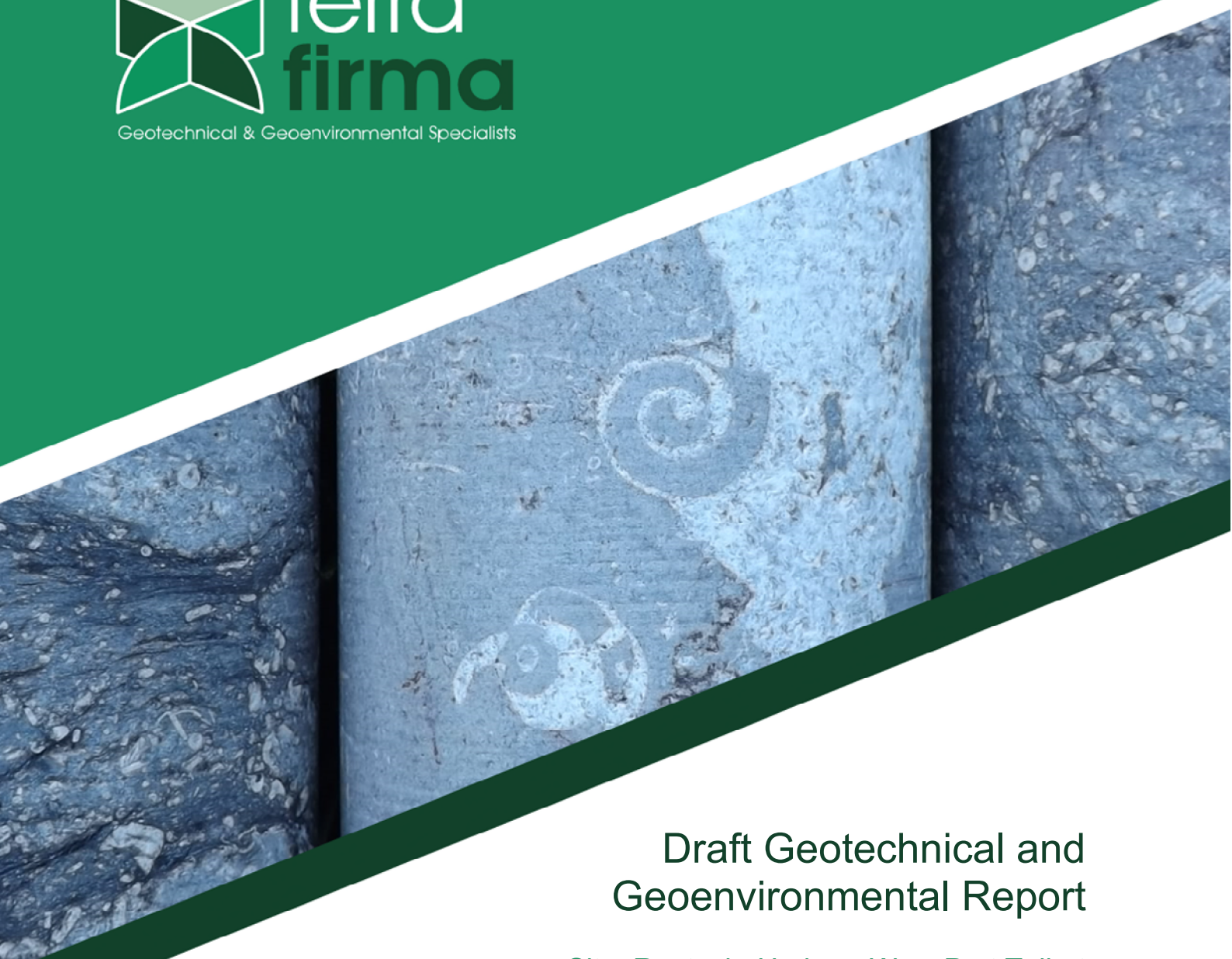




Draft Geotechnical and Geoenvironmental Report

Site: Runtech, Harbour Way, Port Talbot

Prepared For: Runtech Limited

Issue Date: September 2023

Job No: 17730

REPORT TITLE : **Draft Geotechnical and Geoenvironmental Report: New Storage Building, Runtech, Port Talbot.**

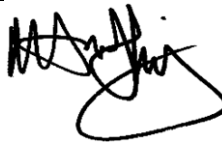
JOB NUMBER : **17730**

ISSUE DATE : **September 2023**

REPORT REFERENCE : **21092023-17730-03**

Document Revision Record

Issue Number	Date	Revision Details
01	13/06/2023	DRAFT
02	21/09/2023	DRAFT with gas update
03	21/09/2023	FINAL with gas update

