



Linc Cymru Housing Association

Devonshire Place, Port Talbot

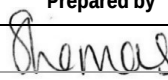
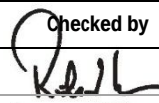
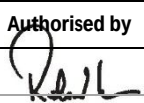
Ground Investigation Report



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Devonshire Place, Port Talbot

Ground Investigation Report

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EXECUTIVE SUMMARY

SITE INFORMATION	Client	Linc Cymru Housing Association
	Site Details and Current Land Use Description	The site currently comprises the former Dyffryn Lower Comprehensive School, located on Devonshire Place, south-east of Port Talbot. The site covers an area of approximately 0.74 hectares with the centre of the site situated at National Grid Reference 277060, 189470. The nearest postcode is SA13 1SG.
	Proposed Development	The proposed development is understood to comprise the demolition of the existing structures and the construction of several 2 storey residential dwellings across the majority of the site with 3 storey apartments located to the east. The development is to comprise areas of hardstanding, including access roads and car parking, with areas of soft landscaping consisting of private gardens and public open space.
GROUND INVESTIGATION	Ground Investigation Rationale	The ground investigation works were undertaken to provide details on the geoenvironmental and geotechnical conditions and constraints at the site with regards to the proposed development.
	Scope of Works	Advancement of a single cable percussive borehole to assist with the 3No.-storey apartment design, 5No. window sample boreholes, 6No. trial pits, with 3No. in-situ soakage tests to BRE365 and 3No. DCP-TRLs across the site.
	Ground Conditions	Made ground was recorded across the site to depths of between 0.2m and 1.0mbgl. A slight hydrocarbon odour was recorded within BH01 between 0.3-0.5mbgl. Cohesive superficial deposits were recorded at the site within TP02 (0.7-1.1mbgl), TP03 (0.35-0.5mbgl) and WS01 (0.2-2.6mbgl) and were recorded to comprise generally stiff orangish brown and light brown slightly gravelly sandy clay. Underlying the majority of the site (with the exception of the north-western area), granular deposits were recorded. These were generally recorded as medium dense, becoming very dense with depth, dark brown, orangish brown and light brown lightly clayey sandy gravel with low to moderate cobble content. It should be noted that all exploratory locations were terminated within these very dense granular deposits.
LAND CONTAMINATION	Contamination Characterisation and Identified Pollutant Linkages	No visual or olfactory evidence of significant contamination was observed during the ground investigation. However, a slight hydrocarbon odour was recorded within BH01 between 0.3m and 0.5mbgl. Laboratory analytical results of the encountered made ground materials reported elevated contaminants, including heavy metals, PAHs and TPH when considering a residential site end use with homegrown produce. It is considered that on the basis of the conceptual site model and limited gas monitoring completed to-date, the available data is adequate to characterise the site and, therefore, the site may be characterised as being Characteristic Situation 1 and no gas protection measures are considered necessary. In addition, no radon protective measures are considered necessary within the construction of new homes.
	Remediation Appraisal / Likely Remedial Approach	Based on the assessment to date, where soft landscaping is proposed where made ground remains after finished site levels have been achieved, localised exposure to potential contaminants cannot be discounted and a suitable cover system may be required. Alternatively, given the limited and localised nature of these exceedances, further testing may be undertaken once final site levels are achieved, to determine the requirement for any such remedial measures.

GROUND ENGINEERING	Foundations	It is considered that conventional foundations may be suitable for the proposed development. Generally, it is recommended that foundations are formed within the dense to very dense granular deposits recorded over the majority of the site from depths below 1.0mbgl. However, within the north-western part of the site, a significant thickness of cohesive soils were recorded. Due to their recorded low volume change potential, a minimum founding depth of 0.75mbgl should be adopted within the design where beyond the influence of planting When founding within the granular superficial deposits, it is considered that these materials may provide an allowable bearing resistance in excess of 150kN/m². However, it is considered that the cohesive materials recorded in the north-western part of the site will provide an allowable bearing resistance of 100kN/m². It should be noted that foundations for each unit should be founded on the same materials to limit differential settlement and it may be necessary to undertake additional post demolition intrusive works to determine the extent of the cohesive materials recorded in the north-western part of the site and/or undertake foundation inspections by a suitable competent person.
	Ground Floor Slabs	Given the presence of shrinkable soils and depth of made ground, the use of suspended floor slabs may be appropriate for the scheme. However, where within granular materials, assuming the absence of significant thicknesses of made ground, a ground bearing slab may be utilised.
	Preliminary Pavement Design	A preliminary design CBR value in the region of 5% has been derived based on the test data to date. Notwithstanding this, given the recorded thickness of made ground across the site, a CBR of <2.5% would be recommended where formations are within this material. CBR values of the subgrade should be confirmed by in situ testing when final formation levels are known
	Drainage	The soakage test results indicate that drainage to soakaways may be feasible within the superficial granular deposits. It is recommended that an appropriate drainage engineer be consulted as to whether such systems will be viable and additional testing may be required to confirm this.
	Buried Concrete	The results of the testing of the sulphate and pH testing from the soils at the site yield an aggressive chemical environmental class (ACEC) of AC-1, requiring a design sulphate class of DS-1.
ADDITIONAL WORKS		Given the limited and localised nature of the recorded elevated concentrations of heavy metals, PAHs and TPH, further testing may be undertaken once final site levels are achieved, to determine the extent of the proposed cover system. The extent of the deeper clays recorded within the north-western part of the site is not known at this stage, and it may be necessary to undertake additional post demolition intrusive works to determine the extent of these cohesive materials and/or undertake foundation inspections by a suitable competent person.

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 TEC has been appointed by Linc Cymru Housing Association to undertake a preliminary land contamination and geotechnical assessment of the former Dyffryn Lower Comprehensive School, Devonshire Place, Port Talbot. All works were undertaken in accordance with our proposal letter dated 28 March 2022 and referenced RE.2203011.001.

1.2 Background

1.2.1 The site currently comprises the former Dyffryn Lower Comprehensive School, located on Devonshire Place, south-east of Port Talbot (Figure 1). The site covers an area of approximately 0.74 hectares with the centre of the site situated at National Grid Reference 277060, 189470. The nearest postcode is SA13 1SG.

1.2.2 The proposed development is understood to comprise the demolition of the existing structures and the construction of several 2-storey residential dwellings across the majority of the site with 3-storey apartments located to the east (Figure 2). The development is to include areas of hardstanding including access roads and car parking, with areas of soft landscaping consisting of private gardens and public open space.

1.2.3 Previous works have been undertaken at the site by TEC, as detailed within the following reports:

- 'Devonshire Place, Port Talbot: Desk Study'. Ref: 2203011.001.01, dated June 2022.

1.2.4 Reference should be made to the previous assessment, although salient information is provided in the following section of this report.

1.2.5 The aim of these works is to provide information on land contamination risk and the ground engineering conditions and constraints associated with the site with regard to the proposed development

1.3 Scope of Works

1.3.1 The scope of work undertaken as part of this report is presented below:

- **Land Contamination - Generic Quantitative Risk Assessment:** this phase of assessment involves updating the site conceptual model developed as part of the Preliminary Risk Assessment based on the findings of an exploratory ground investigation. Generic assessment criteria and assumptions, if appropriate, are used to identify relevant pollutant linkages.
- **Ground Engineering:** general recommendations in relation to ground engineering for the proposed development are provided on the basis of the findings of the exploratory ground investigation.

1.3.2 The above scope of work has been undertaken in accordance with current guidance such as LCRM - *Land contamination: risk management* (Environment Agency, 2020), BS10175+A2 (2017), BS5930:2015+A1:2020 and, where appropriate, Eurocode 7 and NHBC/ LABC.

2 PREVIOUS SITE REPORT SUMMARY

2.1.1 Information for the site has also been obtained through previous assessment undertaken by TEC at the site as detailed within the following reports:

- 'Devonshire Place, Port Talbot: Desk Study'. Ref: 2203011.001.01, dated June 2022.

2.1.2 A summary of relevant information from the previous report, in relation to this assessment, is summarised in Table 2.1. Reference should be made to the report for full information.

Table 2.1: Previous Ground investigation Summary

Site History	Earliest available mapping depicts the site as forming part of several open fields on mapping from 1876 to 1899. By 1917, the construction of 2No. structures, along the eastern and western boundaries (similar to current layout) were depicted on mapping, with the site depicted as 'Schools'. The addition of a third structure along the northern boundary is shown on 1939 mapping, with the site later depicted as 'Dyffryn Comprehensive (Lower) School' from 1967 and is similar to the current layout.
Environmental Setting	The geology for the site is reported to Glaciofluvial Ice Contact Deposits within the northern area of the site, with alluvial fan deposits to the south. These were described by the BGS as comprising sand and gravel and are reported to be underlain by The South Wales Middle Coal Measures Formation. The superficial deposits and the underlying bedrock geology is designated a Secondary A Aquifers of high vulnerability. There are no reported groundwater abstractions within 1km, and the site is not reported to be located within a Source Protection Zone. The nearest surface water feature identified was the Ffrwd Wyltt located ~310m west of the site which flow towards Port Talbot Docks. The closest surface water abstraction is recorded ~480m south of the site and associated within Port Talbot Docks. There are 2No. recorded licensed discharge consents within 500m, both recorded at ~435m south and there are 6No. pollution incidents recorded, the closets are reported ~265m west. No landfills were recorded within 1km of the site; however, several areas of infilled land (water and non-water) are reported within 250m of the site. There are 15No. recorded BGS mineral sites located within 1km of the site.
Ground Gas/ Radon	The site was recorded to be in a lower probability radon affected area (BRE Guide BR211 (2007) and therefore, no radon protection measures were reported to be required for proposed new dwellings. Several areas of potentially infilled land (water and non-water) are recorded within 250m of the site. In addition, a BGS mineral sites located within 250m of the site.
Coal Mining Report	The Envirocheck® report indicates that a Coal Authority report is recommended for the site. The site reported to be underlain by the South Wales Middle Coal Measures Formation and a review of available Coal Authority mapping indicates the site is situated within a Coal Mining Reporting Area.
Relevant Pollutant Linkages	The relevant pollutant linkages identified for the site were limited to: • Human Health (current and future site users and construction workers) – exposure to contaminants associated with made ground/ infilled ground and potentially contaminative current and historic land uses in proximity of the site through the ingestion, inhalation and dermal contact pathways; • Controlled Waters – risk to controlled waters from on-site contaminants of potential concern (CoPC) and subsequent migration to identified groundwater/surface water receptors; and • Human Health (future site users and proposed development) – migration, ingress and inhalation of bulk ground gas from made ground and former coal mining activities in the area.

3 GROUND INVESTIGATION METHODOLOGY

3.1 Background

3.1.1 The exploratory ground investigation undertaken was designed to provide information on the ground conditions to aid with the design of the development; and to investigate the potential pollutant linkages identified as part of the Preliminary Risk Assessment.

3.1.2 All site works were undertaken in accordance with BS5930:2015+A1:2020, BS10175+A2:2017 and, where appropriate, Eurocode 7. Works were supervised by a suitably experienced geoenvironmental consultant from TEC.

3.2 Methodology

3.2.1 A summary of the ground investigation works undertaken and the rationale for each location is provided in in Table 3.1, as follows:

Table 3.1: Summary of Ground Investigation Works

Investigation Method	Location	Date(s)	Location Rationale	Purpose
Cable Percussive Borehole (Dando 2000)	BH01	19.05.2022	Positioned within footprint of proposed building	Characterisation of shallow and deeper ground conditions Collection of geochemical and geotechnical samples for analysis
Window Sample Borehole (Dando Terrier)	WS01 – WS05	20.05.2022	Positioned to provide spatial coverage across the site area	Installation of ground gas groundwater monitoring well
Trial Pitting (Terex 890/ JCB 3CX)	TP01 – TP06 <i>TP01 to TP03</i>	23.05.2022		Characterisation of shallow ground conditions Collection of geochemical and geotechnical samples for analysis <i>Soakage testing to BRE365</i>
Dynamic Cone Penetrometer	DCP01 – DCP03	23.05.2022	Located in approximate areas of proposed access roads/ parking	Provision of indicative Californian Bearing Ratio (CBR) values

3.2.2 Exploratory hole locations are presented on Figure 3 and detailed descriptions of encountered ground conditions are shown on exploratory hole logs presented in Appendix C.

3.3 Field Testing

3.3.1 A summary of in situ field testing undertaken as part of these ground investigation works is provided in Table 3.2

Table 3.2: Summary of Field Testing

Field Test	Purpose
Standard Penetration Test (SPT) in boreholes	Provision of strength profile of underlying ground conditions Provision of in situ densities of granular deposits

3.4 Monitoring Works

3.4.1 A summary of the monitoring works completed at the site to date is provided below in Table 3.3 below;

Table 3.3: Summary of Monitoring Works

Monitoring	Instrument/ Kit	No. of Rounds	Date
Ground Gas	GFM430 Landfill Gas Monitor	1	23.05.2022

3.5 Chemical Testing

- 3.5.1 Laboratory testing was scheduled on the basis of the Preliminary Risk Assessment and field observations.
- 3.5.2 Representative soil and groundwater samples were collected and chemically tested at i2 Analytical Ltd, a UKAS/MCERTS accredited laboratory, for a selection of the following parameters:

Soils (Totals)

- *Heavy metals and metalloids;*
- *Total Organic Carbon (TOC);*
- *Phenols (monohydric);*
- *Total Cyanide;*
- *Sulphate, sulphide, elemental sulphur and pH;*
- *Speciated Polyaromatic Hydrocarbons (PAH);*
- *Polychlorinated biphenyl (PCB);*
- *Total Petroleum Hydrocarbons (TPH-CWG), including BTEX and MTBE; and*
- *Asbestos Screen.*

- 3.5.3 Geochemical certificates of analysis are presented Appendix D.

3.6 Geotechnical Testing

- 3.6.1 Selected soil samples were submitted for geotechnical analysis at K4 Soils Ltd and E Labs. Laboratory testing was scheduled upon the basis of field observations for a selection of the following:

- *Atterberg limit tests – natural moisture content, liquid limit and plastic limit;*
- *Particle size distribution (PSD) tests; and*
- *BRE SD1 Suite B – Water soluble and acid soluble sulphates, total sulphur and pH.*

- 3.6.2 Soil geotechnical certificates of analysis are presented in Appendix E.

3.7 General Sampling

- 3.7.1 Samples were collected in accordance with the following guidance;

- BS5930:2015+A1:2020 – Code of practice for ground investigations;
- BS-EN 1997-2:2007 - Eurocode 7 — Geotechnical design —Part 2: Ground investigation and testing
- BS ISO 10175:2011+A2:2017 - Investigation of potentially contaminated sites – Code of practice;
- BS ISO 18400-105 Soil quality – Sampling - Packaging, transport, storage and preservation of samples; and
- BS ISO 18400-106 Soil quality – Sampling - Quality control and quality assurance.

4 GROUND INVESTIGATION FINDINGS

4.1 Introduction

4.1.1 A summary of encountered ground conditions for the site is provided below while detailed descriptions are shown on exploratory hole logs presented in Appendix C. Photographs of the materials encountered are presented within Appendix A.

Made Ground

4.1.2 Made ground was recorded across the site to depths of between 0.2m and 1.0mbgl. In general, the materials were recorded as comprising black tarmacadam hardstanding underlain by dark brown to brown and locally black slightly sandy clayey gravel of tarmacadam, limestone, slag, clinker, siltstone, sandstone and chert. A slight hydrocarbon odour was recorded within BH01 between 0.3-0.5mbgl.

Superficial Deposits – Cohesive (TP02, TP03 and WS01 only)

4.1.3 Locally, cohesive superficial deposits were recorded at the site within TP02 (0.7-1.1mbgl), TP03 (0.35-0.5mbgl) and WS01 (0.2-2.6mbgl). Where encountered, these materials were recorded to comprise generally stiff orangish brown and light brown slightly gravelly sandy clay. The sand was recorded as fine to medium with the gravel recorded as medium to coarse sub-rounded to angular sandstone and rare chert.

Superficial Deposits – Granular

4.1.4 Granular superficial deposits were recorded to underly the site to depths of >1.5m and >4.9mbgl. These deposits were generally recorded as medium dense, becoming very depth with depth, dark brown, orangish brown and light brown lightly clayey sandy gravel with low to moderate cobble content. The sand was generally recorded as medium to coarse, with the gravel recorded as medium to coarse, and cobbles of angular to sub-angular sandstone, siltstone and occasional chert.

4.1.5 Within BH01 and WS01 only, very dense dark brown and orangish brown sandy gravel with low cobble content was recorded from 2.2m (BH01) and 2.6mbgl (WS01). The sand was recorded as medium to coarse, with the gravel recorded as medium to coarse, and cobbles of angular to sub-angular siltstone and sandstone.

4.1.6 It should be noted that all locations were terminated within these very dense granular deposits.

4.2 Groundwater

4.2.1 Groundwater observations recorded during the ground investigation works and standing depths within the boreholes recorded as part of subsequent monitoring visits are summarised in Table 4.1 below. Groundwater strikes/ observations are also shown on the exploratory hole logs in Appendix C.

Table 4.1: Summary of Groundwater Conditions

Location	Groundwater Strike (mbgl)	Standing Depths (mbgl)	Strata
	19.05.2022	23.05.2022	
BH01	3.8	3.45	Superficial Deposits – granular

4.2.2 It should be noted that groundwater conditions recorded during the investigation may not be representative of long term conditions and that groundwater levels may vary in response to meteorological/ seasonal changes.

