



LanzaTech UK Limited

**Project Dragon – Sustainable Aviation Fuel
(SAF) Production Facility: Production
Development Zone (PDZ)**

Exploratory Ground Investigation Report





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Project Dragon – Sustainable Aviation Fuel (SAF) Production Facility: Production Development Zone (PDZ)

Exploratory Ground Investigation Report

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EXECUTIVE SUMMARY

SITE INFORMATION	Client	LanzaTech UK Limited
	Site Details	The site currently comprises a roughly rectangular disused parcel of land situated off Crown Wharf, within part of the dock area owned by Associated British Ports (ABP), in Port Talbot. The site covers an area of approximately 9.12 hectares, with the centre situated at approximately National Grid Reference 276420, 188660. The nearest postcode is SA13 1RA.
	Current Land Use and Description	The site currently comprises a disused plot with a large central concrete slab and several smaller slabs to the northeast. The rest of the site comprises overgrown with dense scrub vegetation, with extensive Japanese Knotweed contamination observed across the southern half of the site.
	Proposed Development	While full details have not been provided to TEC at this stage, it is understood that the proposed development is to comprise a new facility for the production of synthetic jet fuel.
GROUND INVESTIGATION	Unexploded Ordnance	The ground conditions across the majority of the site it considered to have been unconducive to the detection of UXO during WWII. Bombs, including those with delayed-action fuzes, are recorded across the southern part of the docks, ie potentially within the site boundary. Potential repair works, indicative of bomb damage, have been observed to the metal refinery adjacent to the site. This, together with the recorded bombing to the copper works and the nearby steelworks, has resulted in the majority of the site being assessed at a Moderate Risk from German UXBs.
	Ground Investigation Rationale	The scope of the ground investigation works was to provide information regarding the site conditions and constraints including an assessment of the potential presence of contaminants of potential concern and determine the potential ground gas regime for the site. In addition, to make comments and general recommendations in relation to ground engineering for the proposed development, provided on the basis of the findings of the exploratory ground investigation.
	Scope of Works	4No. Cable percussive boreholes to approximately 20mbgl to determine the depth of made ground and nature of the underlying natural ground materials and allow sampling of encountered materials. 19No. Trial pits and 11No. dynamic sample boreholes to provide spatial coverage across the accessible site area to characterise shallow ground conditions and allow sampling of encountered materials. Installation of shallow and deep ground gas and groundwater monitoring boreholes across the accessible site area.
	Ground Conditions	<u>Made Ground</u> Made ground was encountered across the majority of the site to a maximum observed depth of >5.0mbgl. The made ground generally comprised dark brown silty gravelly sand with gravel of vesicular slag, concrete and rare clinker, brick and mudstone. <u>Superficial Deposits (BLOWN SAND)</u> Wind-blown sand was encountered in four exploratory locations, generally observed as very loose becoming medium dense yellowish brown fine to medium sand, recorded to depths of between 1.2 and >6.5mbgl. <u>Superficial Deposits (TIDAL FLAT DEPOSITS)</u> Tidal Flat Deposits were encountered across the site and found to vary in composition, but typically comprised either loose dark grey and black mottled silty sand, very soft dark grey slightly sandy slightly gravelly silt, or soft to firm dark grey slightly sandy gravelly clay. Peat beds were observed within the cable percussive boreholes, which varied from plastic dark grey amorphous peat to firm dark grey mottled brown pseudo-fibrous peat. <u>Superficial Deposits (ALLUVIAL FAN DEPOSITS)</u> Below the fine grained Tidal Flat Deposits either dense becoming very dense dark grey, greyish brown and brownish grey mottled gravelly sand and slightly sandy gravel with medium cobble content or medium dense to very dense greyish brown slightly sandy gravel with low cobble content was recorded at depths below 9.5m to 14.2mbgl. Gravel and cobbles were consistently observed to be mudstone and sandstone. <u>Solid Geology (SOUTH WALES MIDDLE COAL FORMATION)</u> The solid geology was recorded at BH04 only, at a depth of 17.7mbgl, comprising dark grey sandstone to a maximum recorded depth of 20.35mbgl.

LAND CONTAMINATION	Contamination Characterisation	The following CoPCs have been identified within the sampled made ground materials, in relation to the anticipated commercial site end use: PAHs – benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, and dibenz(a,h)anthracene Further, crocidolite, chrysotile and amosite loose fibres and loose fibrous debris were encountered within made ground materials in 7No. locations. Leachable CoPCs (heavy metals) have been identified within sampled made ground. In addition, CoPCs (heavy metals, heavy end TPH fractions, PAHs and sulphate) have been recorded within the sampled perched water/upper groundwater. Marginal elevated contaminant concentrations (heavy metals and sulphate) have been recorded within the deeper groundwater in relation to conservative EQS values. Based on the limited investigation and initial ground gas monitoring undertaken to-date together with the conceptual site model, it is possible that the site may potentially be considered as Characteristic Situation 3. However further monitoring would be required to confirm this regime.
	Identified Pollutant Linkages	- Human health (end users and construction workers) – potential exposure to CoPCs and asbestos within the shallow made ground via ingestion, inhalation and dermal contact. - Human health (end users and construction workers) – potential ingress and accumulation of bulk ground gas into proposed structures and chronic inhalation by future site end users. - Controlled Waters (Secondary Aquifers and docks) – potential vertical and horizontal migration of identified leachable contaminants within groundwater, along preferential pathways
	Remediation Appraisal / Likely Remedial Approach	It is anticipated that much of the proposed development will be laid to hardstanding or within the footprint of proposed structures, which will mitigate the pollutant pathways. However, 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 and asbestos cannot be discounted and a suitable cover system may be required within areas of soft landscaping. Furthermore, given the recorded presence of asbestos, good working practice methods should be adopted as per current guidance prior to commencement of any groundworks/site preparation works on site. Given that the proposed development layout is unknown and given that the exploratory investigation across much of the site was not possible due to ecological constraints, additional ground investigation and monitoring works would be required within these areas in order to fully characterise the site and determine the requirement for any remedial works in relation to human health and controlled water receptors.
GROUND ENGINEERING	Preliminary Foundation recommendations	It is considered likely that a number of structures within the site will be heavily loaded and will require piled foundations to transfer the imposed loads through the weak and compressible strata down to the stronger material at depth. Based on the ground conditions recorded to-date, depending on the magnitude of the loads, some structures may need to be founded in the rocks of the South Wales Middle Coal Measures. For structures that impose lower loads, but still require deep foundations to control settlement, displacement piles driven down to refusal in the granular Alluvial Fan Deposits overlying the rocks of the South Wales Middle Coal Measures, may be a suitable geotechnical solution. For lightly loaded structures ground improvement may provide a viable and effective alternative to piling. Due to the presence of made ground, the likely founding method and the recorded ground conditions at the site, it is considered likely that suspended floors will be required throughout the design. Notwithstanding this, should small independent buildings be required with light loadings and that can accommodate some amount of differential settlement without significant impact then it may be possible that ground bearing concrete floor slabs can be adopted. Further, while significant areas of slag materials were not encountered during the current works, should their presence be recorded, there would be the need to determine the extent of any potential expansion of these materials such that sufficient voiding is included within the design to accommodate such potential ground movement.



RECOMMENDATIONS FOR FURTHER WORKS	Given the site information obtained to-date, further works would be recommended to fully determine the site conditions and constraints with regards to the proposed development. These would include: • additional exploratory ground investigation works across areas of the site currently inaccessible, as well as additional groundwater and ground gas monitoring of existing boreholes to confirm preliminary assessments made as part of this report and to determine the nature and extent of any remedial measures required; • due to the presence of potential contamination and ground gas across the site, there is likely to be the need to undertake a Foundation Works Risk Assessment in order to determine and minimise the risks associated with each founding method; • due to the potential mining legacy risk, there may be the need to determine the presence (or absence) of voiding in the bedrock as part of the geotechnical assessment; and • it is unclear as to whether the groundwater levels recorded at the site are influenced by the tide and therefore as part of the main ground investigation works, it is recommended that further monitoring is undertaken in order to determine this. The results from the recommended further ground investigations/survey work and associated assessments will be provided for inclusion within the planning application for development at the site.
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1 INTRODUCTION

1.1 Terms of Reference

1.1.1 TEC has been appointed by Costain on behalf of LanzaTech UK Limited to undertake a geoenvironmental and geotechnical assessment of land adjacent to Crown Wharf, Port Talbot, referred to as the 'Production Development Zone (PDZ)'. All works were undertaken in accordance with our proposal letter dated 07 March 2022 and referenced RE.2111006.001_004C.

1.2 Background

1.2.1 The site currently comprises a roughly rectangular disused parcel of land that features a large central concrete slab surrounded by dense overgrown vegetation, situated in part of the dock area owned by Associated British Ports (ABP), in Port Talbot (Figure 1). The site covers an area of approximately 9.12 hectares, with the centre situated at approximately National Grid Reference 276420, 188660. The nearest postcode is SA13 1RA.

1.2.2 It is noted that extensive Japanese Knotweed contamination has been observed across much of the site. The exploratory works detailed within this report have been restricted due to this as well as due to other ecological constraints.

1.2.3 While full details have not been provided to TEC, it is understood that the proposed development is to comprise a new facility for the production of sustainable jet fuel. Notwithstanding this, the Production Development Zone (PDZ) will include process/production plant and equipment, administration buildings, process control room, warehouse, workshop, laboratory, car and cycle parking provision and a new electrical substation.

1.2.4 A number of previous assessments have been undertaken on a site located approximately 250m to the west. These include the following reports:

- Port Talbot Renewable Energy Plant Environmental Desk Study Report by Sinclair Knight Merz (SKM). Prepared for PrenergyPower, dated May 2006.
- Port Talbot Renewable Energy Plant Phase II Geo-Environmental Investigation by Sinclair Knight Merz (SKM). Prepared for PrenergyPower, dated May 2007.
- Port Talbot Renewable Energy Plant, Port Talbot Docks, Factual Report on Ground Investigation. Report ref: H8090, prepared for Atkins Limited on behalf of PrenergyPower, dated March 2009.

1.2.5 As public domain information, it is assumed that the data held within these previous reports can be utilised, although TEC hold no responsibility for the validity of third-party information. Reference should be made to the reports for full information.

1.2.6 In addition, a preliminary geoenvironmental and geotechnical assessment of the site was undertaken by TEC, as documented in the following report:

- 'Project Dragon – Sustainable Aviation Fuel (SAF) Production Facility: Production Development Zone (PDZ)– Desk Study' report ref: 2111006.002.01G. Prepared for LanzaTech UK Limited in May 2022 and revised in October 2023.

1.2.7 Reference should be made to these documents for full details although salient information in relation to this ground investigation report is summarised in the following section.

1.2.8 The aim of these works is to provide information on the 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, 2023), BS10175+A2 (2017), BS5930:2015+A1:2020 and, where appropriate, Eurocode 7 and NHBC/ LABC.

2 BACKGROUND INFORMATION

2.1 Previous Report Summary

2.1.1 Information for the site had also been obtained through previous assessment undertaken by TEC, as detailed within the following report:

- ‘Project Dragon – Sustainable Aviation Fuel (SAF) Production Facility: Production Development Zone (PDZ)– Desk Study’ report ref: 2111006.002.01G. Prepared for LanzaTech UK Limited in May 2022 and revised in October 2023.

2.1.2 It is noted that the above previous report by TEC reviews additional assessments undertaken at the site as detailed within the following documents:

- Port Talbot Renewable Energy Plant Environmental Desk Study Report by Sinclair Knight Merz (SKM). Prepared for PrenergyPower, dated May 2006.
- Port Talbot Renewable Energy Plant Phase II Geo-Environmental Investigation by Sinclair Knight Merz (SKM). Prepared for PrenergyPower, dated May 2007.
- Port Talbot Renewable Energy Plant, Port Talbot Docks, Factual Report on Ground Investigation. Report ref: H8090, prepared for Atkins Limited on behalf of PrenergyPower, dated March 2009.
- Detailed UXO Desk Study and Risk Assessment. Report ref: DRA-23-1532 rev1, prepared by Brimstone, dated April 2023.

2.1.3 Reference should be made to these documents for full details. It is assumed that these reports may be utilised as public domain information; however, TEC holds no liability with regards to the validity or the accuracy of the information contained within such third party reporting.

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

Table 2.1: Previous TEC Site Report Summary

Site History	Earliest available historical mapping shows the site remained undeveloped until 1917 when a centrally located large factory building is identified on maps as ‘Crown Preserved Coal Works’. This was demolished and replaced by factory buildings identified as ‘Metal Refinery Works’ by 1939 and later as ‘Steel Ceilings Factory’ and ‘Wagon Repair Shop’ with associated railway tracks. By 1939, additional railway lines were constructed on an embankment in the south of the site on the area previously recorded as ‘sand’. By 1949, a large pond is present in the west of the site, along with a number of heaped areas of unknown constituents. Additional industrial buildings have been constructed along the northern perimeter, with three rectangular warehouse buildings constructed to the east on mapping dating to 1964. All buildings on site appear to have been demolished as of 2009.
Environmental Setting	The site is recorded to be underlain by superficial Tidal Flat Deposits (designated a Secondary (Undifferentiated) Aquifer of medium groundwater vulnerability), typically described as a consolidated soft silty clay with layers of sand, gravel and peat. The underlying bedrock geology is recorded as the South Wales Middle Coal Measures (designated as a Secondary Aquifer A of medium groundwater vulnerability), described as grey coal bearing mudstones/siltstones with seatearths and minor sandstones. In addition, the BGS reports the site and surrounding area to comprise ‘Landscaped Ground’, described as mainly redeveloped areas and others where extensive earth moving has occurred. Previous ground investigations at an adjacent site record made ground up to 5.5mbgl. The nearest surface water features are the small ponds located on the site, followed by the adjacent docks. There are no groundwater abstractions reported within 500m of the site. There are two discharge consents to groundwater reported within 500m of the site. The northern half of the site is reported to be located in an area with potential for groundwater flooding to occur at the surface, whilst the rest of the site having potential for groundwater flooding of property situated below ground level. There are 19No. reported surface water abstraction records within 500m and 27No. reported discharge consents within 250m of the site. The site is not reported to be located within an area of extent of flooding from rivers and seas without defences (Flood Zone 1).

Coal Mining	It is reported that the site is located within an area which may be affected by coal mining activity, although is not located within a Development High Risk Area and therefore there is no requirement for a Coal Mining Risk Assessment to determine the mining legacy at the site. The Mining and Ground Stability Datasheet included within the Envirocheck Report present in the Desk Study report prepared by TEC (Ref: 2111006.002.01A) indicates that the data is inconclusive with regard the presence of mining instability. The report also indicates that historical records indicate the presence of underground coal mining at Morfa Colliery, located approximately 310m to the southeast of the site. The Consultants Coal Mining Report (ref: 51003005839001), also presented in the Desk Study report prepared by TEC, states there to be no records of 'probable unrecorded shallow workings' (<30m below ground level) at the site, no mine entries, recorded mine gas emissions or mining subsidence notice/claims in the vicinity of the site. Further, there are no records of future underground mining. Notwithstanding the above, a previous site investigation on land to the west of the site recorded coal beds at varying depths between 31m and 47.3mbgl. One of the boreholes indicates the presence of a coal seam between 34m and 36mbgl; however, below this, potential backfilled workings are recorded to a depth of 37.5mbgl. As a consequence, although the risk of voiding below the site may be considered as being low, at this stage, it cannot be ruled out.
Identified Pollutant Linkages	Potential pollutant linkages that have been identified as part of this assessment include: - Human Health (current and future site users) – exposure to contaminants associated with potential made ground and potentially contaminative historic industrial processes on and in proximity to site through ingestion, inhalation and dermal contact pathways. - Human Health (future site users and proposed structures) – migration, ingress and accumulation of ground gases sourced from both potential made ground and potential organic-rich superficial deposits. - Controlled Waters - Leaching of potential contaminants from potential made ground/shallow soils and vertical and lateral migration through the saturated zone to controlled waters.
Ground Engineering	Multiple records of potential excavations or extractive industry usage are reported on site, including unspecified deposited materials, unspecified pits, railway embankments and railway cuttings. In addition, current and historical ponds are reported on site. Potentially soft, compressible clay/silt/sand tidal flat deposits which could include peat as indicated from BGS borehole records, and/or potentially significant thicknesses of made ground, may yield low CBR and design subgrade surface modulus values requiring improvement of the subgrade to support the construction of a pavement foundation. The potential for a high-water table may need consideration within the pavement design based on proximity to the docks and seasonal ponds observed on site.
Unexploded Ordnance	Following a Preliminary Risk Assessment, a Detailed UXO Desk Study and Risk Assessment has been completed by Brimstone (ref: DRA-23-1532 rev1, dated 19th April 2023) to assess the risk from Unexploded Ordnance (UXO) across the site. The ground conditions across the majority of the site was uncondutive to the detection of UXO. Bombs, including those with delayed-action fuzes, are recorded across the southern part of the docks, ie within the site. Potential repair works, indicative of bomb damage, have been observed to the metal refinery. This, together with the recorded bombing to the copper works and the nearby steelworks, has resulted in the majority of the site being assessed at a Moderate Risk from German UXBs. Prior to the start of construction, it is recommended that a non-intrusive magnetometer survey is undertaken across the site and, in particular, within the areas of undeveloped open ground identified on the WWII mapping. Where anomalies are recorded there would be the need for further investigation to confirm/remove the risk. It should be noted that the recorded presence of slag within the made ground materials, may reduce the effectiveness of a magnetometer survey. Once a piling layout has been finalised, an intrusive magnetometer survey would be required, comprising CPT testing at 2m centres to depth of 12m within the purposed pile layout. Again, where anomalies are recorded there would be the need for further investigation to confirm/remove the risk.

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 (previous TEC report ref: 2111006.002.01A).
- 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.
- 3.1.3 It is noted that the exploratory investigation was restricted due to the presence of Japanese Knotweed across the majority of the site area, together with other ecological constraints, restricting the areas in which works could be undertaken.

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
Trial Pitting (JCB 4CX)	TP01 – TP19	12.04.2022 – 13.04.2022	Positioned to provide spatial coverage across the site area	Characterisation of shallow ground conditions in areas where access was possible; and Collection of geochemical samples for analysis
Window Sample Borehole (Dando Terrier)	WS01, WS03/3a, WS06, WS07, WS10 & WS11	14.04.2022 & 21.04.2022	Positioned to provide spatial coverage across the site area	Characterisation of shallow ground conditions in areas where access was possible; Collection of geochemical samples for analysis; and Installation of monitoring wells for ground gas and groundwater
	WS02, WS04/4a, WS05, WS08/8a & WS09			Characterisation of shallow ground conditions in areas where access was possible; and Collection of geochemical samples for analysis.
Cable Percussive Borehole	BH01 – BH04	04.04.2022 – 19.04.2022	Positioned to provide spatial coverage across the site area	Characterisation of deeper ground conditions in areas where access was possible and to prove depth to bedrock; Collection of geotechnical samples for analysis; and Installation of monitoring wells for ground gas and groundwater.