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Executive Summary

Site Location and Proposed Development	Runtech Ltd (the Client) is proposing the commercial development of a storage unit on land situated off Harbour Way, Port Talbot. The development site is square in shape and locates off Harbour Way, Port Talbot. The site centres on an approximate National Grid Reference of 276880, 189130, occupying a plan area of approximately 0.99 Hectares. The site is currently used as a storage courtyard. The site elevation is approximately 10m AOD and is generally level.
Ground Conditions	The site was found to be generally underlain by approximately 2.5m of granular MADE GROUND which lies above silty and clayey TIDAL FLAT and gravelly ALLUVIAL FAN deposits. Ground conditions were confirmed to a depth of 3.66m
Contamination of Concern	All substances tested for were found to be present at concentrations below their respective human health threshold level for the proposed commercial site usage.
Ground Gas Risk Assessment	To date, all six gas monitoring visits have been completed. The measured gas concentrations and flow rates have been calculated to give a gas screening value of 9×10^{-3} l/hr, with reference to Table 8.5 of CIRIA report C665 the site is given a designation of Gas Characteristic Situation 1 (CS1)
Foundation Solution	Due to the depth to the appropriate strata and shallow groundwater, the use of shallow foundations is considered unsuitable on the site. It is recommended to use piled foundations. This will require further site investigation utilising boreholes to ascertain the suitability of the deeper deposits for these foundation types. Floor slabs may be designed as reinforced ground bearing above 500mm of compacted Type 1 material. During the investigation two samples of the in-situ clay were taken and submitted for plasticity testing. In line with the NHBC (Chapter 4.2), the modified plasticity index for each sample was calculated. For design purposes the superficial cohesive deposits should be assumed to have a low volume change potential. Allowances should be made for the removal of any 'soft spots' and their replacement with well-compacted granular materials. Department of Transport (DPT) Type 2 materials or similar should be used and compacted in layers to the Specification for Highway Works. All foundation formations should be inspected by a suitably qualified Engineer before being concreted.

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ANNEX C	Trial Pit Logs
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Drawing 01	Proposed Site Layout
Drawing 02	Investigation Point Plan

SECTION 1 Introduction and Proposed Development

1.1 Introduction

Runtech Limited (the Client) is proposing the development of new storage building at Runtech Limited, Harbour Way, Port Talbot, SA13 1PY.

TFW Group (Terra Firma Wales) Limited have been commissioned by the Client to undertake a geoenvironmental assessment and geotechnical investigation of the site.

A review of the existing data was conducted prior to this report. The full desk study, alongside the Envirocheck report data, can be found in **Annex A**.

The main objectives of the geoenvironmental assessment programme are:

- Investigate the potential human health and environmental liabilities at the site associated with any contamination.
- Provide a summary of the human health and environmental conditions at the site, together with any necessary further intrusive works and / or remediation works to render the site fit for its intended use.

The main objectives of the geotechnical site investigation are:

- Investigated the type, strength and bearing characteristics of the shallow superficial and underlying solid geology.
- Investigate the risk, if any, from historical shallow underground mining features
- Provide engineering foundation and floor slab recommendations for the proposed development.
- Provide infiltration rates and stormwater drainage viability.
- Provide recommendations regarding any other geotechnical aspects pertaining to the development.

In order to achieve the above objectives, TFW Group Limited carried out an assessment programme including a review of existing data, followed by a field investigation to collect geotechnical and geoenvironmental data from selected locations.

1.2 Limitations and Exceptions of Investigation

The Client has requested that a Geoenvironmental Site Assessment (GSA) and Geotechnical Investigation (GI) be performed to enable the outlined main objectives.

The GSA and GI were conducted, and this report has been prepared for the sole internal reliance of the Client and their design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of TFW Group Limited. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill. The report represents the findings and opinions of experienced geoenvironmental and geotechnical consultants. TFW Group Limited does not provide legal advice and the advice of lawyers may be required.

The subsurface geological profiles, any contamination and other plots are generalised by necessity and have been based on the information found at the locations of the exploratory holes and depths sampled and tested.

The investigation was limited by the existing raised concrete slab and well compacted material in the vicinity of the proposed developments which prohibited drilling where it is present.

1.3 Quality Assurance

The quality and environmental aspects of the assessment comply with TFW Group Ltd business management system which is UKAS Accredited to ISO 9001:2015 and ISO 14001:2015 standards.

SECTION 2 Physical Setting and Current Site Use

The development site is rectangular in shape and locates off Harbour Way, Port Talbot. The site centres on an approximate National Grid Reference of 276880, 189130, occupying a plan area of approximately 0.99 Hectares.

The site is currently occupied by Runtech Limited. It is utilised as a storage area for lorries in the northwest and as a storage and loading area for cargo in the southeast.

The site elevation is approximately 10m AOD and is generally level.

The site location can be seen on **Figure 2.1** along with the proposed site layout on **Drawing 01**.



Figure 2.1 Site Location

SECTION 3 Field Investigation

3.1 Site Works

A geotechnical and geoenvironmental site investigation comprising windowless sampling boreholes and soakaway trial pits was undertaken between April 19th and 20th, 2023.