4.3 Contamination Observations

4.3.1 No visual or olfactory evidence of significant contamination was observed during the ground investigation. However, a slight hydrocarbon odour was recorded within BH01 between 0.3m and 0.5mbgl.

5 LAND CONTAMINATION - GENERIC QUANTITATIVE RISK ASSESSMENT

- 5.1.1 The generic quantitative risk assessment comprises a screening of identified contaminants against generic assessment criteria (GAC) that are appropriate to the site setting and the receptors concerned.

5.2 Human Health

Methodology

- 5.2.1 Detailed information on the background legislation and selection of the GAC used within this assessment for human health is presented in Appendix G.
- 5.2.2 The standard land use for the site, for use in this generic assessment, has been defined as “*residential with homegrown produce*” based on the proposed development and in accordance with current guidance.
- 5.2.3 As the site investigation methodology involved targeted sampling, statistical analysis has not been undertaken and the results have been directly compared to the GAC.

Summary of Results

- 5.2.4 The full human health generic quantitative risk assessment is presented in Appendix G.

Made Ground / Shallow Soils

- 5.2.5 The results of the assessment recorded (localised/ marginal) exceedances of the GAC and therefore the following contaminants of potential concern (CoPC) have been identified within the made ground/ reworked ground/ shallow soils;
- Heavy metals – arsenic;
 - PAHs – phenanthrene, fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene; and
 - TPH Aromatic C16 - C21 (BH01)
- 5.2.6 An asbestos screen completed on samples of the made ground/ shallow soils at the laboratory recorded no suspected asbestos containing material or detectable asbestos fibres.

5.3 Controlled Waters

Methodology

- 5.3.1 Leachate analysis has not been undertaken on the sampled made ground/ shallow soils and no groundwater samples have been collected as part of this site investigation, owing to the following:
- No visual or olfactory evidence of significant contamination was noted during the site investigation;
 - No significant thicknesses of Made ground were recorded during the intrusive works;
 - Whilst elevated contaminants have been identified within the made ground samples (heavy metals, PAHs and TPH), the contaminants are considered to generally be of low mobility;
 - No consistent groundwater body was recorded during the ground investigation works; and
 - There are no reported groundwater abstractions within 1km of the site and the site is not reported to be located within a Source Protection Zone.
- 5.3.2 On this basis, no risk to controlled waters from migration of leachable contaminants within the made ground or migration of dissolved phase contaminants to the wider aquifer has been identified. Therefore, these potential pollutant linkages have not been considered further within this assessment.

5.4 Preliminary Ground Gas Risk Assessment

Methodology – Characterisation with gas monitoring data: empirical, semi-quantitative approach

5.4.1 The risks to the development from ground gases have been assessed in accordance with the empirical, semi-quantitative approach as outlined in BS8485:2015+A1:2019 (BS8485). This process includes combining the qualitative assessment of risk (using the CSM) with ground investigation and monitoring data to derive a Characteristic Situation for the site.

Conceptual Site Model Summary

5.4.2 The following potential sources of ground gas have been identified:

Off Site Ground Gas Sources

- Historical coal mining; and
- Potentially infilled areas of land (water and non-water) recorded within 250m of the site.

Ground Gas Monitoring Results

5.4.3 All gas monitoring was undertaken using a calibrated GFM 430 infra-red gas analyser fitted with an internal flow pod. The monitoring results are presented in Appendix F and summarised in Table 5.1.

Table 5.1: Summary of Ground Gas Monitoring Data

Borehole	Response Zone/Strata	Potential source of ground gas	No. of monitoring occasions	Maximum (Steady State) Methane (%)	Maximum Carbon dioxide (Steady State) (%)	Minimum (Steady State) Oxygen (%)	Maximum (Steady State) Flow Rate (l/hr)	Water levels (mbgl)	Range of atmospheric pressure (mb)
BH01	Natural Ground	Historical coal mining / areas of infilled land	1	0.0 (0.0)	0.0 (0.0)	19.3 (19.3)	0.0 (0.0)	3.45	1000 - 1001
WS01			1	0.0 (0.0)	0.4 (0.4)	19.7 (19.7)	0.0 (0.0)	-	
WS02			1	0.0 (0.0)	0.0 (0.0)	20.5 (20.5)	0.0 (0.0)	-	
WS04			1	0.0 (0.0)	0.0 (0.0)	19.2 (19.2)	0.0 (0.0)	-	
WS05			1	0.0 (0.0)	0.2 (0.2)	19.9 (19.9)	0.0 (0.0)	-	

5.4.4 Only limited monitoring has been undertaken as part of these works and while this was during a period of falling atmospheric pressure the pressure is noted to be high (>1000mbar) and therefore the results may not represent worst case conditions.

Borehole Hazardous Gas Flow Rate (Q_{hg})

5.4.5 Hazardous gas flow rates calculated for each borehole standpipe and for each monitoring event, together with the resulting implied maximum Characteristic Situation (CS), are summarised in Table 5.2.

Table 5.2: Borehole Hazardous Gas Flow Rates

Borehole	Date	Methane - Hazardous Flow Rate CH_4 Q_{hg} (l/hr) ¹	Carbon Dioxide – Hazardous Flow Rate CO_2 Q_{hg} (l/hr) ¹	Implied CH_4 CS	Implied CO_2 CS
BH01	23.05.2022	0.0001	0.0001	1	1
WS01		0.0001	0.0004	1	1
WS02		0.0001	0.0001	1	1
WS04		0.0001	0.0001	1	1
WS05		0.0001	0.0002	1	1

Note 1: Where flow rates of <0.1l/hr or concentrations of <0.1% have been recorded, a value of 0.1 (limit of detection of the instrument) has been assumed to calculate the Q_{hg}

Worst Case Check

- 5.4.6 The plausible worst case condition has also been calculated for each gas by multiplying the maximum recorded flow and gas concentration (for standpipes located in the same strata), to provide the worst case implied CS, as summarised in Table 5.3.

Table 5.3: Worst Case Check – Ground Gas

Boreholes	Response Zone/ Strata	Max. Flow Rate (l/hr) ¹	Max. Methane Conc. (%) ¹	Max. Carbon Dioxide Conc. (%)	Maximum Methane - Hazardous Flow Rate CH ₄ Q _{hg} (l/hr) ¹	Maximum Carbon Dioxide – Hazardous Flow Rate CO ₂ Q _{hg} (l/hr) ¹	Implied CH ₄ CS	Implied CO ₂ CS
WS01, WS05	Natural ground	0.0	0.0	0.4	0.0001	0.0004	1	1

Note 1: Where flow rates of <0.1l/hr or concentrations of <0.1% have been recorded, a value of 0.1 (limit of detection of the instrument) has been assumed to calculate the Q_{hg}

Gas Screening Values (GSVs)

- 5.4.7 On the basis of the conceptual site model and limited gas monitoring completed to-date, it is considered that the data is adequate to characterise the site.
- 5.4.8 Therefore, the site GSV is taken to be 0.0004l/hr, which is the worst case for methane and carbon dioxide. This GSV lies within the range of values designated for CS1 (<0.007) and is close to the lower end of this range. Therefore, CS1 and no specific ground gas protection measures are considered necessary with proposed buildings.

5.5 Updated Conceptual Model

- 5.5.1 The findings of the site investigation and the GQRA have been used to update the conceptual model and confirm the relevant pollutant linkages associated with the proposed development.

Identified Sources

- 5.5.2 Sources of contamination/ ground gas identified on and within the vicinity of the site are summarised below:

On Site Sources

- Made ground

Off Site Sources

- Historical coal mining; and
- Potentially contaminative current and historical land uses have been identified within proximity of the site including the including nearby garage, areas potentially infilled land, electricity sub-station and the nearby Port Talbot Steel Works.

Identified Receptors

- 5.5.3 Receptors identified as part of this updated conceptual model are:

- Current/future site users;
- Construction workers;
- Controlled waters (Secondary Aquifers); and
- Proposed development/ structures.

Identified Pathways

- 5.5.4 Potential contaminant pathways relating to the identified receptors and contaminants of concern include:

- Dermal contact – contact with soil, dust or water;
- Ingestion - ingestion of soil, dust or water;
- Inhalation – inhalation of soil, dust or vapours;
- Vertical migration –leaching of hydrocarbon impact within the shallow soils/unsaturated zone resulting in vertical contaminant migration to the underlying aquifer; and
- Horizontal migration – e.g. lateral migration of contaminants within the saturated zone and along preferential pathways such as drainage pipe bedding.

5.5.5 The updated conceptual model is presented in Table 5.4. References to risk estimations are made in accordance with the methodology presented in CIRIA publication C552 (2001) titled '*Contaminated Land Risk Assessment: A Guide to Good Practice*' and summarised in Appendix B.

Table 5.4: Updated Conceptual Model (Hazard Assessment and Risk Estimation)

Identified Hazard/ Source	Identified Receptor	Potential Pathway	Potential Consequence of Source-Pathway-Receptor Pollutant Linkage	Potential Likelihood for Source-Pathway-Receptor Pollutant Linkage	Risk Classification
Made Ground	Current and future site users and construction workers	Exposure to potential contaminants through ingestion, inhalation and dermal contact.	Medium	Low Likelihood to Likely: Made ground was recorded across the site to a maximum depth of 1.0m, although generally to depths of 0.55mbgl. Laboratory analysis of representative samples recorded the exceedance of the GAC for PAHs, heavy metals and TPH (BH01 only), when considering a residential site end use. Therefore, where soft landscaping is proposed and where made ground remains on site after finished site levels have been achieved, exposure to potential contaminants cannot be discounted.	Moderate Risk
	Controlled waters	Leaching of potential contaminants from made ground and vertical and lateral migration through the saturated zone to controlled waters.	Medium	Unlikely to Low Likelihood: While significant concentrations of PAH have been recorded within the made ground on site, given the generally localised nature of this contamination (BH01, WS01 and TP01), the shallow depth at which this contamination was encountered and the generally immobile nature of the contamination, the likelihood of there being a linkage when considering the risk to controlled waters is considered to be low.	Low Risk
	Current and future site users, construction workers and proposed development	Migration, ingress and accumulation of ground gasses.	Severe	Unlikely: The encountered made ground is considered unlikely to be a potential source of significant ground gas based on its limited thickness and observed composition (with no visual evidence of degradable/ putrescible materials noted).	Low Risk
Current and historic potentially contaminative land uses/industrial processes – off-site	Current and future site users, construction workers, controlled waters and proposed development.	Potential on-site contaminant / ground gas migration	Severe	Unlikely to Low Likelihood: Potentially contaminative current and historic processes have been identified in proximity to the site. Notwithstanding this, given the encountered natural ground materials, visual/ olfactory observations during the site investigation works and field/laboratory results, the potential for significant on-site contaminant/gas migration from potential off-site sources is considered unlikely. In addition, based upon the limited monitoring undertaken at the site to date, no specific gas protection measures would be considered necessary with the proposed development structures.	Low to Moderate Risk
Historic coal mining activities – off site	Current and future site users, construction workers, controlled waters and proposed development.	Potential on-site contaminant / ground gas migration	Medium to Severe	Unlikely to Low Likelihood: The site is situated within a Coal Authority Coal Mining Reporting Area. Based upon the limited monitoring undertaken at the site to date, no specific gas protection measures would be considered necessary with the proposed development structures.	Low to Moderate Risk

6 LAND CONTAMINATION - CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

- 6.1.1 No visual or olfactory evidence of significant contamination was observed during the ground investigation. However, a slight hydrocarbon odour was recorded within BH01 between 0.3m and 0.5mbgl.
- 6.1.2 Laboratory analytical results of the encountered made ground materials reported elevated contaminants during the exploratory investigation, including heavy metals, PAHs and TPH (BH01 only) when considering a residential site end use with homegrown produce.
- 6.1.3 It is considered that on the basis of the conceptual site model and limited gas monitoring completed to-date, the available data is adequate to characterise the site and, therefore, the site may be characterised as being Characteristic Situation 1 and no gas protection measures are considered necessary. In addition, no radon protective measures are considered necessary within the construction of new homes.

6.2 Remedial Appraisal

- 6.2.1 Elevated contaminants of potential concern (CoPC) have been recorded within the made ground materials when considering a residential site end use.
- 6.2.2 Therefore, where soft landscaping is proposed in such areas and where made ground remains after finished site levels have been achieved, localised exposure to potential contaminants cannot be discounted and a suitable cover system may be required. Alternatively, given the limited and localised nature of these exceedances further testing may be undertaken once final site levels are achieved, and final proposed development designs are in place, to determine the requirement for any such remedial measures.

6.3 General Considerations

- 6.3.1 Given the presence of general made ground, good brownfield site working practices should be adopted by construction workers to mitigate against potential risks.
- 6.3.2 Should water supply pipes be placed within the made ground encountered at the site, due consideration would need to be given to the UK Water Industry Research Ltd (UKWIR) guidance.
- 6.3.3 Based on our conceptual understanding of the site to-date, it would be anticipated that similar ground conditions to those encountered as part of this assessment exist across the site areas where access has been possible. However, should significant thicknesses of made ground be encountered, or visual or olfactory evidence of potentially significant contamination be identified during the development works, further investigation and assessment may be required.

7 GROUND ENGINEERING

7.1 Proposed Development

- 7.1.1 The site currently comprises 3No. main structures as well as several small structures associated the former Dyffryn Lower Comprehensive School.
- 7.1.2 The proposed development is understood to comprise the demolition of the existing structures onsite and the construction of several 2-storey residential dwellings across the majority of the site with 3-storey apartments located to the east. The development is to comprise areas of hardstanding, including access roads and car parking, with areas of soft landscaping consisting of private gardens and public open space.
- 7.1.3 Although no details have been provided to TEC, line loads of up to 100kN per metre run have been assumed for the residential development at this preliminary stage and general recommendations with regards to the ground engineering have been made on this basis.

7.2 Site Preparation

- 7.2.1 A number of utility services are known to exist within close proximity to the proposed development area, consideration to any realignment and/or removal should be given as appropriate.
- 7.2.2 In addition, based on the proposed development plans, it is understood that a number of trees will be retained on site. Consideration will need to be given to the root protection area of retained trees, if applicable.

7.3 Geotechnical Test Data Summary

- 7.3.1 Laboratory test data are presented in Appendix E while in situ test results are presented on the engineering logs Appendix C.

Plasticity

- 7.3.2 Atterberg Limit tests were undertaken on 2No. cohesive samples, summarised in Table 7.1 below:

Table 7.1: Summary of Laboratory Test Results – Plasticity Index

Moisture Content (%)	Plasticity Index (%)	% passing 425µm sieve	Modified Plasticity Index ⁽¹⁾ (%)	Volume Change Potential ⁽¹⁾
10 – 19	17 – 19	36 - 70	6.1 – 13.3	Non-plastic to Low

Note 1: Based on recommendations provided in the NHBC Standard

Particle Size Distribution

- 7.3.3 Particle Size Distribution (PSD) testing was undertaken on 4No. samples of the granular deposits, summarised in Table 7.2 below:

Table 7.2: Summary of Laboratory Test Results – Particle Size Distribution

Fines (%)	Sand (%)	Gravel (%)	Very coarse (%)
3.7 - 15.4	18.1 – 26.1	66.5 – 72.7	0.0

7.4 Foundations

- 7.4.1 It is considered that conventional foundations may be suitable for the proposed development. Over the majority of the site dense to very dense granular deposits were generally recorded from depths below 1.0mbgl and it is recommended that foundations are taken to these more competent materials. However, at WS01, located near the north-western part of the site, a significant thickness of cohesive soils were recorded. These cohesive materials have been recorded to have a low volume change potential and, as a consequence, a minimum founding depth of 0.75mbgl should be adopted within the design where beyond the influence of planting. Further, while the extent of the deeper clays is not known at this stage, it will be necessary where foundations are judged to be within the influence of proposed, existing, or historic planting to deepen the foundations following the recommendation of the NHBC/ LABC.

7.4.2 When founding within the granular superficial deposits, it is considered that these materials may provide an allowable bearing resistance in excess of 150kN/m². However, it is considered that the cohesive materials recorded in the north-western part of the site (WS01) will provide an allowable bearing resistance of 100kN/m² with total settlements of less than 25mm anticipated at this assumed pressure.

7.4.3 It should be noted that foundations for each unit should be founded on the same materials to limit differential settlement and it may be necessary to undertake additional post demolition intrusive works to determine the extent of the cohesive materials recorded in the north-western part of the site and/or undertake foundation inspections by a suitable competent person.

7.5 Ground Floor Slabs

7.5.1 Given the presence of shrinkable soils and depth of made ground, the use of suspended floor slabs may be appropriate for the scheme, which where within areas of cohesive natural ground should incorporate the minimum void dimensions as outlined in the NHBC Standards. However, where within granular materials, assuming the absence of significant thicknesses of made ground, a ground bearing slab may be utilised.

7.6 Preliminary Pavement Design

7.6.1 The CBR results are summarised in Table 7.3 including recommended values for preliminary design purposes based upon these initial findings. The results are presented in Appendix I.