- 3.2.2 Exploratory hole locations are presented on Figure 2 and detailed descriptions of encountered ground conditions are shown on exploratory hole logs presented in Appendix B.

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
Hand Shear Vane (HSV)	Estimation of undrained shear strengths of cohesive strata
Pocket Penetrometer (PP)	Indication of unconfined compressive strength of cohesive strata
Standard Penetration Test (SPT)	Provision of strength profile of underlying ground conditions Provision of in situ densities of granular deposits
Photo-Ionisation Detector (PID)	Indication of the presence/concentrations of volatile organic compounds (VOCs)

3.4 Monitoring Works

3.4.1 A summary of the monitoring works completed at the site to date is provided below.

Table 3.3: Summary of Monitoring Works

Monitoring	Instrument/ Kit	No. of Rounds	Date(s)
Ground Gas	GFM436 Landfill Gas Monitor	3	09/05/2022-10/05/2022 17/05/2022 24/05/2022
Groundwater	Waterra inertial pump	1	09/05/2022-10/05/2022

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);
- Total Petroleum Hydrocarbons (TPH-CWG), including BTEX and MTBE; and
- Asbestos Screen.

Soils (Leachable)

- Heavy metals (arsenic, chromium, cadmium, copper, lead, selenium, zinc, barium, mercury, nickel, beryllium, vanadium and water soluble boron);
- Phenol (monohydric),
- Total Cyanide;
- Sulphate, sulphide, pH; and
- Speciated Polycyclic Aromatic Hydrocarbons (PAHs).

Waters

- Heavy metals and metalloids;

- *Phenols (monohydric);*
- *Total Cyanide;*
- *General Inorganics;*
- *Speciated Polyaromatic Hydrocarbons (PAH); and*
- *Total Petroleum Hydrocarbons (TPH-CWG), including BTEX and MTBE.*

3.5.3 Geochemical certificates of analysis are presented Appendix C.

3.6 General Sampling

3.6.1 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 B. Photographs of the materials encountered are presented within Appendix A.

Made Ground

4.1.2 Made ground was encountered from the surface in all locations, with the exception of BH03A and BH04. The made ground was generally observed as a dark brown silty gravelly sand with gravel of vesicular slag, concrete and rare clinker, brick and mudstone.

4.1.3 It is noted that a number of exploratory holes were terminated prematurely due the presence of underground obstructions (i.e. concrete slab (TP08, TP09, TP10) or gravel/cobbles of slag/concrete - WS03, WS04/4A, WS08/8A).

Superficial Deposits (BLOWN SAND)

4.1.4 Wind-blown sand was encountered in four locations, from the ground surface in BH03A and BH04, and beneath the made ground in BH03 and WS05. This material was generally observed as very loose becoming medium dense yellowish brown fine to medium sand. The wind-blown sands were recorded to depths of between 1.2 and >6.5mbgl.

Superficial Deposits (TIDAL FLAT DEPOSITS)

4.1.5 Tidal Flat Deposits were encountered beneath the made ground materials or blown sands and was found to vary in composition across the site, but typically observed as either loose dark grey and black mottled silty sand, very soft dark grey slightly sandy slightly gravelly silt, or soft to firm dark grey slightly sandy gravelly clay.

4.1.6 Notably, within the cable percussive boreholes, the Tidal Flat Deposits were noted to contain beds of peat, which varied from plastic dark grey amorphous peat to firm dark grey mottled brown pseudo-fibrous peat.

Superficial Deposits (ALLUVIAL FAN DEPOSITS)

4.1.7 Below the fine grained Tidal Flat Deposits either dense becoming very dense dark grey, greyish brown and brownish grey mottled gravelly sand and slightly sandy gravel with medium cobble content or medium dense to very dense greyish brown slightly sandy gravel with low cobble content was recorded at depths below 9.5m to 14.2mbgl. Gravel and cobbles were consistently observed to be mudstone and sandstone.

Solid Geology (SOUTH WALES MIDDLE COAL FORMATION)

4.1.8 The solid geology was recorded at BH04 at a depth of 17.7mbgl and was recorded as dark grey sandstone to a maximum recorded depth of 20.35mbgl.

4.2 Generalised Ground Profile

4.2.1 The general ground profile encountered at the site is summarised in Table 4.1 below.

Table 4.1: Generalised Ground Profile

Depth (mbgl)	Encountered Material
MADE GROUND	
0.0 – 0.15/>5.0	Dark brown silty gravelly sand. Gravel of vesicular slag, concrete and rare clinker, brick, mudstone and occasional wood fragments.
SUPERFICIAL DEPOSITS – BLOWN SAND	
0.0/2.0 – 1.2/>6.5 BH03/3A, WS05 (southern site area) BH04 (south-western site area)	Very loose becoming medium-dense yellowish brown fine to medium sand.

Depth (mbgl)	Encountered Material
SUPERFICIAL DEPOSITS – TIDAL FLAT DEPOSITS	
0.15/6.5 – 9.5/14.2 BH01 9.3-9.5m BH02 3.8-4.8m & 10.2-13.5m BH03A 10.5-13.5m BH04 9.0-13.0m	Interbedded very loose to loose gravelly silty sands, soft to firm slightly sandy slightly gravelly clays, very soft slightly sandy slightly gravelly silts, locally with pockets of plastic black amorphous peat. Plastic amorphous to firm pseudo-fibrous peat.
SUPERFICIAL DEPOSITS – ALLUVIAL FAN DEPOSITS	
9.5/14.2 – 19.6/24.5	Medium-dense becoming very dense dark grey, greyish brown and brownish grey mottled gravelly sand and slightly sandy gravel with low to medium cobble content or slightly sandy gravel with low cobble content. Gravels and cobbles of mudstone and sandstone.
SOLID GEOLOGY – SOUTH WALES MIDDLE COAL FORMATION	
17.7 - >20.35 (BH04 only)	Dark grey sandstone

4.3

Groundwater

4.3.1

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 4.2 below. Groundwater strikes/ observations are also shown on the exploratory hole logs in Appendix B.

Table 4.2: Summary of Groundwater Conditions

Location	Perched / Groundwater Strike (mbgl)	Standing Depths (mbgl)				Strata
		21.04.2022	09.05.2022	17.05.2022	24.05.2022	
BH01	0.6	1.91	2.75	2.14	2.22	Made Ground
	11.6					Alluvial Fan Deposits
BH02	-	3.95	4.33	3.95	4.82	Tidal Flat Deposits
BH03	0.6	-	-	-	-	Made Ground
	2.0					Blown Sand
BH03A	0.6	3.42	3.77	3.32	4.4	Made Ground
	14.7					Alluvial Fan deposits
	15.2					
BH04	2.6	5.36	5.67	5.27	5.4	Tidal Flat Deposits
WS01	2.3	1.70	1.90	1.94	2.0	Made Ground
WS02	1.7	-	-	-	-	
WS03A	-	0.55	1.70	1.82	1.88	
WS06	-	0.35	0.35	0.32	0.37	
WS07	2.1	0.45	0.62	0.55	0.69	Tidal Flat Deposits
WS09	1.0	-	-	-	-	Made Ground
WS10	2.4	1.89	2.10	-	2.12	
WS11	2.2	1.04	1.22	1.82	1.28	Tidal Flat Deposits
TP01	1.4	-	-	-	-	
TP02	2.3	-	-	-	-	Made Ground
TP03	2.85	-	-	-	-	Tidal Flat Deposits

Location	Perched / Groundwater Strike (mbgl)	Standing Depths (mbgl)				Strata
		21.04.2022	09.05.2022	17.05.2022	24.05.2022	
TP04	1.2	-	-	-	-	Made Ground
TP05	1.8	-	-	-	-	Tidal Flat Deposits
TP12	2.1	-	-	-	-	
TP13	2.3	-	-	-	-	
TP15	0.7	-	-	-	-	Made Ground
TP17	1.0	-	-	-	-	
TP18	1.8	-	-	-	-	
TP19	0.9	-	-	-	-	

4.3.2 Perched groundwater was recorded within the made ground materials across the site, with a shallow groundwater body recorded within the superficial Tidal Flat Deposits, as well as a deeper groundwater body encountered in the Alluvial Fan Deposits in BH01 and BH03A.

4.3.3 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.

4.4 Contamination Observations

4.4.1 No visual or olfactory evidence of contamination was observed during the ground investigation. Screening of soil samples with a PID recorded a maximum concentration of volatile organic compounds (VOCs) of 1.4ppm from made ground materials recovered from TP10, whilst most other concentrations below or near to the instrument level of detect (i.e. 0.0ppm).

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 E.
- 5.2.2 The standard land use for the site, for use in this generic assessment, has been defined as “commercial” 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 E.

Made Ground

- 5.2.5 The results of the assessment recorded (marginal) exceedances of the GAC and therefore, the following contaminants of potential concern (CoPC) have been identified within the made ground encountered;
- PAHs – benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, and dibenz(a,h)anthracene;
- 5.2.6 The laboratory screening for asbestos identified asbestos fragments/ fibres within 7No. samples of the made ground, identified as crocidolite, chrysotile and amosite loose fibres and loose fibrous debris. Further quantitative analysis was completed on these samples with the results indicating concentrations of <0.001% - 0.186% of asbestos by weight to be present.

5.3 Controlled Waters

Methodology

- 5.3.1 Detailed information on the background legislation and selection of the GAC (SSV) used within this assessment for controlled waters is presented in Appendix F.
- 5.3.2 Based on the conceptual understanding, the nearest significant controlled waters receptor is considered to be the underlying Secondary Aquifers considered likely to provide baseflow to the nearby Port Talbot Docks.
- 5.3.3 Therefore, an initial assessment of the potential risk to controlled waters has been undertaken by comparing the soil leachate analytical results and to published Environmental Quality Standards (EQS), where available. In the absence of EQS values, Drinking Water Standards have been utilised.

Summary of Results - Leachate

- 5.3.4 Leachate samples were collected from the made ground materials at 5No. locations across the site, the results are presented in Appendix C.
- 5.3.5 The results of the assessment recorded (marginal) exceedances of the GAC and therefore the following contaminants of potential concern (CoPC) have been identified within the leachate at the site:
- Heavy metals (cadmium, copper, lead and zinc).
- 5.3.6 Notwithstanding this, it is noted that although the concentrations of these potential contaminants exceed the conservative EQS for coastal waters, they do not exceed the current UK Drinking Water Standards (where available).

5.3.7 Whilst it is acknowledged that exceedances of the SSVs for mercury, total cyanide and total phenol are recorded, this is due to the laboratory limit of detection being greater than the selected SSV. No leachable concentrations have been recorded within the sampled material above the laboratory limit of detection and no elevated total concentrations have been recorded within the soil samples analysed. Therefore, these are not considered to be contaminants of potential concern.

5.3.8 In addition, it should be noted that petroleum hydrocarbon concentrations (PAHs) were below limits of detection for all samples suggesting no potential gross or dissolved phase hydrocarbon contamination.

Summary of Results – Perched Water and Groundwater

5.3.9 Water samples were taken from each of the installed borehole monitoring wells (BH01 to BH04, WS01, WS03a, WS06-WS07, WS10-WS11).

5.3.10 The response zones within BH01 to BH04 was within the natural ground (Superficial Granular Deposits). The response zones within WS03a, WS06 and WS11 was within the superficial Tidal Flat Deposits.

5.3.11 The response zone of WS01 was located fully within the made ground, whereas in WS07 and WS10 the response zone was partly in the made ground and partly in the Tidal Flat Deposits.

5.3.12 The results of the groundwater samples are summarised in Appendix F.

Perched Water (Made Ground) and Upper Groundwater (Superficial Tidal Flat Deposits) – WS01, WS3A, WS06, WS07, WS10 and WS11

5.3.13 The results of the assessment recorded a number of exceedances of the GAC, and therefore, the following contaminants of potential concern (CoPC) have been identified within the perched water (made ground) and upper groundwater of the Tidal Flat Deposits at the site:

- *Heavy metals (antimony, arsenic, cobalt, lead, nickel and zinc)*
- *TPH Aromatic (C12-C16, C16-C21 and C21-C35);*
- *PAHs (naphthalene, anthracene and benzo(a)pyrene)*
- *Sulphate.*

5.3.14 Notwithstanding this, it is noted that, with the exception of benzo(a)pyrene, although the concentrations of these potential contaminants exceed the conservative EQS for coastal waters, the majority do not exceed the current UK Drinking Water Standards, (where available).

5.3.15 In addition, it is noted that no detectable VOC concentrations were recorded within the perched water/upper groundwater above the laboratory limit of detection. However, a number of detectable SVOC concentrations were reported above the laboratory limit of detection. These include the previously reported PAH concentrations as well as concentrations of 2,4-dimethylphenol, 2-methylnaphthalene, dibenzofuran, carbozole and anthraquinone

5.3.16 Whilst it is acknowledged that exceedances of the SSVs total cyanide and total phenol are recorded, this is due to the laboratory limit of detection being greater than the selected SSV. No concentrations have been recorded within the sampled perched/upper groundwater above the laboratory limit of detection and no elevated total or leachable concentrations have been recorded within the soil samples analysed. Therefore, these are not currently considered to be contaminants of potential concern.

Deeper Groundwater (Alluvial Fan Deposits and South Wales Middle Coal Measure Formation) – BH01 to BH04

5.3.17 The results of the assessment recorded a number of marginal exceedances of the GAC, and therefore, the following contaminants of potential concern (CoPC) have been identified within the deeper groundwater of the Alluvial Fan Deposits and the South Wales Middle Coal Measures Formation at the site:

- *Heavy metals (cadmium and cobalt); and*
- *Sulphate.*

- 5.3.18 Notwithstanding this, it is noted that although the concentrations of these potential contaminants exceed the conservative EQS for coastal waters, they do not exceed the current UK Drinking Water Standards, (where available).
- 5.3.19 Whilst it is acknowledged that exceedances of the SSVs for benzo(a)pyrene, total cyanide and total phenol are recorded, this is due to the laboratory limit of detection being greater than the selected SSV. No concentrations have been recorded within the sampled deeper groundwater above the laboratory limit of detection and no elevated total or leachable concentrations of total cyanide and total phenol have been recorded within the soil samples analysed. Therefore, these are not currently considered to be contaminants of potential concern for the deeper groundwater.
- 5.3.20 In addition, it should be noted that petroleum hydrocarbon concentrations (including TPHs, PAHs, VOCs and SVOCs) were below limits of detection for all samples suggesting no potential gross or dissolved phase hydrocarbon contamination.

5.4 Ground Gas Risk Assessment

- 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. Notwithstanding this, it noted that much of the site was inaccessible due to the presence of Japanese Knotweed as well as other ecological constraints, therefore the data obtained to date currently does not fully comply with BS8576:2013 and is for preliminary purposes only. Additional investigation and monitoring would be required to fully characterise the ground gas regime at the site in accordance with current guidance.

Conceptual Site Model Summary

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

On Site Ground Gas Sources

- *Made ground observed to a maximum depth of >5.0mbgl (including areas of historic heaped areas of unknown constituents and potentially infilled ponds);*
- *Organic material / Peat layers within the Superficial Tidal Flat Deposits; and*
- *Nearby (off site) historic coal mining activities.*

Soil Organic Matter

- 5.4.3 8No. samples of the peat materials within the Superficial Tidal Flat Deposits were analysed for their soil organic matter content. The results are presented in Appendix D and summarised in Table 5.1.

Table 5.1: Soil Organic Matter Results Summary

Borehole	Depth (mbgl)	Strata	Soil Organic Matter (SOM%)
BH01	5.0	Tidal Flat Deposits (silt with peat lenses)	2.6
BH01	9.3	Tidal Flat Deposits (spongy fibrous peat)	5.8
BH02	3.9	Tidal Flat Deposits (firm fibrous peat)	10.0
BH02	10.4	Tidal Flat Deposits (plastic pseudo-fibrous peat)	7.2
BH03A	10.5	Tidal Flat Deposits (plastic amorphous peat)	16.0
BH03A	12.0	Tidal Flat Deposits (plastic pseudo-fibrous peat)	6.5
BH04	9.0	Tidal Flat Deposits (firm pseudo-fibrous peat)	1.0
BH04	11.5	Tidal Flat Deposits (plastic amorphous peat)	15.0

Ground Gas Monitoring Results

5.4.4 All gas monitoring was undertaken using a calibrated GFM 436 infra-red gas analyser fitted with an internal flow pod. The monitoring results are presented in Appendix G and summarised in Table 5.2.

Table 5.2: 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	Alluvial Fan Deposits	Organic deposits	3	44	1.9	10.0	0.4	2.14 – 2.75	1010 – 1020
BH02				81	6.7	0.6	3.4	3.95 – 4.82	1005 – 1018
BH03A				39	1.4	11.1	<0.1	3.32 – 4.40	1007 – 1022
BH04	Alluvial Fan Deposits and SWMCF	Organic deposits and potential off-site historic coal mining		71.9	2.5	3.9	<0.1	5.27 – 5.67	1006 – 1018
WS01	Made Ground	Potential infilled ponds /heaped material		<0.1	0.4	18.4	<0.1	1.90 – 2.0	1003 – 1018
WS03A	Tidal Flat Deposits	Peat layers / organic deposits		<0.1	1.9	16.4	0.1	1.70 – 1.88	1005 – 1018
WS06				10.6	2.3	13.6	<0.1	0.32 – 0.37	1010 – 1017
WS07	Made Ground/ Tidal Flat Deposits	Potential infilled ground / organic deposits		<0.1	0.3	20.0	<0.1	0.55 – 0.69	1010 – 1017
WS10				<0.1	<0.1	2.4	13.0	Dry – 2.12	1006 – 1017
WS11	Tidal Flat Deposits	Peat layers / organic deposits		<0.1	1.4	19.4	0.4	1.22 – 1.82	1006 – 1017

5.4.5 Monitoring has been undertaken during periods of generally high atmospheric pressures and, therefore, may not represent worst cast temporal conditions.

Borehole Hazardous Gas Flow Rate (Q_{hg})

5.4.6 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 5.3.

Table 5.3: Borehole Hazardous Gas Flow Rates

Borehole	Date	Methane – Hazardous Flow Rate CH_4 Qhg (l/hr) ¹	Carbon Dioxide – Hazardous Flow Rate CO_2 Qhg (l/hr) ¹	Implied CH_4 CS	Implied CO_2 CS
BH01	09/05/2022	0.0001	0.0001	1	1
	17/05/2022	0.0001	0.0001	1	1
	24/05/2022	0.0001	0.0004	1	1

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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
BH02	09/05/2022	2.261	0.1666	3	2
	17/05/2022	2.673	0.211	3	2
	24/05/2022	0.0001	0.0001	2	1
BH03A	09/05/2022	0.0001	0.0001	1	1
	17/05/2022	0.021	0.0008	1	1
	24/05/2022	0.0006	0.0014	1	1
BH04	09/05/2022	0.0001	0.0018	1	1
	17/05/2022	0.0557	0.0022	1	1
	24/05/2022	0.0719	0.0025	2	1
WS01	09/05/2022	0.0001	0.0001	1	1
	17/05/2022	0.0001	0.0004	1	1
	24/05/2022	0.0001	0.0001	1	1
WS03A	09/05/2022	0.0001	0.0001	1	1
	17/05/2022	0.0001	0.0016	1	1
	24/05/2022	0.0001	0.0019	1	1
WS06	09/05/2022	0.0106	0.0023	1	1
	17/05/2022	0.0001	0.0002	1	1
	24/05/2022	0.0001	0.0019	1	1
WS07	09/05/2022	0.0001	0.0001	1	1
	17/05/2022	0.0001	0.0003	1	1
	24/05/2022	0.0001	0.0003	1	1
WS10	09/05/2022	0.0001	0.0001	1	1
	17/05/2022	0.0001	0.0024	1	1
	24/05/2022	0.0001	0.0032	1	1
WS11	09/05/2022	0.0004	0.0004	1	1
	17/05/2022	0.0001	0.0009	1	1
	24/05/2022	0.0001	0.0014	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

- 5.4.7 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 5.4.