The fieldwork was supervised by TFW Group Limited, who logged the exploratory holes to the requirements of BS 5930:2015+A1:2020. The proposed locations of the exploratory holes were determined by TFW Group Ltd in general accordance with BS 10175:2011+A2:2017 in order to assess the findings of the preliminary conceptual site model.

Trial pits referenced SA01 and SA02, were formed using a JCB 3CX excavator with a 0.60m wide toothed bucket.

Representative disturbed samples were taken and retained in airtight containers for environmental and geotechnical testing.

On completion all trial pits were backfilled with materials arisings compacted in layers using the excavator bucket. The ground surface was reinstated.

The trial pit logs are presented in **Annex C**.

Soakaway tests were carried out in trial pits SA01 and SA02 in general accordance with BRE DG 365:2016. The excavation sides were squared using the excavator bucket and dimensions recorded within the test section. The trial pit was partially filled with clean water using a dedicated bowser with a 75mm diameter outlet and the fall in level recorded against time. The results are presented in **Annex D**.

The boreholes referenced WS01 to WS04A, were formed using a Terrier 2000 rig. Dynamic sampling techniques were employed from surface to produce a continuous disturbed sample.

Standard penetration tests (SPT) were carried out at regular intervals in general accordance with BS1377: Part 9:1990:3.3. SPT results summarised as N values are presented on the borehole log.

Boreholes were monitored for groundwater ingress as drilling proceeded.

Representative disturbed samples were taken and retained in airtight containers for environmental and geotechnical testing.

The borehole logs are presented in **Annex E**.

Exploratory hole locations are shown on **Drawing 01**.

3.2 Ground Conditions

The ground conditions encountered by the exploratory holes can in general be summarised as shown in **Table 3.1**.

Table 3.1 Summary of Typical Ground Conditions

Depth (m)			Thickness (m)	Stratum
0.00	-	0.10-0.90	absent-0.90	MADE GROUND: Loose to dense grey sandy slag, concrete, and limestone GRAVEL .
0.10	-	0.60-1.30	0.50-0.80	MADE GROUND: Medium dense grey silty sandy limestone and slag GRAVEL .
0.60-1.30	-	2.50-2.55	1.20-1.95	MADE GROUND: Loose black gravelly SAND
2.50-2.55	-	3.00	0.50-0.55	TIDAL FLAT DEPOSITS: Very soft grey sandy SILT/CLAY with frequent rootlets.
3.00	-	>3.60	Unconfirmed	ALLUVIAL FAN DEPOSITS: Dense grey clayey sandy GRAVEL .

3.2.1 Miscellaneous Ground Conditions

Evidence of the history of the site as railway sidings was found in SA02 present as railway sleepers and twisted metal sheeting.

3.3 Groundwater

Groundwater information recorded during the site investigation is summarised in **Table 3.2**.

Table 3.2 Groundwater Summary

Location	Depth (m)	Details
WS01	1.5	Water struck between 1-2m during drilling. After 30 minutes stabilised at 1.5m
WS03	1.5	Water struck between 1-2m during drilling. After 30 minutes stabilised at 1.5m
SA01	1.3	Groundwater struck at 1.3m. No depth change observed
SA02	1.6	Groundwater struck at 1.3m. No depth change observed

3.4 Stability and Obstructions

Trial pits remained stable and vertical during excavation.

3.5 Installation Well Construction

Gas well locations were selected on a targeted basis to investigate suspected sources of contamination or potential contamination migration pathways.

Gas well locations were selected on a non-targeted basis to characterise the gas contamination status of the site. A regular triangular pattern was adopted, but due to early refusals on all but two of the wells only two monitoring points were able to be installed.

Groundwater and gas installation well construction details are summarised in **Table 3.3**.

Table 3.3 Installation Well Summary

Location	Response Zone		Stratum
	From (m)	To (m)	
WS01	0.0	2.0	Made Ground
WS03	0.0	2.0	Made Ground

3.6 Laboratory Chemical Testing

3.6.1 Sampling Strategy

Soil sampling locations were selected on a targeted basis to investigate suspected/known sources of contamination or potential contamination migration pathways.

Sample locations, depths and suspected contamination source targets are summarised in **Table 3.4**:

Table 3.4 Sample Locations, Depths and Targets

Location	Depth (m)	Contamination Targets
WS01	0.20-0.40	S1
WS01	1.50-1.70	S1
WS03	0.70-0.80	S1
WS03	1.60-1.70	S1
WS04	0.40-0.50	S1
SA01	0.50	S1
SA01	1.20	S1
SA02	0.70	S1
SA02	1.10	S1

3.6.2 Soil Laboratory Analysis

During the site investigation works soil samples were taken and despatched to the accredited laboratories of Eurofins Chemtest for laboratory chemical testing. Soil samples were tested for the determinants listed in **Table 3.5**.