Table 7.3: Summary of CBR Data

Stratum	Method	Derived CBR Values (%)	Recommended CBR for Preliminary Design (%)
Superficial Deposits at assumed formation level >500mbgl	DCP ⁽¹⁾	3.5 – 37.7	5

Note 1: Jones CR and R Jolt (1991)

7.6.2 Notwithstanding this, given the recorded thickness of made ground across the site, a CBR of <2.5% would be recommended where formations are within these materials.

7.6.3 It should be noted that all road formations should be proof rolled and soft spots removed and replaced with selected granular fill and, where adoptable, a pavement of sufficient thickness (nominally >450mm) to prevent the penetration of frost should be employed.

7.6.4 CBR values of the subgrade should be confirmed by in situ testing when final formation levels are known.

7.7 Excavations

7.7.1 Excavations at the site for conventional foundations may be achievable using conventional equipment.

7.7.2 Groundwater was encountered at a single location, BH01 at 3.8mbgl, with standing water recorded at 3.45mbgl. Based on observations made during the ground investigations, groundwater ingress into excavations is considered unlikely to be significantly problematic where above the recorded groundwater level, although some localised dewatering may be required, particularly where excavations are left open for any length of time. It would be recommended that where formation levels within the cohesive deposits, they are protected to mitigate against softening associated with any such water ingress.

7.7.3 It should be noted that groundwater levels might fluctuate according to the season and from year to year. This may have implications on recommendations, including those for foundations and excavations. Accordingly, a careful watch should be maintained during any future groundworks and the recommendations presented in this report may be subject to amendment should additional information becoming available.

7.7.4 It is recommended that appropriate shoring/temporary works are used in accordance with current Health and Safety requirements where access for personnel is required into excavations.

7.8 Protection of Buried Concrete

7.8.1 The desk study and observations of the encountered ground materials during the intrusive works indicate the site would be categorised as:

- 'Brownfield locations', including potential aggressive materials or leachates, except those containing pyrite.

7.8.2 At this stage, there is insufficient data to confirm the mobility of groundwater at the site (and potential changes that may result during construction) and therefore a mobile groundwater has been assumed.

7.8.3 It should be noted that groundwater samples have not been collected as part of this scope of work.

7.8.4 The results of the testing of the soil samples, together with the resulting Aggressive Chemical Environment for Concrete (ACEC) Class and Design Sulphate (DS) Class, as derived in accordance with BRE Special Digest 1, are presented in Table 7.4. The full laboratory results are presented in Appendix E.

Table 7.4: Summary of ACEC

Stratum	No. of tests	pH	Water Soluble Sulphate (mg/l)	ACEC ⁽¹⁾	DS Class ⁽¹⁾
Made Ground / shallow soils	10	7.5 – 8.7	12 – 120	AC-1	DS-1
Superficial – cohesive	2	6.4 – 7.4	<20	AC-1	DS-1
Superficial – granular	4	7.5 – 8.2	<20	AC-1	DS-1

Note 1: Based on a characteristic value derived for a data set of <5 samples per stratum (maximum water soluble sulphate concentration/ lowest pH) as per BRE SD1

7.9 Drainage

7.9.1 Soakage testing was undertaken at 3No. locations on site in general accordance with BRE365, at approximate locations as indicated by Robert Limbrick Ltd.

7.9.2 The infiltration rates from the soakage testing undertaken at the site are summarised in Table 7.5 with the full results presented within Appendix H.

Table 7.5: Soakage Test Results

Soakage Test Location	Stratum	Infiltration Rate(s) (m/s)	Comments
TP01	Superficial granular deposits	$2.85 \times 10^{-4} - 7.61 \times 10^{-4}$	Three fills completed
TP02		$3.08 \times 10^{-4} - 8.35 \times 10^{-4}$	
TP03		$2.08 \times 10^{-4} - 4.29 \times 10^{-4}$	

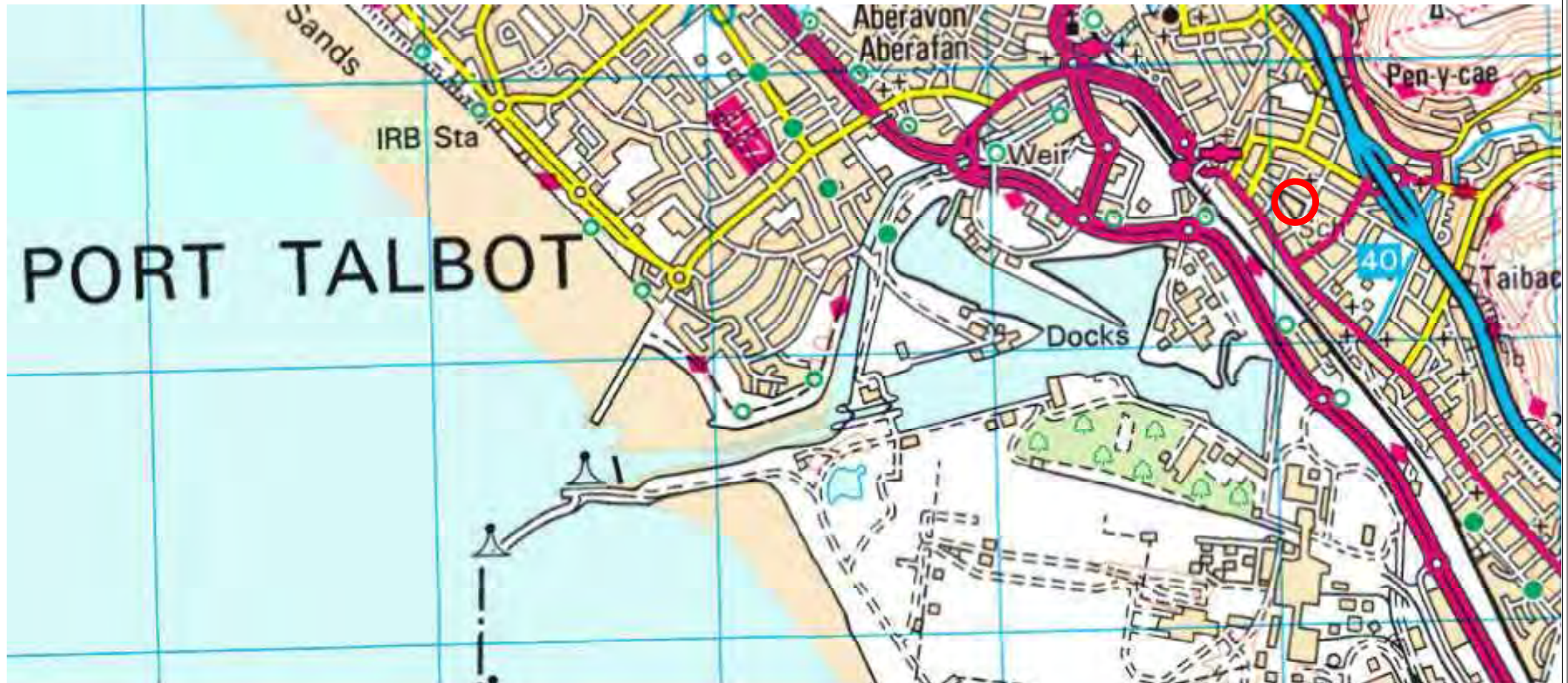
7.9.3 While the results suggest that the granular materials recorded across the majority of the site are likely to provide a suitable drainage medium, it is recommended that an appropriate drainage engineer be consulted as to whether such systems will be viable and additional testing may be required to confirm this.

7.9.4 It should be noted that CIRIA Report 156 (1996) "*Infiltration drainage – Manual of good practice*" suggests that infiltration systems should normally be built at least 6m away from the nearest foundation of any buildings; however, CIRIA C697 (2007) "*SUDS Manual*", while referring to Report 156 for geotechnical issues relating to the siting of soakaways, indicates a minimum distance of 5m from foundations.

7.9.5 In addition, the requirements of the Natural Resources Wales and Building Regulations would need to be incorporated into any design which drains into an aquifer.

TEC

Figures and Drawings



Approximate Site Location:



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Licence number 100043301



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The Old Chape
35a Southover
Wells, Somerset
BAS 1UH

Tel: 01749 677760
Email: info@tecon.co.uk
Web: www.tecon.co.uk

Site Name

Devonshire Place, Port Talbot

Drawing Name

Site Location Plan

Client Name:

Linc Cymru Housing Association

Project No

2203011.002

Figure No:

1

Date:

June 2022

Scale:

NTS



TEC
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Email: info@tecon.co.uk
Web: www.tecon.co.uk

Site Name

Devonshire Place, Port Talbot

Drawing Name

Proposed Development Plan

Client Name:

Linc Cymru Housing Association

Project No:

2203011.002

Figure No.

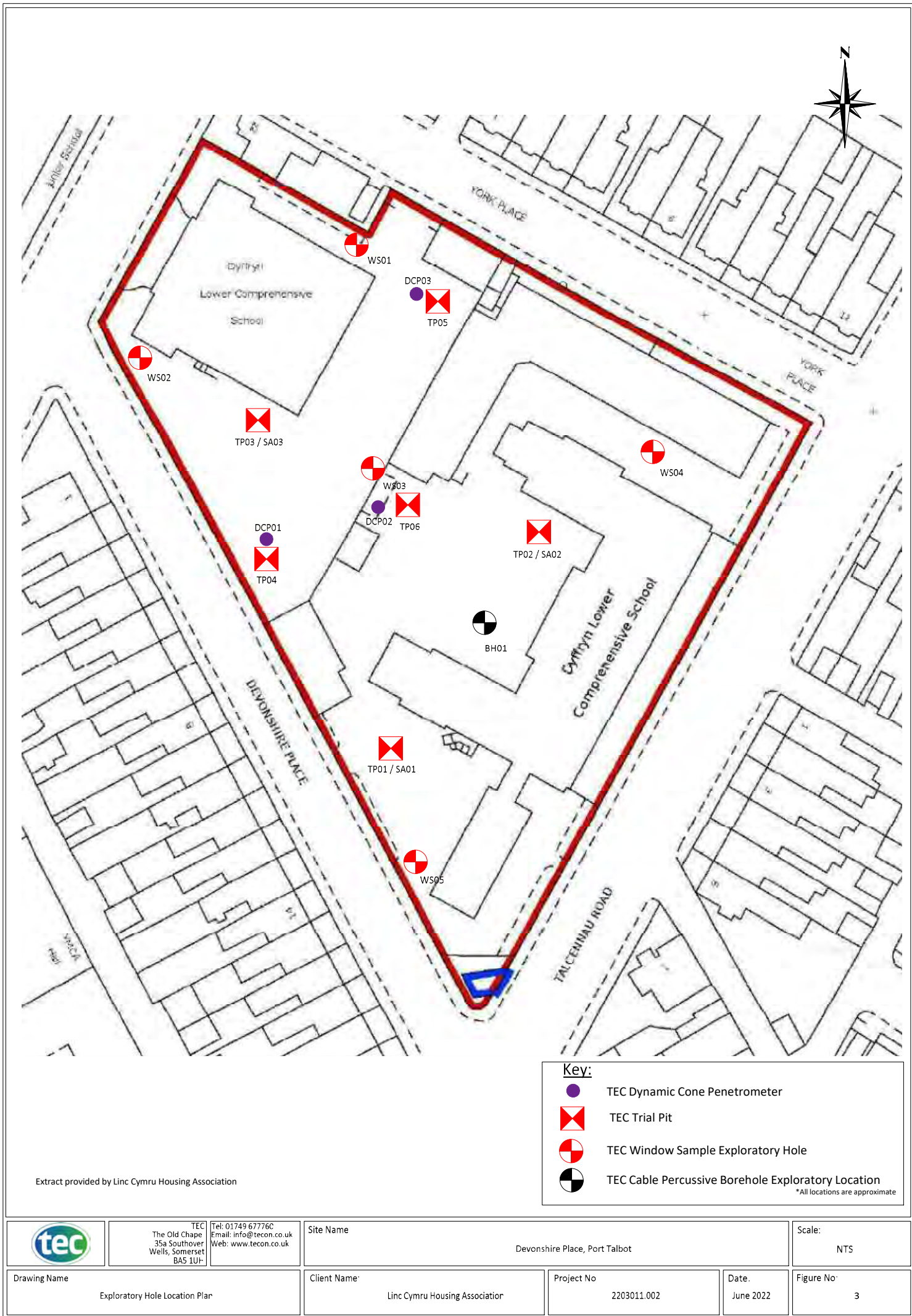
2

Date:

June 2022

Scale:

NTS



Appendix A

Site Photographs



Photograph 1: Materials recovered from WS01.



Photograph 2: Materials recovered from WS03.



Photograph 3: Materials recovered from WS04.



Photograph 4: View of TP01.



Photograph 5: Materials recovered from TP02.



Photograph 6: View of TP05.



Photograph 7: Materials recovered from TP05.



Photograph 8: Materials recovered from TP06.

Appendix B

Risk Methodologies and Evaluation

Risk Evaluation

The qualitative assessment methodology presented in CIRIA publication C552 (2001) titled '*Contaminated Land Risk Assessment: A Guide to Good Practice*' has been used by TEC for the basis of evaluating potential risk.

The method requires an assessment of the:

- magnitude of the probability or likelihood of the risk occurring (Table 1); and
- magnitude of the potential consequence or severity of the risk occurring (Table 2)

Table 1. Classification of Probability

Classification	Definition
High likelihood	There is a pollution linkage and an event that either appears very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the short-term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.

Table 2. Classification of Consequence

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. (Note: Water Resources Act contains no scope for considering significance of pollution). Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organisation forming part of such ecosystem (note: the definitions of ecological systems within the draft circular on Contaminated Land, DETR, 2000).	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to human health ("significant harm" as defined in DETR, 2000). Pollution of sensitive water resources. (Note: Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem, (note: the definitions of ecological systems within draft circular on Contaminated Land, DETR, 2000).	Concentration of a contaminant from site exceeding the generic or site-specific assessment criteria. Leaching of contaminants from a site to a major or minor aquifer. Death of a species within a designated nature reserve.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ("significant harm" as defined in the draft circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater. Damage to building rendering it unsafe to occupy (for example foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc), easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discolouration of concrete.

The combination of the two factors is determined using Table 3 and the resulting level of risk is described in Table 4. The evaluation can be applied to each of the scenarios identified in the risk model and the overall risk assessed.

Table 3. Combination of Consequence with Probability

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

Table 4. Description of risks and likely action required

Very High Risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, or there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short-term and are likely over the longer-term.
Moderate Risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the long-term.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low Risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Using the risk model the pollutant linkages are identified and a preliminary estimate of risk undertaken. If there is no pollutant linkage identified, then there is no risk. If the estimate of risk for all the linkages and exposure scenarios is very low at this stage then it is likely that no further assessment will be required.

Appendix C

Exploratory Hole Logs



Borehole Log

Borehole No.

BH01

Sheet 1 of 1

Project Name: Devonshire Place, Port Talbot

Project No.
2203011.001

Co-ords: -

Hole Type
CP

Location: Port Talbot

Level: mbgl

Scale
1:53

Client: Linc Cymru Housing Association

Dates: 19/05/2022 - 19/05/2022

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.10				0.10			MADE GROUND: Black tarmacadam hardstanding.	
		0.30	6ES			0.50			MADE GROUND: Black to dark brown slightly sandy clayey gravel of tarmacadam, limestone, slag and clinker.	
		1.00		N=13 (2,3/3,5,3,2)		1.00			<i>Slight hydrocarbon odour note</i> MADE GROUND: Dark brown to brown slightly sandy gravelly clay. Gravel of chert, sandstone, siltstone, slag and clinker.	1
		1.40	12D						SUPERFICIAL DEPOSIT: Loose to medium dense, becoming very dense dark brown and light brown slightly sandy clayey GRAVEL with low cobble content. Gravel of medium to coarse and cobbles of angular to sub-angular sandstone and chert.	2
		2.00		50 (7,13/12,19,19,)		2.20			SUPERFICIAL DEPOSIT: Very dense dark brown and light brown slightly clayey sandy GRAVEL with low to moderate cobble content. Sand is medium to coarse. Gravel of medium to coarse and cobbles of angular to sub-angular sandstone and siltstone.	3
		3.00		50 (25 for 40mm/50 for 105mm)		3.70			SUPERFICIAL DEPOSIT: Very dense dark brown and light brown sandy GRAVEL with low to moderate cobble content. Sand is medium to coarse. Gravel of medium to coarse and cobbles of angular to sub-angular sandstone and siltstone.	4
		3.50	23D			4.90			End of borehole at 4.9 m	5
		4.00		50 (7,11/50 for 179mm)						6
										7
										8
										9
										10

Remarks

Chiselling for 2hr to allow progress between 3-4m, 1.5hrs between 4-4.9mbgl. Borehole terminated due to extremely dense granular deposits.





Borehole Log

Borehole No.

