



CrossFlow Energy

ABP Margam Sands

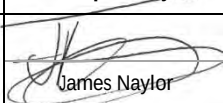
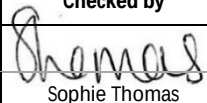
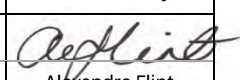
Land Contamination Assessment



This report has been prepared for **CrossFlow Energy** in accordance with the terms and conditions of appointment for **ABP Margam Sands**. Tweedie Evans Consulting Limited (TEC) cannot accept any responsibility for any use of or reliance on the contents by a third party.

ABP Margam Sands

Land Contamination Assessment

ISSUE RECORD					
Report Reference: 2109014.002.01					
Version	Date	Amendments Record	Prepared by	Checked by	Authorised by
-	March 2022	-	 James Naylor	 Sophie Thomas	 Alexandra Flint
Report Liability Date: March 2022					

TEC is ISO 9001:2015 and ISO 14001:2015 certified by Advanced Certification Limited, a UKAS Accredited Certification Body (number 8872) and ISO 45001:2018 certified by QMS International Ltd for the scope of 'Specialist consultancy services across the UK in contaminated land assessment, ground engineering, waste management and construction phase monitoring'.

TEC
The Old Chapel
35a Southover
Wells
Somerset
BA5 1UH
Tel: 01749 677760
Email: info@tecon.co.uk

TABLE OF CONTENTS

1	Introduction.....	1
2	Background Information	2
3	Ground Investigation Methodology.....	4
4	Ground Investigation Findings.....	6
5	Land Contamination - Generic Quantitative Risk Assessment.....	7
6	Land Contamination - Conclusions and Recommendations	10

Figures and Drawings

Figure 1 Site Location Plan

Figure 2 Proposed Development and Exploratory Hole Location Plan

Crossflow Energy Drawing No. PPP Test Site Layout Drawing dated 05 August 2021

Appendices

Appendix A Site Photographs

Appendix B The Coal Authority – Consultants Coal Mining Report

Appendix C Exploratory Hole Logs
- TEC WS01 to WS04

Appendix D Geochemical Certificates of Analysis
- i2 Analytical Report No. 22-45368

Appendix E Generic Quantitative Risk Assessment: Human Health

Appendix F Risk Methodologies and Evaluation

1 INTRODUCTION

1.1 Terms of Reference

- 1.1.1 TEC has been appointed by Dulas Ltd on behalf of CrossFlow Energy Company Ltd (Crossflow Energy) to undertake a land contamination assessment of the site at ABP Margam Sands. All works were undertaken in accordance with our proposal letter dated 28 February 2022 and referenced AF.2109014.002A.

1.2 Background

- 1.2.1 The site currently comprises an irregular shaped parcel of land used for wind turbine demonstrations near the breakwater at Port Talbot Docks, ABP Margam Sands in Neath Port Talbot (Figure 1). The site covers an area of approximately 0.22 hectares, with the centre of the site situated at National Grid Reference 275920, 187430.
- 1.2.2 The proposed development is understood to comprise the construction of a wind turbine and temporary pop-up telecoms mast, alongside its existing older demonstration turbine and associated infrastructure (Crossflow Energy Drawing No. PPP Test Site Layout Drawing dated 05 August).
- 1.2.3 The aim of these works is to provide information on land contamination risk associated with the site with regard to the proposed development.
- 1.2.4 Geotechnical investigations were previously undertaken at the site in 2014 by Ground Investigation (Wales) Limited (Ground Investigation), on behalf of Crossflow Energy, understood to be for the 'proof of concept' Vertical Axis Wind Turbine (VAWT) that is now present on site. These investigations are documented in the following reports;
- VAWT Project, Port Talbot Docks – Factual Geotechnical Letter Report. Prepared by Ground Investigation for Crossflow Energy. Reference P-W.1064-01.01.LetterReport, dated January 2014
 - Port Talbot – Soil Investigation Report (Piezocone Test, Standard Data Interpretation, Seismic Test, Geotechnical Parameters). Prepared by Lankelma for Ground Investigation. Reference 105811-10, dated January 2014.
- 1.2.5 In addition, a desk study was previously undertaken for the proposed new demonstrator wind turbine at the site by TEC, as presented in the following report:
- ABP Margam Sands – Desk Study Report. Prepared by TEC for Crossflow Energy. Reference 2109014.001.01 dated November 2021.
- 1.2.6 The previous desk study assessment identified potential pollutant linkages associated with the proposed development. Therefore, the aim of these works is to provide additional information on land contamination from the results of an intrusive investigation, to update the conceptual site model and assess the potential pollutant linkages.

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 (desk study) based on the findings of an exploratory ground investigation. Generic assessment criteria and assumptions, if appropriate, are used to identify relevant pollutant linkages.
- 1.3.2 The above scope of work has been undertaken in accordance with current guidance such as LCRM - *Land contamination: risk management* (Environment Agency, 2020), BS10175+A2 (2017), BS5930:2015+A1:2020 and, where appropriate, Eurocode 7 and NHBC/ LABC.

2 BACKGROUND INFORMATION

2.1 Summary of Previous Reports

2.1.1 Information for the site has been obtained through a review of the previous factual geotechnical letter report completed by Ground Investigation in 2014 (referenced P-W.1064-01.01.LetterReport); and the desk study undertaken by TEC in November 2021 and referenced 2109014.001.01.

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

Table 2.1: Previous Reports Summary

Ground Investigation Factual Geotechnical Letter Report and Lankelma Soil Investigation Report (2014)	
Scope of Works	A single cable percussive borehole was drilled to a depth of 25m below ground level (bgl) at the position of the proposed wind turbine, between the 27 th and 29 th November 2013. In addition, 3no. piezcone tests (CPTu) and 1no. seismic test were undertaken by Lankelma to a depth of 25m.
Ground Conditions	Ground conditions were recorded to comprise made ground to a depth of 10.5m, consisting of bands of sandy silt with variable fractions of sand and gravel to 4.9m, underlain by silty, gravelly sand with shell fragments and gravel sized fragments of slag. The standard penetration tests (SPTs) undertaken in the borehole suggested the made ground sand deposits below 4.9m generally increased from medium dense to dense. Below the made ground, a succession of typically medium dense (locally dense) brown sand and grey silty sand was recorded to 17.8m, underlain by firm to stiff grey sandy silts and grey silty clays to the depth of the borehole at 25m. Groundwater strikes were recorded at depths between 2.0m and 9.50m, with a standing level subsequently recorded in the installed standpipe at a depth of 6.295mbgl. The report states that continuous groundwater monitoring was due to be undertaken, which had not been completed at the time of issue of the factual report. It was reported that water was added throughout the drilling of the borehole from a depth of 2.0m to counter the effects of "boiling sands".
Geotechnical Design Parameters	Geotechnical parameters of the underlying ground conditions, as derived from the CPTu and seismic tests were provided within the report produced by Lankelma.
TEC Desk Study (2021)	
Site History	The earliest available historic mapping indicated the site remained undeveloped (1877) and was recorded to be situated within an area of sands / sand dunes until 1964, where the area was depicted as rough grass. From 1979 a track/road is depicted along the eastern boundary of the site. No further development was recorded on historical mapping, but it is understood that the site is reclaimed land, based upon the proposed development area being depicted below the high-water mark for ordinary tides until 1965.
Environmental Setting	The geology for the site is reported to comprise superficial deposits of Marine Beach Deposits and Storm Beach Deposits (immediately north), underlain by the South Wales Middle Coal Measures Formation. The South Wales Middle Coal Measures Formation is designated a Secondary A Aquifer and the superficial deposits are designated a Secondary (Undifferentiated) Aquifer. There are no reported groundwater abstractions within 1km, and the site is not reported to be located within an Environment Agency Source Protection Zone. The nearest surface water feature was identified as Swansea Bay, located ~75m south of the site boundary. There are 110. reported discharge consents to Swansea Bay within 500m of the site, the closest being ~110m southeast. In addition, a single pollution incident was recorded ~115m southeast, recorded as chemical paint/dyes incident. No landfills were recorded within 250m of the site, however 2no. recorded licenced waste management facilities were recorded within 250m, both relating to Afan Wastewater Treatment Works (Landfill gas engine). In addition, a number of potentially infilled land (water) areas have been recorded within proximity of the site, including on site. Several 'Points of Interest' have been recorded within 250m of the site boundary, including tanks, outfalls and sewage works across the wider Tata Steel Port Talbot site.