Table 3.5 Soil Laboratory Analysis

Metals & Metalloids	In-Organics	Organics	Others
Arsenic	Cyanide	Phenols	pH (acidity)
Cadmium	Sulfate	PAH	Asbestos
Chromium III		Petroleum Hydrocarbons	
Chromium VI			
Copper			
Lead			
Mercury			
Nickel			
Selenium			
Zinc			

The results are discussed in detail in **SECTION 6** and the laboratory test results certificates may be found in **Annex F**.

3.7 Soil Property Testing

3.7.1 In-situ Permeability Testing

During the site investigation two trial pit soakaway tests were undertaken in SA01 and SA02 and carried out in general accordance with BRE DG 365:2016.

Soakaway test results are summarised in **Table 3.6**.

Table 3.6 Summary of Soakaway Results

Trial Pit	Depth Range of Test (m)	Infiltration Rate (ms ⁻¹)
SA01	N/A	Groundwater inflow prohibited test from occurring
SA02	N/A	Groundwater inflow prohibited test from occurring

The test results are discussed in **SECTION 8.4** and the calculation sheets may be found in **Annex D**.

3.7.2 Laboratory Geotechnical Testing

A schedule of laboratory tests was prepared by TFW Group Ltd and samples were despatched to the accredited laboratories of Apex Testing Solutions. A summary of the testing carried out is presented in **Table 3.7**.

Table 3.7 Summary of Geotechnical Testing

Geotechnical Test	Standard (BS1377:1990)	No. Tested
Moisture Content	Part 2, Clause 3.2	2
4 Point Liquid and Plastic Limit	Part 2, Clause 4.3 & 5.3	2

The test results are presented in **Annex H** and discussed in **SECTION 7** of this report.

SECTION 4 Evaluation of Geoenvironmental Analytical Results

4.1 Assessment Methodology

Comparison of the analytical results has been made with the 2015 Sutable 4 Use Levels (S4UL) provided by Land Quality Management (LQM) Limited and the Chartered Institute of Environmental Health (CIEH) or provisional Category 4 Screening Levels (pC4SL).

Sulfate results have been compared to guidelines presented in British Research Establishment (BRE SD1:2015). Sulfate levels need only be considered for buried concrete risk assessment and are not human health related.

4.2 Soil Test Results

A summary of the chemical test results which include the regulatory soil guideline values used in a commercial setting are given in the following tables. The complete results can be found in **Annex F**.

4.2.1 Inorganics & Miscellaneous

Nine samples were tested for a standard suite of inorganics, pH, and organic matter. The summarised results are in **Table 4.1**.

Table 4.1 Summary of Soil Chemical Test Results – Inorganics & Miscellaneous

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Arsenic	640	LQM/CIEH	1.40	23.00	0
Cadmium	190	LQM/CIEH	< 0.10	2.80	0
Chromium III	8600	LQM/CIEH	14.00	860.00	0
Chromium VI	33	LQM/CIEH	< 0.50	< 0.50	0
Copper	68000	LQM/CIEH	12.00	190.00	0
Lead	2300	pC4SL	8.00	230.00	0
Mercury (inorganic)	1100	LQM/CIEH	< 0.05	0.11	0
Nickel	980	LQM/CIEH	10.00	36.00	0
Selenium	12000	LQM/CIEH	0.28	1.40	0
Zinc	730000	LQM/CIEH	39.00	700.00	0
Cyanide	-	-	< 0.50	< 0.50	-
Boron	240000	LQM/CIEH	0.79	4.40	0
Sulfate (%)	0.24	BRE	< 0.010	0.16	0
Organic Matter (%)	-	-	0.60	5.40	-
pH	-	-	8.20	10.60	-
Phenols	120	LQM/CIEH	< 0.10	0.23	0
Notes:					
- No available guideline					

4.2.2 Organics

Nine samples were tested for speciated polycyclic aromatic hydrocarbons. The summarised results are in **Table 4.2**.

Table 4.2 Summary of Soil Chemical Test Results – Speciated Polycyclic Aromatic Hydrocarbons

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Naphthalene	190	LQM/CIEH	< 0.10	1.90	0
Acenaphthylene	83000	LQM/CIEH	< 0.10	2.30	0
Acenaphthene	84000	LQM/CIEH	< 0.10	4.20	0
Fluorene	63000	LQM/CIEH	< 0.10	3.50	0
Phenanthrene	22000	LQM/CIEH	0.52	36.00	0
Anthracene	5200000	LQM/CIEH	0.25	11.00	0
Fluoranthene	23000	LQM/CIEH	0.65	37.00	0
Pyrene	54000	LQM/CIEH	0.66	37.00	0
Benzo(a)anthracene	170	LQM/CIEH	0.44	17.00	0
Chrysene	350	LQM/CIEH	0.54	21.00	0
Benzo(b)fluoranthene	44	LQM/CIEH	< 0.10	19.00	0
Benzo(k)fluoranthene	1200	LQM/CIEH	< 0.10	7.40	0
Benzo(a)pyrene	35	LQM/CIEH	< 0.10	15.00	0
Indeno(123cd)pyrene	500	LQM/CIEH	< 0.10	9.30	0
Dibenzo(ah)anthracene	3.5	LQM/CIEH	< 0.10	2.70	0
Benzo(ghi)perylene	3900	LQM/CIEH	< 0.10	8.70	0
Total PAH	-	-	3.10	230.00	-
Notes:					
Thresholds based on 1.0% soil organic matter					
- No available guidelines					

Nine samples were tested for petroleum hydrocarbon. The summarised results are shown in

Table 4.3.