Table 5.4: Worst Case Check – Ground Gas

Boreholes	Response Zone/ Strata	Max. Flow Rate (l/hr)	Max. Methane Conc. (%)	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
BH01, BH02, BH03A, BH04	Alluvial Fan Deposits and SWMCF	3.4	81	6.7	2.754	0.2278	3	2
WS01	Made Ground	0.1	0.1	0.4	0.0001	0.0004	1	1
WS03A, WS06, WS11	Tidal Flat Deposits	0.4	10.6	2.3	0.0424	0.0092	1	1
WS07, WS10	Made Ground/ Tidal Flat Deposits	0.1	0.1	3.2	0.0001	0.0032	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)

- 5.4.8 It is considered that there is currently insufficient data to adequately characterise the site. However, the initial results indicate the site may be Characteristic Situation 3. Further ground investigation and additional monitoring would be required to fully characterise the ground gas regime at the site and inform the scope of ground gas protection measures required for any proposed development.

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/ unspecified deposited material; and
- Potentially infilled land;
- Organic natural ground

Off Site Sources

- Surrounding current and historic industrial land uses, including coal mining, copper works, iron and steel works, warehouses, factories, depots, engineering works and railway sidings/mineral tramways.

Identified Receptors

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

- Current/future site users;
- Construction workers;
- Controlled waters (Secondary A Aquifer and Secondary (undifferentiated) Aquifer and surface waters);
- 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 contaminants within the made ground/unsaturated zone resulting in vertical contaminant migration to the underlying aquifer;
- Horizontal migrations – lateral migration of contaminants within the saturated zone along preferential pathways;
- Migration, ingress and accumulation of ground gases along preferential pathways.

5.5.5 The updated conceptual model is presented in Table 5.5. 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 H.

Table 5.5: 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/ infilled ground on site and potentially contaminative processes	Current and future site users and construction workers	Exposure to potential contaminants through ingestion, inhalation and dermal contact.	Medium	Low Likelihood to Likely: Laboratory analysis of the made ground encountered on site recorded elevated PAH concentrations, in excess of the assessment criteria for a commercial site end use. In addition, asbestos fibres/fibrous debris (<0.001% - 0.186% of asbestos by weight) was recorded within 7no. samples of made ground. Therefore, the risk cannot be fully discounted. It is understood that much of the proposed development will be laid to hardstanding or within the footprint of proposed structures which will mitigate the pollutant pathways. However, where soft landscaping is proposed and where made ground materials remain on-site after finished site levels have been achieved, exposure to potential contaminants cannot be discounted. Additional investigation works in areas currently inaccessible would be required to confirm this preliminary assessment.	Low to Moderate Risk
	Controlled waters	Leaching of potential contaminants from made ground and vertical and lateral migration through the saturated zone to controlled waters.	Medium	Low Likelihood to Likely: Elevated leachable concentrations of heavy metals, have been recorded within made ground and elevated concentrations of heavy metals, PAHs and heavy-end TPH fractions have been recorded within the perched water/upper groundwater underlying the central and western site areas, in relation to conservative EQS GACs. Notwithstanding this, it is noted that only localised, marginal exceedances of limited heavy metals were recorded within the deeper groundwater sampled on site, in relation to conservative EQS values. In addition, it is noted that petroleum hydrocarbon concentrations (including TPHs, PAHs, VOCs and SVOCs) were below limits of detection for all samples of the deeper groundwater suggesting no potential gross or dissolved phase hydrocarbon contamination migration to the deeper groundwater body. Furthermore, given the generally cohesive nature of the superficial tidal flat deposits, significant vertical and horizontal contaminant migration is likely to be limited. Additional ground investigation and monitoring would be required to fully characterise the site.	Low Risk
	Current and future site users, construction workers and proposed development	Migration, ingress and accumulation of ground gasses.	Severe	Unlikely to Low Likelihood: Site observations and gas monitoring undertaken to date indicates the made ground encountered is considered unlikely to be a potential source of significant ground gas composition (with no visual evidence of degradable/putrescible materials noted). Additional investigation and gas monitoring would be required to confirm the ground gas regime onsite in accordance with BS8576: 2013.	Low to Moderate Risk
Organic Rich natural ground on site and historic coal mining activities off site	Current and future site users, construction workers, controlled waters and proposed development/structures	Migration, ingress and inhalation of ground gasses.	Severe	Low Likelihood to Likely: Gas monitoring undertaken to date indicates the site may be placed in CS3, requiring ground gas protection measures to be incorporated within the proposed development. Additional investigation works and gas monitoring would be required to comply with BS8576: 2013 and to confirm this preliminary assessment of the ground gas regime on site.	Moderate Risk

6 LAND CONTAMINATION - CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

- 6.1.1 No visual or olfactory evidence of significant contamination was noted during the ground investigation.
- 6.1.2 Laboratory analytical results of the encountered made ground materials reported localised exceedances of the GAC for a commercial site end use for a number of PAHs compounds, together with asbestos fibres/fragments and fibrous debris encountered in a number of locations.
- 6.1.3 Leachable CoPCs (heavy metals) have been identified within sampled made ground. In addition, CoPCs (heavy metals, heavy end TPH fractions, PAHs and sulphate) have been recorded within the sampled perched water/upper groundwater. Marginal elevated contaminant concentrations (heavy metals and sulphate) have been recorded within the deeper groundwater in relation to conservative EQS values.
- 6.1.4 Based on the limited ground gas monitoring undertaken to date, together with the conceptual site model, it is possible that the site may potentially be considered as Characteristic Situation 3. However, further monitoring would be recommended to confirm this regime.
- 6.1.5 No radon protective measures are considered necessary within the construction of new homes.

6.2 Remedial Appraisal and Recommended Further Works

Human Health

- 6.2.1 Contaminants of potential concern (CoPC) have been recorded within made ground materials encountered in the accessible areas of the site, when considering a commercial site end use.
- 6.2.2 It is understood that much of the proposed development will be laid to hardstanding or within the footprint of proposed structures, which will mitigate the pollutant pathways. However, 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 and asbestos cannot be discounted and a suitable cover system may be required within areas of soft landscaping.
- 6.2.3 Furthermore, given that the proposed development layout is unknown and given that the exploratory investigation across much of the site was not possible due to ecological constraints, additional ground investigation works would be required within these areas in order to fully characterise the site and determine the requirement for any remedial works in relation to human health.
- 6.2.4 Given the recorded presence of asbestos, good working practice methods should be adopted as per current guidance prior to commencement of any groundworks/site preparation works on site (e.g. CL:AIRE (2016) Control of Asbestos Regulations 2012 – Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry guidance and, CIRIA Report C765 “Asbestos in soil and made ground good practice site guide” (2017)).

Controlled Waters

- 6.2.5 Contaminants of potential concern (CoPC) have been recorded within the sampled groundwater in relation to conservative EQS values.
- 6.2.6 Given the generally cohesive component of the upper superficial Tidal Flat Deposits, the anticipated low mobility of the identified heavy end TPH fractions and PAHs recorded within the perched water and upper groundwater, and the presence of hardstanding across parts of the proposed development area which will limit the potential for infiltration and as such, the potential for contaminant migration is considered likely to be low.
- 6.2.7 Notwithstanding this, additional ground investigation and groundwater monitoring/sampling works would be required to confirm this preliminary assessment and the fully determine the potential risk to controlled waters on site and any potential remedial measures required.

Ground Gas

- 6.2.8 Additional ground investigation in areas not currently accessible is required as well as additional ground gas

monitoring of existing boreholes to confirm the ground gas regime on site and determine the need for and extent of any ground gas protections measures within the proposed development.

6.3 General Considerations

- 6.3.1 Given the presence of general made ground and asbestos, 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.

7 GROUND ENGINEERING

7.1 Proposed Development

7.1.1 While details have not been provided to TEC at this stage, it is understood that the proposed development is to comprise a new facility for the production of synthetic jet fuel. As likely loadings derived from the proposed structures are not available for the proposed development, general recommendations with regards to the ground engineering have been made at this preliminary stage.

7.2 Site Preparation

7.2.1 Significant areas of Japanese Knotweed were observed across the site at the time of the site works. This will need to be controlled prior to the commencement of any construction activity.

7.2.2 A number of services are known to be present within the development area and may need to be diverted or protected during the works.

7.2.3 Areas of concrete hardstanding and ground slabs were observed across the site. It is considered likely that below ground structures associate with the historic buildings will be present and these will need to be removed as part of the enabling works.

7.3 UXO Mitigation Measures

7.3.1 The majority of the site has been assessed at a Moderate Risk from German UXBs and as a result, prior to the start of construction, it is recommended that a non-intrusive magnetometer survey is undertaken across the site and, in particular, within the areas of undeveloped open ground identified on the WWII mapping. Where anomalies are recorded there would be the need for further investigation to confirm/remove the risk. It should be noted that the recorded presence of slag within the made ground materials, may reduce the effectiveness of a magnetometer survey.

7.3.2 Once a piling layout has been finalised, an intrusive magnetometer survey would be required, comprising CPT testing at 2m centres to depth of 12m within the purposed pile layout. Again, where anomalies are recorded there would be the need for further investigation to confirm/remove the risk.

7.4 Geotechnical Test Data Summary

7.4.1 Laboratory test data are presented in Appendix D while in situ test results are presented on the engineering logs Appendix B.

Plasticity

7.4.2 Atterberg Limit tests were undertaken on 13no. cohesive Tidal Flats Deposits samples from BH01 to BH04, summarised in Table 7.1 below:

Table 7.1: Summary of Laboratory Test Results

Moisture Content (%)	Plasticity Index (%)	% passing 425µm sieve	Modified Plasticity Index ⁽¹⁾ (%)	Volume Change Potential ⁽¹⁾
22 – 58	10 - 24	86 – 100	10 – 22.1	Low to Medium

Note 1: Based on recommendations provided in the NHBC Standard

Particle Size Distribution

7.4.3 Particle Size Distribution (PSD) testing was undertaken on 14No. samples of the more granular superficial deposits, summarised in Table 7.2 below:

Table 7.2: Summary of PSD Laboratory Results

Stratum	Fines (<0.063mm) Component (%)	Sand Component (%)	Gravel Component (%)
Superficial Blown Sands (granular)	1.9 – 25.4	73.3 - 97.8	0.3 – 22.3
Superficial Tidal Flat Deposits (granular)	4.7 – 8.7	30.4 – 90.9	0.7 – 64.8
Alluvial Fan Deposits (granular)	1.4 – 57.3	14.9 – 72.3	0.0 – 79.4

Soil Strength

7.4.4

A summary of the geotechnical field test data is provided in Table 7.3 below.

Table 7.3: Summary of Geotechnical Field Test Data

SPT 'N' Values			
Strata (depth)	Number of Tests	Range of Results, 'N' Values Ranges	Equivalent Undrained Shear Strength (Cu, kPa) ⁽¹⁾
<i>Superficial Blown Sand:</i> Very loose becoming medium-dense fine to medium sand (0.0->6.5m)	10	1 – 23 (Average: 9.2)	-
<i>Superficial Tidal Flat Deposits:</i> Interbedded very loose to loose sands/soft to firm clays/very soft silts, locally with peat lenses (0.15 – 14.2m)	48	0 - 37 (Average: 5)	20
<i>Alluvial Fan Deposits:</i> Medium-dense becoming very dense gravelly sand / slightly sandy gravel with low to medium cobble content /slightly sandy gravel with low cobble content (9.5-24.5m).	23	1 - >50 (Average: 48)	-
<i>South Wales Middle Coal Measures Formation:</i> Dark grey sandstone (17.7->20.35m)	2	36 - >50 (Average: 43)	-
Hand Shear Vane and Pocket Penetrometer Results			
Strata (depth)	Number of Tests	Range of Results	Undrained Strength Classification ⁽²⁾
<i>Superficial Tidal Flat Deposits (where cohesive)</i> (1.3-7.0m)	45	5 – 55 (Cu, kPa)	Extremely low to medium strength
	13	0.5 – 1.5 (kg/cm ²) / 22.5 – 67.5 (Cu, kPa)	Low to medium strength
Undrained Triaxial Results			
Strata (depth)	Number of Tests	Range of Results (Cu, kPa)	Undrained Strength Classification ⁽²⁾
Tidal Flat Deposits (Peat/peaty clay) (6.4 – 11.6m)	9	7 - 25 (Average 16.6)	Extremely low to low strength
Tidal Flat Deposits (Clay) (5.5 – 5.65m)	3	13 – 14 (Average 13.6)	Very low strength

Note 1: Based on published correlations (Stroud, 1975)

Note 2: BS5930:2015/ BS EN ISO 14688-2:2004

Wind Blown Sand

7.4.5

The Blown Sands are described as generally being loose to medium dense with uncorrected SPT 'N' values of between 0 and 23 (average 9) being recorded, suggesting a friction angle, ϕ' , no greater than 30° may be appropriate.

Tidal Flat Deposits

- 7.4.6 The testing undertaken to-date suggests the within the Tidal flat Deposits, where cohesive in nature, to be of low strength and it is suggested that a characteristic undrained strength of 15kN/m^2 may be appropriate for these materials. Further, while effective strength testing was not undertaken as part of the current scope, based on standard correlations with plasticity index, strength parameters of ϕ' of 28° (CIRIA 104) can be derived for these cohesive materials. However, when using the correlation with plasticity suggested in BS8002:2015 friction values of between 25° and 29.5° are derived.
- 7.4.7 Where granular in nature a correlated friction angle of ϕ' of 25° may be derived (Schmertmann (1975), Meyerhoff (1956), Carter, M. and Bentley, S. (1991) and Swiss Standard SN 670 010b).

Alluvial Fan Deposits

- 7.4.8 Based on available information the sands and gravels recorded to underly the Tidal Flat Deposits at depth of between 9.5m to 14.2mbgl are considered to be very dense with uncorrected SPT 'N' values generally being >50 being recorded, suggesting a friction angle, ϕ' , in the order of 45° may be appropriate.

7.5 Tentative Design Parameters

- 7.5.1 Based on the available preliminary information, it is considered that the following tentative parameters may be appropriate for initial design purposes. However, it should be noted that additional geotechnical assessment will be required as part of the main ground investigation works. A summary of the preliminary design parameters is presented in below:

Table 7.4: Summary of Tentative Geotechnical Parameters

Property ⁽¹⁾	Blown Sands	Tidal Flat Deposits	Alluvial Fan Deposits
Unit Weight ⁽²⁾	17kN/m^3	$15\text{-}17\text{kN/m}^3$	$20\text{ - }21\text{kN/m}^3$
Plastic Index	-	10-24	-
Uncorrected SPT 'N' value	9	5	>50
Undrained Strength, S_u	-	15kN/m^2 ⁽²⁾	-
Drained Friction, ϕ'	28° ⁽³⁾	26° ⁽⁴⁾	45° ⁽³⁾
Drained Modulus, E'	9MN/m^2 ⁽⁵⁾	-	$>50\text{MN/m}^2$ ⁽⁵⁾
Undrained Modulus, E_u	-	$4\text{-}5\text{MN/m}^2$ ⁽⁵⁾	-
Modulus of Compressibility, m_v	-	$0.65\text{m}^2/\text{MN}$ ⁽²⁾	-

Notes: 1. Properties should not be considered as characteristic values for design purposes.
2. CIRIA Funder Report CP/7
3. Schmertmann (1975)
4. BS8002:2015 recommendations
5. CIRIA 143

7.6 Foundations

- 7.6.1 It is considered that conventional foundations are unlikely to be suitable for the proposed development and it is considered likely that a piled foundation solution will be required at the proposed development.
- 7.6.2 The underlying soils have been recorded to be of low to medium volume change potential, requiring standard voids to be incorporated into the design.
- 7.6.3 It is considered likely that a number of structures within the site will be heavily loaded. These loads will likely need to be transferred through the weak and compressible strata down to the stronger material at depth, by means of piled foundations. Based on the ground conditions recorded to-date, depending on the loads, some structures may need to be founded in the rocks of the South Wales Middle Coal Measures. As a result, there may be the need to determine the presence (or absence) of voiding in these strata and, if present, potentially, the piles may need to penetrate through coal seams/voids and socket into the underlying rock.

- 7.6.4 For structures that impose lower loads, but still require deep foundations to control settlement, displacement piles driven down to refusal in the granular deposits overlying the rocks of the South Wales Middle Coal Measures may be a suitable geotechnical solution.
- 7.6.5 For lightly loaded structures ground improvement may provide a viable and effective alternative to piling.
- 7.6.6 It should be noted that due to the presence of potential contamination and ground gas across the site, there is likely to be the need to undertake a Foundation Works Risk assessment in order to determine and minimise the risks associated with each founding method.
- 7.6.7 Due to the presence of made ground, the likely founding method and the recorded ground conditions at the site, it is considered likely that suspended floors will be required throughout the design. Notwithstanding this, should small independent buildings be required with light loadings and that can accommodate some amount of differential settlement without significant impact then it may be possible that ground bearing concrete floor slabs can be adopted.
- 7.6.8 Further, while significant areas of slag materials were not encountered during the current works, should their presence be recorded, there would be the need to determine the extent of any potential expansion of these materials such that sufficient voiding is included within the design to accommodate such potential ground movement.
- 7.6.9 Groundwater was recorded at shallow depth. However, at this stage, it is unclear as to whether the groundwater levels recorded at the site are influenced by the tide and therefore as part of the main ground investigation works, it is recommended that further monitoring is undertaken in order to determine this.
- 7.7 Preliminary Pavement Design**
- 7.7.1 While no testing was undertaken as part of the current phase of works to determine appropriate pavement design parameters, given the recorded thickness of made ground across the site, a CBR of <2.5% would be recommended where formations are within this material.
- 7.8 Excavations**
- 7.8.1 Excavations at the site may be achievable using conventional equipment. However, it should be noted that many of the exploratory holes were noted to collapse due to instability of made ground or superficial blown sand, particularly where below the groundwater level.
- 7.8.2 Groundwater seepages/levels were recorded at shallow depths across the site and therefore groundwater ingress into excavations is considered likely to be problematic, particularly where the excavation is within the blown sands where instability is considered likely to occur.
- 7.8.3 It should be noted that groundwater levels might fluctuate according to the tide, the season and from year to year. This may have implications on recommendations, including those for foundations and excavations.
- 7.9 Protection of Buried Concrete**
- 7.9.1 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’.
- 7.9.2 In addition, observations made during the intrusive works suggest the groundwater conditions to be ‘mobile’, as flow is likely to be into excavations or is percolating through the ground.
- 7.9.3 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 7.5. The full laboratory results are presented in Appendix C and Appendix D.