WS01

Sheet 1 of 1

Project Name: Devonshire Place, Port Talbot

Project No.
2203011.001

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: Linc Cymru Housing Associat

Dates: 20/05/2022 - 20/05/2022

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.20	7ES			0.10 0.20 0.25			MADE GROUND: Black tarmacadam hardstanding. MADE GROUND: Black tarmacadam gravel. MADE GROUND: Dark brown to black slightly sandy gravelly clay. Gravel of sandstone, chert, slag, clinker and rare plastic.	
		0.80 0.90 1.00	27D 19D	N=35 (3,3/4,7,12,12)		1.00			SUPERFICIAL DEPOSITS: Stiff orangish brown to light brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel of medium to coarse sub-rounded to angular sandstone and rare chert. <i>PP@0.7mbgl: 2.5, 2.0, 2.0, 2.5, 2.0 kg/cm3</i>	1
		1.50	25D			1.40			SUPERFICIAL DEPOSITS: Stiff light brown to brown slightly sandy gravelly CLAY. Gravel of medium to coarse sub-rounded to angular sandstone.	
		2.00		N=29 (4,4/6,7,8,8)					SUPERFICIAL DEPOSITS: Stiff light brown to brown friable slightly sandy gravelly CLAY. Gravel of medium to coarse sub-rounded to angular sandstone.	2
						2.60			<i>Becoming light brown below 2.4mbgl</i>	
		2.80		50 (20,22/50 for 115mm)		2.80			SUPERFICIAL DEPOSITS: Very stiff to extremely weak orangish brown to light brown slightly clayey GRAVEL. Gravel of fine to medium angular siltstone. <i>End of borehole at 2.8 m</i>	3
										4
										5
										6

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS02

Sheet 1 of 1

Project Name: Devonshire Place, Port Talbot

Project No.
2203011.001

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: Linc Cymru Housing Association

Dates: 20/05/2022 - 20/05/2022

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.10				0.10			MADE GROUND: Black tarmacadam hardstanding.	
		0.20				0.20			MADE GROUND: Black tarmacadam gravel.	
		0.45				0.45			MADE GROUND: Dark brown to brown slightly gravelly clay. Gravel of brick, sandstone, coal, slag and black carbonaceous material.	
		1.00				1.00			SUPERFICIAL DEPOSITS: Medium dense light brown to brown slightly clayey sandy GRAVEL of medium to coarse sub-angular to angular sandstone.	1
		1.50				1.50			SUPERFICIAL DEPOSITS: Dense to very dense light brown to orangish brown sandy GRAVEL. Sand is fine to medium. Gravel of fine to coarse sub-angular to angular sandstone.	
									End of borehole at 1.5 m	

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project Name: Devonshire Place, Port Talbot

Project No.
2203011.001

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: Linc Cymru Housing Association

Dates: 20/05/2022 - 20/05/2022

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.60	9ES	N=23 (4,5/6,5,7,5)		0.10			MADE GROUND: Black tarmacadam hardstanding.	1
						0.25			MADE GROUND: Black tarmacadam and limestone gravel.	
						0.30			MADE GROUND: Black slightly gravelly ashly clay. Gravel of slag, limestone and sandstone.	
		1.00	26D			0.90			MADE GROUND: Brown slightly sandy gravelly clay. Gravel of brick, sandstone and limestone.	
		1.20				1.50			SUPERFICIAL DEPOSITS: Medium dense to dense light brown to orangish brown slightly clayey sandy GRAVEL. Sand is fine to medium. Gravel of fine to coarse sub-angular to angular sandstone.	
		1.90		50 (8,17/50 for 10mm)		1.90			SUPERFICIAL DEPOSITS: Very dense light brown to orangish brown sandy GRAVEL. Sand is medium to coarse. Gravel of medium to coarse sub-angular to angular sandstone.	2
									End of borehole at 1.9 m	2
										3
										4
										5
										6

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: Devonshire Place, Port Talbot

Project No.
2203011.001

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: Linc Cymru Housing Associatoin

Dates: 20/05/2022 - 20/05/2022

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.20	10ES			0.10			MADE GROUND: Black tarmacadam hardstanding.	
						0.35			MADE GROUND: Black tarmacadam gravel.	
		0.60	15D						SUPERFICIAL DEPOSITS: Medium dense to dense light brown to yellow brown slightly clayey sandy GRAVEL with low cobble content. Sand is fine to medium. Gravel of medium to coarse and cobbles of sub-angular to angular sandstone.	1
		1.00		N=33 (8,7/8,7,9,9)					Localised pockets of yellow brown to orange brown clayey medium sand.	
		1.40	20D							
		2.00		N=36 (7,9/10,9,7,10)		1.80			SUPERFICIAL DEPOSITS: Dense to very dense light brown slightly sandy clayey GRAVEL. Sand is medium to coarse. Gravel of medium to coarse of sub-angular sandstone.	2
		2.40	24D						Becoming sligtly clayey sandy gravel below 2.4mbgl	
		3.00		N=53 (11,11/53 for 255mm)		3.00			End of borehole at 3.0 m	3
										4
										5
										6

Remarks

No groundwater encountered.





Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project Name: Devonshire Place, Port Talbot

Project No.
2203011.001

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: Linc Cymru Housing Association

Dates: 20/05/2022 - 20/05/2022

Logged By
ST

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
						0.10			MADE GROUND: Black tarmacadam hardstanding.	
						0.30			MADE GROUND: Black tarmacadam and limestone gravel.	
		0.50	11ES			0.70			REWORKED GROUND: Brown to dark brown slightly gravelly, slightly sandy clay. Gravel of sandstone and limestone.	
		1.00	16D	N=39 (9,11/11,9,10,9)	1.00			SUPERFICIAL DEPOSITS: Dense light brown to yellowish brown slightly clayey sandy GRAVEL with low cobble content. Sand is fine to medium. Gravel of fine to coarse and cobbles of sub-angular to angular sandstone.		
		1.00					SUPERFICIAL DEPOSITS: Very dense light brown to orangish brown sandy GRAVEL. Sand is medium to coarse. Gravel of medium to coarse sub-angular to angular sandstone.			
		1.90		50 (16,20/50 for 115mm)		1.90			Locally slightly clayey between 1.7-1.9mbgl	
									End of borehole at 1.9 m	
										2
										3
										4
										5
										6

Remarks

No groundwater encountered.





Trial Pit Log

Trialpit No
TP01

Sheet 1 of 1

Project Name: Devonshire Place, Port Talbot

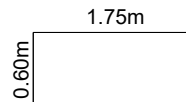
Project No.
2203011.001

Co-ords: -
Level: mbgl

Date
23/05/2022

Location: Port Talbot

Dimensions:
Inclination: °
Orientation: °
Depth: 1.8m



Scale
1:25

Logged
ST

Client: Linc Cymru Housing Association

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
	0.30	1ES			0.15			MADE GROUND: Black tarmacadam hardstanding.	1
					0.55			MADE GROUND: Brown slightly sandy, slightly gravelly clay. Gravel of chert, sandstone and clinker.	
					1.15			SUPERFICIAL DEPOSITS: (Medium dense to dense) orangish brown to light brown slightly sandy clayey GRAVEL. Gravel of medium to coarse sub-angular to sub-rounded sandstone.	
					1.75			SUPERFICIAL DEPOSITS: (Dense) orangish brown to light brown slightly sandy, slightly clayey GRAVEL with low cobble content. Gravel of medium to coarse and cobbles of sub-angular to sub-rounded sandstone.	
								End of pit at 1.8 m	2
									3
									4
									5

Remarks: (Densities) based on field observations only. No groundwater encountered.

Stability: Stable





Trial Pit Log

Trialpit No
TP02

Sheet 1 of 1

Project Name: Devonshire Place, Port Talbot

Project No.
2203011.001

Co-ords: -
Level: mbgl

Date
23/05/2022

Location: Port Talbot

Dimensions:
Inclination: °
Orientation: °
Depth: 1.7m

1.55m
0.65m

Scale
1:25

Logged
ST

Client: Linc Cymru Housing Association

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
	0.20	2ES			0.15			MADE GROUND: Black tarmacadam hardstanding.	
					0.30			MADE GROUND: Brown to dark grey slightly gravelly silty clay. Gravel of chert, sandstone, slag, clinker, rare metal and plastic.	
								SUPERFICIAL DEPOSITS: (Medium dense) yellowish brown slightly sandy clayey GRAVEL. Gravel of medium to coarse sub-angular to rounded sandstone.	
	0.80	18D			0.70			SUPERFICIAL DEPOSITS: Firm orangish brown to light brown and brown slightly sandy, gravelly CLAY with low cobble content. Gravel of medium to coarse and cobbles of sub-angular to rounded sandstone.	1
					1.10			SUPERFICIAL DEPOSITS: (Dense) orangish brown to light brown slightly sandy, slightly clayey GRAVEL with low cobble content. Gravel of medium to coarse and cobbles of sub-angular to sub-rounded sandstone and siltstone.	
					1.65			End of pit at 1.7 m	2
									3
									4
									5

Remarks: (Densities) based on field observations only. No groundwater encountered.

Stability: Stable





Trial Pit Log

Trialpit No
TP03

Sheet 1 of 1

Project Name: Devonshire Place, Port Talbot

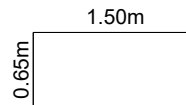
Project No.
2203011.001

Co-ords: -
Level: mbgl

Date
23/05/2022

Location: Port Talbot

Dimensions:
Inclination: °
Orientation: °
Depth: 1.6m



Scale
1:25

Logged
ST

Client: Linc Cymru Housing Association

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
	0.20	3ES			0.15			MADE GROUND: Black tarmacadam hardstanding.	
					0.35			MADE GROUND: Brown to dark grey slightly gravelly silty clay. Gravel of chert, sandstone, slag, clinker, rare metal and plastic.	
					0.55			SUPERFICIAL DEPOSITS: Firm reddish brown to orangish brown slightly sandy gravelly CLAY with low cobble content. Gravel of medium to coarse and cobbles of sub-rounded to rounded sandstone.	
	1.10	13D			1.10			SUPERFICIAL DEPOSITS: (Dense) orangish brown to light brown slightly clayey sandy GRAVEL with low cobble content. Gravel of medium to coarse and cobbles of sub-rounded to rounded sandstone.	1
					1.60			SUPERFICIAL DEPOSITS: (Dense to very dense) orangish brown to light brown sandy GRAVEL with low to moderate cobble content. Gravel of medium to coarse and cobbles of rounded to sub-rounded sandstone and siltstone.	2
								End of pit at 1.6 m	3
									4
									5

Remarks: (Densities) based on field observations only. No groundwater encountered.

Stability: Stable





Trial Pit Log

Trialpit No
TP05

Sheet 1 of 1

Project Name: Devonshire Place, Port Talbot

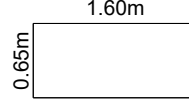
Project No.
2203011.001

Co-ords: -
Level: mbgl

Date
23/05/2022

Location: Port Talbot

Dimensions:
Inclination: °
Orientation: °
Depth: 1.5m



Scale
1:25

Logged
ST

Client: Linc Cymru Housing Association

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
	0.20	5ES			0.20			MADE GROUND: Black tarmacadam hardstanding.	
	0.30							SUPERFICIAL DEPOSITS: Firm to stiff orangish brown mottled light brown and light grey slightly gravelly sandy CLAY. Gravel of medium to coarse sub-angular to rounded chert and sandstone.	
	0.60	22D							
					1.10			SUPERFICIAL DEPOSITS: (Very dense) light brown to orangish brown slightly sandy clayey GRAVEL with low cobble content. Gravel of medium to coarse and cobbles of sub-rounded to sub-angular sandstone.	
					1.50			End of pit at 1.5 m	

1

2

3

4

5

Remarks: (Densities) based on field observations only. No groundwater encountered.

Stability: Stable





Trial Pit Log

Trialpit No
TP06

Sheet 1 of 1

Project Name: Devonshire Place, Port Talbot

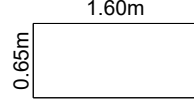
Project No.
2203011.001

Co-ords: -
Level: mbgl

Date
23/05/2022

Location: Port Talbot

Dimensions:
Inclination: °
Orientation: °
Depth: 1.7m



Scale
1:25

Client: Linc Cymru Housing Association

Logged
ST

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
					0.20			MADE GROUND: Black tarmacadam hardstanding.	
					0.50			MADE GROUND: Dark grey to dark brown slightly sandy, slightly gravelly clay. Gravel of chert, sandstone and rare clinker.	
					0.90			SUPERFICIAL DEPOSITS: (Medium dense) orangish brown to light brown slightly sandy clayey GRAVEL with low cobble content. Gravel of medium to coarse and cobbles sub-angular to sub-rounded sandstone.	
	1.20	14D						SUPERFICIAL DEPOSITS: (Dense to very dense) orangish brown to light brown slightly sandy, slightly clayey GRAVEL with low to moderate cobble content. Gravel of medium to coarse and cobbles of sub-angular to sub-rounded sandstone.	1
	1.40	21D							
					1.70				
								End of pit at 1.7 m	2
									3
									4
									5

Remarks: (Densities) based on field observations only. No groundwater encountered.

Stability: Stable



Appendix D

Geochemical Certificates of Analysis

**Sophie Thomas**

Tweedie Evans Consulting Ltd
The Old Chapel
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Wells
Somerset
BA5 1UH

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

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

Analytical Report Number : 22-60358

Project / Site name:	Devonshire Place Port Talbot	Samples received on:	23/05/2022
Your job number:	2203011 001	Samples instructed on/ Analysis started on:	24/05/2022
Your order number:		Analysis completed by:	08/06/2022
Report Issue Number:	1	Report issued on:	08/06/2022
Samples Analysed:	6 soil samples		

Signed:

Adam Fenwick
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

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

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

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

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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

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

Analytical Report Number: 22-60358

Project / Site name: Devonshire Place Port Talbot

Lab Sample Number				2287422	2287423	2287424	2287425	2287426
Sample Reference				BH01	WS01	WS02	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.40	0.20-0.35	0.30-0.40	0.60-0.70	0.20-0.30
Date Sampled				19/05/2022	20/05/2022	20/05/2022	20/05/2022	20/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	45	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	13	7	17	16	22
Total mass of sample received	kg	0.001	NONE	0.3	0.4	0.3	0.3	0.4

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	JSW	JSW	JSW	JSW	JSW

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	8.3	8.1	8.5	8.3
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	1	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	300	-	370	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.024	0.021	0.014	0.012	0.031
Sulphide	mg/kg	1	MCERTS	10	30	6.6	7.3	26
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.9	5.7	2.5	1.8	-
Total Organic Carbon (TOC) - Manual	%	0.1	MCERTS	-	-	-	-	6.3

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	7.6	49	< 0.05	< 0.05	0.78
Acenaphthene	mg/kg	0.05	MCERTS	0.84	5.7	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	7.7	40	< 0.05	< 0.05	0.67
Phenanthrene	mg/kg	0.05	MCERTS	75	340	2.1	< 0.05	5.9
Anthracene	mg/kg	0.05	MCERTS	19	96	0.45	< 0.05	1.1
Fluoranthene	mg/kg	0.05	MCERTS	75	450	2.9	< 0.05	4.2
Pyrene	mg/kg	0.05	MCERTS	59	350	2.2	< 0.05	3.4
Benzo(a)anthracene	mg/kg	0.05	MCERTS	35	190	0.95	< 0.05	1.9
Chrysene	mg/kg	0.05	MCERTS	25	140	1.1	< 0.05	1.6
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	34	180	1.1	< 0.05	1.8
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	10	64	0.52	< 0.05	0.85
Benzo(a)pyrene	mg/kg	0.05	MCERTS	27	160	0.64	< 0.05	1.5
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	13	83	0.59	< 0.05	0.84
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	3.5	19	< 0.05	< 0.05	0.27
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	14	91	0.7	< 0.05	1

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	406	2260	13.1	< 0.80	25.8
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Analytical Report Number: 22-60358
Project / Site name: Devonshire Place Port Talbot

Lab Sample Number				2287422	2287423	2287424	2287425	2287426
Sample Reference				BH01	WS01	WS02	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.40	0.20-0.35	0.30-0.40	0.60-0.70	0.20-0.30
Date Sampled				19/05/2022	20/05/2022	20/05/2022	20/05/2022	20/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	37	14	53	43	33
Barium (aqua regia extractable)	mg/kg	1	MCERTS	57	100	130	100	300
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.65	0.61	0.81	0.71	1.4
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	0.9	0.9	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.9	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	1.6	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	10	20	18	13
Copper (aqua regia extractable)	mg/kg	1	MCERTS	75	220	140	77	94
Lead (aqua regia extractable)	mg/kg	1	MCERTS	32	45	110	37	34
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.5	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	22	17	23	18	45
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	26	27	30	29	46
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	110	180	200	110	88

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-

Petroleum Hydrocarbons

TPH C10 - C40 EH_CU_ID_TOTAL	mg/kg	10	MCERTS	920	-	22	-	-
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TPH-CWG - Aliphatic >EC5 - EC6 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10 HS_ID_AL	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_ID_AL	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_ID_AL	mg/kg	2	MCERTS	< 2.0	-	< 2.0	-	-
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	-
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	-
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_ID_AL	mg/kg	10	MCERTS	< 10	-	< 10	-	-

TPH-CWG - Aromatic >EC5 - EC7 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10 HS_ID_AR	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_ID_AR	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_ID_AR	mg/kg	2	MCERTS	54	-	< 2.0	-	-
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_ID_AR	mg/kg	10	MCERTS	370	-	< 10	-	-
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_ID_AR	mg/kg	10	MCERTS	430	-	13	-	-
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_ID_AR	mg/kg	10	MCERTS	850	-	22	-	-

Analytical Report Number: 22-60358

Project / Site name: Devonshire Place Port Talbot

Lab Sample Number				2287422	2287423	2287424	2287425	2287426
Sample Reference				BH01	WS01	WS02	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.40	0.20-0.35	0.30-0.40	0.60-0.70	0.20-0.30
Date Sampled				19/05/2022	20/05/2022	20/05/2022	20/05/2022	20/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

