geotechnical Ltd have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified.

No responsibility can be accepted for errors within third party items presented in this report. Further Earth Environmental & Geotechnical Ltd was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Earth Environmental & Geotechnical Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to Earth Environmental & Geotechnical Ltd and including the doing of any independent investigation of the information provided to Earth Environmental & Geotechnical Ltd save as otherwise provided in the terms of the contract between the client and Earth Environmental & Geotechnical Ltd.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and Earth Environmental & Geotechnical Ltd] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.