Table 7.5: Summary of ACEC

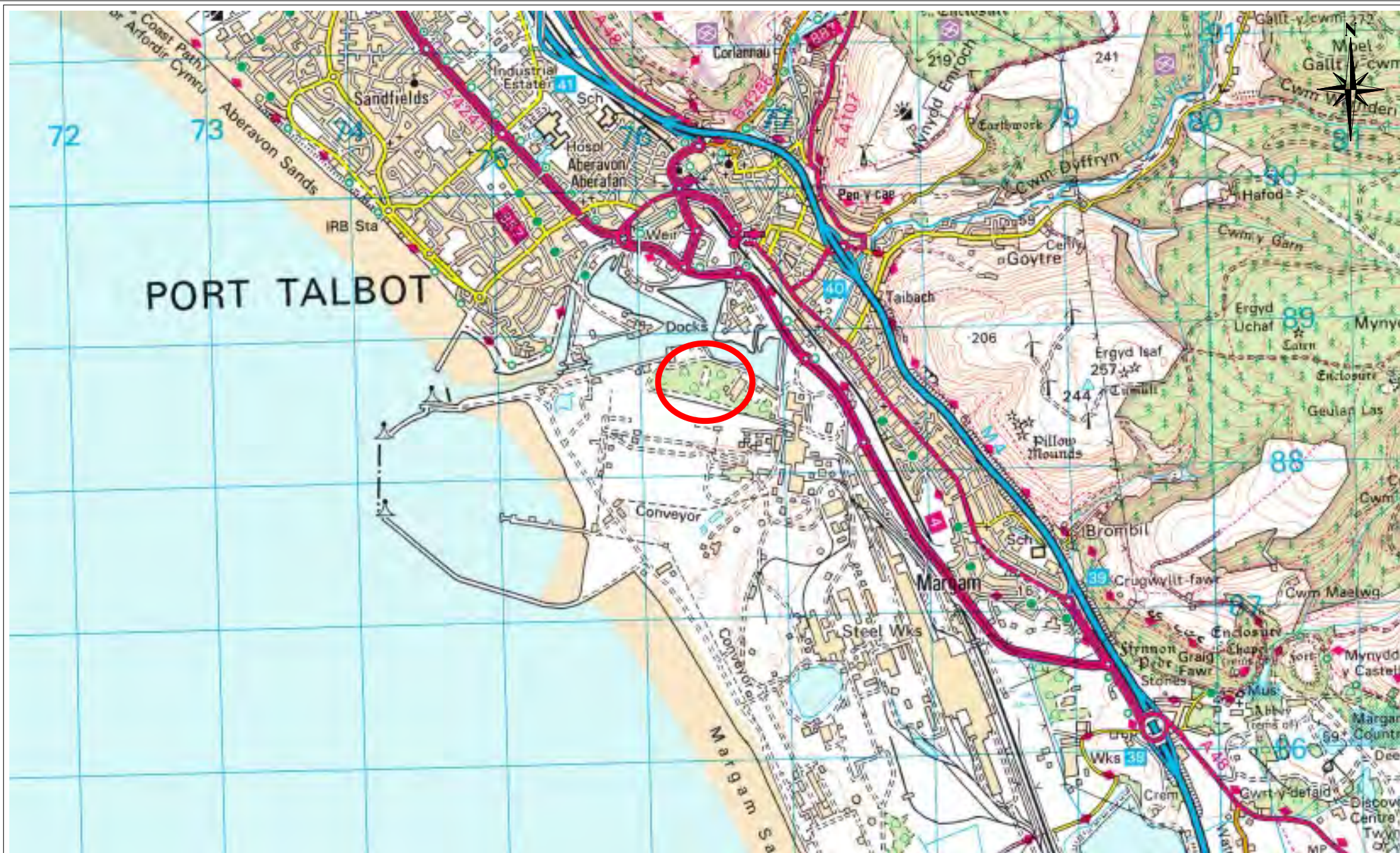
Stratum	No. of tests	pH	Water Soluble Sulphate (mg/l)	Sulphate Concentration in Groundwater (mg/l)	ACEC ⁽¹⁾	DS Class ⁽¹⁾
Made Ground	21	8.7 – 10.6	4.7 – 230	-	AC-1	DS-1
Tidal Flat Deposits	11	7.5 – 8.1	89 - 874	16.6 – 96.6	AC-2	DS-2
Alluvial Fan Deposits	5	7.5 – 8.0	22 - 302	142 - 411	AC-1	DS-1

Note 1: Based on a characteristic value derived for a data set of 5-9 samples per stratum (mean of the two highest sulphate test results and two lowest pH tests) as per BRE SD1

7.9.4 While further testing (including testing of groundwater samples) is recommended in order to comply with the requirements of the BRE guidance, provisionally buried concrete can be designed to DS-2.

TEC

Figures and Drawings



Approximate Site Location:



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Site Name:

Phoenix Wharf, Port Talbot

Drawing Name:

Site Location Plan

Client Name:

LanzaTech

Project No:

2111006.003

Figure No:

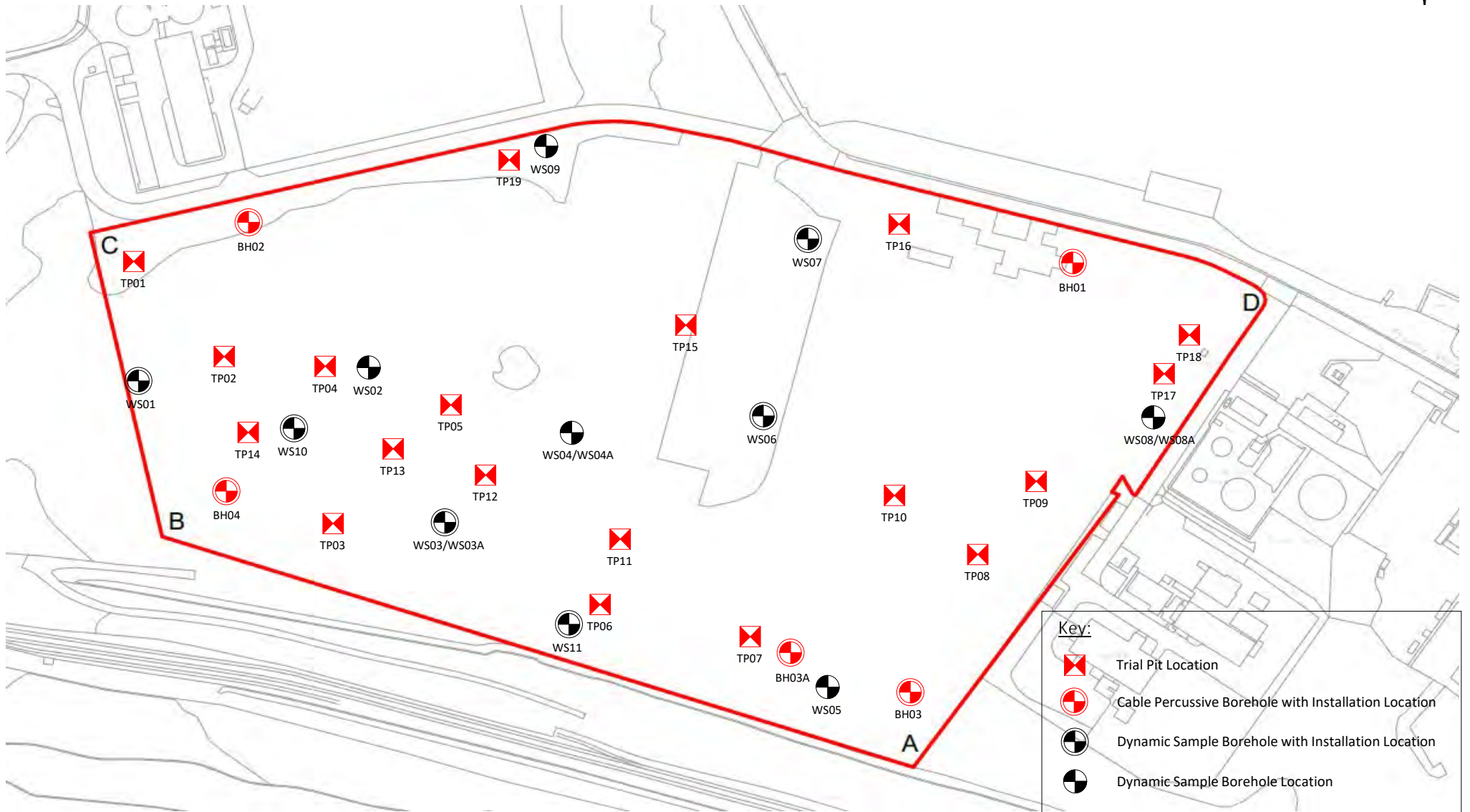
1

Date:

June 2022

Scale:

NTS



Key:

- Trial Pit Location
- Cable Percussive Borehole with Installation Location
- Dynamic Sample Borehole with Installation Location
- Dynamic Sample Borehole Location

*All locations are approximate



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Tel: 01749 677760
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Web: www.tecon.co.uk

Site Name:
Phoenix Wharf, Port Talbot

Drawing Name:
Exploratory Hole Location Plan

Client Name:
LanzaTech

Project No:
2111006.003

Figure No
2

Date:
June 2022

Scale:
NTS

Appendix A

Site Photographs



Photograph 1: Excavation at TP03.



Photograph 2: Excavated materials from TP03.



Photograph 3: Excavation at TP05.



Photograph 4: Excavated materials from TP05.

Phoenix Wharf, Port Talbot



Photograph 5: Excavation at TP12.



Photograph 6: Excavated materials from TP13.

Phoenix Wharf, Port Talbot



Photograph 7: Excavation at TP14.



Photograph 8: WS01 0-5.0mbgl.



Photograph 9: WS02 materials.



Photograph 10: WS03A materials.



Photograph 11: WS06 materials.

Appendix B

Exploratory Hole Logs



Borehole Log

Borehole No.

BH01

Sheet 1 of 2

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
CP

Location: Port Talbot

Level: mbgl

Scale
1:53

Client: LanzaTech

Dates: 04/04/2022 - 07/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.20 - 1.20	1B			0.20			Dark grey mottled dark brown very gravelly SAND. Gravel of vesicular slag and concrete (MADE GROUND).	1
									Dark grey mottled black gravelly silty SAND with occasional silt lenses. Gravel of slag, mudstone and rare brick fragments (MADE GROUND).	
		1.20	C	N=8 (1,2/2,2,2,2)	Water=0.60m	1.20			Loose dark grey and black mottled gravelly silty SAND. Gravel of fine to medium angular mudstone? (TIDAL FLAT DEPOSITS)	2
		1.20 - 2.20	2B							
		2.20	C	N=9 (1,2/1,2,2,4)	Water=1.50m	2.20			Very soft dark grey slightly sandy SILT with rare shell fragments. Sand is fine to medium (TIDAL FLAT DEPOSITS).	3
		2.20 - 4.20	3B	10kPa						
		2.5	HV	10kPa						4
		2.5	HV	10kPa						
		3.20	C	N=9 (1,2/2,3,2,2)	Water=2.30m					5
		4.20	S	N=3 (1 for 225mm/3 for 225mm)	Water=2.60m	4.20			Very soft dark grey slightly sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel of fine to coarse, rounded mudstone and sandstone? Cobbles of sub-rounded mudstone (TIDAL FLAT DEPOSITS).	6
		4.20 - 5.00	4B							
		5.00 - 6.40	5B							7
		5.20	C	N=2 (1 for 300mm/2 for 150mm)	Water=2.90m	5.20			Soft dark grey SILT with low cobble content and frequent pockets of plastic black amorphous PEAT and strong organic odour. Cobbles of rounded mudstone? (TIDAL FLAT DEPOSITS).	
		5.5	HV	10kPa						8
		5.5	HV	10kPa						
		6.40 - 6.80	6U							9
		6.40 - 8.10	8B							
		6.80 - 7.00	7D							10
		7.0	HV	10kPa						
		7.0	HV	5kPa						11
		8.10	C	N=11 (1,2/2,2,4,3)	Water=1.60m					
		8.10 - 9.30	9B							12
		9.30 - 9.50	10B			9.30			Silty grey mottled dark grey fibrous PEAT (TIDAL FLAT DEPOSITS).	13
		9.50	C	N=54 (3,5/7,19,13,15)	Water=2.00m	9.50			Dense becoming very dense dark grey, greyish brown and brownish grey mottled gravelly SAND with medium cobble content. Gravels are fine to coarse, sub-rounded to rounded chert and sandstone? Cobbles of	
		9.50 - 11.00	11B							14

Continued on next sheet

Remarks

Terminated at depth due to refusal on bedrock. Groundwater resting at 1.91mbgl after 24 hours.





Borehole Log

Borehole No.

BH01

Sheet 2 of 2

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
CP

Location: Port Talbot

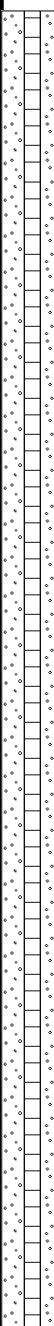
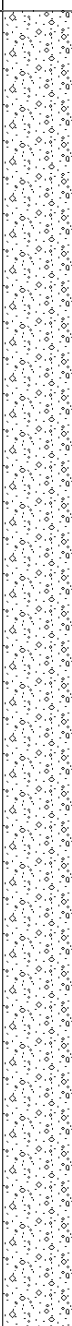
Level: mbgl

Scale
1:53

Client: LanzaTech

Dates: 04/04/2022 - 07/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results	Information						
		11.00	C	N=48 (10,15/48 for 150mm)	Water=2.20m	19.60			rounded sandstone? (ALLUVIAL FAN DEPOSITS?)	11	
		11.00 - 11.60	12B								
		11.60	C	N=37 (16,7/8,9,9,11)	Water=0.50m						
		11.60 - 13.10	13D								12
		13.10	C	N=50 (4,10/50 for 175mm)	Water=0.60m						13
		13.10 - 14.60	14B								
		14.60	C	N=52 (8,13/52 for 105mm)	Water=0.60m						15
		14.60 - 16.10	15B								
		16.10	C	N=50 (12,15/50 for 175mm)	Water=0.60m						16
		16.10 - 17.60	16B								
		17.60	C	N=59 (2,3/59 for 246mm)	Water=0.60m						18
		17.60 - 19.00	17B								
		19.30	C	N=50 (10,11/13,37,0,0)	Water=2.80m						19
		19.30 - 19.60	18B								
		19.50	C	N=50 (25 for 18mm/50 for 0mm)	Water=3.10m						20
End of borehole at 19.6 m											

Remarks

Terminated at depth due to refusal on bedrock. Groundwater resting at 1.91mbgl after 24 hours.





Borehole Log

Borehole No.

BH02

Sheet 1 of 3

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
CP

Location: Port Talbot

Level: mbgl

Scale
1:53

Client: LanzaTech

Dates: 04/04/2022 - 11/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.00 - 0.10	2D						Dark brown and black mottled slightly gravelly SAND with low cobble content and rare rootlets. Gravel of slag and clinker. Cobbles of slag (MADE GROUND).	
		0.00 - 0.50	1B							
		1.00	C	N=14 (1,3/3,4,3,4)		1.00			Soft dark brown mottled black slightly sandy SILT with occasional pockets of black fibrous peat and rare brick boulders (MADE GROUND).	1
		1.00 - 1.10	4D							
		1.00 - 1.50	3B							
		1.1	HV	30kPa						2
		2.00	C	N=10 (2,3/3,3,2,2)						
		3.00	S	N=1 (1,0/0,0,0,1)		3.00			Very soft dark grey slightly sandy SILT. Sand is fine to medium (TIDAL FLAT DEPOSITS).	3
		3.00 - 3.10	6D							
		3.00 - 3.50	5B							
		3.2	HV	5kPa					Firm dark grey fibrous PEAT (TIDAL FLAT DEPOSITS).	4
		3.80 - 4.00	7B			3.80				
		3.90 - 4.00	8D							
		4.00	S	N=0 (1,0/0,0,0,0)					Firm grey mottled brown CLAY with occasional pockets of soft greyish brown SILT (TIDAL FLAT DEPOSITS).	5
		4.80 - 4.90	10D			4.80				
		4.80 - 5.00	9B							
		5.00	S	N=5 (1,1/2,1,1,1)						6
		6.50 - 7.10	11U							7
		8.00	S	N=3 (1,0/1,1,0,1)		8.00			Very soft greyish brown slightly sandy SILT. Sand is fine to medium (TIDAL FLAT DEPOSITS).	8
		8.00 - 8.50	12B							
		8.50 - 8.60	13D							9
		9.50	S	N=0 (1,0/0,0,0,0)						10
		10.20 - 10.40	14B			10.20				
		10.40 - 10.50	15D							

Continued on next sheet

Remarks

Terminated at depth due to refusal on bedrock. Groundwater resting at 3.95mbgl after 24 hours.





Borehole Log

Borehole No.

BH02

Sheet 2 of 3

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
CP

Location: Port Talbot

Level: mbgl

Scale
1:53

Client: LanzaTech

Dates: 04/04/2022 - 11/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		11.00 - 11.60	16U			13.50			pseudo-fibrous PEAT with strong organic odour (TIDAL FLAT DEPOSITS).	11
		12.00 - 12.50	17B							12
		12.50	S	N=7 (0,0/0,1,3,3)						13
		13.50 - 13.90	18B							14
		14.00	C	N=26 (6,6/5,6,7,8)						15
		15.50	C	N=32 (7,8/10,7,7,8)						16
		17.00	C	N=34 (4,8/7,7,10,10)						17
		17.00 - 17.50	19B							18
		18.50	C	N=50 (10,11/12,11,13,14)						19
		19.00 - 19.50	20B							20
		20.00	C	N=33 (11,11/8,8,8,9)						
Continued on next sheet										

Remarks

Terminated at depth due to refusal on bedrock. Groundwater resting at 3.95mbgl after 24 hours.





Borehole Log

Borehole No.

BH02

Sheet 3 of 3

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
CP

Location: Port Talbot

Level: mbgl

Scale
1:53

Client: LanzaTech

Dates: 04/04/2022 - 11/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		21.50	C	N=50 (18,7/50 for 225mm)						21
		21.50 - 22.00	21B							22
		23.00	C	N=50 (19,6/50 for 225mm)						23
		24.30 - 24.50	22B							24
		24.50	C	N=50 (25 for 75mm/50 for 0mm)		24.50			End of borehole at 24.5 m	25
										26
										27
										28
										29
										30
										31

Remarks

Terminated at depth due to refusal on bedrock. Groundwater resting at 3.95mbgl after 24 hours.





Borehole Log

Borehole No.