	2no. Integrated Pollutions Prevention and Control (IPPC) notices are recorded approximately 160m east of the site, relating to the Afan Wastewater Treatment Works.
Coal Mining	The site is underlain by the South Wales Middle Coal Measures Formation. A review of available Coal Authority mapping indicated the site to be situated within a Coal Mining Reporting Area and an area designated as a surface coal resource area.
Ground Gas/ Radon	The site was not recorded to be in a radon affected area. The potential historical coal mining in the area, and nearby industrial/contaminative processes, were identified as possible sources of ground gas generation.
Relevant Pollutant Linkages	The relevant potential pollutant linkages identified for the site were recorded as: - Human Health (current and future site users and construction workers) – exposure to contaminants associated with potential made ground and potentially contaminative uses on and in proximity of the site through the ingestion, inhalation and dermal contact pathways; - Controlled Waters – risk to controlled waters from on-site contaminants of potential concern (CoPC) and subsequent migration to identified groundwater receptors; and - Human health (Future site end users and onsite structures) – migration, ingress and inhalation of potential gases that may be associated with made ground and former coal mining activities within the area.

2.2

The Coal Authority – Consultants Coal Mining Report

2.2.1

The previous desk study identified the site to be located within a Coal Mining Reporting Area as designated by the Coal Authority. Therefore, a Consultants Coal Mining Report (ref. 51002948242001) was obtained for the site area to provide information on possible historic/current coal mining on-site and in the surrounding area. The report is presented in Appendix B and summarised below in Table 2.2.

Table 2.2: Coal Mining Report Summary

The Coal Authority	- The Coal Authority report that there are no past underground mining recorded, no possible unrecorded shallow workings, and no spine roadways recorded at shallow depth; - It is reported that there are no mine entries recorded within 100m of the site boundary and no outcrops have been recorded; - There are no geological faults, fissures or breaklines recorded within proximity to the site; - There are no opencast mines or Coal Authority tips reported within 500m of the site boundary; - The Coal Authority report that there are no previous site investigations, remediated sites or coal mining subsidence within 50m of the site boundary; - There are no reported mine gas or mine water treatment schemes within 500m of the site boundary; and - The Coal Authority report that there are no future underground mining, coal mining licensing, court orders or Section 46 notices recorded within 200m of the site boundary.
---------------------------	--

3 GROUND INVESTIGATION METHODOLOGY

3.1 Background

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

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

3.2 Methodology

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

Table 3.1: Summary of Ground Investigation Works

Investigation Method	Location	Date(s)	Location Rationale	Purpose
Window Sample Borehole (Dando Terrier)	WS01 – WS04	10/03/2022	Positioned around proposed development area on site.	Characterise shallow ground conditions Collection of samples for geochemical analysis.

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 C.

3.3 Field Testing

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

Table 3.2: Summary of Field Testing

Field Test	Purpose
Standard Penetration Test (SPT)	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 Chemical Testing

3.4.1 Laboratory testing was scheduled on the basis of the previous desk study and field observations.

3.4.2 Representative soil 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.

3.4.3 Geochemical certificates of analysis are presented Appendix D.

3.5 General Sampling

3.5.1 Samples were collected in accordance with the following guidance;

- BS5930:2015+A1:2020 – Code of practice for ground investigations;
- BS ISO 10175:2011+A2:2017 - Investigation of potentially contaminated sites – Code of practice;
- BS ISO 18400-105 Soil quality – Sampling - Packaging, transport, storage and preservation of samples; and
- BS ISO 18400-106 Soil quality – Sampling - Quality control and quality assurance.

4 GROUND INVESTIGATION FINDINGS

4.1 Introduction

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

Made Ground/ Reclaimed Land

4.1.2 Made ground was encountered across the site to a maximum observed depth of 3.45mbgl, typically comprising grey mottled brown gravelly sand with occasional rootlets to 0.15m and 0.3mbgl, underlain by greyish brown becoming brown silty gravelly sand / slightly gravelly sandy silt. The gravel component was observed as typically comprising siltstone, mudstone, and rare slag.

4.1.3 All window sample borehole locations refused within the made ground at depths between 2.45m and 3.45mbgl, which is considered to be reclaimed land. The depth to natural ground was not proven during these works. Ground Investigation previously recorded the made ground to be 10.5m deep at the site.

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 – 0.25 / 0.3	Grey mottled brown silty gravelly sand with occasional rootlets. Gravel of slag, siltstone and mudstone.
0.25 / 0.3 – 2.45-3.45	Greyish brown becoming brown mottled light brown silty gravelly sand. Gravel of siltstone, mudstone and rare slag.
	<i>WS02 only</i>
0.15 – 0.9	Light grey locally mottled brown slightly gravelly sandy silt. Gravel of siltstone.

4.3 Groundwater

4.3.1 Groundwater was not recorded in any of the locations advanced during the intrusive investigation works to a maximum observed depth of 3.45mbgl.

4.3.2 Ground Investigation previously recorded groundwater strikes at depths between 2.0m and 9.5m, with a resting water level of 6.295m. However, given the proximity of the site to the estuary, it is likely that groundwater beneath the site is tidally influenced and depth to groundwater may therefore vary temporally.

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 concentrations of volatile organic compounds (VOCs) to be less than 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 no exceedances of the GAC and therefore no contaminants of potential concern (CoPC) have been identified within the made ground.
- 5.2.6 However, the laboratory screening for asbestos identified loose fibres (chrysotile) within a single sample of the shallow made ground (WS04 at 0.3-0.4mbgl).