Table 4.3 Summary of Soil Chemical Test Results – Petroleum Hydrocarbons

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Aliphatic					
VPH C5 – C6 Ali	3200	LQM/CIEH	< 0.05	< 0.05	0
VPH C6 – C7 Ali	7800	LQM/CIEH	< 0.05	< 0.05	0
VPH C7 – C8 Ali	7800	LQM/CIEH	< 0.05	< 0.05	0
VPH C8 – C10 Ali	2000	LQM/CIEH	< 0.05	0.21	0
EPH C10 – C12 Ali	9700	LQM/CIEH	< 2.0	4.20	0
EPH C12 – C16 Ali	59000	LQM/CIEH	1.10	23.00	0
EPH C16 – C21 Ali	1600000	LQM/CIEH	< 2.0	66.00	0
EPH C21– C35 Ali	1600000	LQM/CIEH	< 3.0	1700.00	0
EPH C35– C40 Ali	1600000	LQM/CIEH	< 1.0	< 1.0	0
Aromatic					
VPH >C5-C7	70	LQM/CIEH	< 0.05	< 0.05	0
VPH >C7-C8	130	LQM/CIEH	< 0.05	< 0.05	0
VPH >C8-C10	34	LQM/CIEH	< 0.05	< 0.05	0
EPH >C10-C12	74	LQM/CIEH	< 1.0	< 1.0	0
EPH >C12-C16	140	LQM/CIEH	< 1.0	15.00	0
EPH >C16-C21	260	LQM/CIEH	< 2.0	130.00	0
EPH >C21-C35	1100	LQM/CIEH	< 2.0	200.00	0
EPH >C35-C40	1100	LQM/CIEH	< 1.0	16.00	0
Notes: VPH – Volatile Petroleum Hydrocarbon EPH – Extractable Petroleum Hydrocarbon Thresholds based on 1.0% soil organic matter * – Ali C16-21 and C21-C35 based on criteria for Ali EC >16-35					

4.2.3 Asbestos Testing

All made ground soil samples were scheduled for asbestos screening. Asbestos was not detected.

SECTION 5 Geotechnical Testing Results

Geotechnical testing results are summarised in the following sections and presented in their entirety in **Annex H**.

5.1 Plasticity & Moisture Content Testing

During the investigation two samples of the shallow clay material was taken and submitted for plasticity testing. The test results are summarised in **Table 5.1**.

Table 5.1 Plasticity & Moisture Content Test Results

Location	Depth (m)	Laboratory Principal Soil Type	Moisture Content (%)	Plasticity Index (%)	Passing 425µm Sieve (%)	Modified Plasticity Index (%)	Volume Change Potential
WS01	2.60-2.80	CLAY	23.8	15	91	13.65	Low
WS03	2.90-3.00	CLAY	18.9	12	89	10.68	Low

In line with the NHBC (Chapter 4.2), the modified plasticity index for each sample was calculated. For design purposes the soils on site should be assumed to have a low volume change potential.

SECTION 6 Ground Gas Risk Assessment

6.1 Gas Risk Characterisation

6.1.1 Gas Source

The source of potential ground gas is the made ground on and off site. This would arise from the breakdown of items such as the timber found in SA02 breaking down and producing methane and carbon dioxide.

6.1.2 Gas Migration Pathways

Migration pathways for potential ground gas would be through shallow superficial soils, through foundations, and through service entry points.

6.1.3 Potential Receptors

These will include any employees and site visitors using the building.

6.1.4 Driving Forces

The rate of ground gas flow from source to receptor will be driven by two factors. The first is groundwater level and the second is atmospheric pressure.

Groundwater level has the effect of squeezing the gas out of the ground when it is high and providing a greater area for accumulation when it is low. As the site is close to the sea, the groundwater level will be mostly affected by the tides and as such, it is expected that ground gas flow rates will be highest in the lead up to and at high tide.

Atmospheric pressure affects ground gas flow inversely. During periods of low atmospheric pressure, ground gas flow will be higher as it moves from relatively high-pressure underground. Ground gas flow will then be lower during high atmospheric pressure periods.

6.2 Volatile Gasses

6.3 Gas Screening Value

Two ground gas monitoring wells were installed in WS01 and WS03. Installation details are shown on the relevant log.

The complete six rounds of gas monitoring have been carried out.

Recorded gas concentrations are summarised in **Table 6.1**.