BH03

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
CP

Location: Port Talbot

Level: mbgl

Scale
1:53

Client: LanzaTech

Dates: 11/04/2022 - 12/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.00 - 1.00	1D						Dark brown mottled black gravelly SAND with rare rootlets and low cobble content. Gravel of vesicular slag, brick and rare concrete. Cobbles of brick (MADE GROUND).	1
		1.00		N=26 (1,2/4,4,8,10)						
		1.00 - 2.00	2D							
		2.00		N=2 (1 for 375mm/2 for 75mm)		2.00				2
		2.00 - 3.00	3D						Very loose becoming medium-dense dark brown and greyish brown mottled fine to medium SAND (BLOWN SAND).	
		3.00		N=13 (1,1/2,3,3,5)						3
		3.00 - 4.00	4D							
		4.00		N=23 (2,4/6,5,6,6)						4
		4.00 - 5.00	5D							
		5.00		N=18 (3,3/4,4,4,6)						5
		5.00 - 6.00	6D							6
						6.50				7
									End of borehole at 6.5 m	8
										9
										10

Remarks

Terminated at depth due to saturated sands undermining rig stability.





Borehole Log

Borehole No.

BH03A

Sheet 1 of 2

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
CP

Location: Port Talbot

Level: mbgl

Scale
1:53

Client: LanzaTech

Dates: 12/04/2022 - 19/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.00 - 1.20	1D						Medium dense yellow brown SAND with rare rootlets. Sand is fine to medium (BLOWN SAND).	
		1.20	S	N=11 (1,2/2,2,3,4)						1
		1.20 - 2.20	2D							
		2.20	C	N=14 (1,0/2,3,5,4)		2.50				2
		2.20 - 3.20	3D							
		3.20	C	N=1 (1 for 225mm/1 for 225mm)					Soft dark grey slightly sandy slightly gravelly CLAY with a single brick cobble. Sand is fine to coarse. Gravel is fine to medium sub-angular to sub-rounded mudstone? (TIDAL FLAT DEPOSITS).	3
		3.20 - 4.20	4D							
		4.20	C	N=36 (1,3/8,10,9,9)		4.20			Soft dark grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse sub-rounded various lithologies (TIDAL FLAT DEPOSITS).	4
		4.20 - 5.20	5D							
		5.20 - 5.65	6U			5.20			Very soft to soft dark grey slightly sandy CLAY. Sand is fine (TIDAL FLAT DEPOSITS).	5
		5.20 - 6.70	8D							
		5.7	HV	15kPa						6
		5.65 - 5.85	7D							
		6.70	S	N=1 (2 for 225mm/1 for 225mm)						7
		6.7	HV	15kPa						
		6.70 - 8.20	9D							
		8.20 - 9.20	10D							8
		9.20 - 9.65	11U							9
		9.20 - 9.70	12D							
		9.70	S	N=0 (1 for 450mm/0 for 0mm)						
		9.70 - 10.50	13D							10

Continued on next sheet

Remarks

Terminated at depth due to refusal on bedrock. Groundwater resting at 3.42mbgl after 24 hours.





Borehole Log

Borehole No.

BH03A

Sheet 2 of 2

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
CP

Location: Port Talbot

Level: mbgl

Scale
1:53

Client: LanzaTech

Dates: 12/04/2022 - 19/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		10.50 - 10.95	14U			10.50			Plastic dark grey amorphous PEAT with rare wood fragments and strong organic odour (TIDAL FLAT DEPOSITS).	11
		10.50 - 12.00	16D							
		10.95 - 11.20	15D							
		12.00	S	N=8 (2,2/2,2,2,2)		11.90			Plastic dark grey pseudo-fibrous PEAT with strong organic odour (TIDAL FLAT DEPOSITS).	12
		12.00 - 13.50	17D							
		13.50	S	N=1 (1 for 375mm/1 for 75mm)		13.50			Soft dark grey SILT (TIDAL FLAT DEPOSITS).	14
		13.50 - 14.20	18D							
		14.20	19B			14.20			Dense greyish brown gravelly slightly clayey SAND. Sand is fine to coarse. Gravel is fine to coarse sub-angular chert, sandstone and mudstone (ALLUVIAL FAN DEPOSITS?).	15
		14.20	S	N=50 (7,10/50 for 225mm)						
		15.70	C	N=50 (5,10/50 for 252mm)					Very dense brown slightly gravelly SAND with medium cobble content. Sand is medium to coarse. Gravel is fine to coarse sub-rounded sandstone and mudstone. Cobbles of sub-angular to sub-rounded sandstone (ALUVIAL FAN DEPOSITS?).	16
		15.70 - 16.10	20D							
		16.00	C	N=50 (25 for 0mm/50 for 0mm)						
		16.10 - 16.30	21B							
		16.30	C	N=50 (13,7/50 for 256mm)						
		16.30 - 17.30	22D							
		17.30 - 18.30	23D							
		17.80	C	N=50 (8,15/50 for 225mm)						
		18.30 - 19.30	24D							
		20.00	C	N=50 (13,12/50 for 150mm)						20

Remarks

Terminated at depth due to refusal on bedrock. Groundwater resting at 3.42mbgl after 24 hours.





Borehole Log

Borehole No.

BH04

Sheet 1 of 2

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
CP

Location: Port Talbot

Level: mbgl

Scale
1:53

Client: LanzaTech

Dates: 12/04/2022 - 14/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.00 - 0.20	1D			1.20			Very loose yellowish brown fine to medium SAND with frequent rootlets (BLOWN SAND).	1
		1.00 1.00 - 1.20	C 2D	N=3 (1,0/1,0,1,1)	Casing=1.00m					
		2.00	C	N=12 (1,1/2,4,2,4)	Casing=2.00m	4.00			Very loose to loose yellowish brown gravelly SAND. Sand is fine to medium. Gravel is fine to coarse, sub-rounded various lithologies (TIDAL FLAT DEPOSITS).	2
		2.60 - 2.70	3D							
		3.00	C	N=3 (1,0/0,1,1,1)	Casing=3.00m	7.00				3
		4.00 4.00 - 4.20	C 4D	N=4 (1,1/1,1,1,1)	Casing=4.00m				Very loose yellowish brown and greyish brown mottled fine to medium SAND with occasional pockets of soft grey clay (TIDAL FLAT DEPOSITS).	4
		5.00	S	N=0 (1,0/0,0,0,0)	Casing=5.00m	9.00				5
		6.50	C	N=2 (1,1/0,0,1,1)	Casing=6.50m					6
		7.00 - 7.20	5D			10.00			Soft greyish brown SILT (TIDAL FLAT DEPOSITS).	7
		8.00	S	N=4 (1,1/1,1,1,1)	Casing=8.00m					8
		9.00 - 9.20	6D						Firm dark grey mottled brown pseudo-fibrous PEAT with weak organic odour (TIDAL FLAT DEPOSITS).	9
		9.50 - 9.95	7U						Plastic dark grey amorphous PEAT with strong organic odour (TIDAL FLAT	10

Continued on next sheet

Remarks

Terminated at depth due to refusal on bedrock. Groundwater resting at 5.36mbgl after 24 hours.





Borehole Log

Borehole No.

BH04

Sheet 2 of 2

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
CP

Location: Port Talbot

Level: mbgl

Scale
1:53

Client: LanzaTech

Dates: 12/04/2022 - 14/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		11.00	S	N=7 (1,1/2,1,2,2)	Casing=11.00m				DEPOSITS).	11
		11.50 - 11.60	8D							12
		12.50	S	N=1 (2,2/1,0,0,0)	Casing=12.50m					
		13.00 - 13.10	9D			13.00				13
		14.00	S	N=1 (1,1/0,0,0,1)	Casing=14.00m				Very loose becoming dense dark grey mottled brown gravelly SAND with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded various lithologies (ALLUVIAL FAN DEPOSITS?).	14
		15.00	C	N=30 (6,8/8,7,7,8)	Casing=15.00m					15
		15.00 - 15.10	10B							16
		17.00	C	N=46 (8,8/10,12,14,10)	Casing=17.00m					17
		17.70 - 18.00	11B			17.70				18
		18.50	C	N=36 (10,12/10,9,8,9)	Casing=18.50m				Dark grey SANDSTONE recovered as coarse sub-angular gravel (SOUTH WALES MIDDLE COAL MEASURES FORMATION?).	19
		20.00	C	N=50 (25 for 75mm/50 for 25mm)	Casing=20.00m					20
		20.00 - 20.35	12D			20.35			End of borehole at 20.4 m	

Remarks

Terminated at depth due to refusal on bedrock. Groundwater resting at 5.36mbgl after 24 hours.





Borehole Log

Borehole No.

WS01

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 14/04/2022 - 14/04/2022

Logged By
AB

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.40 - 0.60 0.50	1ES PID	0ppmv					Black and dark brown mottled clayey gravelly SAND with a weak organic odour. Gravels of brick, concrete and slag (MADE GROUND).	
		1.00	C	N=11 (3,3/2,3,3,3)						1
		2.00	C	N=3 (1,0/1,1,0,1)					Occasional wood fragments observed.	2
		3.00	C	7 (2,2/3,2,2,)						3
		4.00	C	N=7 (4,2/3,2,2,0)						4
		5.00	C	N=0 (1,0/0,0,0,0)		5.00			End of borehole at 5.0 m	5
										6

Remarks

Groundwater encountered at 2.30mbgl, resting at 1.695mbgl after 24 hours.





Borehole Log

Borehole No.

WS02

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

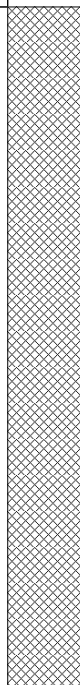
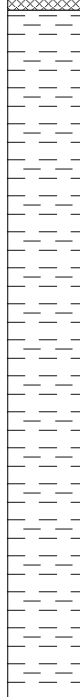
Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 14/04/2022 - 14/04/2022

Logged By
AB

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.20 - 0.80	1ES						Black and dark brown mottled clayey gravelly SAND with gravel of brick, concrete and slag (MADE GROUND).	
		1.00	C	N=14 (4,3/3,4,4,3)					No recovery	1
		2.00	C	N=3 (3,2/2,0,1,0)					Poor recovery	2
		3.00	C	N=2 (1,0/1,0,1,0)		3.00			Soft grey mottled black sandy silty CLAY with occasional rootlets and a weak organic odour. Sand is fine (TIDAL FLAT DEPOSITS).	3
		4.00	C	N=1 (1,0/0,1,0,0)						4
		4.7 4.7 4.7 5.00	HV HV HV C	15kPa 20kPa 20kPa N=7 (1,0/2,1,2,2)					Pocket Penetrometer at 4.70mbgl = 0.50kg/cm ² No recovery	5
						6.00			End of borehole at 6.0 m	6

Remarks

Groundwater encountered at 1.70mbgl.





Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 14/04/2022 - 14/04/2022

Logged By
AB

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
						0.70			Dark brown and black mottled silty gravelly SAND with gravel of brick and corroded metal (MADE GROUND). <u>Frequent rootlets observed</u> <u>Occasional rootlets observed</u>	
									End of borehole at 0.7 m	

Remarks

No groundwater encountered. Terminated at depth due to refusal on gravels and cobbles of slag.





Borehole Log

Borehole No.

WS03a

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 14/04/2022 - 14/04/2022

Logged By
AB

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.20 - 0.60	1ES			0.90			Dark brown mottled grey gravelly SAND with gravel of slag, brick and wood fragments (MADE GROUND).	
		0.50	PID	1ppmv						
		1.00	C	N=13 (1,2/2,4,4,3)					Firm grey slightly sandy CLAY with lenses of loose yellowish brown fine to medium SAND (TIDAL FLAT DEPOSITS).	1
		1.3	HV	35kPa						
		1.3	HV	45kPa						
		1.3	HV	50kPa					Pocket Penetrometer at 1.30mbgl = 1.25kg/cm2	
		1.7	HV	50kPa						
		1.7	HV	50kPa					Pocket Penetrometer at 1.65mbgl = 1.50kg/cm2	
		1.7	HV	55kPa						
		2.00	C	N=4 (1,1/1,1,1,1)						
		2.3	HV	26kPa						
		2.3	HV	32kPa					Pocket Penetrometer at 2.30mbgl = 1.50kg/cm2	
		2.3	HV	40kPa						
		2.7	HV	40kPa						
		2.7	HV	55kPa					Pocket Penetrometer at 2.70mbgl = 1.50kg/cm2	
		2.7	HV	55kPa						
		3.00	C	N=1 (1,0/0,1,0,0)					Poor recovery	3
									Very sandy CLAY	
		4.00	C	N=1 (1,0/0,0,1,0)						4
		5.00	C	N=11 (2,2/3,2,4,2)		5.00			End of borehole at 5.0 m	5
										6

Remarks

No groundwater encountered during drilling. Groundwater resting at 0.55mbgl after 24 hours.





Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 14/04/2022 - 14/04/2022

Logged By
AB

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		1.00	C	N=50 (23,24/50 for 105mm)		1.00			Dark brown and black mottled silty gravelly SAND with gravel of brick (MADE GROUND).	1
									End of borehole at 1.0 m	2
										3
										4
										5
										6

Remarks

Terminated at depth due to refusal on gravels and cobbles of slag/concrete. No groundwater encountered.





Borehole Log

Borehole No.

WS04a

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 14/04/2022 - 14/04/2022

Logged By
AB

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		1.00	C	N=50 (23,24/50 for 115mm)		1.00			Dark brown and black mottled silty gravelly SAND with gravel of brick (MADE GROUND).	1
									End of borehole at 1.0 m	2
										3
										4
										5
										6

Remarks

Terminated at depth due to refusal on gravels and cobbles of slag/concrete. No groundwater encountered.





Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 14/04/2022 - 14/04/2022

Logged By
AB

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.20 - 0.50	1ES						Yellowish brown SAND with frequent rootlets (MADE GROUND).	
						0.60 0.70			Black sandy GRAVEL of slag (MADE GROUND).	
		1.00	C	N=6 (1,2/1,2,1,2)					Loose yellowish brown fine to medium SAND with black staining (BLOWN SAND).	1
		2.00	C	N=1 (1,0/0,0,0,1)						2
		3.00	C	N=1 (1,0/0,0,1,0)		3.00			End of borehole at 3.0 m	3
										4
										5
										6

Remarks

Terminated at depth due to borehole collapse in Blown Sands. No groundwater encountered.





Borehole Log

Borehole No.

WS06

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 14/04/2022 - 14/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.20 - 0.60	1ES			0.13			Light grey CONCRETE. 40% matrix, 45% clasts, 5% voids. Clasts of mudstone, sandstone and quartz. Black gravelly SAND. Gravel of brick and concrete (MADE GROUND).	
		1.00	C	N=1 (1,0/0,0,1,0)		0.95			Very loose greyish brown clayey SAND. Sand is fine to medium (TIDAL FLAT DEPOSITS).	1
		2.00	C	N=0 (1,0/0,0,0,0)		2.20			Soft greyish brown very sandy CLAY. Sand is fine to medium (TIDAL FLAT DEPOSITS).	2
		2.8	HV	10kPa		2.80			Soft grey CLAY (TIDAL FLAT DEPOSITS).	
		2.8	HV	15kPa					Pocket Penetrometer at 2.8mbgl = 0.5kg/cm2	
		2.8	HV	20kPa		3.00			Loose grey fine to medium SAND (TIDAL FLAT DEPOSITS).	3
		3.00	C	N=4 (1,1/1,1,1,1)		3.40			Firm grey mottled brown CLAY with occasional decayed rootlets (TIDAL FLAT DEPOSITS).	
		3.5	HV	30kPa					Pocket Penetrometer at 3.5mbgl = 0.8kg/cm2	
		3.5	HV	30kPa					Pocket Penetrometer at 3.9mbgl = 1.1kg/cm2	
		3.5	HV	35kPa						
		3.9	HV	30kPa						
		3.9	HV	30kPa						
		3.9	HV	35kPa						
		4.00	C	N=9 (1,2/2,3,2,2)						
		4.4	HV	30kPa					Pocket Penetrometer at 4.4mbgl = 1.5kg/cm2	
		4.4	HV	45kPa						
		4.4	HV	50kPa						
		4.8	HV	10kPa					Pocket Penetrometer at 4.8mbgl = 0.5kg/cm2	
		4.8	HV	10kPa		5.00				
		4.8	HV	10kPa						
		5.00	C	N=4 (1,1/1,1,1,1)					End of borehole at 5.0 m	5

Remarks

Groundwater was not encountered during drilling. Groundwater resting at 0.35mbgl after 24 hours.





Borehole Log

Borehole No.

WS07

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 21/04/2022 - 21/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.20 - 0.60	1ES			0.12			Light grey CONCRETE. 40% matrix, 45% clasts, 5% voids. Clasts of mudstone, sandstone and quartz.	
		0.50	PID	0ppmv					Dark grey and black mottled gravelly slightly silty SAND. Gravel of concrete and vesicular slag (MADE GROUND).	
		1.00	C	N=0 (1,1/0,0,0,0)		0.90 0.95			Brown slightly clayey SAND. Sand is fine to medium (MADE GROUND). Black gravelly SAND. Gravel of brick, concrete and slag (MADE GROUND).	1
		2.00	C	N=0 (1,0/0,0,0,0)					Very loose greyish brown slightly clayey SAND. Sand is fine to medium (TIDAL FLAT DEPOSITS).	2
		2.8	HV	7kPa					Poor Recovery	
		3.00	C	N=0 (1,0/0,0,0,0)					Soft grey slightly sandy CLAY lense. Pocket Penetrometer at 2.75m = 0.8kg/cm2	3
		3.7	HV	15kPa					Pocket Penetrometer at 3.7m = 0.5kg/cm2 Soft grey slightly sandy CLAY lense.	
		3.9	HV	20kPa					Pocket Penetrometer at 3.9m = 0.75kg/cm2 Soft grey slightly sandy CLAY lense.	4
		4.00	C	N=0 (1,0/0,0,0,0)						
		4.4	HV	15kPa		4.30			Soft greyish brown CLAY (TIDAL FLAT DEPOSITS).	
		4.4	HV	15kPa						
		4.4	HV	20kPa						
		5.00	C	N=0 (1,0/0,0,0,0)		4.70 5.00			Plastic dark grey and black mottled amorphous PEAT with weak organic odour (TIDAL FLAT DEPOSITS). End of borehole at 5.0 m	5
										6

Remarks

Groundwater was encountered at 2.1mbgl, resting at 0.45mbgl after 1 hour.





Borehole Log

Borehole No.

WS08

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 21/04/2022 - 21/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.40	C	N=0 (50 for 10mm/0 for 0mm)		0.40			Dark brown gravelly SAND with frequent rootlets. Gravel of vesicular slag (MADE GROUND).	
									----- End of borehole at 0.4 m	
										1
										2
										3
										4
										5
										6

Remarks

Groundwater was not encountered. Terminated at depth due to refusal on gravels and cobbles of slag.





Borehole Log

Borehole No.

WS08A

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 21/04/2022 - 21/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.30	C	N=0 (50 for 15mm/0 for 0mm)		0.30			Dark brown gravelly SAND with frequent rootlets. Gravel of vesicular slag (MADE GROUND). ----- End of borehole at 0.3 m	
										1
										2
										3
										4
										5
										6

Remarks

Groundwater was not encountered. Terminated at depth due to refusal on gravels and cobbles of slag.