5.3 Controlled Waters

Methodology

- 5.3.1 Leachate analysis has not been undertaken on the sampled made ground/ shallow soils and no groundwater samples have been collected as part of this site investigation, owing to the following;
- No visual or olfactory evidence of significant contamination was noted during the site investigation;
 - No contaminants of potential concern that would be mobile and hazardous in an aqueous environment were recorded within the sampled made ground/ shallow soils;
 - There are no reported groundwater abstractions within 1km, and the site is not reported to be located within an Environment Agency Source Protection Zone.
- 5.3.2 On this basis, no risk to controlled waters from migration of leachable contaminants within the made ground or migration of dissolved phase contaminants to the wider aquifer has been identified. Therefore, these potential pollutant linkages have not been considered further within this assessment.

5.4 Ground Gas

- 5.4.1 The previous desk study report identified potential sources of ground gas in relation to the site, including the potential for made ground and coal workings on site.
- 5.4.2 The investigation works by TEC and previously by Ground Investigation have not identified any evidence of shallow coal workings and the made ground encountered on site was noted to comprise generally reworked natural deposits (sand/ silt) with rare inclusions of slag. A Coal Mining Report obtained for the site also identified no known shallow workings or mine gas emissions in proximity to the site.
- 5.4.3 The potential for off-site sources of ground gas cannot be fully discounted associated with the surrounding reclaimed/ infilled land, steel works and associated infrastructure and sewage treatment plant.
- 5.4.4 However, given the nature of the proposed structures (wind turbine) and the existing structures on site (above ground storage containers/ units and wind turbine), no risk to site users from ground gas entry and accumulation is present. Where any excavations or below ground chambers are present, any potential risks

to construction or maintenance works should be managed accordingly with the usual confined space working risk assessments and safe systems of work.

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 (localised asbestos fibres); and
- Diesel storage tank and electrical substation.

Off Site Sources

- A number of potentially contaminative land uses have been identified in proximity to the site including steel works and associated infrastructure (railway, tanks etc.), reclaimed/ infilled land and sewage treatment plan.

Identified Receptors

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

- Current/future site users;
- Construction workers.

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.
- Potential ingress and accumulation of ground gas where below ground excavations or chambers are proposed.

5.5.5 The updated conceptual model is presented in Table 5.1. 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 F.

Table 5.1: 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 and potentially contaminative processes (diesel storage tank and electrical substation) – on site	Current and future site users and construction workers	Exposure to potential contaminants through ingestion, inhalation and dermal contact.	Medium	Low Likelihood: No visual or olfactory evidence of significant contamination was observed during the investigation works undertaken within the proposed wind turbine area. In addition, no organic contaminants of potential concern have been identified within the underlying made ground. However, loose fibres of asbestos were identified within a single sample (WS04 at 0.3-0.4mbgl) of the made ground on site. The site area is noted to comprise gravel cover, which will mitigate potential risks to site users from exposure to localised asbestos fibres in the underlying shallow soils. Where, ground works/ excavations are undertaken on site, risks to construction workers (and neighbouring site users), should be appropriately managed through CDM.	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	Unlikely: No visual or olfactory evidence of significant contamination was observed during the investigation works and no risk to controlled waters from migration of leachable contaminants within the made ground or migration of dissolved phase contaminants to the wider aquifer has been identified as part of these works.	Low Risk
	Current and future site users, construction workers and proposed development	Migration, ingress and accumulation of ground gasses.	Severe	Unlikely: The encountered made ground is considered unlikely to be a potential source of significant ground gas based on its observed composition (generally reworked natural deposits with no visual evidence of degradable/ putrescible materials noted).	Low Risk
Potentially contaminative processes - off-site	Current and future site users, construction workers, controlled waters and proposed development.	Potential on-site contaminant / ground gas migration from off-site sources. Exposure to potential contaminants through ingestion, inhalation and dermal contact.	Medium to Severe	Unlikely: Potentially contaminative current and historic processes have been identified in proximity to the site. However, laboratory test results, field test data and visual/ olfactory observations during the intrusive investigation suggest no potential on-site contaminant migration from identified off site sources.	Low Risk
Surrounding reclaimed/ infilled land, steel works and associated infrastructure and sewage treatment plant.	Construction workers	Potential on-site ground gas migration	Medium to Severe	Unlikely to Low Likelihood: The potential for off-site sources of ground gas cannot be fully discounted associated with the surrounding reclaimed/ infilled land, steel works and associated infrastructure and sewage treatment plant. However, given the nature of the proposed structures (wind turbine) and the existing structures on site (above ground storage containers/ units and wind turbine), no risk to site users from ground gas entry and accumulation is present. Where any excavations or below ground chambers are present, any potential risks to construction or maintenance works should be managed accordingly with the usual confined space working risk assessments and safe systems of work.	Low 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 both organic and inorganic contaminants to be generally below the relevant GAC for a commercial site end use. However, asbestos fibres have been recorded within a single sample of the made ground (WS04 at 0.3-0.4mbgl).
- 6.1.3 No risk to controlled waters from migration of leachable contaminants within the made ground or migration of dissolved phase contaminants to the wider aquifer has been identified.
- 6.1.4 The potential for off-site sources of ground gas cannot be fully discounted associated with the surrounding reclaimed/ infilled land, steel works and associated infrastructure and sewage treatment plant. However, given the nature of the proposed structures (wind turbine) and the existing structures on site (above ground storage containers/ units and wind turbine), no risk to site users from ground gas entry and accumulation is present.

6.2 Remedial Appraisal

- 6.2.1 No specific remedial measures are considered to be required and the site is considered suitable for the proposed continued commercial end use.
- 6.2.2 Where, ground works/ excavations are undertaken on site, risks to construction workers (and neighbouring site users), should be appropriately managed through CDM, with due consideration to the potential presence of asbestos fibres within the underlying shallow made ground.
- 6.2.3 Where any excavations or below ground chambers are present, any potential risks to construction or maintenance works from possible ground gases should be managed accordingly with the usual confined space working risk assessments and safe systems of work.