PCBs

PCB Congener 077	mg/kg	0.001	NONE	-	-	-	-	-
PCB Congener 081	mg/kg	0.001	NONE	-	-	-	-	-
PCB Congener 105	mg/kg	0.001	NONE	-	-	-	-	-
PCB Congener 114	mg/kg	0.001	NONE	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	NONE	-	-	-	-	-
PCB Congener 123	mg/kg	0.001	NONE	-	-	-	-	-
PCB Congener 126	mg/kg	0.001	NONE	-	-	-	-	-
PCB Congener 156	mg/kg	0.001	NONE	-	-	-	-	-
PCB Congener 157	mg/kg	0.001	NONE	-	-	-	-	-
PCB Congener 167	mg/kg	0.001	NONE	-	-	-	-	-
PCB Congener 169	mg/kg	0.001	NONE	-	-	-	-	-
PCB Congener 189	mg/kg	0.001	NONE	-	-	-	-	-

Total PCBs – WHO12

Total PCBs	mg/kg	0.012	NONE	-	-	-	-	-
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 22-60358

Project / Site name: Devonshire Place Port Talbot

Lab Sample Number				2287427
Sample Reference				WS05
Sample Number				None Supplied
Depth (m)				0.50-0.60
Date Sampled				20/05/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	48
Moisture Content	%	0.01	NONE	12
Total mass of sample received	kg	0.001	NONE	0.4

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	JSW

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	470
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.066
Sulphide	mg/kg	1	MCERTS	11
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.4
Total Organic Carbon (TOC) - Manual	%	0.1	MCERTS	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.75
Anthracene	mg/kg	0.05	MCERTS	0.23
Fluoranthene	mg/kg	0.05	MCERTS	0.77
Pyrene	mg/kg	0.05	MCERTS	0.56
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.35
Chrysene	mg/kg	0.05	MCERTS	0.33
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.21
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.21
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.2
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	3.61
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Analytical Report Number: 22-60358

Project / Site name: Devonshire Place Port Talbot

Lab Sample Number				2287427
Sample Reference				WS05
Sample Number				None Supplied
Depth (m)				0.50-0.60
Date Sampled				20/05/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	64
Barium (aqua regia extractable)	mg/kg	1	MCERTS	140
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.82
Boron (water soluble)	mg/kg	0.2	MCERTS	1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	170
Lead (aqua regia extractable)	mg/kg	1	MCERTS	66
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.6
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	22
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	28
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	240

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0

Petroleum Hydrocarbons

TPH C10 - C40 _{EH, CU, 1D, TOTAL}	mg/kg	10	MCERTS	< 10
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TPH-CWG - Aliphatic >EC5 - EC6 _{HS, 1D, AL}	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS, 1D, AL}	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS, 1D, AL}	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH, CU, 1D, AL}	mg/kg	1	MCERTS	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH, CU, 1D, AL}	mg/kg	2	MCERTS	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH, CU, 1D, AL}	mg/kg	8	MCERTS	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH, CU, 1D, AL}	mg/kg	8	MCERTS	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) _{EH, CU+HS, 1D, AL}	mg/kg	10	MCERTS	< 10

TPH-CWG - Aromatic >EC5 - EC7 _{HS, 1D, AR}	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS, 1D, AR}	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS, 1D, AR}	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH, CU, 1D, AR}	mg/kg	1	MCERTS	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH, CU, 1D, AR}	mg/kg	2	MCERTS	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 _{EH, CU, 1D, AR}	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic >EC21 - EC35 _{EH, CU, 1D, AR}	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic (EC5 - EC35) _{EH, CU+HS, 1D, AR}	mg/kg	10	MCERTS	< 10

Analytical Report Number: 22-60358

Project / Site name: Devonshire Place Port Talbot

Lab Sample Number				2287427
Sample Reference				WS05
Sample Number				None Supplied
Depth (m)				0.50-0.60
Date Sampled				20/05/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
PCBs				
PCB Congener 077	mg/kg	0.001	NONE	< 0.001
PCB Congener 081	mg/kg	0.001	NONE	< 0.001
PCB Congener 105	mg/kg	0.001	NONE	< 0.001
PCB Congener 114	mg/kg	0.001	NONE	< 0.001
PCB Congener 118	mg/kg	0.001	NONE	< 0.001
PCB Congener 123	mg/kg	0.001	NONE	< 0.001
PCB Congener 126	mg/kg	0.001	NONE	< 0.001
PCB Congener 156	mg/kg	0.001	NONE	< 0.001
PCB Congener 157	mg/kg	0.001	NONE	< 0.001
PCB Congener 167	mg/kg	0.001	NONE	< 0.001
PCB Congener 169	mg/kg	0.001	NONE	< 0.001
PCB Congener 189	mg/kg	0.001	NONE	< 0.001

Total PCBs – WHO12

Total PCBs	mg/kg	0.012	NONE	< 0.012
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 22-60358

Project / Site name: Devonshire Place Port Talbot

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2287422	BH01	None Supplied	0.30-0.40	Brown loam and clay with gravel.
2287423	WS01	None Supplied	0.20-0.35	Brown loam and clay with gravel and stones.
2287424	WS02	None Supplied	0.30-0.40	Brown clay and loam with gravel and vegetation.
2287425	WS03	None Supplied	0.60-0.70	Brown clay and loam with gravel.
2287426	WS04	None Supplied	0.20-0.30	Brown loam and sand with gravel and clinker
2287427	WS05	None Supplied	0.50-0.60	Brown loam and clay with stones and vegetation.

Analytical Report Number : 22-60358

Project / Site name: Devonshire Place Port Talbot

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
PCBs WHO 12 in soil	Determination of PCBs (WHO-12 Congeners) by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS

Analytical Report Number : 22-60358

Project / Site name: Devonshire Place Port Talbot

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total



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Analytical Report Number : 22-60748

Project / Site name:	Devonshire Place Port Talbot	Samples received on:	25/05/2022
Your job number:	2203011 001	Samples instructed on/ Analysis started on:	25/05/2022
Your order number:		Analysis completed by:	09/06/2022
Report Issue Number:	1	Report issued on:	09/06/2022
Samples Analysed:	4 soil samples		


Signed:

Adam Fenwick
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

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

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

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

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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

Analytical Report Number: 22-60748

Project / Site name: Devonshire Place Port Talbot

Lab Sample Number				2289672	2289673	2289674	2289675
Sample Reference				TP01	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.40	0.20-0.30	0.20-0.30	0.30-0.40
Date Sampled				23/05/2022	23/05/2022	23/05/2022	23/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	21	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	10	15	17	17
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	GF1	GF1	GF1	GF1

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3	7.5	7.6	7.9
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	520	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.12	0.086	0.1	0.11
Sulphide	mg/kg	1	MCERTS	4.3	30	31	18
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.4	1.7	2	2

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.25	0.2
Acenaphthylene	mg/kg	0.05	MCERTS	16	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	3.6	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	24	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	180	< 0.05	0.47	0.46
Anthracene	mg/kg	0.05	MCERTS	34	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	160	< 0.05	0.64	0.83
Pyrene	mg/kg	0.05	MCERTS	110	< 0.05	0.55	0.73
Benzo(a)anthracene	mg/kg	0.05	MCERTS	58	< 0.05	0.42	0.48
Chrysene	mg/kg	0.05	MCERTS	50	< 0.05	0.36	0.36
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	51	< 0.05	0.35	0.46
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	18	< 0.05	0.17	0.15
Benzo(a)pyrene	mg/kg	0.05	MCERTS	38	< 0.05	0.25	0.32
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	19	< 0.05	< 0.05	0.22
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	5.7	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	21	< 0.05	< 0.05	0.23

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	790	< 0.80	3.46	4.44
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Analytical Report Number: 22-60748
Project / Site name: Devonshire Place Port Talbot

Lab Sample Number				2289672	2289673	2289674	2289675
Sample Reference				TP01	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.40	0.20-0.30	0.20-0.30	0.30-0.40
Date Sampled				23/05/2022	23/05/2022	23/05/2022	23/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	33	22	30	29
Barium (aqua regia extractable)	mg/kg	1	MCERTS	93	67	110	94
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.65	0.69	0.78	0.72
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	1.6	0.7	0.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	19	22	36
Copper (aqua regia extractable)	mg/kg	1	MCERTS	86	72	100	88
Lead (aqua regia extractable)	mg/kg	1	MCERTS	75	36	73	56
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.6	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	21	21	27
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	25	26	29	29
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	140	110	150	140

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-
o-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0	-

Petroleum Hydrocarbons

TPH C10 - C40 _{EH, CU, 1D, TOTAL}	mg/kg	10	MCERTS	-	-	< 10	-
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TPH-CWG - Aliphatic >EC5 - EC6 _{HS, 1D, AL}	mg/kg	0.001	MCERTS	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8 _{HS, 1D, AL}	mg/kg	0.001	MCERTS	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10 _{HS, 1D, AL}	mg/kg	0.001	MCERTS	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12 _{EH, CU, 1D, AL}	mg/kg	1	MCERTS	-	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16 _{EH, CU, 1D, AL}	mg/kg	2	MCERTS	-	-	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21 _{EH, CU, 1D, AL}	mg/kg	8	MCERTS	-	-	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35 _{EH, CU, 1D, AL}	mg/kg	8	MCERTS	-	-	< 8.0	-
TPH-CWG - Aliphatic (EC5 - EC35) _{EH, CU+HS, 1D, AL}	mg/kg	10	MCERTS	-	-	< 10	-

TPH-CWG - Aromatic >EC5 - EC7 _{HS, 1D, AR}	mg/kg	0.001	MCERTS	-	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8 _{HS, 1D, AR}	mg/kg	0.001	MCERTS	-	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10 _{HS, 1D, AR}	mg/kg	0.001	MCERTS	-	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12 _{EH, CU, 1D, AR}	mg/kg	1	MCERTS	-	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16 _{EH, CU, 1D, AR}	mg/kg	2	MCERTS	-	-	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21 _{EH, CU, 1D, AR}	mg/kg	10	MCERTS	-	-	< 10	-
TPH-CWG - Aromatic >EC21 - EC35 _{EH, CU, 1D, AR}	mg/kg	10	MCERTS	-	-	< 10	-
TPH-CWG - Aromatic (EC5 - EC35) _{EH, CU+HS, 1D, AR}	mg/kg	10	MCERTS	-	-	< 10	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 22-60748

Project / Site name: Devonshire Place Port Talbot

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2289672	TP01	None Supplied	0.30-0.40	Brown loam and clay with gravel.
2289673	TP02	None Supplied	0.20-0.30	Brown loam and clay with stones and gravel
2289674	TP03	None Supplied	0.20-0.30	Brown loam and clay with gravel.
2289675	TP04	None Supplied	0.30-0.40	Brown loam and clay with gravel.

Analytical Report Number : 22-60748

Project / Site name: Devonshire Place Port Talbot

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

Analytical Report Number : 22-60748
Project / Site name: Devonshire Place Port Talbot

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Appendix E

Geotechnical Laboratory Report



Job No.	Project Name	Programme	
31926	Devonshire Place, Port Talbot	Samples received	25/05/2022
		Schedule received	26/05/2022
Project No.	Client	Project started	27/05/2022
2203011.001	TEC	Testing Started	16/06/2022

[illegible]

Test Methods: BS1377: Part 2: 1990:
 Natural Moisture Content : clause 3.2
 Atterberg Limits: clause 4.3, 4.4 and 5.0
These results only apply to the items tested

NOTE: The report shall not be reproduced except in full without authority of the laboratory

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU

Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved

Initials J.P

Date: 21/06/2022

MSF-5-R1



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 31926

Borehole/Pit No. TP02

Site Name Devonshire Place, Port Talbot

Sample No. -

Project No. 2203011.001

Client

TEC

Depth Top 0.80 m

Depth Base 1.00 m

Sample Type D

Soil Description

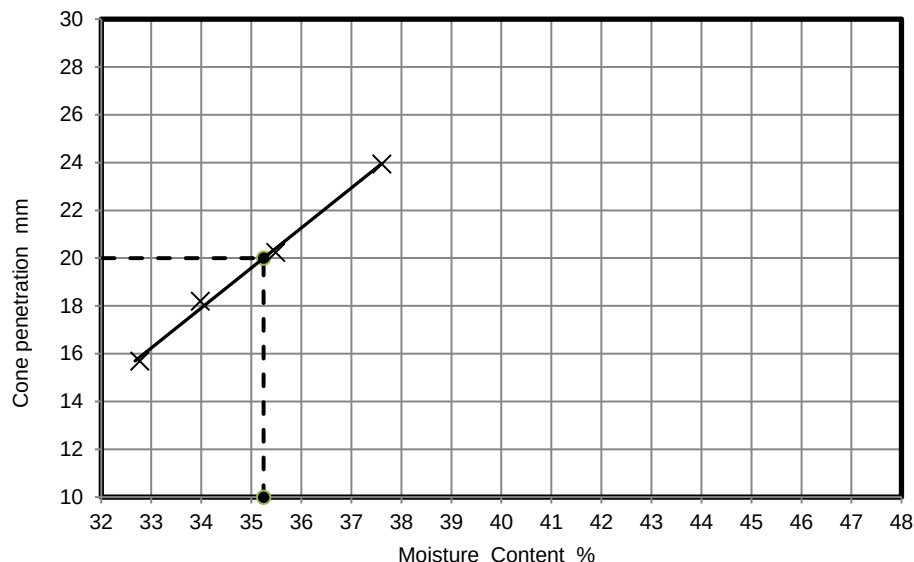
Dark brown slightly sandy slightly gravelly silty CLAY (gravel is fmc and sub-angular to sub-rounded and irregular)

Samples received 25/05/2022

Schedules received 26/05/2022

Project Started 27/05/2022

Date Tested 16/06/2022



NATURAL MOISTURE CONTENT

19

%

% PASSING 425µm SIEVE

70

%

LIQUID LIMIT

35

%

PLASTIC LIMIT

16

%

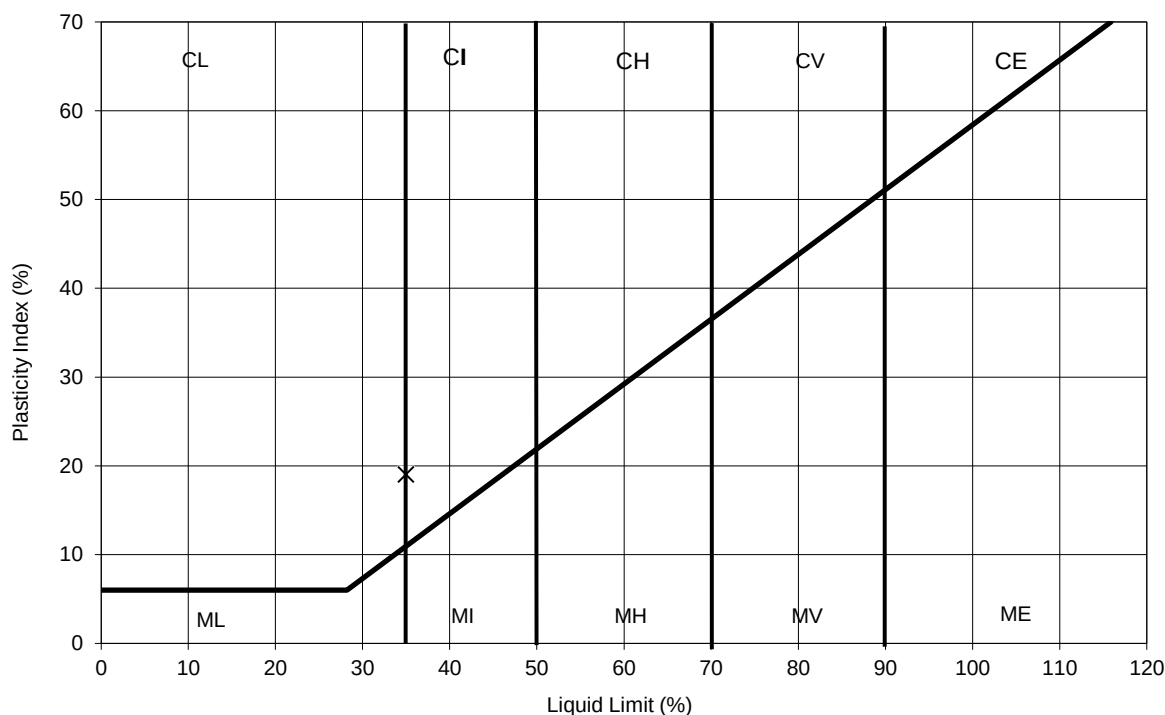
PLASTICITY INDEX

19

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 21/06/2022

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 31926

Borehole/Pit No. WS04

Site Name Devonshire Place, Port Talbot

Sample No. -

Project No. 2203011.001

Client

TEC

Depth Top 1.40 m

Depth Base 1.50 m

Sample Type D

Soil Description

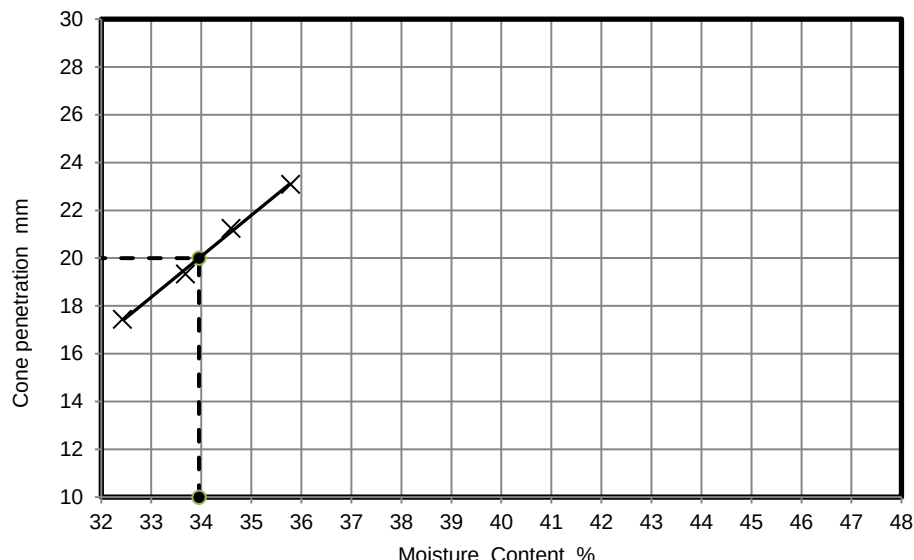
Brown slightly sandy gravelly silty CLAY (gravel is fmc and angular to sub-angular)