Borehole Log

Borehole No.

WS10

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

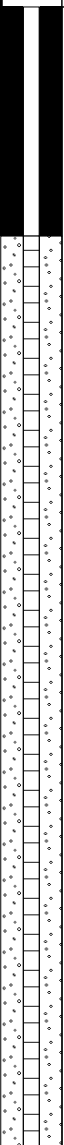
Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 21/04/2022 - 21/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.20	PID	0ppmv		0.40			Brown gravelly SAND with frequent rootlets. Gravel of slag (MADE GROUND).	
									Dark grey and black mottled gravelly SAND. Gravel of clinker, slag, mudstone? and rare concrete (MADE GROUND).	
		1.00	C	N=14 (5,5/5,3,3,3)					No recovery.	1
		2.00	C	N=6 (2,1/2,1,2,1)					Poor recovery.	2
		3.00	C	N=6 (1,1/2,1,2,1)		2.80			Loose locally dense black fine SAND with occasional wood fragments and weak organic odour (TIDAL FLAT DEPOSITS). No recovery.	3
		4.00	C	N=37 (8,0/0,20,13,4)						4
		5.00	C	N=8 (2,2/2,2,2,2)		5.00			End of borehole at 5.0 m	5
										6

Remarks

Groundwater encountered at 2.4mbgl, resting at 1.89mbgl after 1 hour.





Borehole Log

Borehole No.

WS11

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:33

Client: LanzaTech

Dates: 21/04/2022 - 21/04/2022

Logged By
MT

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.20	PID	0ppmv		0.30 0.40 0.60			Dark brown and black mottled gravelly SAND with occasional rootlets. Gravel of slag (MADE GROUND). Yellowish brown mottled greyish brown slightly clayey SAND with rare rootlets. Sand is fine to medium (MADE GROUND). Black gravelly SAND. Gravel of slag and clinker (MADE GROUND). Very loose yellowish brown mottled orangish brown SAND with rare fine chert gravel. Sand is fine to medium (TIDAL FLAT DEPOSITS). <u>No recovery</u>	1
		1.00	C	N=1 (1,0/1,0,0,0)		1.80			Very loose brown mottled greyish brown clayey SAND. Sand is fine to medium (TIDAL FLAT DEPOSITS).	2
		2.00	C	N=4 (1,0/1,0,2,1)		2.80			Soft grey SILT (TIDAL FLAT DEPOSITS).	3
		3.00	C	N=0 (1,0/0,0,0,0)		3.00			Very loose orangish brown fine to medium SAND (TIDAL FLAT DEPOSITS). <u>No recovery</u>	4
		3.40				3.40			Very loose greyish brown fine to medium SAND (TIDAL FLAT DEPOSITS).	5
		4.00	C	N=0 (1,0/0,0,0,0)		5.00			End of borehole at 5.0 m	6
		5.00	C	N=1 (1,0/0,0,0,1)						

Remarks

Groundwater encountered at 2.2mbgl, raising to 1.04mbgl after 1 hour.





Trial Pit Log

Trialpit No
TP01

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

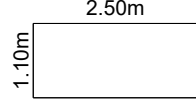
Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

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



Scale
1:25

Client: LanzaTech

Logged
AB

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
▼	0.10	1ES			0.20			Grass and moss over dark brown slightly clayey SAND with frequent rootlets. (MADE GROUND)	1
	0.15	2ES						Loose* pale brown slightly gravelly SAND. Sand is fine to coarse. Gravel of fine sub-rounded chert (TIDAL FLAT DEPOSITS).	
					1.50			End of pit at 1.5 m	2
									3
									4
									5

Remarks: Trial pit terminated due to sidewall collapse. Groundwater encountered at 1.40mbgl. *Density from field observation only.

Stability: Unstable





Trial Pit Log

Trialpit No
TP02

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

Dimensions:
Inclination: °
Orientation: °
Depth: 2.5m



Scale
1:25

Client: LanzaTech

Logged
AB

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
	0.20 - 0.60	1ES						Dark brown and black mottled slightly silty gravelly SAND with low cobble content of brick. Gravel of brick, concrete and occasional wood fragments (MADE GROUND). <i>Frequent roots and rootlets observed</i> <i>Occasional roots and rootlets observed.</i>	1
▼	2.40 - 2.50 2.50	2ES PID	0ppmv		2.50			End of pit at 2.5 m	2 3 4 5

Remarks: Trial pit terminated due to sidewall collapse. Groundwater encountered at 2.30mbgl.

Stability: Unstable





Trial Pit Log

Trialpit No
TP03

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

Dimensions: 3.10m
Inclination: °
Orientation: °
Depth: 2.9m

0.90m

Scale
1:25

Logged
AB

Client: LanzaTech

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
▼	1.20 - 1.80	1ES			0.30			Dark brown gravelly silty SAND with frequent wood fragments and rootlets. Gravel of brick and concrete (MADE GROUND). Frequent roots and rootlets observed.	1
					2.10			Loose* yellowish brown fine to medium SAND with lenses of soft grey sandy silt (TIDAL FLAT DEPOSITS).	2
					2.90			Firm grey, yellow and red mottled slightly sandy CLAY. Sand is fine to medium (TIDAL FLAT DEPOSITS).	3
								End of pit at 2.9 m	4
									5

Remarks: Trial pit terminated due to sidewall collapse. Groundwater encountered at 2.85mbgl. *Density from field observation only.

Stability: Unstable





Trial Pit Log

Trialpit No
TP04

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

Dimensions:
Inclination: °

0.90m

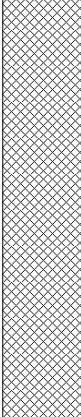
2.90m

Orientation: °
Depth: 1.4m

Scale
1:25

Logged
AB

Client: LanzaTech

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results	Information				
	0.80 - 1.00	1ES					 Dark brown and black mottled gravelly clayey SAND with gravel of brick, concrete and frequent wood fragments (MADE GROUND). <i>Frequent roots and rootlets observed.</i> <i>Occasional roots and rootlets observed.</i>	1
					1.40			2
								3
								4
								5

Remarks: Trial pit terminated due to sidewall collapse. Groundwater encountered at 1.20mbgl

Stability: Unstable





Trial Pit Log

Trialpit No
TP05

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

Dimensions: 2.00m
Inclination: °
Orientation: °
Depth: 1.8m

1.90m

Scale
1:25

Logged
MT

Client: LanzaTech

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results	Information				
▼	0.10 - 0.20	1ES			0.20			Black slightly sandy gravelly SILT with frequent rootlets. Gravel of brick and wood fragments (MADE GROUND).
					1.80			Yellowish brown becoming greyish brown with depth fine to medium SAND (TIDAL FLAT DEPOSITS).
								End of pit at 1.8 m

1

2

3

4

5

Remarks: Trial pit terminated due to sidewall collapse. Groundwater encountered at 1.80mbgl.

Stability: Unstable





Trial Pit Log

Trialpit No
TP06

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

Dimensions:
Inclination: °

2.80m

Orientation: °
Depth: 2.0m

1.70m

Scale
1:25

Logged
AB

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
	1.00 - 2.00	1ES			0.30			Dark brown silty gravelly SAND with frequent wood fragments and rootlets. Gravel of brick and concrete (MADE GROUND).	1
								Loose* yellowish brown fine to medium SAND with lenses of grey sandy silt (TIDAL FLAT DEPOSITS).	
					1.80 2.00			Firm grey, yellow and red mottled slightly sandy CLAY. Sand is fine to medium (TIDAL FLAT DEPOSITS).	
								End of pit at 2.0 m	2
									3
									4
									5

Remarks: Trial pit terminated due to sidewall collapse. No groundwater encountered. *Density from field observation only.

Stability: Unstable





Trial Pit Log

Trialpit No
TP07

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

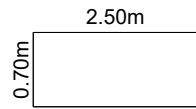
Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

Dimensions:
Inclination: °
Orientation: °
Depth: 1.0m



Scale
1:25

Client: LanzaTech

Logged
AB

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
	0.20 - 0.90	1ES			0.15			Grass over dark brown slightly clayey SAND with frequent rootlets (MADE GROUND).	
								Loose* pale brown fine to medium SAND with occasional rootlets (TIDAL FLAT DEPOSITS).	
					1.00			End of pit at 1.0 m	1
									2
									3
									4
									5

Remarks: Trial pit terminated due to sidewall collapse. No groundwater encountered. *Density from field observation only.

Stability: Unstable





Trial Pit Log

Trialpit No
TP08

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

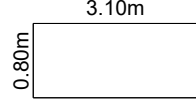
Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

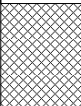
Dimensions:
Inclination: °
Orientation: °
Depth: 0.4m



Scale
1:25

Client: LanzaTech

Logged
AB

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
	0.10 - 0.35 0.20	1ES PID	Oppmv		0.35			Black gravelly silty SAND with frequent rootlets and a low cobble content of slag and brick. Gravel of slag, brick and slate (MADE GROUND).	
								End of pit at 0.4 m	
									1
									2
									3
									4
									5

Remarks: Trial pit terminated at 0.35mbgl on concrete slab. No groundwater encountered.

Stability: Stable





Trial Pit Log

Trialpit No
TP10

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

Dimensions:
Inclination: °

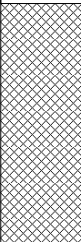
0.75m

2.50m

Orientation: °
Depth: 0.8m

Scale
1:25

Logged
AB

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results	Information				
	0.10 - 0.15 0.15	1ES PID	1ppmv		0.80			Black gravelly slightly silty SAND with a low cobble content of brick and slag. Gravel of slag and clinker with occasional brick and chert (MADE GROUND). <u>Frequent rootlets observed</u>
								End of pit at 0.8 m
								1
								2
								3
								4
								5

Remarks: Trial pit terminated at 0.80mbgl on concrete slab. No groundwater encountered.

Stability: Stable





Trial Pit Log

Trialpit No
TP11

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

Dimensions: 2.50m
Inclination: °
Orientation: °
Depth: 1.3m

0.80m

Scale
1:25

Logged
AB

Client: LanzaTech

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
	0.10 - 0.20	1ES			0.25			Dark brown gravelly silty SAND with frequent wood fragments and rootlets. Gravel of brick and concrete (MADE GROUND).	1
					1.30			Loose* yellowish brown fine to medium SAND with lenses of grey sandy silt (TIDAL FLAT DEPOSITS).	
								End of pit at 1.3 m	2
									3
									4
									5

Remarks: Trial pit terminated due to sidewall collapse. No groundwater encountered. *Density from field observation only.

Stability: Unstable





Trial Pit Log

Trialpit No
TP12

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

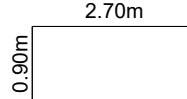
Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

Dimensions:
Inclination: °
Orientation: °
Depth: 2.2m



Scale
1:25

Client: LanzaTech

Logged
AB

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
	0.60 - 1.20	1ES			0.40			Dark brown gravelly silty SAND with frequent wood fragments and rootlets. Gravel of brick and concrete (MADE GROUND).	1
								Grey gravelly SAND with gravel of slag, corroded metal and concrete (MADE GROUND).	
					2.10 2.20			Loose* yellowish brown fine to medium SAND with lenses of grey sandy silt (TIDAL FLAT DEPOSITS). End of pit at 2.2 m	2
									3
									4
									5

Remarks: Trial pit terminated due to sidewall collapse. Groundwater encountered at 2.10mbgl. *Density from field observation only.

Stability: Unstable





Trial Pit Log

Trialpit No
TP13

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

Dimensions:
Inclination: °

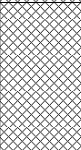
2.40m

Orientation: °
Depth: 2.3m

0.80m

Scale
1:25

Logged
AB

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
▼	0.30				0.30			Dark brown gravelly silty SAND with frequent wood fragments and rootlets. Gravel of brick and concrete (MADE GROUND).	1
								Brown gravelly SAND with gravels of concrete and slag (MADE GROUND).	
	0.80	1ES			0.80			Grey slightly gravelly clayey fine to coarse SAND with gravels of fine to medium angular to sub-angular mudstone (TIDAL FLAT DEPOSITS).	
	1.00	PID	0ppmv						2
					2.30			End of pit at 2.3 m	3
									4
									5

Remarks: Trial pit terminated due to sidewall collapse. Groundwater encountered at 2.30mbgl. *Density from field observation only.

Stability: Unstable





Trial Pit Log

Trialpit No
TP14

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
12/04/2022

Location: Port Talbot

Dimensions:
Inclination: °
Orientation: °
Depth: 2.0m



Scale
1:25

Client: LanzaTech

Logged
MT

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
					0.80			Black gravelly SAND with low cobble content and occasional rootlets. Gravel of brick and wood fragments. Cobbles of brick (MADE GROUND).	1
					2.00			Orangish brown SAND with occasional pockets of greyish brown silt (TIDAL FLAT DEPOSITS).	
								End of pit at 2.0 m	2
									3
									4
									5

Remarks: Trial pit terminated due to sidewall collapse. Groundwater was not encountered.

Stability: Unstable





Trial Pit Log

Trialpit No
TP15

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
13/04/2022

Location: Port Talbot

Dimensions:
Inclination: °
Orientation: °
Depth: 1.4m

0.70m

2.50m

Scale
1:25

Logged
AB

Client: LanzaTech

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results	Information				
	0.80 - 1.20	1ES			1.40			Dark brown gravelly silty SAND with gravel of chert, concrete, metal and wood fragments (MADE GROUND).
								End of pit at 1.4 m

1

2

3

4

5

Remarks: Trial pit terminated due to sidewall collapse. Groundwater encountered at 0.70mbgl.

Stability: Unstable





Trial Pit Log

Trialpit No
TP16

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
13/04/2022

Location: Port Talbot

Dimensions:
Inclination: °
Orientation: °
Depth: 1.4m

0.80m

2.20m

Scale
1:25

Logged
AB

Client: LanzaTech

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
	0.20 - 0.80	1ES						Black gravelly silty SAND with a high cobble content of brick. Gravels of brick and concrete (MADE GROUND).	
					0.90			Loose* pale brown fine to medium SAND with lenses of grey sandy silt.	1
					1.40			End of pit at 1.4 m	2
									3
									4
									5

Remarks: Trial pit terminated due to sidewall collapse. No groundwater encountered. *Density from field observation only.

Stability: Unstable





Trial Pit Log

Trialpit No
TP18

Sheet 1 of 1

Project Name: Phoenix Wharf, Port Talbot

Project No.
2111006.003

Co-ords: -
Level: mbgl

Date
13/04/2022

Location: Port Talbot

Dimensions:
Inclination: °

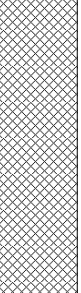
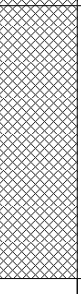
2.40m

Orientation: °
Depth: 1.9m

0.80m

Scale
1:25

Logged
AB

Water Strike	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results	Information					
	0.20 - 1.00	1ES			1.00			Dark brown gravelly silty SAND with gravel of chert, concrete, brick, metal and wood fragments (MADE GROUND).	1
					1.90			Loose* yellowish brown slightly gravelly SAND with lenses of grey sandy clay. Gravel of brick, concrete and slag (MADE GROUND).	2
								End of pit at 1.9 m	3
									4
									5

Remarks: Trial pit terminated due to sidewall collapse. Groundwater encountered at 1.80mbgl. *Density from field observation only.

Stability: Unstable





Appendix C

Geochemical Certificates of Analysis

Amy Butler

Tweedie Evans Consulting Ltd
The Old Chapel
35a Southover
Wells
Somerset
BA5 1UH

t: 01749 677 760
f: 01749 679 345
e:

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

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

Analytical Report Number : 22-53683

Replaces Analytical Report Number: 22-53683, issue no. 1
Additional analysis undertaken.

Project / Site name:	Pheonix Wharf, Port Talbot	Samples received on:	19/04/2022
Your job number:	2111006	Samples instructed on/ Analysis started on:	25/04/2022
Your order number:		Analysis completed by:	10/05/2022
Report Issue Number:	2	Report issued on:	06/06/2022
Samples Analysed:	5 leachate samples - 15 soil samples		


Signed:

Anna Goc
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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: 22-53683
Project / Site name: Phoenix Wharf, Port Talbot

Lab Sample Number				2250035	2250036	2250037	2250038	2250039
Sample Reference				TP01	TP02	TP02	TP03	TP05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.15	0.20	2.40	1.20	0.10
Date Sampled				04/12/2022	04/12/2022	04/12/2022	04/12/2022	04/12/2022
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	< 0.1	26	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	11	9.7	11	11	12
Total mass of sample received	kg	0.001	NONE	0.7	0.5	0.5	0.5	0.5

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile & Amosite	Chrysotile & Amosite	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001	0.186	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001	0.186	-	-
Asbestos Analyst ID	N/A	N/A	N/A	ASE	DSA	DSA	ASE	ASE

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8	7.9	8	8.7	7.8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	2800	1200	-	1500
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.01	0.23	0.18	0.011	0.022
Sulphide	mg/kg	1	MCERTS	430	110	190	6.2	4.8
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.8	3.5	2.7	0.6	5.6

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	1.1	0.51	0.96	0.72
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	1.4	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.51	< 0.05	9.9	2.5
Fluorene	mg/kg	0.05	MCERTS	< 0.05	3.4	< 0.05	9.3	3
Phenanthrene	mg/kg	0.05	MCERTS	1.1	24	1.5	45	29
Anthracene	mg/kg	0.05	MCERTS	0.25	15	0.31	24	8
Fluoranthene	mg/kg	0.05	MCERTS	2.3	27	1.5	45	31
Pyrene	mg/kg	0.05	MCERTS	2.3	18	1.2	43	27
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.8	24	1.1	51	14
Chrysene	mg/kg	0.05	MCERTS	1.6	16	0.88	33	13
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.5	18	0.86	45	12
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.1	6.6	0.56	17	3.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.5	13	0.79	40	9.2
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.1	5.5	0.36	15	5.3
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.34	2.8	< 0.05	5.3	1.5
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.4	5.3	0.47	15	5.3

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	18.4	181	9.99	398	165
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	300	32	13	32
Barium (aqua regia extractable)	mg/kg	1	MCERTS	44	91	250	8.9	340
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.4	1.2	2.2	0.26	1.2
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	0.3	0.9	0.4	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	2.1
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	8.7	70	59	8.7	72
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29	67	81	22	140
Lead (aqua regia extractable)	mg/kg	1	MCERTS	31	260	150	9.7	130
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.7	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	8.1	28	36	8.2	46

Analytical Report Number: 22-53683

Project / Site name: Pheonix Wharf, Port Talbot

Lab Sample Number				2250035	2250036	2250037	2250038	2250039
Sample Reference				TP01	TP02	TP02	TP03	TP05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.15	0.20	2.40	1.20	0.10
Date Sampled				04/12/2022	04/12/2022	04/12/2022	04/12/2022	04/12/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
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	17	120	100	15	93
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	77	460	290	30	230