6.3 General Considerations

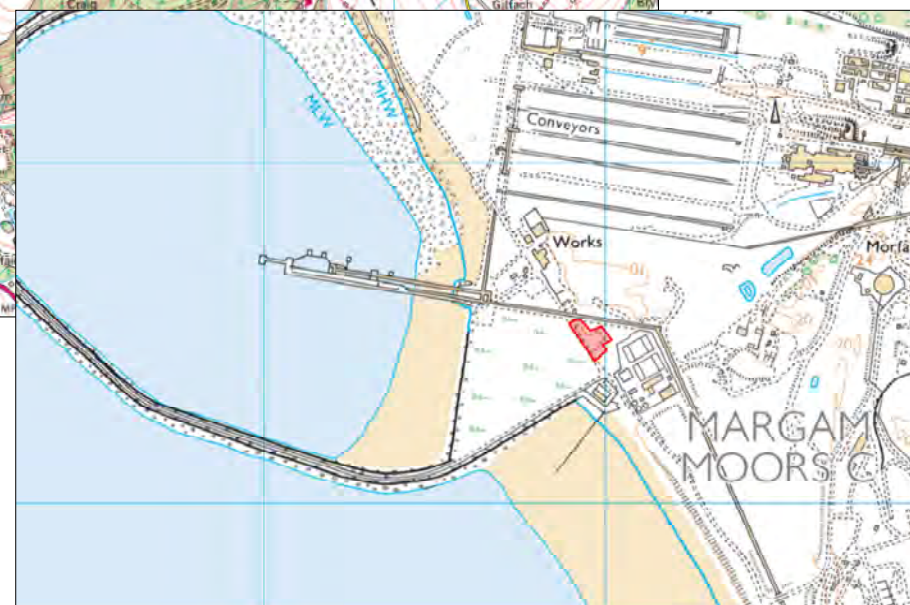
- 6.3.1 Based on our conceptual understanding of the site to-date, it would be anticipated that similar ground conditions to those encountered as part of this assessment exist across the site areas where access has been possible. However, should significant thicknesses of made ground be encountered, or visual or olfactory evidence of potentially significant contamination be identified during the development works, further investigation and assessment may be required.
- 6.3.2 Should water supply pipes be proposed on site, due consideration would need to be given to the UK Water Industry Research Ltd (UKWIR) guidance.

TEC

Figures and Drawings



Approximate Site Location:



Ordnance Survey © Crown Copyright [2022] All rights reserved.
Licence number 100043301



TEC
The Old Chapel
35a Southover
Wells, Somerset
BA5 1UH

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

Site Name:

ABP Margam Sands

Drawing Name:

Site Location Plan

Client Name:

CrossFlow Energy

Project No:

2109014.002

Figure No:

1

Date:

March 2022

Scale:

NTS

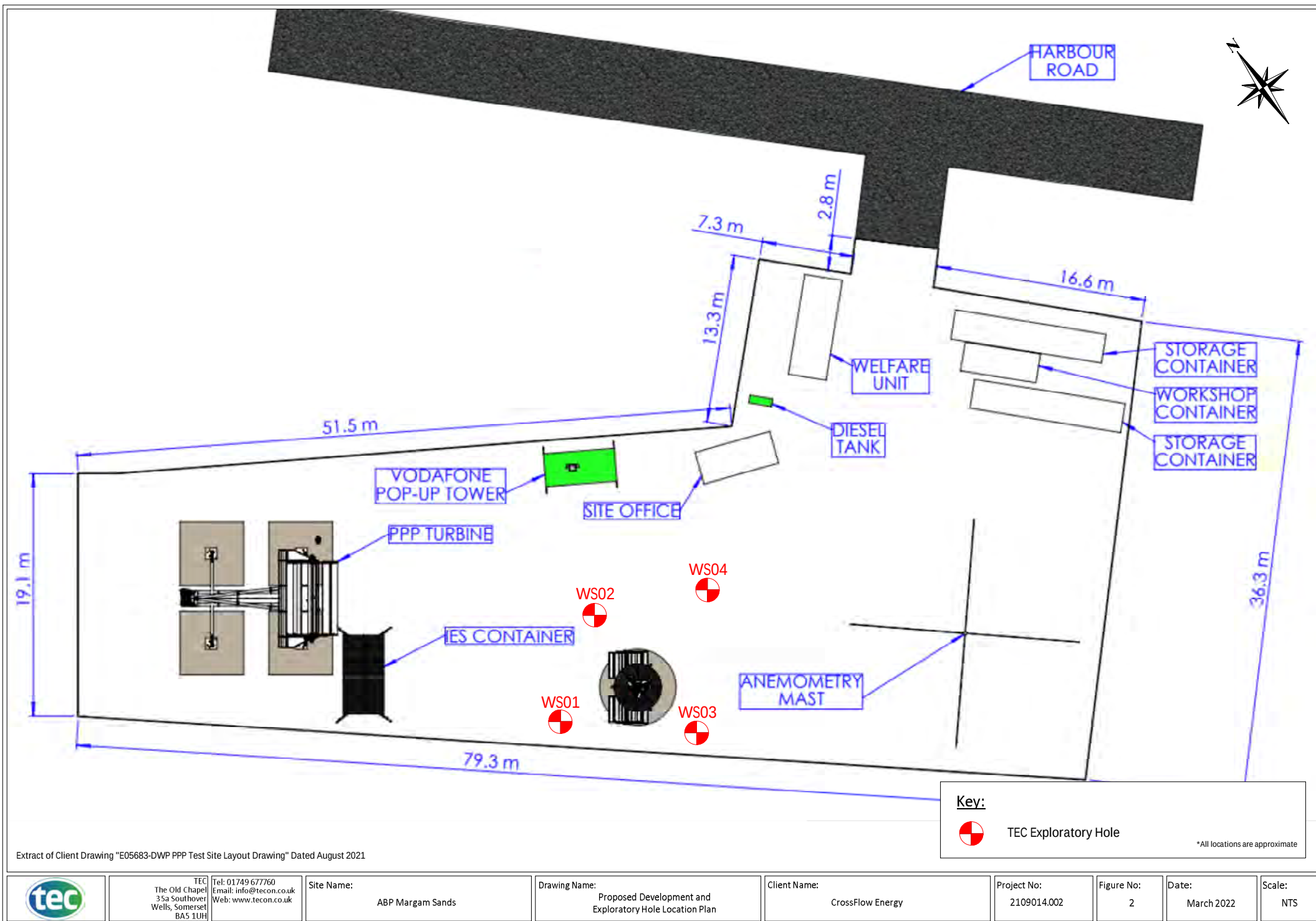
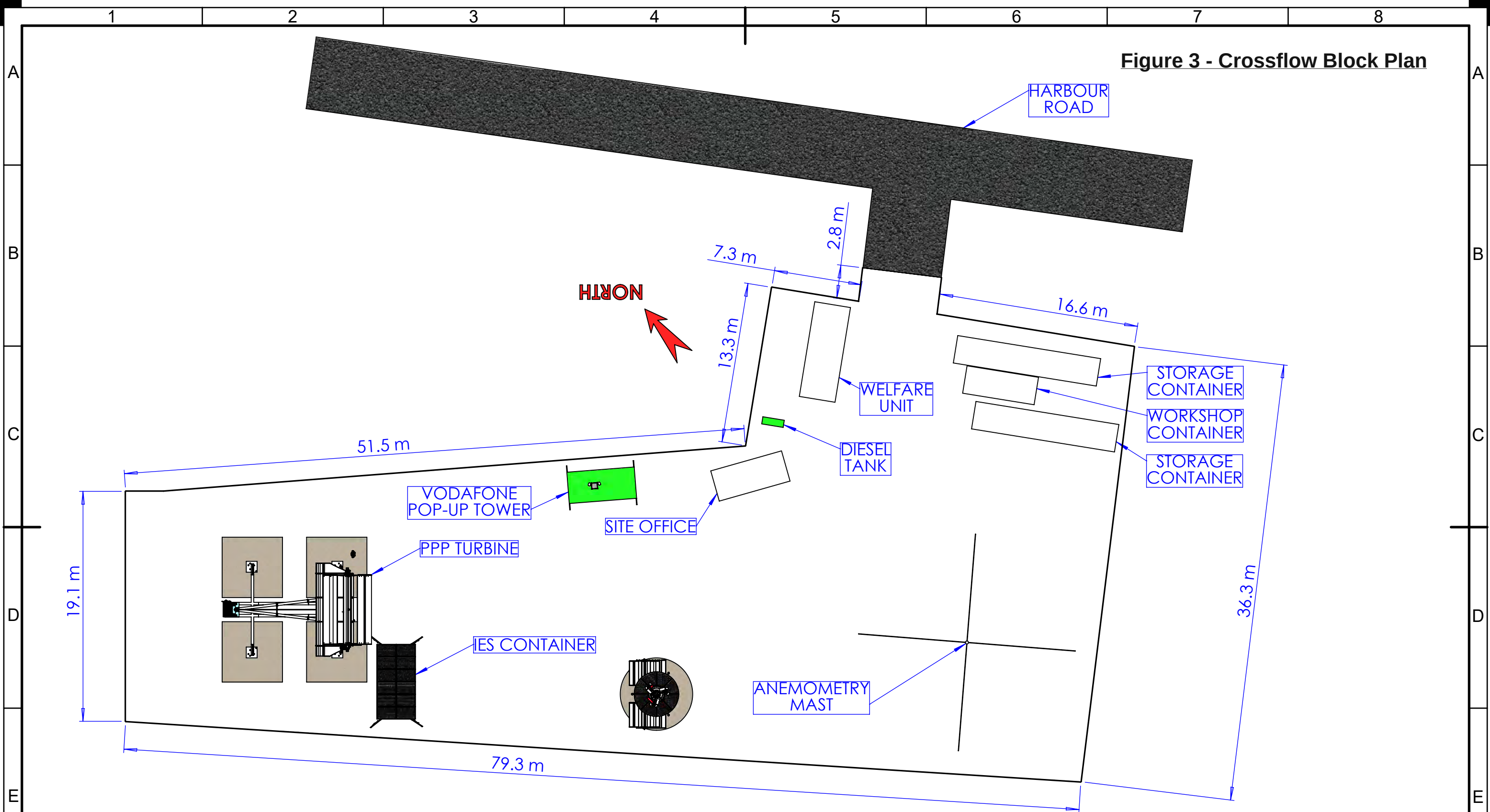