Table 6.1 Measured Gas Concentration Summary

Gas	Minimum (% V/V)	Maximum (% V/V)
Methane	0.0	0.1
Carbon Dioxide	0.1	3.0
Oxygen	10.9	21.3

Methane levels peaked at 0.1% V/V. Carbon dioxide levels varied between 0.1% and 3.0% V/V. Oxygen concentrations varied between 10.9% and 21.3% V/V.

The gas flow rate from the boreholes was also assessed, a maximum flow rate of 0.5l/hr was recorded.

Based on a flow rate of 0.5l/hr and the highest recorded carbon dioxide concentration of 3.0%, a gas screening value of 9×10^{-3} l/hr is calculated, as follows:

$$(3.0/100) \times 0.3 = 9 \times 10^{-3} \text{ l/hr}$$

The complete results are presented in **Annex G**.

6.4 Conclusion

When this monitoring result is compared with Table 8.5 of CIRIA report C665, the site is classified as 'Gas Characteristic Situation 1' (CS1).

SECTION 7 Quantitative Risk Assessment

7.1 Contaminants of Concern

All substances tested for were found to be present at concentrations below their respective human health threshold level.

As good practice, construction workers should adhere to good site management, COSHH, good standards of hygiene and appropriate health & safety on site, with personal protection equipment (PPE) and dust suppression where appropriate.

All imported soils should be validated as clean and suitable for use in accordance with 'Requirements for the Chemical Testing of Imported Soils for Various End Uses and Validation Cover Systems'.

The soils should also be physically suitable and contain no 'sharps' as defined in BS8332:2015 Specification for Topsoil and BS8601:2013 Specification for Subsoil and Requirements for Use.

For proposed new supply water pipes, the UK Water Industry Research publication 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (Report 10/WM/03/21)' should be consulted.

In accordance with EC Regulation 1272/2008 and Environment Agency Guidance WM3 soils destined for off-site disposal should be classified on the basis of their hazard phrases prior to disposal. Soils are classified as a mirror entry waste and should be classified on the basis of their specific chemical properties.

If during earthworks ground conditions are encountered that are markedly different to those found during the investigation then the ground should be subject to additional sampling and testing and any necessary remedial measures designed and implemented before continuing with the works.

7.1.1.1 Ground Gas

With reference to Tables 8.5 and 8.6 of CIRIA report C665, the Gas Characteristic Situation for the site is designated very low risk and, as such, does not require any special precautions to be taken regarding hazardous ground gas during development.

7.1.2 Aquatic Environment

During the construction period, there is a risk to the environment/adjacent sites from de-watering, digging foundations, moving contaminated soil, drainage misconnections, discharges to local surface waters or the ground, runoff from construction materials and/or exposed ground, wheel washings and oil or chemical spills.

The risk is considered to be negligible as any adverse effects will be easily preventable by due diligence to good construction practise and housekeeping in preventing surface runoff and the spillage of materials.

The basic measures that should be taken are as follows:

- Prepare a drainage plan and mark the manholes to prevent pollutants accidentally reaching the surface water sewers.
- Carry out any activities that could cause pollution in a designated, bunded area, away from rivers or boreholes. Where possible it should drain to the foul sewer.
- Use settlement ponds to remove silty water.
- Store all oils and chemicals in a fully bunded area to prevent leaks or spills.
- Get advice on whether you need an environmental permit and apply in good time.

SECTION 8 Engineering Recommendations

8.1 Preparation of Site

Areas of vegetation including all roots should be stripped and removed from beneath the proposed development site.

Allowances should be made for any temporary/permanent support works to any existing adjacent structure necessary as a result of the proposed works.

Contingencies should be made for the protection/diversion of any underground/overhead services present beneath/above the site brought about as a result of the proposed works.

Any reduced levels should be brought up to the required levels with suitable inert mainly granular materials. Department of Transport (DTp) type 2 sub-base or similar should be used and compacted in layers to the requirements of the Specification for Highway Works.

Allowances should also be made for the excavation of any soft spots/areas and their replacement with well compacted imported granular materials.

In accordance with EC Regulation 1272/2008 and Environment Agency Guidance WM3 soils and other materials destined for off-site disposal should be classified on the basis of their hazard phrases prior to disposal. Soils are classified as a mirror entry waste and should be classified on the basis of their specific chemical properties. TFW Group Ltd offer this service if required.

8.2 Foundation and Floor Slab Solution

Due to the depth to the appropriate strata, the use of shallow foundations is considered unsuitable on the site. It is recommended to use piled foundations. This will require further site investigation utilising boreholes to ascertain the suitability of the deeper deposits for these foundation types. Any borehole survey will need to conduct Standard Penetration Tests every metre and extend at least 5m into any potential founding horizon to ensure consistency.

For piled foundations, measurements should be put in place to monitor vibrations during pile installation. If vibrations exceed guideline levels, then measures should also be taken to dampen such vibrations. If, however, vibrations exceed permissible values then consideration should be given to an alternative solution.

The estimated working pile loads, pile type and lengths should be confirmed by a specialist piling contractor and it may be prudent to test drive/install piles at selected locations.