Samples received 25/05/2022

Schedules received 26/05/2022

Project Started 27/05/2022

Date Tested 16/06/2022



NATURAL MOISTURE CONTENT

10

%

% PASSING 425µm SIEVE

36

%

LIQUID LIMIT

34

%

PLASTIC LIMIT

17

%

PLASTICITY INDEX

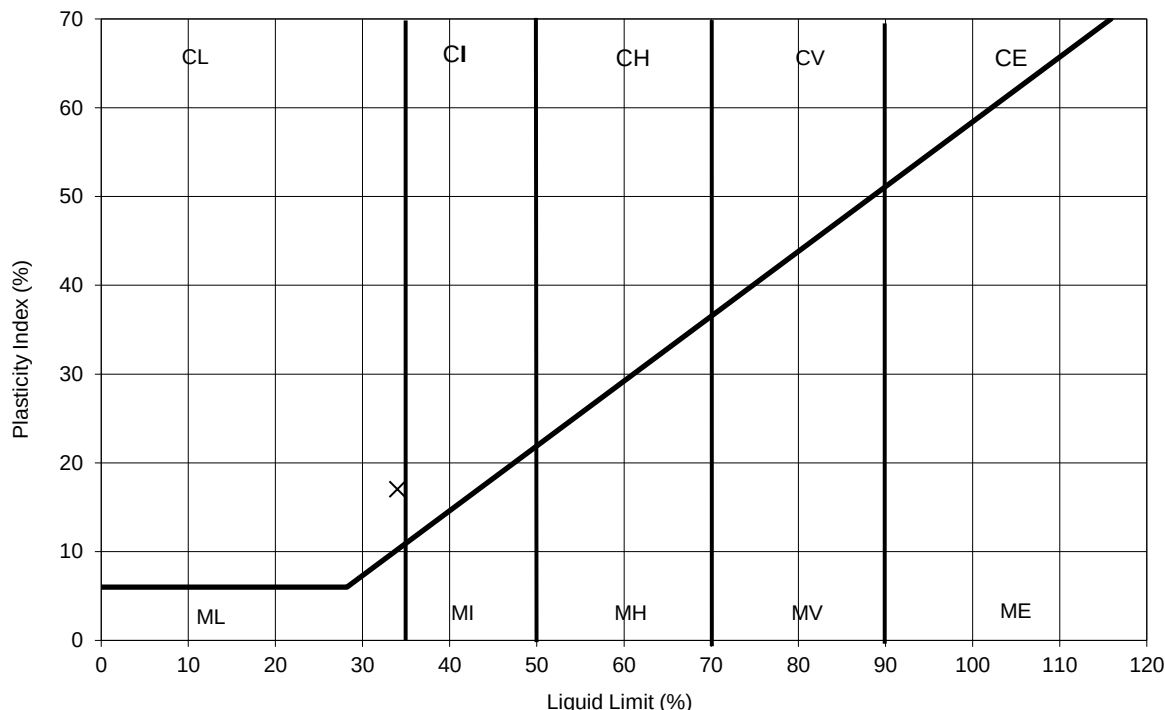
17

%

Remarks

Sample washed to obtain test fraction

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 21/06/2022

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2

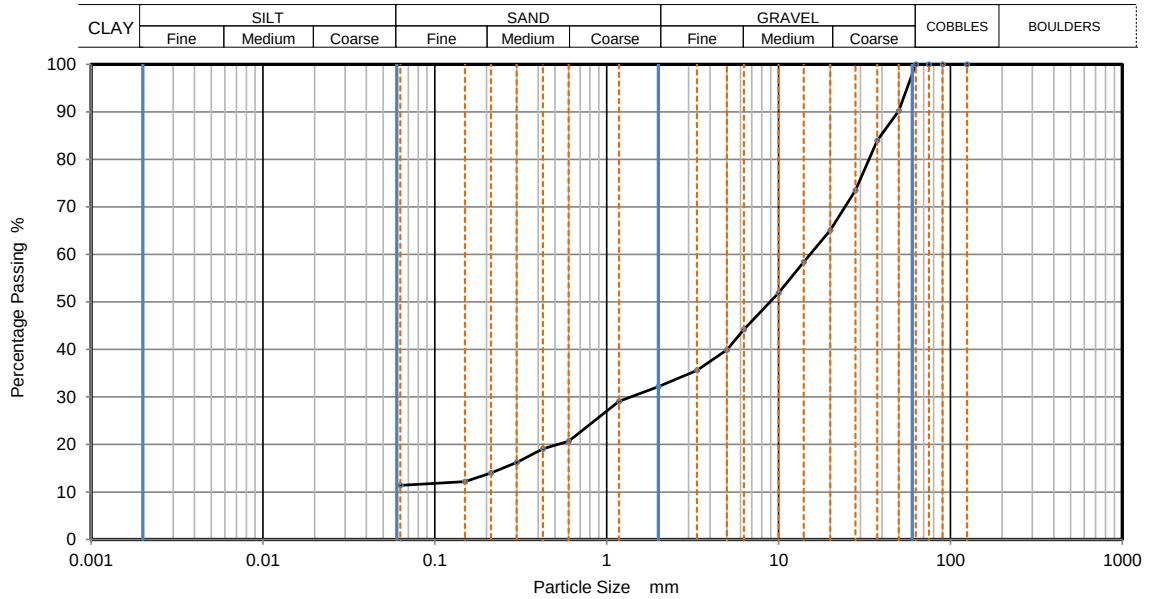


PARTICLE SIZE DISTRIBUTION

Job Ref	31926
Borehole/Pit No.	BH01
Sample No.	-
Depth Top	1.40 m
Depth Base	1.80 m
Sample Type	D
Samples received	25/05/2022
Schedules received	26/05/2022
Project started	27/05/2022
Date tested	16/06/2022

Site Name	Devonshire Place, Port Talbot		
Project No.	2203011.001	Client	TEC
Soil Description	Brown clayey very sandy GRAVEL (gravel is fmc and sub-angular to sub-rounded)		
Test Method	BS1377:Part 2: 1990, clause 9.0		

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	90		
37.5	84		
28	74		
20	65		
14	58		
10	52		
6.3	44		
5	40		
3.35	36		
2	32		
1.18	29		
0.6	21		
0.425	19		
0.3	16		
0.212	14		
0.15	12		
0.063	11		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	67.8
Sand	20.8
Fines <0.063mm	11.4

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

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K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288		Checked and Approved Initials: J.P Date: 21/06/2022
2519 Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-5-R3

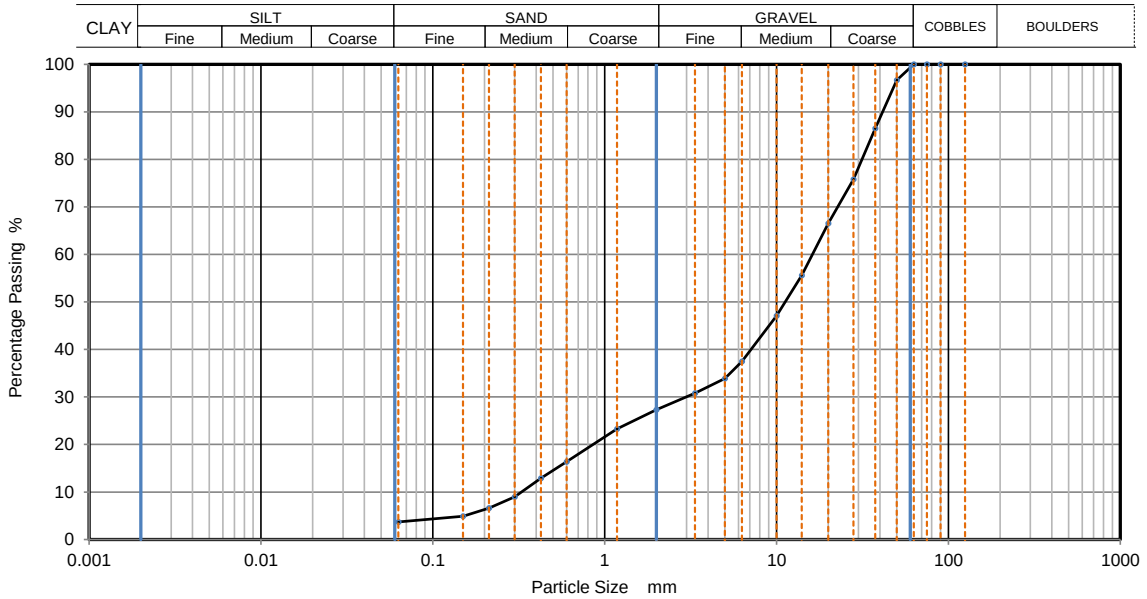


PARTICLE SIZE DISTRIBUTION

Job Ref	31926
Borehole/Pit No.	TP03
Sample No.	-
Depth Top	1.10 m
Depth Base	1.30 m
Sample Type	D
Samples received	25/05/2022
Schedules received	26/05/2022
Project started	27/05/2022
Date tested	16/06/2022

Site Name	Devonshire Place, Port Talbot		
Project No.	2203011.001	Client	TEC
Soil Description	Reddish brown slightly clayey very sandy GRAVEL (gravel is fmc and sub-angular to sub-rounded)		
Test Method	BS1377:Part 2: 1990, clause 9.0		

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	97		
37.5	87		
28	76		
20	67		
14	56		
10	47		
6.3	38		
5	34		
3.35	31		
2	27		
1.18	23		
0.6	16		
0.425	13		
0.3	9		
0.212	7		
0.15	5		
0.063	4		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	72.7
Sand	23.6
Fines <0.063mm	3.7

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	49
Curvature Coefficient	1.7

Remarks
Preparation and testing in accordance with BS1377 unless noted below

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K4 Soils Laboratory
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Tel: 01923 711288

Checked and Approved

Initials: J.P
Date: 21/06/2022

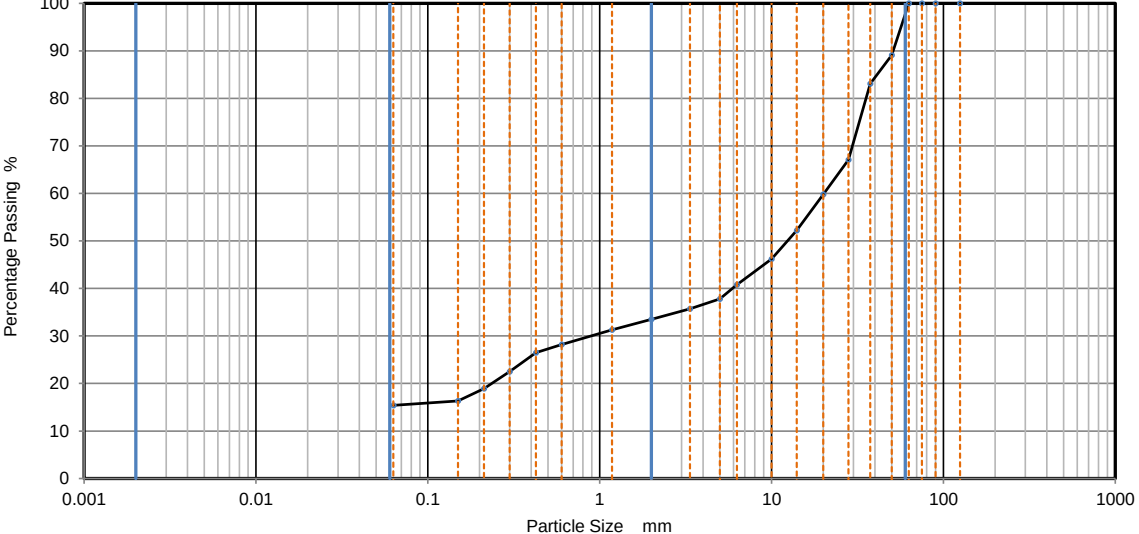
2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R3

	PARTICLE SIZE DISTRIBUTION			Job Ref	31926
				Borehole/Pit No.	WS04
Site Name	Devonshire Place, Port Talbot			Sample No.	-
Project No.	2203011.001	Client	TEC	Depth Top	0.60 m
Soil Description	Brown silty clayey sandy GRAVEL (gravel is fmc and sub-angular to sub-rounded)			Depth Base	1.00 m
				Sample Type	D
				Samples received	25/05/2022
				Schedules received	26/05/2022
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	27/05/2022
These results only apply to the items tested				Date tested	16/06/2022

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	89		
37.5	83		
28	67		
20	60		
14	52		
10	46		
6.3	41		
5	38		
3.35	36		
2	34		
1.18	31		
0.6	28		
0.425	27		
0.3	23		
0.212	19		
0.15	16		
0.063	15		

Sample Proportions		% dry mass
Very coarse		0.0
Gravel		66.5
Sand		18.1
Fines <0.063mm		15.4

Grading Analysis		
D100	mm	
D60	mm	20.2
D30	mm	0.896
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with BS1377 unless noted below

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	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288		Checked and Approved Initials: J.P Date: 21/06/2022
	2519 Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-5-R3

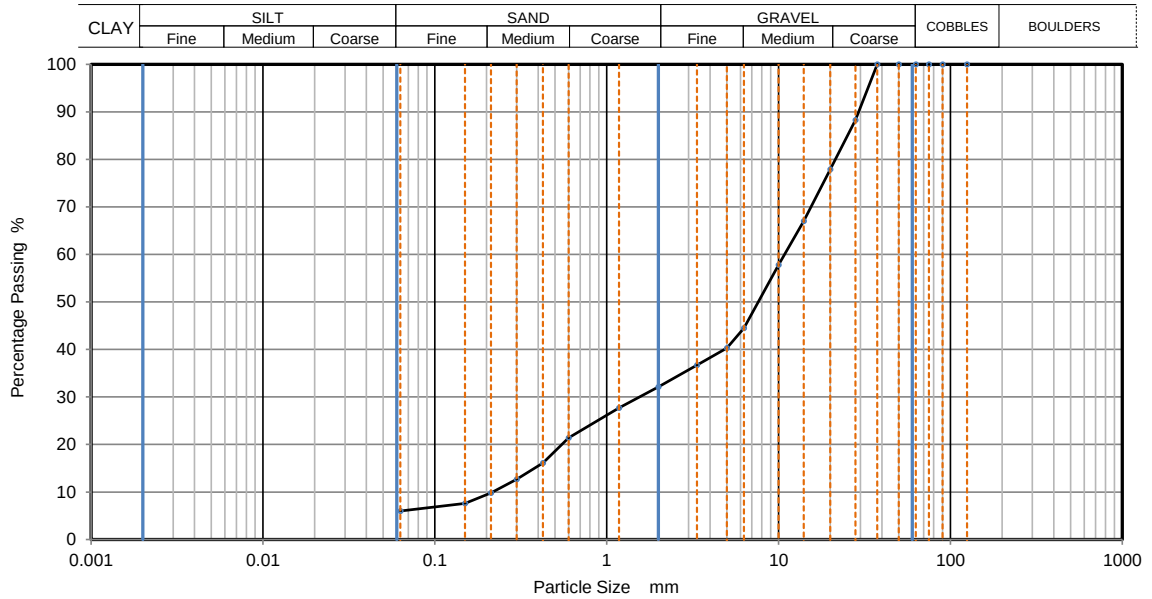


PARTICLE SIZE DISTRIBUTION

Job Ref	31926
Borehole/Pit No.	WS05
Sample No.	-
Depth Top	1.00 m
Depth Base	1.80 m
Sample Type	D
Samples received	25/05/2022
Schedules received	26/05/2022
Project started	27/05/2022
Date tested	21/06/2022

Site Name	Devonshire Place, Port Talbot		
Project No.	2203011.001	Client	TEC
Soil Description	Brown silty very sandy GRAVEL (gravel is fmc and sub-angular to sub-rounded)		
Test Method	BS1377:Part 2: 1990, clause 9.0		

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	88		
20	78		
14	67		
10	58		
6.3	45		
5	40		
3.35	37		
2	32		
1.18	28		
0.6	21		
0.425	16		
0.3	13		
0.212	10		
0.15	8		
0.063	6		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	67.9
Sand	26.1
Fines <0.063mm	6.0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	50
Curvature Coefficient	1