Figure 3 - Crossflow Block Plan



NOTES:-
1. ALL DIMENSIONS ARE APPROXIMATE.
2. SITE AREA 2,300 m² APPROX.

Material: N/A		This drawing and any information or descriptive material set out on it are the confidential and copyright property of Cross-Flow Energy Co. Ltd. © and MUST NOT BE DISCLOSED, COPIED, LOANED in whole or part or used for any purpose without the written permission of Cross-Flow Energy Co. Ltd.	Description: PPP SITE LAYOUT DRAWING - WITH 3.5kW ECOTOWER		
Finish: N/A			Drawn by: N LONG		Drawn Date: 05/08/2021
Unless Otherwise Stated: Linear Tol.: ±0.2 , Angular Tol.: 0°15' Surface Finish: 0.32µm All Dimensions: mm			Checked/Approved by:		Checked/Approved Date:
Drawing Scale: 1:300			Part Number: PPP TEST SITE LAYOUT DRAWING		
Approx Weight: Kg	Drawing Produced In Accordance With: BS8888	Legal Owner:  Baglan Bay Innovation Centre, Energy Park Central Avenue, Port Talbot, SA12 7AX, UK +44 1639 816 020 engr@crossflowenergy.co.uk www.crossflowenergy.co.uk	Drawing Number: PPP TEST SITE LAYOUT DRAWING		
Projection Method: THIRD ANGLE 	Sheet Size: A3		Sheet: 1 of 2	Revision: 4	

Appendix A

Site Photographs

ABP Margam Sands



Photograph 1: General site conditions, looking northwest.



Photograph 2: General site conditions, looking north.

ABP Margam Sands



Photograph 3: General site conditions, looking east.



Photograph 4: Materials recovered WS01, 0.0 – 2.0mbgl.

ABP Margam Sands



Photograph 5: Materials recovered from WS01, 0.0 – 3.0mbgl.



Photograph 6: Materials recovered from WS02, 0.0 – 3.0mbgl.

ABP Margam Sands



Photograph 7: Materials recovered from WS03, 0.0 – 2.0mbgl.



Photograph 8: Materials recovered from WS04, 0.0 – 2.0mbgl.

ABP Margam Sands



Photograph 9: Slag material recovered from WS04.

Appendix B

Coal Authority



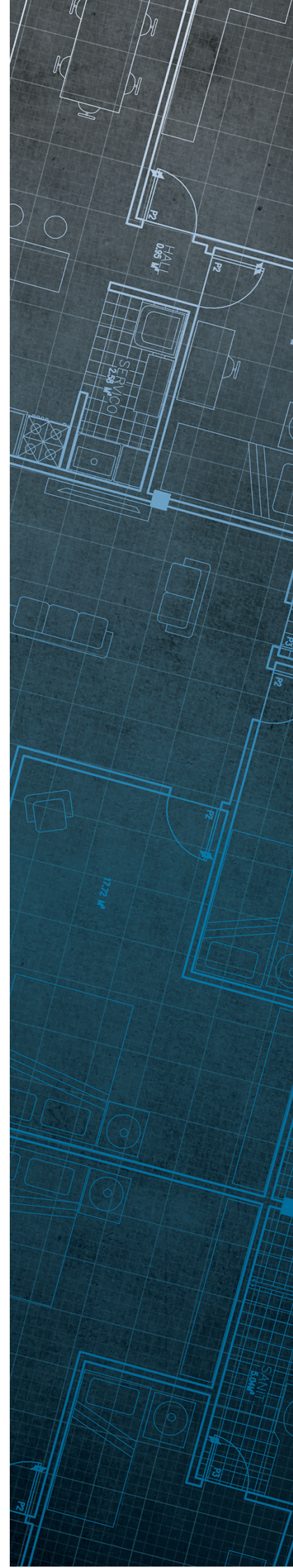
The Coal
Authority

Consultants Coal Mining Report

Associated British Ports
Puckey House
Phoenix Wharf Access Road
Port Talbot
Neath Port Talbot
SA13 1RB

Date of enquiry: 1 March 2022
Date enquiry received: 1 March 2022
Issue date: 1 March 2022

Our reference: 51002948242001
Your reference: 2109014



Consultants

Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

TWEEDIE EVANS CONSULTING LTD

Enquiry address

Associated British Ports
Puckey House
Phoenix Wharf Access Road
Port Talbot
Neath Port Talbot
SA13 1RB