For the quoted pile sizes, founded within the competent in-situ materials, total settlements should not exceed 10mm with differential movements between adjacent piles being less than half this value.

Founding strata is granular and not considered at risk of damage from the shrinking or swelling of the soil, and the effects of frost heave/and or thermal shrinkage. As a precaution foundation should be taken down to a minimum depth of 450mm below finished level.

Floor slabs may be designed as reinforced ground bearing above 500mm of compacted Type 1 material.

During the investigation two samples of the in-situ clay were taken and submitted for plasticity testing. In line with the NHBC (Chapter 4.2), the modified plasticity index for each sample was calculated. For design purposes the superficial cohesive deposits should be assumed to have a low volume change potential.

Allowances should be made for the removal of any 'soft spots' and their replacement with well-compacted granular materials. Department of Transport (DPT) Type 2 materials or similar should be used and compacted in layers to the Specification for Highway Works.

All foundation formations should be inspected by a suitably qualified Engineer before being concreted.

8.3 Excavations and Formations

The existing concrete platform on the site will need to be broken out. Aside from this, most of the shallow excavations will be possible with normal soil excavating machinery.

Shallow perched water and groundwater flows were not encountered during the investigation. Any water inflows together with rainwater infiltration should be dealt with by conventional pumping techniques. However, it should be noted that during times of heavy rainfall a higher water table will be encountered.

The sides of any excavations deeper than 1.20m, or shallower if unstable, should be supported by planking and strutting or other proprietary means.

The sub-formations/formations are likely to be susceptible to loosening, softening and deterioration by exposure to weather (rain, frost and drying conditions), the action of water (flood water or removal of groundwater) and site traffic.

Formations should never be left unprotected and continuously exposed to rain causing degradation, or left exposed/uncovered overnight, unless permitted by a qualified engineer.

Construction plant and other vehicular traffic should not be operated on unprotected formations.

As a minimum the formation/excavation surfaces must be protected by blinding concrete immediately after exposure.

Allowances should be made for the removal of soft spots/areas and their replacement with well compacted granular materials.

Allowances should also be made for special precautions to prevent formation deterioration in addition to the above.

8.4 Storm Water Drainage

During the site investigation two soakaway tests were undertaken in general accordance with BRE DG 365:2016. The soakaway tests were carried out in trial pits SA01 and SA02.

The soakaway pits filled with groundwater before testing could begin.

It is considered that soakaway storm water draining is unsuitable at the site.

8.5 Protection of Buried Concrete

No sulfate testing was undertaken. It is recommended to conduct sulfate testing of the subsurface soils to allow a design sulfate class and ACEC value to be applied to concrete foundations.