Remarks
Preparation and testing in accordance with BS1377 unless noted below

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Checked and Approved	
Initials:	J.P
Date:	21/06/2022
MSF-5-R3	



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info@elab-uk.co.uk

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 22-40902

Issue: 1

Date of Issue: 06/06/2022

Contact: Sophie Thomas

Customer Details: TEC
The Old Chapel
35A Southover
Wells
Somerset BA5 1UH

Quotation No: Q22-02525

Order No: 2203011-001

Customer Reference: 2203011-001

Date Received: 26/05/2022

Date Approved: 06/06/2022

Details: Devonshire Place, Port Talbot

Approved by: 

Graham Knight, Lab Manager

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

This report may only be reproduced in full



Sample Summary

Report No.: 22-40902, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
281094	TP06 1.40 - 1.60	23/05/2022	26/05/2022	Sand	
281095	TP05 0.60 - 0.80	23/05/2022	26/05/2022	Sandy loam	
281096	BH01 3.50 - 3.60	23/05/2022	26/05/2022	Sand	
281097	WS04 2.40 - 2.50	23/05/2022	26/05/2022	Sandy loam	
281098	WS01 1.50 - 1.60	23/05/2022	26/05/2022	Sandy silty loam	
281099	WS03 1.20 - 1.30	23/05/2022	26/05/2022	Loamy sand	
281100	WS01 0.80 - 0.90	23/05/2022	26/05/2022	Sandy clayey loam	



Results Summary

Report No.: 22-40902, issue number 1

ELAB Reference	281094	281095	281096	281097	281098	281099	281100
Customer Reference							
Sample ID							
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP06	TP05	BH01	WS04	WS01	WS03	WS01
Sample Depth (m)	1.40 - 1.60	0.60 - 0.80	3.50 - 3.60	2.40 - 2.50	1.50 - 1.60	1.20 - 1.30	0.80 - 0.90
Sampling Date	23/05/2022	23/05/2022	23/05/2022	23/05/2022	23/05/2022	23/05/2022	23/05/2022

Determinand	Codes	Units	LOD							
Soil sample preparation parameters										
Moisture Content	N	%	0.1	6.8	11.9	10.4	8.0	8.5	6.7	10.6
Material removed	N	%	0.1	9.4	< 0.1	10.9	13.9	7.5	12.4	9.1
Description of Inert material removed	N		0	Stones	None	Stones	Stones	Stones	Stones	Stones
Anions										
Water Soluble Sulphate	M	mg/l	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Inorganics										
Total Sulphur	N	%	0.01	0.01	0.01	< 0.01	< 0.01	0.02	0.01	< 0.01
Acid Soluble Sulphate (SO4)	U	%	0.02	0.04	0.03	0.03	0.03	0.03	0.03	0.03
Miscellaneous										
pH	M	pH units	0.1	8.2	7.8	8.0	7.5	6.4	8.1	7.4



Method Summary

Report No.: 22-40902, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	01/06/2022	113	Electromeric
Acid Soluble Sulphate	U	Air dried sample	06/06/2022	115	Ion Chromatography
Water soluble anions	M	Air dried sample	29/05/2022	172	Ion Chromatography
Total organic carbon/Total sulphur	N	Air dried sample	30/05/2022	216	IR

Tests marked N are not UKAS accredited

Report Information

Report No.: 22-40902, issue number 1

Key

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

Deviation Codes

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

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

Sample Retention and Disposal

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

TPH Classification - HWOL Acronym System

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

Appendix F

Ground Gas Monitoring Results



Ground Gas Monitoring Results

Project:	Devonshire Place	Gas analyser:	GFM 430	Preceding Weather Conditions		On-site weather conditions	General Site Conditions / Ground Conditions / On-site Activities
Project Number:	2203011.001	Condition:	Calibrated	Atmospheric trend:	1009-1021mbar (falling)	Light rain showers, windy and very cloudy	
Location:	Port Talbot	Dip Meter:	15m Green	Temperature range:	8-17°C		
Test Date:	23/05/2022	Operator:	ST	Rainfall:	3.5mm		

GAS MONITORING TO BE UNDERTAKEN IN ACCORDANCE WITH TEC METHOD STATEMENT

Borehole Information	Time (s)	Borehole Flow Rate (l/hr)	DP (Pa)	Gas Concentrations						Groundwater Level	Borehole Depth	Comments
				CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	LEL (%)	CO (ppm)	H2S (ppm)			
BH ref: BH01	0	0.0	0	0.0	0.0	20.3	0.0	0	0	3.45mbgl	4.90mbgl	
	15	0.0	0	0.0	0.0	20.0	0.0	0	0			
	30	0.0	0	0.0	0.0	19.5	0.0	0	0			
Time: 13:20	45	0.0	0	0.0	0.0	19.4	0.0	0	0			
	60	0.0	0	0.0	0.0	19.3	0.0	0	0			
Atmospheric pressure (mb) before: 1001	120	0.0	0	0.0	0.0	19.3	0.0	0	0			
	180	0.0	0	0.0	0.0	19.3	0.0	0	0			
Atmospheric preasure (mb) after: 1000												
Well Condition: Good												
Well Diameter: 50mm												

Borehole Information	Time (s)	Borehole Flow Rate (l/hr)	DP (Pa)	Gas Concentrations						Groundwater Level	Borehole Depth	Comments
				CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	LEL (%)	CO (ppm)	H2S (ppm)			
BH ref: WS01	0	0.0	0	0.0	0.0	20.5	0.0	0	0	Dry	2.74mbgl	
	15	0.0	0	0.0	0.2	20.2	0.0	0	0			
	30	0.0	0	0.0	0.4	19.8	0.0	0	0			
Time: 13:45	45	0.0	0	0.0	0.4	19.8	0.0	0	0			
	60	0.0	0	0.0	0.4	19.8	0.0	0	0			
Atmospheric pressure (mb) before: 1001	120	0.0	0	0.0	0.4	19.7	0.0	0	0			
	180	0.0	0	0.0	0.4	19.7	0.0	0	0			
Atmospheric preasure (mb) after: 1001												
Well Condition: Good												
Well Diameter: 50mm												

Borehole Information	Time (s)	Borehole Flow Rate (l/hr)	DP (Pa)	Gas Concentrations						Groundwater Level	Borehole Depth	Comments
				CH4 (%v/v)	CO2 (%v/v)	O2 (%v/v)	LEL (%)	CO (ppm)	H2S (ppm)			
BH ref: WS02	0	0.0	0	0.0	0.0	20.5	0.0	0	0	Dry	2.74mbgl	
	15	0.0	0	0.0	0.0	20.6	0.0	0	0			
	30	0.0	0	0.0	0.0	20.5	0.0	0	0			
Time: 13:57	45	0.0	0	0.0	0.0	20.5	0.0	0	0			
	60	0.0	0	0.0	0.0	20.5	0.0	0	0			
Atmospheric pressure (mb) before: 1000	120	0.0	0	0.0	0.0	20.5	0.0	0	0			
	180	0.0	0	0.0	0.0	20.5	0.0	0	0			
Atmospheric preasure (mb) after: 1000												
Well Condition: Good												
Well Diameter: 50mm												



Ground Gas Monitoring Results

Project:	Devonshire Place	Gas analyser:	GFM 430	Preceding Weather Conditions		On-site weather conditions	General Site Conditions / Ground Conditions / On-site Activities
Project Number:	2203011.001	Condition:	Calibrated	Atmospheric trend:	1009-1021mbar (falling)	Light rain showers, windy and very cloudy	
Location:	Port Talbot	Dip Meter:	15m Green	Temperature range:	8-17°C		
Test Date:	23/05/2022	Operator:	ST	Rainfall:	3.5mm		

GAS MONITORING TO BE UNDERTAKEN IN ACCORDANCE WITH TEC METHOD STATEMENT

Borehole Information	Time (s)	Borehole Flow Rate (l/hr)	DP (Pa)	Gas Concentrations						Groundwater Level	Borehole Depth	Comments
				CH4 (%w/v)	CO2 (%w/v)	O2 (%w/v)	LEL (%)	CO (ppm)	H2S (ppm)			
BH ref: WS04	0	0.0	0	0.0	0.0	20.6	0.0	0	0	Dry	2.91mbgl	
	15	0.0	0	0.0	0.0	20.0	0.0	0	0			
Time: 13:33	30	0.0	0	0.0	0.0	19.4	0.0	0	0			
	45	0.0	0	0.0	0.0	19.2	0.0	0	0			
Atmospheric pressure (mb) before: 1000	60	0.0	0	0.0	0.0	19.2	0.0	0	0			
	120	0.0	0	0.0	0.0	19.3	0.0	0	0			
	180	0.0	0	0.0	0.0	19.2	0.0	0	0			
Atmospheric pressure (mb) after: 1000												
Well Condition: Good												
Well Diameter: 50mm												

Borehole Information	Time (s)	Borehole Flow Rate (l/hr)	DP (Pa)	Gas Concentrations						Groundwater Level	Borehole Depth	Comments
				CH4 (%w/v)	CO2 (%w/v)	O2 (%w/v)	LEL (%)	CO (ppm)	H2S (ppm)			
BH ref: WS05	0	0.0	0	0.0	0.0	20.4	0.0	0	0	Dry	1.75mbgl	
	15	0.0	0	0.0	0.2	20.6	0.0	0	0			
Time: 13:12	30	0.0	0	0.0	0.2	20.0	0.0	0	0			
	45	0.0	0	0.0	0.2	20.0	0.0	0	0			
Atmospheric pressure (mb) before: 1001	60	0.0	0	0.0	0.2	19.9	0.0	0	0			
	120	0.0	0	0.0	0.2	19.9	0.0	0	0			
	180	0.0	0	0.0	0.2	19.9	0.0	0	0			
Atmospheric pressure (mb) after: 1001												
Well Condition: Good												
Well Diameter: 50mm												

Borehole Information	Time (s)	Borehole Flow Rate (l/hr)	DP (Pa)	Gas Concentrations						Groundwater Level	Borehole Depth	Comments
				CH4 (%w/v)	CO2 (%w/v)	O2 (%w/v)	LEL (%)	CO (ppm)	H2S (ppm)			
BH ref:												
Time:												
Atmospheric pressure (mb) before:												
Atmospheric pressure (mb) after:												
Well Condition:												
Well Diameter:												

Appendix G

Generic Quantitative Risk Assessment: Human Health



Project Number: 2203011.001		Lab Sample Number	2287422	2287423	2287424	2287425	2287426	2287427	2289672	2289673	2289674	2289675
Project Name: Devonshire Place, Port Talbot		Sample Reference	BH01	WS01	WS02	WS03	WS04	WS05	TP01	TP02	TP03	TP04
Site End Use:	GAC (mg/kg)	Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Residential with homegrown produce		Depth (m)	0.30-0.40	0.20-0.35	0.30-0.40	0.60-0.70	0.20-0.30	0.50-0.60	0.30-0.40	0.20-0.30	0.20-0.30	0.30-0.40
		Date Sampled	19/05/2022	20/05/2022	20/05/2022	20/05/2022	20/05/2022	20/05/2022	20/05/2022	23/05/2022	23/05/2022	23/05/2022
Determinand			1	2	3	4	5	6	7	8	9	10
Arsenic	37 ⁽¹⁾	mg/kg	37.00	14.00	53.00	43.00	33.00	64.00	33.00	22.00	30.00	29.00
Boron	290 ⁽³⁾	mg/kg	< 0.2	< 0.2	0.90	0.90	< 0.2	1.00	1.20	1.60	0.70	0.90
Cadmium	22 ⁽¹⁾	mg/kg	< 0.2	0.90	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (total)	910 ⁽³⁾	mg/kg	17.00	10.00	20.00	18.00	13.00	19.00	19.00	19.00	22.00	36.00
Chromium (VI)	21 ⁽¹⁾	mg/kg	< 1.2	1.60	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Copper	2400 ⁽³⁾	mg/kg	75.00	220.00	140.00	77.00	94.00	170.00	86.00	72.00	100.00	88.00
Lead	200 ⁽¹⁾	mg/kg	32.00	45.00	110.00	37.00	34.00	66.00	75.00	36.00	73.00	56.00
Mercury	40 ⁽²⁾	mg/kg	< 0.3	0.50	< 0.3	< 0.3	< 0.3	0.60	< 0.3	< 0.3	0.60	0.50
Nickel	130 ⁽²⁾	mg/kg	22.00	17.00	23.00	18.00	45.00	22.00	20.00	21.00	21.00	27.00
Selenium	350 ⁽²⁾	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	3700 ⁽³⁾	mg/kg	110.00	180.00	200.00	110.00	88.00	240.00	140.00	110.00	150.00	140.00
Beryllium	1.7 ⁽³⁾	mg/kg	0.65	0.61	0.81	0.71	1.40	0.82	0.65	0.69	0.78	0.72
Vanadium	410 ⁽³⁾	mg/kg	26.00	27.00	30.00	29.00	46.00	28.00	25.00	26.00	29.00	29.00
Barium	1300 ⁽⁴⁾	mg/kg	57.00	100.00	130.00	100.00	300.00	140.00	93.00	67.00	110.00	94.00
Cyanide (Total)	20 ⁽⁵⁾	mg/kg	< 1.0	< 1.0	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenol (Monohydric)	120 ⁽³⁾	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sulphide	-	mg/kg	10.00	30.00	6.60	7.30	26.00	11.00	4.30	30.00	31.00	18.00
	-											
Naphthalene	2.3 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.25	0.20
Acenaphthylene	170 ⁽³⁾	mg/kg	7.60	49.00	< 0.05	< 0.05	0.78	< 0.05	16.00	< 0.05	< 0.05	< 0.05
Acenaphthene	210 ⁽³⁾	mg/kg	0.84	5.70	< 0.05	< 0.05	< 0.05	< 0.05	3.60	< 0.05	< 0.05	< 0.05
Fluorene	170 ⁽³⁾	mg/kg	7.70	40.00	< 0.05	< 0.05	0.67	< 0.05	24.00	< 0.05	< 0.05	< 0.05
Phenanthrene	95 ⁽³⁾	mg/kg	75.00	340.00	2.10	< 0.05	5.90	0.75	180.00	< 0.05	0.47	0.46
Anthracene	2400 ⁽³⁾	mg/kg	19.00	96.00	0.45	< 0.05	1.10	0.23	34.00	< 0.05	< 0.05	< 0.05
Fluoranthene	280 ⁽³⁾	mg/kg	75.00	450.00	2.90	< 0.05	4.20	0.77	160.00	< 0.05	0.64	0.83
Pyrene	620 ⁽³⁾	mg/kg	59.00	350.00	2.20	< 0.05	3.40	0.56	110.00	< 0.05	0.55	0.73
Benzo(a)anthracene	7.2 ⁽³⁾	mg/kg	35.00	190.00	0.95	< 0.05	1.90	0.35	58.00	< 0.05	0.42	0.48
Chrysene	15 ⁽³⁾	mg/kg	25.00	140.00	1.10	< 0.05	1.60	0.33	50.00	< 0.05	0.36	0.36
Benzo(b)fluoranthene	2.6 ⁽³⁾	mg/kg	34.00	180.00	1.10	< 0.05	1.80	0.21	51.00	< 0.05	0.35	0.46
Benzo(k)fluoranthene	77 ⁽³⁾	mg/kg	10.00	64.00	0.52	< 0.05	0.85	0.21	18.00	< 0.05	0.17	0.15
Benzo(a)pyrene	2.2 ⁽³⁾	mg/kg	27.00	160.00	0.64	< 0.05	1.50	0.20	38.00	< 0.05	0.25	0.32
Indeno(1,2,3-cd)pyrene	27 ⁽³⁾	mg/kg	13.00	83.00	0.59	< 0.05	0.84	< 0.05	19.00	< 0.05	< 0.05	0.22
Dibenz(a,h)anthracene	0.24 ⁽³⁾	mg/kg	3.50	19.00	< 0.05	< 0.05	0.27	< 0.05	5.70	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	320 ⁽³⁾	mg/kg	14.00	91.00	0.70	< 0.05	1.00	< 0.05	21.00	< 0.05	< 0.05	0.23
Speciated Total EPA-16 PAHs	-	mg/kg	406.00	2260.00	13.10	< 0.80	25.80	3.61	791.00	< 0.81	3.46	4.44
Benzene	0.087 ⁽³⁾	µg/kg	< 1.0	-	< 1.0	-	-	< 1.0	-	-	< 1.0	-
Toluene	130 ⁽³⁾	µg/kg	< 1.0	-	< 1.0	-	-	< 1.0	-	-	< 1.0	-
Ethylbenzene	47 ⁽³⁾	µg/kg	< 1.0	-	< 1.0	-	-	< 1.0	-	-	< 1.0	-
p & m-xylene	56 ⁽³⁾	µg/kg	< 1.0	-	< 1.0	-	-	< 1.0	-	-	< 1.0	-
o-xylene	60 ⁽³⁾	µg/kg	< 1.0	-	< 1.0	-	-	< 1.0	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	49 ⁽⁴⁾	µg/kg	< 1.0	-	< 1.0	-	-	< 1.0	-	-	< 1.0	-
TPH Aliphatic C5 - C6	42 ⁽³⁾	mg/kg	< 0.001	-	< 0.001	-	-	< 0.001	-	-	< 0.001	-
TPH Aliphatic C6 - C8	100 ⁽³⁾	mg/kg	< 0.001	-	< 0.001	-	-	< 0.001	-	-	< 0.001	-
TPH Aliphatic C8 - C10	27 ⁽³⁾	mg/kg	< 0.001	-	< 0.001	-	-	< 0.001	-	-	< 0.001	-
TPH Aliphatic C10 - C12	130 ⁽³⁾	mg/kg	< 1.0	-	< 1.0	-	-	< 1.0	-	-	< 1.0	-
TPH Aliphatic C12 - C16	1100 ⁽³⁾	mg/kg	< 2.0	-	< 2.0	-	-	< 2.0	-	-	< 2.0	-
TPH Aliphatic C16 - C21	65000 ⁽³⁾	mg/kg	< 8.0	-	< 8.0	-	-	< 8.0	-	-	< 8.0	-
TPH Aliphatic C21 - C35	65000 ⁽³⁾	mg/kg	< 8.0	-	< 8.0	-	-	< 8.0	-	-	< 8.0	-
TPH Aromatic C5 - C7	70 ⁽³⁾	mg/kg	< 0.001	-	< 0.001	-	-	< 0.001	-	-	< 0.001	-
TPH Aromatic C7 - C8	130 ⁽³⁾	mg/kg	< 0.001	-	< 0.001	-	-	< 0.001	-	-	< 0.001	-
TPH Aromatic C8 - C10	34 ⁽³⁾	mg/kg	< 0.001	-	< 0.001	-	-	< 0.001	-	-	< 0.001	-
TPH Aromatic C10 - C12	74 ⁽³⁾	mg/kg	< 1.0	-	< 1.0	-	-	< 1.0	-	-	< 1.0	-
TPH Aromatic C12 - C16	140 ⁽³⁾	mg/kg	54.00	-	< 2.0	-	-	< 2.0	-	-	< 2.0	-
TPH Aromatic C16 - C21	260 ⁽³⁾	mg/kg	370.00	-	< 10	-	-	< 10	-	-	< 10	-
TPH Aromatic C21 - C35	1100 ⁽³⁾	mg/kg	430.00	-	13.00	-	-	< 10	-	-	< 10	-