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

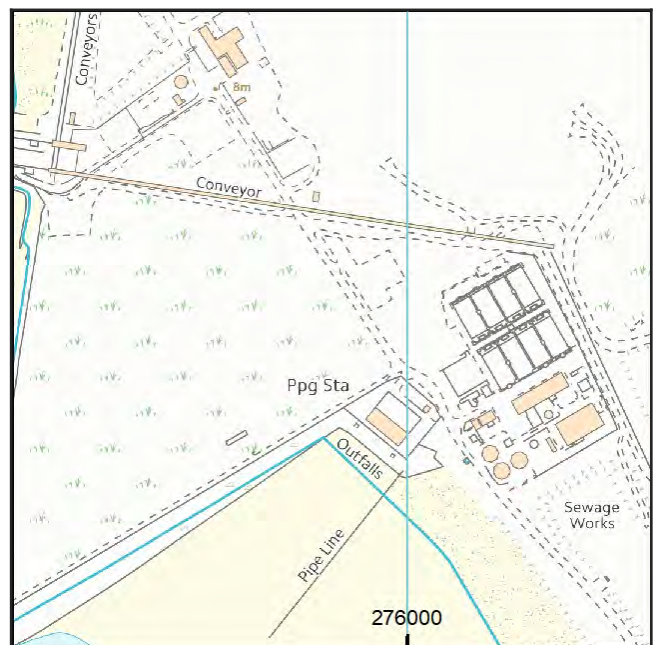
www.groundstability.com

 @coalauthority

 /company/the-coal-authority

 /thecoalauthority

 /thecoalauthority



Approximate position of property



Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right 2018. All rights reserved.

Ordnance Survey Licence number: 100020315

Section 1 – Mining activity and geology

Past underground mining

No past mining recorded.

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers

None available.

Outcrops

No outcrops recorded.

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Section 4 – Further information

Based on the responses in this report, no further information has been highlighted.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk**.

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices

Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land

Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
www.groundstability.com

Appendix C

Exploratory Hole Logs



Borehole Log

Borehole No.

WS01

Sheet 1 of 1

Project Name: ABP Margam Sands, Port Talbot

Project No.
2109014.002

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:22

Client: CrossFlow Energy

Dates: 10/03/2022 - 10/03/2022

Logged By
JN

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
						0.30			MADE GROUND: Grey mottled brown silty gravelly sand with occasional rootlets. Gravel of slag, siltstone and mudstone.	
		0.40 - 0.50	1ES			0.40			MADE GROUND: Dark grey mottled grey gravelly silty fine and medium sand. Gravel of siltstone, slag and mudstone.	
		0.50	PID	0ppmv					<i>DPM layer recorded within recovered material.</i>	
						0.60			MADE GROUND: Grey becoming brown mottled light brown silty gravelly sand. Gravel of siltstone and rare slag.	
		0.80 - 0.90	2D						MADE GROUND: Brown mottled light brown gravelly fine to coarse sand. Gravel of siltstone and rare slag.	1
		0.90	PID	0ppmv						
		1.00	C	N=46 (5,10/11,13,11,11)	Casing=1.00m Water=DRY					
		1.50 - 2.00	3B						<i>Band of sandy angular to subrounded gravel of siltstone.</i>	
		2.00	PID	0ppmv						2
		2.50 - 2.70	4D							
		2.70	PID	0ppmv						
		3.00	C	N=50 (13,12/50 for 255mm)	Casing=1.00m Water=DRY					3
						3.45			End of borehole at 3.5 m	
										4

Remarks

Location terminated upon refusal within made ground.
Groundwater not encountered.
No visual or olfactory evidence of gross contamination.





Borehole Log

Borehole No.

WS02

Sheet 1 of 1

Project Name: ABP Margam Sands, Port Talbot

Project No.
2109014.002

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:22

Client: CrossFlow Energy

Dates: 10/03/2022 - 10/03/2022

Logged By
JN

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.20 - 0.30 0.30	1ES PID	0ppmv		0.15			MADE GROUND: Grey mottled brown silty gravelly sand with occasional rootlets. Gravel of slag, siltstone and mudstone. MADE GROUND: Light grey locally mottled brown slight gravelly sandy silt. Gravel of siltstone. Sand is fine and medium. <i>DPM layer recorded within recovered material.</i>	
		0.80 - 0.90 0.90 1.00	2D PID C	0ppmv N=38 (5,9/10,9,9,10)	Casing=1.00m Water=DRY	0.90			MADE GROUND: Brown mottled light brown silty gravelly fine to coarse sand. Gravel of siltstone, mudstone and rare slag.	1
		3.00	C	N=50 (25 for 135mm/50 for 210mm)	Casing=1.00m Water=DRY	3.45				2 3
									End of borehole at 3.5 m	4

Remarks

Location terminated upon refusal within made ground.
Groundwater not encountered.
No visual or olfactory evidence of gross contamination.





Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project Name: ABP Margam Sands, Port Talbot

Project No.
2109014.002

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:22

Client: CrossFlow Energy

Dates: 10/03/2022 - 10/03/2022

Logged By
JN

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.10 - 0.20	1ES			0.25			MADE GROUND: Grey mottled brown silty gravelly sand with occasional rootlets. Gravel of slag, siltstone and mudstone.	
									MADE GROUND: Greyish brown becoming brown mottled light brown silty gravelly sand. Gravel of siltstone and rare slag. <i>DPM layer recorded within recovered material.</i>	
		1.00	C	N=30 (5,6/6,8,8,8)	Casing=1.00m Water=DRY	0.90			MADE GROUND: Brown mottled light brown silty gravelly fine to coarse sand. Gravel of siltstone, mudstone and rare slag.	1
		1.20 - 1.40	2D							
		1.90 - 2.00 2.00	3D C	N=50 (12,12/50 for 275mm)	Casing=1.00m Water=DRY					2
						2.45			End of borehole at 2.5 m	3
										4

Remarks

Location terminated upon refusal within made ground.
Groundwater not encountered.
No visual or olfactory evidence of gross contamination.





Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: ABP Margam Sands, Port Talbot

Project No.
2109014.002

Co-ords: -

Hole Type
WS

Location: Port Talbot

Level: mbgl

Scale
1:22

Client: CrossFlow Energy

Dates: 10/03/2022 - 10/03/2022

Logged By
JN

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	Information					
		0.30 - 0.40	1ES			0.30			MADE GROUND: Grey mottled brown silty gravelly sand with occasional rootlets. Gravel of slag, siltstone and mudstone.	
						0.45			MADE GROUND: Dark grey mottled grey gravelly silty fine and medium sand. Gravel of siltstone, slag and mudstone. <i>DPM layer recorded within recovered material.</i>	
		0.70 - 1.00	2B			0.70			MADE GROUND: Greyish brown becoming brown mottled light brown silty gravelly sand. Gravel of siltstone and rare slag. <i>Large cobbles of slag.</i>	
		1.00	C	N=37 (5,4/6,8,12,11)	Casing=1.00m Water=DRY				MADE GROUND: Brown mottled light brown gravelly fine to coarse sand. Gravel of siltstone and rare slag.	1
		1.30 - 1.40	3D							
		2.00	C	N=50 (8,9/50 for 265mm)	Casing=1.00m Water=DRY					2
						2.45			End of borehole at 2.5 m	3
										4

Remarks

Location terminated upon refusal within made ground.
Groundwater not encountered.
No visual or olfactory evidence of gross contamination.