Monoaromatics & Oxygenates

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

Petroleum Hydrocarbons

TPH C10 - C40 _{EH,CU,1D_TOTAL}	mg/kg	10	MCERTS	-	340	120	-	110
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TPH-CWG - Aliphatic >EC5 - EC6 _{HS,1D,AL}	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS,1D,AL}	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS,1D,AL}	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH,CU,1D,AL}	mg/kg	1	MCERTS	-	< 1.0	3.4	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH,CU,1D,AL}	mg/kg	2	MCERTS	-	9.4	12	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	-	17	18	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	-	38	41	-	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) _{EH,CU+HS,1D,AL}	mg/kg	10	MCERTS	-	66	74	-	< 10

TPH-CWG - Aromatic >EC5 - EC7 _{HS,1D,AR}	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS,1D,AR}	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS,1D,AR}	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH,CU,1D,AR}	mg/kg	1	MCERTS	-	3	1.9	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,1D,AR}	mg/kg	2	MCERTS	-	13	5.2	-	11
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	-	91	< 10	-	41
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	-	150	18	-	60
TPH-CWG - Aromatic (EC5 - EC35) _{EH,CU+HS,1D,AR}	mg/kg	10	MCERTS	-	260	33	-	110

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

Analytical Report Number: 22-53683
Project / Site name: Phoenix Wharf, Port Talbot

Lab Sample Number				2250040	2250041	2250042	2250043	2250044
Sample Reference				TP06	TP07	TP08	TP10	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.20	0.10	0.10	0.10
Date Sampled				04/12/2022	04/12/2022	04/12/2022	04/12/2022	04/12/2022
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	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	17	8.1	9.5	11
Total mass of sample received	kg	0.001	NONE	0.5	0.7	0.5	0.5	0.5

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	Chrysotile & Amosite	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	0.008	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	0.008	-	-
Asbestos Analyst ID	N/A	N/A	N/A	ASE	ASE	DSA	DBU	DBU

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3	8.7	8.1	8.3	8.1
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	1.6	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	240	-	2400	760	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.02	0.0063	0.19	0.13	0.026
Sulphide	mg/kg	1	MCERTS	4.7	1.1	33	38	1.1
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.3	< 0.1	2.2	1.8	1.8

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	0.57	< 0.05	1.3
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.28	< 0.05	0.86	0.3	2.7
Fluorene	mg/kg	0.05	MCERTS	0.23	< 0.05	1	0.33	2.7
Phenanthrene	mg/kg	0.05	MCERTS	4.1	< 0.05	11	3	28
Anthracene	mg/kg	0.05	MCERTS	0.91	< 0.05	2.8	0.84	8.1
Fluoranthene	mg/kg	0.05	MCERTS	4.5	< 0.05	16	4.7	27
Pyrene	mg/kg	0.05	MCERTS	3.8	< 0.05	13	4.3	24
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.5	< 0.05	7.8	2.9	16
Chrysene	mg/kg	0.05	MCERTS	1.6	< 0.05	8.3	2.2	16
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.9	< 0.05	7	2.3	18
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.79	< 0.05	3.2	1.1	4.5
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.7	< 0.05	5.7	1.9	15
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.7	< 0.05	3.5	1.2	6.9
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.21	< 0.05	1.1	0.42	2.1
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.81	< 0.05	3.6	1.4	7.3

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	24	< 0.80	84.5	26.9	180
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	9.3	27	16	18
Barium (aqua regia extractable)	mg/kg	1	MCERTS	18	5.1	380	100	46
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.34	0.17	1.2	0.76	0.33
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	< 0.2	1.1	0.9	0.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	4.8	1.6	1.3
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	11	5.3	140	47	12
Copper (aqua regia extractable)	mg/kg	1	MCERTS	18	7.3	290	67	350
Lead (aqua regia extractable)	mg/kg	1	MCERTS	30	4.7	1300	60	40
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	< 0.3	< 0.3	< 0.3	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10	4.6	130	21	15

Analytical Report Number: 22-53683

Project / Site name: Phoenix Wharf, Port Talbot

Lab Sample Number				2250040	2250041	2250042	2250043	2250044
Sample Reference				TP06	TP07	TP08	TP10	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.20	0.10	0.10	0.10
Date Sampled				04/12/2022	04/12/2022	04/12/2022	04/12/2022	04/12/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
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	17	11	180	52	20
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	41	18	770	120	94

Monoaromatics & Oxygenates

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

Petroleum Hydrocarbons

TPH C10 - C40 _{EH,CU,ID,TOTAL}	mg/kg	10	MCERTS	55	-	560	1400	-
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TPH-CWG - Aliphatic >EC5 - EC6 _{HS,ID,AL}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8 _{HS,ID,AL}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10 _{HS,ID,AL}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12 _{EH,CU,ID,AL}	mg/kg	1	MCERTS	< 1.0	-	< 1.0	3.6	-
TPH-CWG - Aliphatic >EC12 - EC16 _{EH,CU,ID,AL}	mg/kg	2	MCERTS	< 2.0	-	14	86	-
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,ID,AL}	mg/kg	8	MCERTS	< 8.0	-	49	120	-
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,ID,AL}	mg/kg	8	MCERTS	< 8.0	-	230	440	-
TPH-CWG - Aliphatic (EC5 - EC35) _{EH,CU+HS,ID,AL}	mg/kg	10	MCERTS	< 10	-	290	660	-

TPH-CWG - Aromatic >EC5 - EC7 _{HS,ID,AR}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8 _{HS,ID,AR}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10 _{HS,ID,AR}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12 _{EH,CU,ID,AR}	mg/kg	1	MCERTS	< 1.0	-	1.5	1.2	-
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,ID,AR}	mg/kg	2	MCERTS	< 2.0	-	7.7	19	-
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,ID,AR}	mg/kg	10	MCERTS	19	-	38	140	-
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,ID,AR}	mg/kg	10	MCERTS	31	-	120	360	-
TPH-CWG - Aromatic (EC5 - EC35) _{EH,CU+HS,ID,AR}	mg/kg	10	MCERTS	53	-	170	510	-

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

Analytical Report Number: 22-53683
Project / Site name: Phoenix Wharf, Port Talbot

Lab Sample Number				2250045	2250046	2250047	2250048	2250049
Sample Reference				TP12	TP15	TP16	TP17	TP19
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	0.80	0.20	0.20	0.20
Date Sampled				04/12/2022	04/12/2022	04/12/2022	04/12/2022	04/12/2022
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	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	23	31	18	18	10
Total mass of sample received	kg	0.001	NONE	0.5	0.7	0.5	0.5	0.7

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile	Chrysotile	Chrysotile & Amosite	-	Chrysotile
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Detected	Not-detected	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	0.011	0.002	0.001	-	< 0.001
Asbestos Quantification Total	%	0.001	ISO 17025	0.011	0.002	0.001	-	< 0.001
Asbestos Analyst ID	N/A	N/A	N/A	DSA	DSA	DSA	DSA	DSA

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.4	8.2	7.8	8.1	9.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	6.4	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1700	-	770	380	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.083	0.13	0.14	0.066	0.047
Sulphide	mg/kg	1	MCERTS	17	11	10	9.2	27
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.3	6.4	5.8	5	1.6

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	1.9	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.87	< 0.05	0.4
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	3.8	11	66	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	3.2	12	99	0.34
Phenanthrene	mg/kg	0.05	MCERTS	2.2	44	140	950	2.3
Anthracene	mg/kg	0.05	MCERTS	0.57	14	35	220	0.43
Fluoranthene	mg/kg	0.05	MCERTS	3	53	180	1100	3.9
Pyrene	mg/kg	0.05	MCERTS	2.6	54	160	900	2.8
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.8	48	100	530	3.1
Chrysene	mg/kg	0.05	MCERTS	1.4	36	75	520	2.6
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.9	47	68	330	3
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.65	20	50	280	0.85
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.5	44	71	340	1.7
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.79	20	36	130	2.5
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	5.8	11	42	0.69
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.9	23	36	130	5.3

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	17.2	417	992	5630	29.8
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	64	68	19	11
Barium (aqua regia extractable)	mg/kg	1	MCERTS	640	220	390	92	300
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.23	1.1	1.1	0.41	0.84
Boron (water soluble)	mg/kg	0.2	MCERTS	3.9	2.3	1	0.7	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	110	5.2	< 0.2	< 0.2	5
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	140	33	28	12	240
Copper (aqua regia extractable)	mg/kg	1	MCERTS	2200	430	400	120	890
Lead (aqua regia extractable)	mg/kg	1	MCERTS	570	170	520	96	260
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	2	< 0.3	0.6	0.4	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	370	38	72	14	35

Analytical Report Number: 22-53683
Project / Site name: Phoenix Wharf, Port Talbot

Lab Sample Number				2250045	2250046	2250047	2250048	2250049
Sample Reference				TP12	TP15	TP16	TP17	TP19
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	0.80	0.20	0.20	0.20
Date Sampled				04/12/2022	04/12/2022	04/12/2022	04/12/2022	04/12/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
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	19	55	55	22	430
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	1900	360	400	160	720

Monoaromatics & Oxygenates

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

Petroleum Hydrocarbons

TPH C10 - C40 _{EH,CU,ID,TOTAL}	mg/kg	10	MCERTS	250	-	2000	11000	-
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TPH-CWG - Aliphatic >EC5 - EC6 _{HS,ID,AL}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8 _{HS,ID,AL}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10 _{HS,ID,AL}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12 _{EH,CU,ID,AL}	mg/kg	1	MCERTS	1.1	-	< 1.0	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16 _{EH,CU,ID,AL}	mg/kg	2	MCERTS	9.1	-	5.1	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,ID,AL}	mg/kg	8	MCERTS	32	-	< 8.0	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,ID,AL}	mg/kg	8	MCERTS	110	-	73	< 8.0	-
TPH-CWG - Aliphatic (EC5 - EC35) _{EH,CU+HS,ID,AL}	mg/kg	10	MCERTS	160	-	80	< 10	-

TPH-CWG - Aromatic >EC5 - EC7 _{HS,ID,AR}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8 _{HS,ID,AR}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10 _{HS,ID,AR}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12 _{EH,CU,ID,AR}	mg/kg	1	MCERTS	< 1.0	-	1.4	28	-
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,ID,AR}	mg/kg	2	MCERTS	2	-	41	320	-
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,ID,AR}	mg/kg	10	MCERTS	18	-	590	3400	-
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,ID,AR}	mg/kg	10	MCERTS	46	-	1100	6800	-
TPH-CWG - Aromatic (EC5 - EC35) _{EH,CU+HS,ID,AR}	mg/kg	10	MCERTS	66	-	1700	11000	-

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

Analytical Report Number: 22-53683
Project / Site name: Pheonix Wharf, Port Talbot
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

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

Quantitative Analysis

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

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

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

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
2250036	TP02	0.20	109	Loose Fibres	Chrysotile & Amosite	< 0.001	< 0.001
2250037	TP02	2.40	138	Loose Fibres & Loose Fibrous Debris	Chrysotile & Amosite	0.186	0.186
2250042	TP08	0.10	112	Loose Fibres & Loose Fibrous Debris	Chrysotile & Amosite	0.008	0.008
2250045	TP12	0.60	100	Loose Fibres	Chrysotile	0.011	0.011
2250046	TP15	0.80	126	Loose Fibrous Debris	Chrysotile	0.002	0.002
2250047	TP16	0.20	134	Loose Fibres	Chrysotile & Amosite	0.001	0.001
2250049	TP19	0.20	144	Loose Fibres	Chrysotile	< 0.001	< 0.001

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



Analytical Report Number: 22-53683

Project / Site name: Phoenix Wharf, Port Talbot

Lab Sample Number				2250050	2250051	2250052	2250053	2250054
Sample Reference				TP01	TP04	TP09	TP13	TP18
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.80	0.20	0.90	0.20
Date Sampled				04/12/2022	04/12/2022	04/12/2022	04/12/2022	04/12/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	7.7	7.9	8.4	7.9	8
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO ₄	mg/l	0.1	ISO 17025	2.5	6	11.4	90.3	8.8
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Organic Carbon (TOC)	mg/l	0.1	NONE	8.17	4.6	6.09	2.76	5.58

Total Phenols

Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0	3.7	8.5	1.9	6.2
Barium (dissolved)	µg/l	0.05	ISO 17025	12	37	18	47	19
Beryllium (dissolved)	µg/l	0.2	ISO 17025	0.4	0.2	0.4	0.3	0.3
Boron (dissolved)	µg/l	10	ISO 17025	24	25	40	180	52
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	0.12	0.31	< 0.08
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.1	2	2.6	0.8	1.5
Copper (dissolved)	µg/l	0.7	ISO 17025	8.2	2.7	11	25	10
Lead (dissolved)	µg/l	1	ISO 17025	5.3	6.8	8	2.9	9.4
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	4	2.7	5	4.1	4.7
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0	5
Vanadium (dissolved)	µg/l	1.7	ISO 17025	11	5.2	10	< 1.7	5.2
Zinc (dissolved)	µg/l	0.4	ISO 17025	8	8	13	8.1	16

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

Analytical Report Number : 22-53683

Project / Site name: Pheonix Wharf, 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 *
2250035	TP01	None Supplied	0.15	Brown sandy loam with vegetation and gravel
2250036	TP02	None Supplied	0.2	Brown clay and sand with gravel and vegetation.
2250037	TP02	None Supplied	2.4	Brown sandy gravel with stones.
2250038	TP03	None Supplied	1.2	Brown sandy clay with vegetation.
2250039	TP05	None Supplied	0.1	Brown clay and sand with gravel and vegetation.
2250040	TP06	None Supplied	1	Brown sandy clay with vegetation.
2250041	TP07	None Supplied	0.2	Brown sand with vegetation.
2250042	TP08	None Supplied	0.1	Brown sandy clay with gravel.
2250043	TP10	None Supplied	0.1	Brown clay and sand with gravel.
2250044	TP11	None Supplied	0.1	Brown sandy loam with vegetation.
2250045	TP12	None Supplied	0.6	Brown sandy clay.
2250046	TP15	None Supplied	0.8	Brown clay and loam with vegetation and gravel
2250047	TP16	None Supplied	0.2	Brown sandy loam with gravel.
2250048	TP17	None Supplied	0.2	Brown sandy loam with gravel.
2250049	TP19	None Supplied	0.2	Brown sandy clay with gravel.

Analytical Report Number : 22-53683

Project / Site name: Pheonix Wharf, 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
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
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
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	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 leachate	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
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 leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
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
pH at 20oC in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
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

Analytical Report Number : 22-53683

Project / Site name: Pheonix Wharf, 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
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 leachate	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	ISO 17025
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 in leachate	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
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
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
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
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

Analytical Report Number : 22-53683

Project / Site name: Pheonix Wharf, 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
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 : 22-53919

Project / Site name:	Phoneix Wharf Port Talbot	Samples received on:	26/04/2022
Your job number:	2111006 003	Samples instructed on/ Analysis started on:	26/04/2022
Your order number:		Analysis completed by:	12/05/2022
Report Issue Number:	1	Report issued on:	12/05/2022
Samples Analysed:	1 soil sample		


Signed:

Martyna Langer
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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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: 22-53919

Project / Site name: Phoneix Wharf Port Talbot

Lab Sample Number				2251447
Sample Reference				WS07
Sample Number				None Supplied
Depth (m)				0.20-0.70
Date Sampled				21/04/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	22
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	SPU

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	280
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.036
Sulphide	mg/kg	1	MCERTS	12
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	6.4

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	9.3
Acenaphthylene	mg/kg	0.05	MCERTS	0.6
Acenaphthene	mg/kg	0.05	MCERTS	6.5
Fluorene	mg/kg	0.05	MCERTS	5.4
Phenanthrene	mg/kg	0.05	MCERTS	93
Anthracene	mg/kg	0.05	MCERTS	24
Fluoranthene	mg/kg	0.05	MCERTS	110
Pyrene	mg/kg	0.05	MCERTS	120
Benzo(a)anthracene	mg/kg	0.05	MCERTS	78
Chrysene	mg/kg	0.05	MCERTS	75
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	73
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	32
Benzo(a)pyrene	mg/kg	0.05	MCERTS	67
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	40
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	9.3
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	42

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	786
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Analytical Report Number: 22-53919

Project / Site name: Phoneix Wharf Port Talbot

Lab Sample Number				2251447
Sample Reference				WS07
Sample Number				None Supplied
Depth (m)				0.20-0.70
Date Sampled				21/04/2022
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	15
Barium (aqua regia extractable)	mg/kg	1	MCERTS	250
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.91
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5
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	8.6
Copper (aqua regia extractable)	mg/kg	1	MCERTS	140
Lead (aqua regia extractable)	mg/kg	1	MCERTS	17
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	32
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	25
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	47

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	1500
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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	5.4
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	23
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	98
TPH-CWG - Aliphatic (EC5 - EC35) _{EH,CU+HS,1D,AL}	mg/kg	10	MCERTS	130

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	5.1
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,1D,AR}	mg/kg	2	MCERTS	23
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	400
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	770
TPH-CWG - Aromatic (EC5 - EC35) _{EH,CU+HS,1D,AR}	mg/kg	10	MCERTS	1200

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



Analytical Report Number : 22-53919

Project / Site name: Phoneix Wharf 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 *
2251447	WS07	None Supplied	0.20-0.70	Black loam and clay with gravel and clinker

Analytical Report Number : 22-53919

Project / Site name: Phoneix Wharf 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 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
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

Analytical Report Number : 22-53919

Project / Site name: Phoneix Wharf 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
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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 : 22-54703

Replaces Analytical Report Number: 22-54703, issue no. 1
Additional analysis undertaken.