Notes:

⁽¹⁾ DEFRA C4SLs (2014)

⁽²⁾ Environment Agency SGVs (2009)

⁽³⁾ LQM/ClEH S4ULs (2015)

⁽⁴⁾ CL:AIRE, AGS & EIS (2009)

⁽⁵⁾ Dutch Intervention Value for free cyanide (VROM 2000)

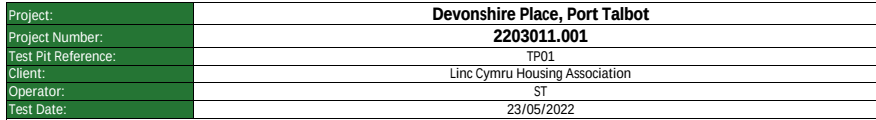
*All GACs based on a sandy soil and Soil Organic Matter (SOM) of 1% where applicable.

Concentration does not exceed GAC
Concentration exceeds GAC
No set GAC

Appendix H

Soakage Test Results

BRE Digest 365 (2016) Soakaway Design

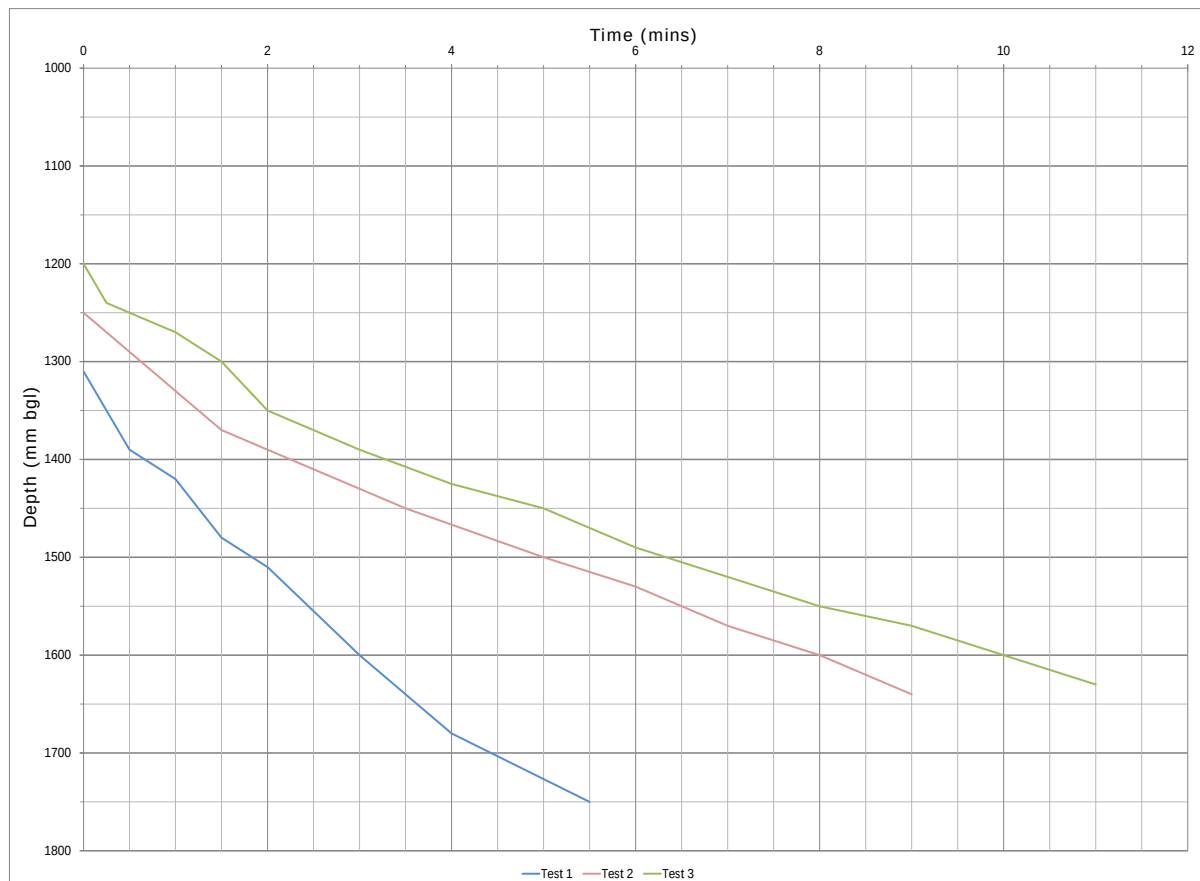
[illegible][illegible][illegible]

Pit reference	TP01
Pit depth (m)	1.75
Pit width (m)	0.65
Pit length (m)	1.75
Depth to standing water (m)	-
Granular Fill used to stabilise the pit?	N

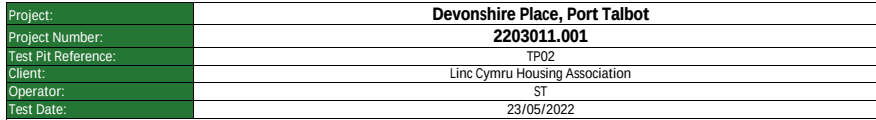
t_{25} (min)	1.0	1.6	2.8
t_{75} (min)	3.5	8.5	10.3

Note: Where granular fill used to stabilise the test pit, assume there to be 30% free volume.

Soil Infiltration Rate (m/sec)	7.61E-04	2.94E-04	2.85E-04
Soil Infiltration Rate (mm/hr)	2.74E+03	1.06E+03	1.03E+03
Extrapolated Data?	No	No	No



BRE Digest 365 (2016) Soakaway Design

[illegible][illegible][illegible][illegible]

Pit reference	TP02
Pit depth (m)	1.65
Pit width (m)	0.65
Pit length (m)	1.50
Depth to standing water (m)	-
Granular Fill used to stabilise the pit?	N

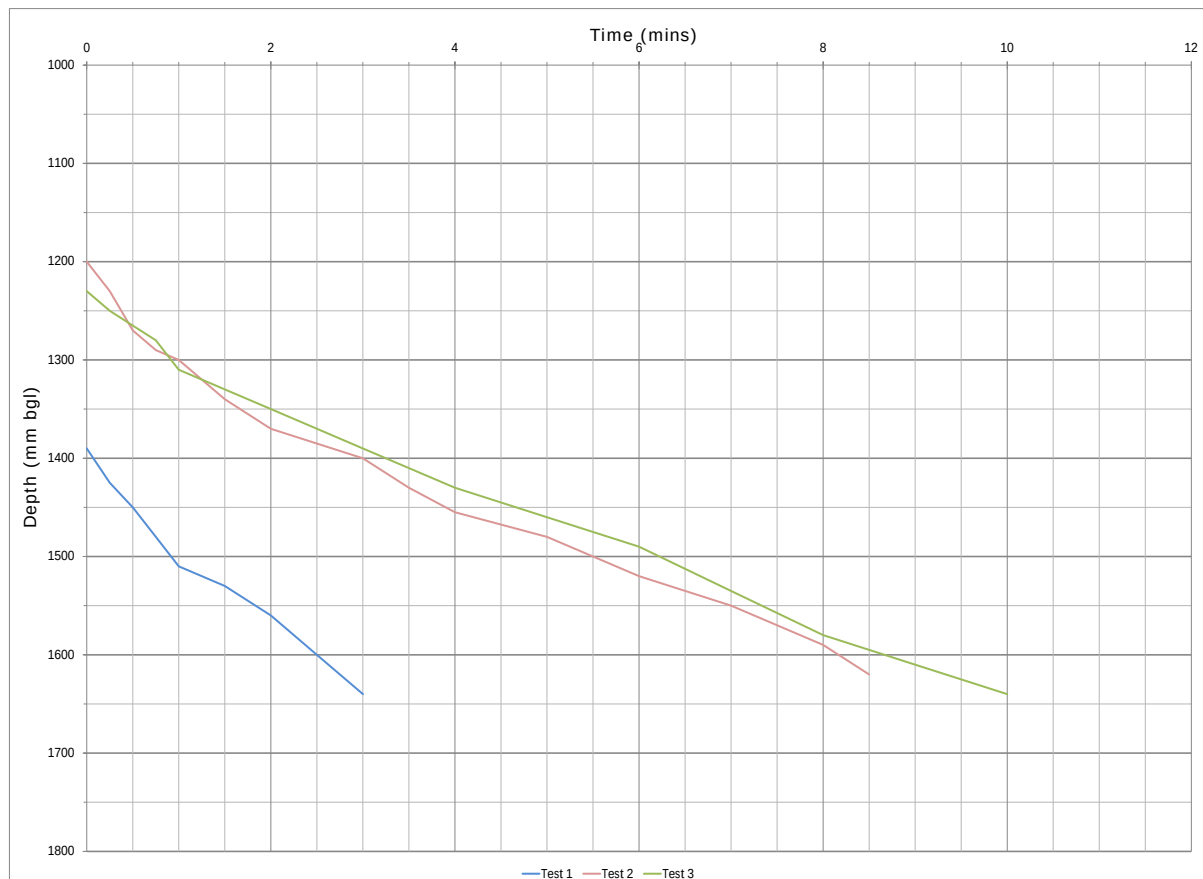
	Test 1	Test 2	Test 3
Max. depth (mm bgl)	1650	1650	1650
Effective depth (mm bgl)	1390	1200	1230
Effective drop (mm)	260	450	420
25% effective depth (mm bgl)	1455	1313	1335
50% effective depth (mm bgl)	1520	1425	1440
75% effective depth (mm bgl)	1585	1538	1545

t_{25} (min)	0.6	1.1	1.3
t_{75} (min)	2.3	6.6	7.2

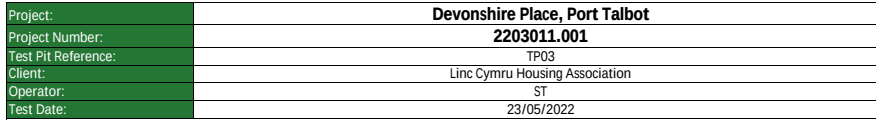
V_{p75-25} (m ³)	0.13	0.22	0.20
q_{p50} (m ³)	1.53	1.94	1.88
t_{p75-25} (min)	2	6	6

Note: Where granular fill used to stabilise the test pit, assume there to be 30% free volume.

Soil Infiltration Rate (m/sec)	8.35E-04	3.42E-04	3.08E-04
Soil Infiltration Rate (mm/hr)	3.00E+03	1.23E+03	1.11E+03
Extrapolated Data?	No	No	No



BRE Digest 365 (2016) Soakaway Design

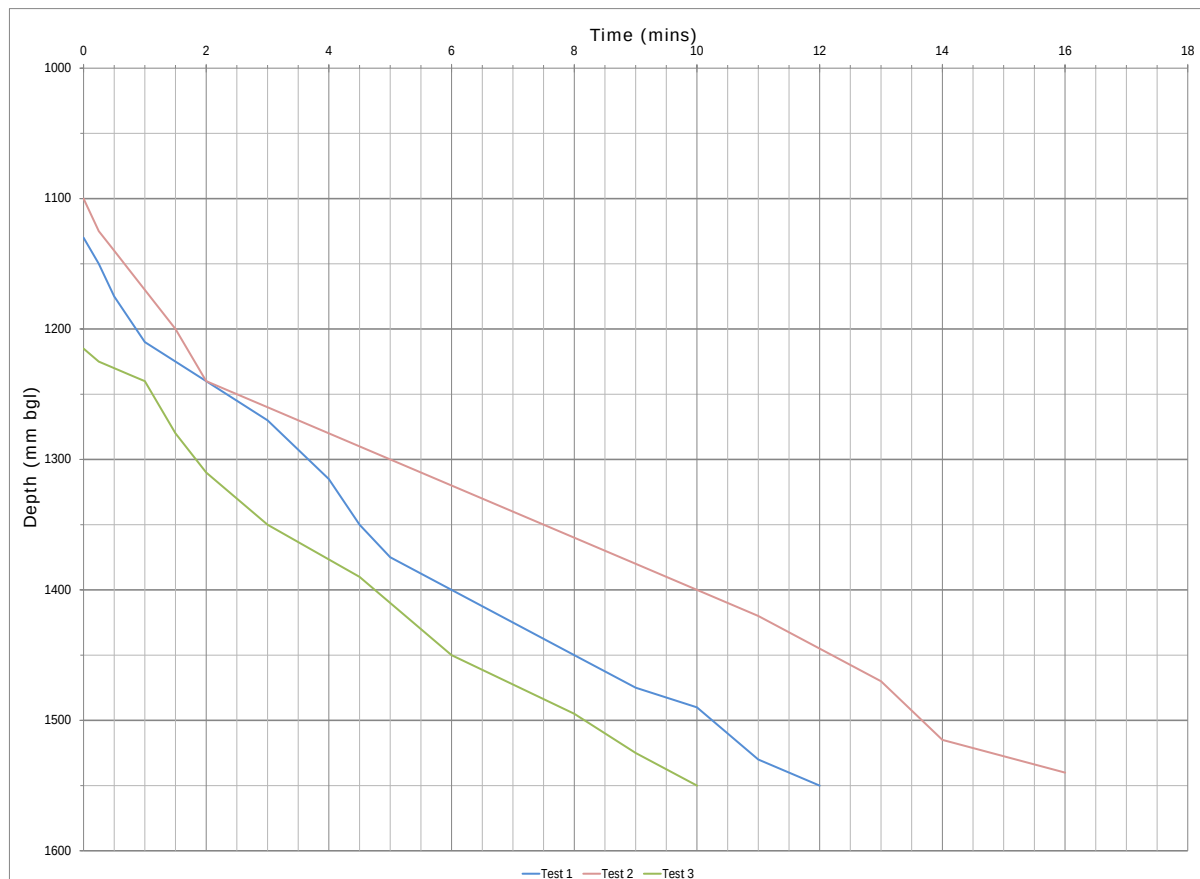
[illegible][illegible][illegible]

Pit reference	TP03
Pit depth (m)	1.50
Pit width (m)	0.65
Pit length (m)	1.50
Depth to standing water (m)	-
Granular Fill used to stabilise the pit?	N

$V_{p75-25} (m^3)$	0.18	0.20	0.14
$\bar{a}_{p50} (m^2)$	1.77	1.84	1.59
$t_{p75-25} (min)$	5	9	3

Note: Where granular fill used to stabilise the test pit, assume there to be 30% free volume.

Soil Infiltration Rate (m/sec)	3.69E-04	2.08E-04	4.29E-04
Soil Infiltration Rate (mm/hr)	1.33E+03	7.50E+02	1.54E+03
Extrapolated Data?	No	No	No



Appendix I

DCP-TRL Results

DCP01

[illegible]

The CBR Adjustment Factors are applied to unpaved roads on the assumption that the effect of moisture will be a maximum at the top surface and will reduce linearly to zero at a depth of 1000 mm.



Project:	Devonshire Place, Port Talbot
Project No.	2203011.001
Client:	Linc Cymru Housing Association
Test No.	DCP02
Test Date:	23/05/2022
Surface Moisture:	Moderate
Soil Type	Made ground over superficials

[illegible]

The CBR Adjustment Factors are applied to unpaved roads on the assumption that the effect of moisture will be a maximum at the top surface and will reduce linearly to zero at a depth of 1000 mm.



DCP03

[illegible]

The CBR Adjustment Factors are applied to unpaved roads on the assumption that the effect of moisture will be a maximum at the top surface and will reduce linearly to zero at a depth of 1000 mm.