Appendix D

Geochemical Certificates of Analysis

**James Naylor**

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

t: 01749 677 760
f: 01749 679 345
e: james.naylor@tecon.co.uk

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

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

Analytical Report Number : 22-45368

Project / Site name:	NPT Site, Port Talbot	Samples received on:	14/03/2022
Your job number:	2109014 002	Samples instructed on/ Analysis started on:	14/03/2022
Your order number:		Analysis completed by:	28/03/2022
Report Issue Number:	1	Report issued on:	28/03/2022
Samples Analysed:	4 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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: 22-45368
Project / Site name: NPT Site, Port Talbot

Lab Sample Number				2203949	2203950	2203951	2203952
Sample Reference				WS01	WS02	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.50	0.20-0.30	0.10-0.20	0.30-0.40
Date Sampled				10/03/2022	10/03/2022	10/03/2022	10/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	41	17
Moisture Content	%	0.01	NONE	5.6	14	5.6	6.7
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	Chrysotile- Loose Fibres
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Detected
Asbestos Analyst ID	N/A	N/A	N/A	NTK	NTK	NTK	NTK

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.6	9.2	9.6	8.4
Electrical Conductivity	µS/cm	10	ISO 17025	250	-	-	-
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0	-	-	-
Free Cyanide	mg/kg	1	MCERTS	< 1.0	-	-	-
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1500	1200	2700	1900
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.12	0.019	0.4	0.17
Sulphide	mg/kg	1	MCERTS	74	2.4	3700	19
Water Soluble Chloride (2:1)	mg/kg	1	MCERTS	36	-	-	-
Ammoniacal Nitrogen as NH ₄	mg/kg	0.5	MCERTS	< 0.5	-	-	-
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.039	-	-	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	3.9	0.2	0.6	3.1

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.5
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.1
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.59
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.46
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.36
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.49
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.34
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.17
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.24
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.1
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.19

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	4.54
-----------------------------	-------	-----	--------	--------	--------	--------	------

Analytical Report Number: 22-45368
Project / Site name: NPT Site, Port Talbot

Lab Sample Number				2203949	2203950	2203951	2203952
Sample Reference				WS01	WS02	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.50	0.20-0.30	0.10-0.20	0.30-0.40
Date Sampled				10/03/2022	10/03/2022	10/03/2022	10/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	4.2	-	-	-
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	25	4.8	4.5	39
Barium (aqua regia extractable)	mg/kg	1	MCERTS	240	33	720	310
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.7	0.32	6.6	2
Boron (water soluble)	mg/kg	0.2	MCERTS	1	0.4	2.8	1.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 4.0	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	33	7.4	18	71
Cobalt (aqua regia extractable)	mg/kg	0.15	MCERTS	12	-	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	55	3.7	11	62
Iron (aqua regia extractable)	mg/kg	40	MCERTS	20000	-	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	37	4.5	3.8	50
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	840	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	1.2	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	25	7.3	2.3	25
Phosphorus (aqua regia extractable)	mg/kg	20	ISO 17025	290	-	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Tin (aqua regia extractable)	mg/kg	1	MCERTS	2.4	-	-	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	43	9.8	37	91
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	97	21	40	120

Calcium (aqua regia extractable)	mg/kg	20	ISO 17025	36000	-	-	-
Magnesium (aqua regia extractable)	mg/kg	20	ISO 17025	8200	-	-	-
Potassium (aqua regia extractable)	mg/kg	20	ISO 17025	2000	-	-	-
Sodium (aqua regia extractable)	mg/kg	20	ISO 17025	570	-	-	-

Monoaromatics & Oxygenates

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

Analytical Report Number: 22-45368
Project / Site name: NPT Site, Port Talbot

Lab Sample Number				2203949	2203950	2203951	2203952
Sample Reference				WS01	WS02	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.50	0.20-0.30	0.10-0.20	0.30-0.40
Date Sampled				10/03/2022	10/03/2022	10/03/2022	10/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				

Petroleum Hydrocarbons

Diesel Range Organics (C10 - C28) EH_CU_1D_TOTAL	mg/kg	50	NONE	< 50	-	-	-
Mineral Oil (C10 - C40) EH_CU_1D_AL	mg/kg	10	NONE	< 10	-	-	-

TPH C10 - C40 EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
---	-------	----	--------	------	------	------	------

TPH2 (C6 - C10) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	-	-	-
--	-------	-----	--------	-------	---	---	---

TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	MCERTS	< 0.001	< 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	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	MCERTS	< 0.001	< 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	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10

TPH (C10 - C25) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	-	-	-
---	-------	----	--------	------	---	---	---

Analytical Report Number: 22-45368
Project / Site name: NPT Site, Port Talbot

Lab Sample Number	2203949	2203950	2203951	2203952
Sample Reference	WS01	WS02	WS03	WS04
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.40-0.50	0.20-0.30	0.10-0.20	0.30-0.40
Date Sampled	10/03/2022	10/03/2022	10/03/2022	10/03/2022
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	

VOCs

Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	-
Chloroethane	µg/kg	1	NONE	< 1.0	-	-	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	-	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-	-	-
Benzene	µg/kg	1	MCERTS	< 1.0	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-	-	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-	-	-
Styrene	µg/kg	1	MCERTS	< 1.0	-	-	-
Tribromomethane	µg/kg	1	NONE	< 1.0	-	-	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-

Analytical Report Number: 22-45368
Project / Site name: NPT Site, Port Talbot

Lab Sample Number				2203949	2203950	2203951	2203952
Sample Reference				WS01	WS02	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.50	0.20-0.30	0.10-0.20	0.30-0.40
Date Sampled				10/03/2022	10/03/2022	10/03/2022	10/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-

Analytical Report Number: 22-45368
Project / Site name: NPT Site, Port Talbot

Lab Sample Number				2203949	2203950	2203951	2203952
Sample Reference				WS01	WS02	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.50	0.20-0.30	0.10-0.20	0.30-0.40
Date Sampled				10/03/2022	10/03/2022	10/03/2022	10/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				

SVOCs

Aniline	mg/kg	0.1	NONE	< 0.1	-	-	-
Phenol	mg/kg	0.2	ISO 17025	< 0.2	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	-	-	-
Isophorone	mg/kg	0.2	MCERTS	< 0.2	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	0.6	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Carbazole	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-	-

Analytical Report Number: 22-45368
Project / Site name: NPT Site, Port Talbot

Lab Sample Number				2203949	2203950	2203951	2203952
Sample Reference				WS01	WS02	WS03	WS04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.50	0.20-0.30	0.10-0.20	0.30-0.40
Date Sampled				10/03/2022	10/03/2022	10/03/2022	10/03/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	-	-

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



Analytical Report Number : 22-45368
Project / Site name: NPT Site, 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 *
2203949	WS01	None Supplied	0.40-0.50	Brown gravelly loam with coal.
2203950	WS02	None Supplied	0.20-0.30	Light grey sand.
2203951	WS03	None Supplied	0.10-0.20	Brown gravelly loam with stones and vegetation.
2203952	WS04	None Supplied	0.30-0.40	Brown gravelly loam with coal and stones.