Project / Site name:	Phoenix Wharf, Port Talbot	Samples received on:	21/04/2022
Your job number:	2111006	Samples instructed on/ Analysis started on:	28/04/2022
Your order number:		Analysis completed by:	02/06/2022
Report Issue Number:	2	Report issued on:	07/06/2022
Samples Analysed:	1 leachate sample - 5 soil samples		


Signed:

Anna Goc
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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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: 22-54703
Project / Site name: Phoenix Wharf, Port Talbot

Lab Sample Number				2255199	2255200	2255201	2255202	2255203
Sample Reference				WS01	WS01	WS02	WS05	WS06a
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.60	3.20-3.50	0.20-0.60	0.20-0.60	0.20-0.50
Date Sampled				14/04/2022	14/04/2022	14/04/2022	14/04/2022	14/04/2022
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	20	27	45	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	11	11	6.6	11	25
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4	0.4

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	Chrysotile	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	< 0.001	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	< 0.001	-	-
Asbestos Analyst ID	N/A	N/A	N/A	GFI	GFI	SSZ	GFI	GFI

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	10.6	9	8	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	750	-	1500	160	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.021	0.29	0.28	0.006	0.023
Sulphide	mg/kg	1	MCERTS	21	150	830	2.9	2.2
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.3	1.3	2.6	0.4	-
Total Organic Carbon (TOC) - Manual	%	0.1	MCERTS	-	-	-	-	7.3

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	0.58	1.3	< 0.05	28
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.28	< 0.05	0.61
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.22	< 0.05	12
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.95	< 0.05	10
Phenanthrene	mg/kg	0.05	MCERTS	1.3	0.96	6.9	< 0.05	99
Anthracene	mg/kg	0.05	MCERTS	0.21	< 0.05	1.8	< 0.05	38
Fluoranthene	mg/kg	0.05	MCERTS	1.7	1.1	8.8	< 0.05	100
Pyrene	mg/kg	0.05	MCERTS	1.3	0.88	6.3	< 0.05	120
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.2	0.73	5.5	< 0.05	130
Chrysene	mg/kg	0.05	MCERTS	0.93	0.64	3.9	< 0.05	92
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.87	0.68	3.9	< 0.05	130
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.64	0.29	2.4	< 0.05	43
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.63	0.45	3	< 0.05	110
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.38	0.25	1.6	< 0.05	55
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.62	< 0.05	18
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.29	0.31	1.7	< 0.05	58

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	9.46	6.82	49.1	< 0.80	1040
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Analytical Report Number: 22-54703
Project / Site name: Phoenix Wharf, Port Talbot

Lab Sample Number	2255199	2255200	2255201	2255202	2255203
Sample Reference	WS01	WS01	WS02	WS05	WS06a
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.40-0.60	3.20-3.50	0.20-0.60	0.20-0.60	0.20-0.50
Date Sampled	14/04/2022	14/04/2022	14/04/2022	14/04/2022	14/04/2022
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	32	52	31	13	12
Barium (aqua regia extractable)	mg/kg	1	MCERTS	220	200	270	13	170
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	1.5	2.1	0.19	0.81
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	1.2	0.8	< 0.2	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	3	< 0.2	1.5	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	99	240	31	6.6	6.8
Copper (aqua regia extractable)	mg/kg	1	MCERTS	56	54	180	33	60
Lead (aqua regia extractable)	mg/kg	1	MCERTS	270	560	120	10	19
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	45	28	34	6.2	28
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	320	240	51	15	23
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	550	890	260	38	31

Monoaromatics & Oxygenates

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

Petroleum Hydrocarbons

TPH C10 - C40 _{EH, CU, ID, TOTAL}	mg/kg	10	MCERTS	37	-	75	22	-
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TPH-CWG - Aliphatic >EC5 - EC6 _{HS, ID, AL}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8 _{HS, ID, AL}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10 _{HS, ID, AL}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12 _{EH, CU, ID, AL}	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16 _{EH, CU, ID, AL}	mg/kg	2	MCERTS	< 2.0	-	< 2.0	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21 _{EH, CU, ID, AL}	mg/kg	8	MCERTS	< 8.0	-	< 8.0	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35 _{EH, CU, ID, AL}	mg/kg	8	MCERTS	< 8.0	-	< 8.0	< 8.0	-
TPH-CWG - Aliphatic (EC5 - EC35) _{EH, CU+HS, ID, AL}	mg/kg	10	MCERTS	< 10	-	< 10	< 10	-

TPH-CWG - Aromatic >EC5 - EC7 _{HS, ID, AR}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8 _{HS, ID, AR}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10 _{HS, ID, AR}	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12 _{EH, CU, ID, AR}	mg/kg	1	MCERTS	< 1.0	-	2	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16 _{EH, CU, ID, AR}	mg/kg	2	MCERTS	5.3	-	6.6	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21 _{EH, CU, ID, AR}	mg/kg	10	MCERTS	12	-	27	< 10	-
TPH-CWG - Aromatic >EC21 - EC35 _{EH, CU, ID, AR}	mg/kg	10	MCERTS	20	-	39	17	-
TPH-CWG - Aromatic (EC5 - EC35) _{EH, CU+HS, ID, AR}	mg/kg	10	MCERTS	37	-	75	22	-

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



Analytical Report Number: 22-54703
Project / Site name: Phoenix Wharf, Port Talbot
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

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

Quantitative Analysis

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

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

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

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
2255201	WS02	0.20-0.60	116	Loose Fibres	Chrysotile	< 0.001	< 0.001

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



Analytical Report Number: 22-54703

Project / Site name: Phoenix Wharf, Port Talbot

Lab Sample Number				2255204
Sample Reference				WS03a
Sample Number				None Supplied
Depth (m)				0.20-0.60
Date Sampled				14/04/2022
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status	

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	8
Total Cyanide	µg/l	10	ISO 17025	< 10
Sulphate as SO ₄	mg/l	0.1	ISO 17025	14.5
Sulphide	µg/l	5	NONE	< 5.0
Total Organic Carbon (TOC)	mg/l	0.1	NONE	9.58

Total Phenols

Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1	ISO 17025	1.2
Barium (dissolved)	µg/l	0.05	ISO 17025	160
Beryllium (dissolved)	µg/l	0.2	ISO 17025	0.2
Boron (dissolved)	µg/l	10	ISO 17025	65
Cadmium (dissolved)	µg/l	0.08	ISO 17025	1.6
Chromium (dissolved)	µg/l	0.4	ISO 17025	3.5
Copper (dissolved)	µg/l	0.7	ISO 17025	19
Lead (dissolved)	µg/l	1	ISO 17025	4.1
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	3.6
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	12

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

Analytical Report Number : 22-54703

Project / Site name: Phoenix Wharf, 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 *
2255199	WS01	None Supplied	0.40-0.60	Brown loam and clay with gravel and stones.
2255200	WS01	None Supplied	3.20-3.50	Brown clay and sand with gravel and stones.
2255201	WS02	None Supplied	0.20-0.60	Brown loam and clay with gravel and stones.
2255202	WS05	None Supplied	0.20-0.60	Brown sandy clay with gravel and vegetation.
2255203	WS06a	None Supplied	0.20-0.50	Brown clay and sand with gravel.

Analytical Report Number : 22-54703

Project / Site name: Phoenix Wharf, 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
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
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
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	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 leachate	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
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 leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
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
pH at 20oC in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
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

Analytical Report Number : 22-54703

Project / Site name: Phoenix Wharf, 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
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 leachate	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	ISO 17025
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 in leachate	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
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
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
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
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
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.

Analytical Report Number : 22-54703

Project / Site name: Phoenix Wharf, 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
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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

Sample Deviation Report



Analytical Report Number : 22-54703

Project / Site name: Phoenix Wharf, Port Talbot

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

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS01	None Supplied	S	2255199	c	Sulphide in soil	L010-PL	c
WS01	None Supplied	S	2255199	c	Total cyanide in soil	L080-PL	c
WS01	None Supplied	S	2255200	c	Sulphide in soil	L010-PL	c
WS01	None Supplied	S	2255200	c	Total cyanide in soil	L080-PL	c
WS02	None Supplied	S	2255201	c	Sulphide in soil	L010-PL	c
WS02	None Supplied	S	2255201	c	Total cyanide in soil	L080-PL	c
WS05	None Supplied	S	2255202	c	Sulphide in soil	L010-PL	c
WS05	None Supplied	S	2255202	c	Total cyanide in soil	L080-PL	c
WS06a	None Supplied	S	2255203	c	Sulphide in soil	L010-PL	c
WS06a	None Supplied	S	2255203	c	Total cyanide in soil	L080-PL	c

**Mitchell Tucker**

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Analytical Report Number : 22-57758

Project / Site name:	Phoenix Wharf, Port Talbot	Samples received on:	12/05/2022
Your job number:		Samples instructed on/ Analysis started on:	12/05/2022
Your order number:	2111006 003	Analysis completed by:	25/05/2022
Report Issue Number:	1	Report issued on:	01/06/2022
Samples Analysed:	10 water samples		

Martyna Langer
Signed:

Martyna Langer
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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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: 22-57758

Project / Site name: Phoenix Wharf, Port Talbot

Your Order No: 2111006 003

Lab Sample Number				2272222	2272223	2272224	2272225	2272226
Sample Reference				BH01	BH02	BH03 A	BH04	WS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				10/05/2022	10/05/2022	10/05/2022	10/05/2022	10/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

pH	pH Units	N/A	ISO 17025	7.3	7	6.8	7.2	7.8
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	1300	2200	4500	5400	1100
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO4	µg/l	45	ISO 17025	176000	149000	411000	142000	833000
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	54
Chloride	mg/l	0.15	ISO 17025	460	990	1500*	2100*	22
Ammoniacal Nitrogen as NH4	µg/l	15	ISO 17025	2300	2200	2200	4400	27
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	3.64	3.56	2.63	8.25	3.94

Total Phenols

Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	3.92
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.75
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.76
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	2.51
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	7.58
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	1.46
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	6.28
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	4.5
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	3.21
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	4.09
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	4
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	1.44
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	2.35
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	1.27
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.53
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	1.47

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	< 0.16	46.1
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Analytical Report Number: 22-57758

Project / Site name: Phoenix Wharf, Port Talbot

Your Order No: 2111006 003

Lab Sample Number				2272222	2272223	2272224	2272225	2272226
Sample Reference				BH01	BH02	BH03 A	BH04	WS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				10/05/2022	10/05/2022	10/05/2022	10/05/2022	10/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	420	560	650	1000	490
Calcium (dissolved)	mg/l	0.012	ISO 17025	77	38	44	70	200
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.03	0.035	0.072	0.1	0.074
Magnesium (dissolved)	mg/l	0.005	ISO 17025	75	94	89	140	37
Phosphorus (dissolved)	µg/l	20	ISO 17025	233	528	428	544	59.8
Potassium (dissolved)	mg/l	0.025	ISO 17025	36	41	35	74	41
Sodium (dissolved)	mg/l	0.01	ISO 17025	450	810	1000	1100	160

Antimony (dissolved)	µg/l	0.4	ISO 17025	< 0.4	0.5	< 0.4	0.6	2
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.96	1.83	1.11	2.93	4.21
Barium (dissolved)	µg/l	0.06	ISO 17025	52	97	26	96	40
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	0.24	< 0.02	0.04
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	0.4
Cobalt (dissolved)	µg/l	0.2	ISO 17025	2.9	3.9	3.5	3.4	12
Copper (dissolved)	µg/l	0.5	ISO 17025	0.7	< 0.5	0.7	< 0.5	1.8
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	5.7
Manganese (dissolved)	µg/l	0.05	ISO 17025	1400	3000	4400	3300	5200
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	2.7	0.39	0.17	3.2	71
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.6	6.3	3.2	4.1	14
Selenium (dissolved)	µg/l	0.6	ISO 17025	2.6	5.3	7.8	7.8	1.2
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	< 0.20	< 0.20	0.41
Vanadium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.8	0.3	1.2	6.4
Zinc (dissolved)	µg/l	0.5	ISO 17025	2.7	6	3.9	1.5	5.8

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0



Analytical Report Number: 22-57758

Project / Site name: Phoenix Wharf, Port Talbot

Your Order No: 2111006 003

Lab Sample Number	2272222	2272223	2272224	2272225	2272226
Sample Reference	BH01	BH02	BH03 A	BH04	WS01
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled	10/05/2022	10/05/2022	10/05/2022	10/05/2022	10/05/2022
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

Mineral Oil (C10 - C40) EH_ID_AL_#1_#2_MS	µg/l	10	NONE	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Diesel Range Organics (C10 - C25) EH_ID_TOTAL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	290

TPH1 (C10 - C40) EH_ID_TOTAL_#1_#2	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	370
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TPH2 (C6 - C10) HS_ID_TOTAL	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
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TPH-CWG - Aliphatic >C5 - C6 HS_ID_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8 HS_ID_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10 HS_ID_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12 EH_ID_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16 EH_ID_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21 EH_ID_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35 EH_ID_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35) HS+EH_ID_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7 HS_ID_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8 HS_ID_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10 HS_ID_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12 EH_ID_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	26
TPH-CWG - Aromatic >C12 - C16 EH_ID_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	150
TPH-CWG - Aromatic >C16 - C21 EH_ID_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	120
TPH-CWG - Aromatic >C21 - C35 EH_ID_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	75
TPH-CWG - Aromatic (C5 - C35) HS+EH_ID_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	370

VOCs

Chloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0



Analytical Report Number: 22-57758

Project / Site name: Phoenix Wharf, Port Talbot

Your Order No: 2111006 003

Lab Sample Number				2272222	2272223	2272224	2272225	2272226
Sample Reference				BH01	BH02	BH03 A	BH04	WS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				10/05/2022	10/05/2022	10/05/2022	10/05/2022	10/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0



Analytical Report Number: 22-57758

Project / Site name: Phoenix Wharf, Port Talbot

Your Order No: 2111006 003

Lab Sample Number				2272222	2272223	2272224	2272225	2272226
Sample Reference				BH01	BH02	BH03 A	BH04	WS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				10/05/2022	10/05/2022	10/05/2022	10/05/2022	10/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)				Units	Limit of detection	Accreditation Status		

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	3.9
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	7.1
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.75
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.76
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	2.1
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	2.5
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	7.6
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	1.5
Carbazole	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	0.89
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	6.3
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	4.5
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	3.2
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	4.1
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	4
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	1.4



Analytical Report Number: 22-57758

Project / Site name: Phoenix Wharf, Port Talbot

Your Order No: 2111006 003

Lab Sample Number				2272222	2272223	2272224	2272225	2272226
Sample Reference				BH01	BH02	BH03 A	BH04	WS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				10/05/2022	10/05/2022	10/05/2022	10/05/2022	10/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	2.4
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	1.3
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.53
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	1.5
3&4-Methylphenol	µg/l	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

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

* Result was reported from high dilution and should be interpreted with care



Analytical Report Number: 22-57758

Project / Site name: Phoenix Wharf, Port Talbot

Your Order No: 2111006 003

Lab Sample Number				2272227	2272228	2272229	2272230	2272231
Sample Reference				WS03A	WS06	WS07	WS10	WS11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				10/05/2022	10/05/2022	10/05/2022	10/05/2022	10/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

pH	pH Units	N/A	ISO 17025	7.4	7.2	7.2	7.2	7.1
Electrical Conductivity at 20 °C	µS/cm	10	ISO 17025	560	1800	620	580	660
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO4	µg/l	45	ISO 17025	37000	16600	27200	48500	97600
Sulphide	µg/l	5	NONE	< 5.0	8.9	24	< 5.0	< 5.0
Chloride	mg/l	0.15	ISO 17025	42	520	99	29	22
Ammoniacal Nitrogen as NH4	µg/l	15	ISO 17025	< 15	7400	1200	1000	2200
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	3.53	15.6	4.5	3.1	6.49

Total Phenols

Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	2.93	5.37	0.72	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	6.16	1	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	3.48	3.17	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	9.34	3.13	0.3	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	0.94	70	39.1	1.76	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	23.6	14.2	0.61	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	1.24	50.2	75.9	2	< 0.01
Pyrene	µg/l	0.01	ISO 17025	1.07	58.2	69.9	1.75	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	0.43	26.1	31.5	0.88	< 0.01
Chrysene	µg/l	0.01	ISO 17025	0.46	23	32.4	0.98	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	0.47	17.4	32.4	1.43	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	0.22	7.3	8.86	1.6	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	0.33	14.8	20.5	0.76	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	5.81	7.07	0.37	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	1.96	2.5	0.06	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	6.8	9.67	0.42	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	5.16	327	357	13.6	< 0.16
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Analytical Report Number: 22-57758

Project / Site name: Phoenix Wharf, Port Talbot

Your Order No: 2111006 003

Lab Sample Number				2272227	2272228	2272229	2272230	2272231
Sample Reference				WS03A	WS06	WS07	WS10	WS11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				10/05/2022	10/05/2022	10/05/2022	10/05/2022	10/05/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)				Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	130	610	270	180	220
Calcium (dissolved)	mg/l	0.012	ISO 17025	110	110	110	180	220
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.13	3	2.4	1	0.046
Magnesium (dissolved)	mg/l	0.005	ISO 17025	23	50	33	24	26
Phosphorus (dissolved)	µg/l	20	ISO 17025	286	552	593	138	54.2
Potassium (dissolved)	mg/l	0.025	ISO 17025	5	18	11	8.8	12
Sodium (dissolved)	mg/l	0.01	ISO 17025	19	360	84	42	18

Antimony (dissolved)	µg/l	0.4	ISO 17025	0.9	1.4	1.4	7.3	1.1
Arsenic (dissolved)	µg/l	0.15	ISO 17025	2.91	49.8	18.1	5.59	11.1
Barium (dissolved)	µg/l	0.06	ISO 17025	24	130	89	140	100
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.07	< 0.02	< 0.02	0.04	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.6	< 0.2	< 0.2	< 0.2
Cobalt (dissolved)	µg/l	0.2	ISO 17025	3.1	5.8	5.3	3.2	2.2
Copper (dissolved)	µg/l	0.5	ISO 17025	1.6	0.9	0.7	0.9	< 0.5
Lead (dissolved)	µg/l	0.2	ISO 17025	0.4	0.4	0.2	0.2	0.3
Manganese (dissolved)	µg/l	0.05	ISO 17025	1600	2600	1200	2300	1400
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	17	8.6	15	3	3.5
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.8	2.8	2.9	9.9	2.5
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	6.2	< 0.6	< 0.6	0.6
Tin (dissolved)	µg/l	0.2	ISO 17025	< 0.20	< 0.20	0.21	< 0.20	< 0.20
Vanadium (dissolved)	µg/l	0.2	ISO 17025	1.2	5.6	1.9	1.1	4.6
Zinc (dissolved)	µg/l	0.5	ISO 17025	8.8	1.5	2	8.4	1.6

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0



Analytical Report Number: 22-57758

Project / Site name: Phoenix Wharf, Port Talbot

Your Order No: 2111006 003

Lab Sample Number	2272227	2272228	2272229	2272230	2272231
Sample Reference	WS03A	WS06	WS07	WS10	WS11
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled	10/05/2022	10/05/2022	10/05/2022	10/05/2022	10/05/2022
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

Mineral Oil (C10 - C40) EH_ID_AL_#1_#2_MS	µg/l	10	NONE	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Diesel Range Organics (C10 - C25) EH_ID_TOTAL_#1_#2_MS	µg/l	10	NONE	< 10	1400	3100	11	< 10

TPH1 (C10 - C40) EH_ID_TOTAL_#1_#2	µg/l	10	ISO 17025	< 10	2000	3900	15	< 10
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TPH2 (C6 - C10) HS_ID_TOTAL	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
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TPH-CWG - Aliphatic >C5 - C6 HS_ID_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8 HS_ID_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10 HS_ID_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12 EH_ID_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16 EH_ID_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21 EH_ID_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35 EH_ID_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35) HS+EH_ID_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7 HS_ID_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8 HS_ID_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10 HS_ID_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12 EH_ID_AR_#1_#2_MS	µg/l	10	NONE	< 10	26	43	< 10	< 10
TPH-CWG - Aromatic >C12 - C16 EH_ID_AR_#1_#2_MS	µg/l	10	NONE	< 10	210	300	< 10	< 10
TPH-CWG - Aromatic >C16 - C21 EH_ID_AR_#1_#2_MS	µg/l	10	NONE	< 10	1200	2800	< 10	< 10
TPH-CWG - Aromatic >C21 - C35 EH_ID_AR_#1_#2_MS	µg/l	10	NONE	< 10	530	820	< 10	< 10
TPH-CWG - Aromatic (C5 - C35) HS+EH_ID_AR_#1_#2_MS	µg/l	10	NONE	< 10	2000	3900	< 10	< 10

VOCs

Chloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0