Analytical Report Number : 22-45368

Project / Site name: NPT Site, 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
Cations in soil by ICP-OES	Determination of cations 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
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Hexavalent chromium in soil	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
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
DRO C10-28 (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Electrical conductivity of soil	Determination of electrical conductivity in soil by electrometric measurement.	In-house method	L031-PL	D	ISO 17025
Free cyanide in soil	Determination of free 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
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
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

Analytical Report Number : 22-45368

Project / Site name: NPT Site, 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
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
TPH ₂ (Soil)	Determination of hydrocarbons C ₆ -C ₁₀ by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (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
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	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
Ammonium as NH ₄ in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
DRO (Soil)	Determination of extractable hydrocarbons in soil by GC-MS/FID.	In-house method with silica gel split/clean up.	L076-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

Analytical Report Number : 22-45368

Project / Site name: NPT Site, Port Talbot

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS

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

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

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

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

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

Appendix E

Generic Quantitative Risk Assessment: Human Health



Project Number: 2109014.002		Lab Sample Number	2203949	2203950	2203951	2203952					
Project Name: ABP Margam Sands		Sample Reference	WS01	WS02	WS03	WS04					
Site End Use:	GAC (mg/kg)	Sample Number	None Supplied	None Supplied	None Supplied	None Supplied					
Commercial		Depth (m)	0.40-0.50	0.20-0.30	0.10-0.20	0.30-0.40					
		Date Sampled	10/03/2022	10/03/2022	10/03/2022	10/03/2022					
Determinand			1	2	3	4	5				
Arsenic	640 ⁽¹⁾	mg/kg	25.00	4.80	4.50	39.00					
Boron	240000 ⁽³⁾	mg/kg	1.00	0.40	2.80	1.30					
Cadmium	410 ⁽¹⁾	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2					
Chromium (total)	8600 ⁽³⁾	mg/kg	33.00	7.40	18.00	71.00					
Chromium (VI)	49 ⁽¹⁾	mg/kg	< 4.0	< 1.2	< 1.2	< 1.2					
Copper	68000 ⁽³⁾	mg/kg	55.00	3.70	11.00	62.00					
Lead	2300 ⁽¹⁾	mg/kg	37.00	4.50	3.80	50.00					
Mercury	3600 ⁽²⁾	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3					
Nickel	1800 ⁽²⁾	mg/kg	25.00	7.30	2.30	25.00					
Selenium	13000 ⁽²⁾	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0					
Zinc	730000 ⁽³⁾	mg/kg	97.00	21.00	40.00	120.00					
Beryllium	12 ⁽³⁾	mg/kg	1.70	0.32	6.60	2.00					
Vanadium	9000 ⁽³⁾	mg/kg	43.00	9.80	37.00	91.00					
Barium	22000 ⁽⁴⁾	mg/kg	240.00	33.00	720.00	310.00					
Cyanide (Total)	20 ⁽⁵⁾	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0					
Phenol (Monohydric)	440 ⁽³⁾	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0					
Sulphide	-	mg/kg	74.00	2.40	3700.00	19.00					
Total Organic Carbon (TOC)	-	%	3.90	0.20	0.60	3.10					
Naphthalene	190 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	0.50					
Acenaphthylene	83000 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05					
Acenaphthene	84000 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05					
Fluorene	63000 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05					
Phenanthrene	22000 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	1.10					
Anthracene	520000 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05					
Fluoranthene	23000 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	0.59					
Pyrene	54000 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	0.46					
Benzo(a)anthracene	170 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	0.36					
Chrysene	350 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	0.49					
Benzo(b)fluoranthene	44 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	0.34					
Benzo(k)fluoranthene	1200 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	0.17					
Benzo(a)pyrene	35 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	0.24					
Indeno(1,2,3-cd)pyrene	500 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	0.10					
Dibenz(a,h)anthracene	3.5 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05					
Benzo(ghi)perylene	3900 ⁽³⁾	mg/kg	< 0.05	< 0.05	< 0.05	0.19					
Speciated Total EPA-16 PAHs	-	mg/kg	< 0.80	< 0.80	< 0.80	4.54					
Benzene	27 ⁽³⁾	µg/kg	< 1.0	< 1.0	< 1.0	< 1.0					
Toluene	56000 ⁽³⁾	µg/kg	< 1.0	< 1.0	< 1.0	< 1.0					
Ethylbenzene	5700 ⁽³⁾	µg/kg	< 1.0	< 1.0	< 1.0	< 1.0					
p & m-xylene	5900 ⁽³⁾	µg/kg	< 1.0	< 1.0	< 1.0	< 1.0					
o-xylene	6600 ⁽³⁾	µg/kg	< 1.0	< 1.0	< 1.0	< 1.0					
MTBE (Methyl Tertiary Butyl Ether)	7900 ⁽⁴⁾	µg/kg	< 1.0	< 1.0	< 1.0	< 1.0					
TPH Aliphatic C5 - C6	3200 ⁽³⁾	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001					
TPH Aliphatic C6 - C8	7800 ⁽³⁾	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001					
TPH Aliphatic C8 - C10	2000 ⁽³⁾	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001					
TPH Aliphatic C10 - C12	9700 ⁽³⁾	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0					
TPH Aliphatic C12 - C16	59000 ⁽³⁾	mg/kg	< 2.0	< 2.0	< 2.0	< 2.0					
TPH Aliphatic C16 - C21	1600000 ⁽³⁾	mg/kg	< 8.0	< 8.0	< 8.0	< 8.0					
TPH Aliphatic C21 - C35	1600000 ⁽³⁾	mg/kg	< 8.0	< 8.0	< 8.0	< 8.0					
TPH Aromatic C5 - C7	26000 ⁽³⁾	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001					
TPH Aromatic C7 - C8	56000 ⁽³⁾	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001					
TPH Aromatic C8 - C10	3500 ⁽³⁾	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001					
TPH Aromatic C10 - C12	16000 ⁽³⁾	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0					
TPH Aromatic C12 - C16	36000 ⁽³⁾	mg/kg	< 2.0	< 2.0	< 2.0	< 2.0					
TPH Aromatic C16 - C21	28000 ⁽³⁾	mg/kg	< 10	< 10	< 10	< 10					
TPH Aromatic C21 - C35	28000 ⁽³⁾	mg/kg	< 10	< 10	< 10	< 10					

Notes:

⁽¹⁾ DEFRA C4SLs (2014)

⁽²⁾ Environment Agency SGVs (2009)

⁽³⁾ LQM/CIEH S4ULS (2015)

⁽⁴⁾ CL:AIRE, AGS & EIS (2009)

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

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

Concentration does not exceed GAC
Concentration exceeds GAC
No set GAC

Appendix F

Risk Methodologies and Evaluation

Risk Evaluation

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

The method requires an assessment of the:

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

Table 1. Classification of Probability

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

Table 2. Classification of Consequence

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

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

Table 3. Combination of Consequence with Probability

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

Table 4. Description of risks and likely action required

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

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