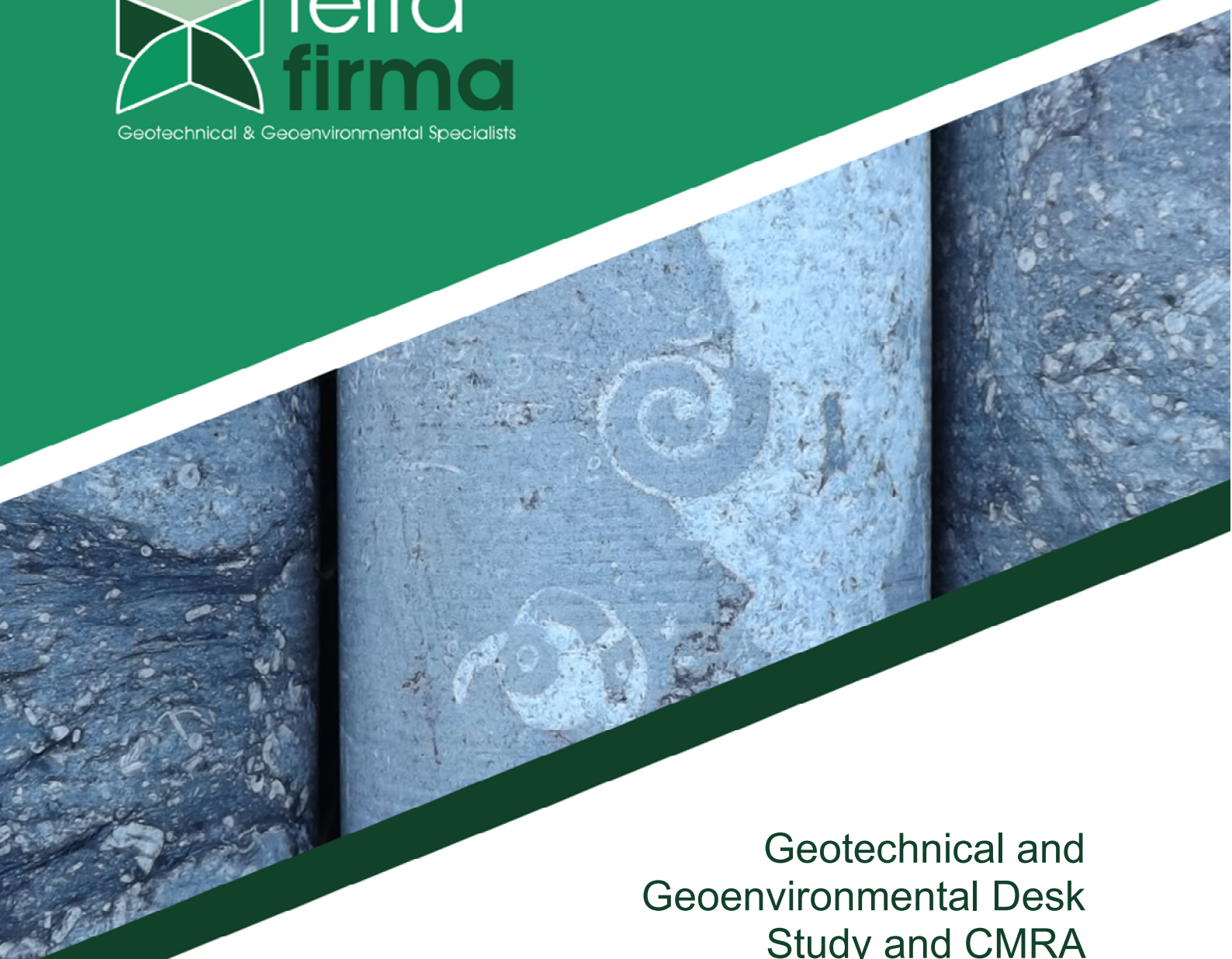
8.6 Access Roads and Car Parking Areas

For car parking and road areas, formations within the in-situ made ground a CBR value of 3.5% may be used for design purposes.

Allowances should be made for the removal of any 'soft spots/areas' and their replacement with well-compacted granular materials as previously described.

Please note that the Local Council / Highways Authority may require in-situ CBR testing to be undertaken before a road is adopted. In-situ CBR Testing should be performed following earthworks to verify the performance of the engineered fill.

ANNEX A
Desk Study Report



Geotechnical and Geoenvironmental Desk Study and CMRA

Site: 'Runtech', Port Talbot

Prepared For: Runtech Ltd

Issue Date: March 2023

Job No: 17730

REPORT TITLE : **Geotechnical and Geoenvironmental Desk Study and CMRA: Proposed Commercial Development, Port Talbot**

REPORT STATUS : **Draft**

JOB NUMBER : **17730**

ISSUE DATE : **March 2023**

REPORT REFERENCE : **070323-17730-ISSUE01**

Document Revision Record

Issue Number	Date	Revision Details
01	07.03.2023	Draft report

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Executive Summary

Site Location and Proposed Development	<i>Runtech Ltd (the Client) is proposing the commercial development of a storage unit on land situated off Harbour Way, Port Talbot.</i> <i>The development site is square in shape and locates off Harbour Way, Port Talbot. The site centres on an approximate National Grid Reference of 276880, 189130, occupying a plan area of approximately 0.99 Hectares.</i> <i>The site is currently used as a storage courtyard.</i> <i>The site elevation is approximately 10m AOD and is generally level.</i>
Site History	<i>Historically, the site has been used as industrial land, occupied by several railway systems, associated with the local nearby factories. Several structures have been built and demolished on site also. Much of the surrounding area has been occupied by industrial land, with tin and copper works. The Llewellyn's Quay was situated 0m west from the site up until c.1964 when it was partially infilled.</i>
Geology	<i>The 1:50,000 scale British Geological Maps of the area (247) was consulted for geology underlying the site. The site is shown to be underlain by the South Wales Middle Coal Measures Formation.</i> <i>Strata in the local area have a dip of 24° north.</i> <i>The site is situated on an area of landscaped ground.</i> <i>The 1:10,000 scale map (SS78NE) shows the nearest coal seam to the site situates 820m northeast. This is the Field Wernddu coal seam. Strata in this local area dip towards the northeast, so this coal seam will not underlie the site.</i> <i>The Upper Cwmgorse Marine Band is situated 1280m southeast from the site. Based on local dip direction, this coal seam would likely situate below the site at a depth much greater than the influencing depth for ground stability.</i> <i>The 2ft 9 coal seam is the nearest coal seam that would underlie the site. Situated 2750m southeast, and dipping 24° northeast, this coal seam is likely to underlie the site at a depth much greater than the influencing depth for ground stability. You HAVEN'T PUT TETATIVE FOUNDATION SOLUTION IN</i>
Coal Mining Risk Assessment	<i>The site situates within the South Wales Coal Fields.</i> <i>The Coal Authority Report states that the property is not within a surface area that is affected by past underground mining.</i> <i>In the probable unrecorded shallow workings section of the report, it is also confirmed that there are none. No spine roadways are recorded at shallow depth.</i> <i>The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining at the site.</i> <i>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.</i> <i>The Coal Authority has no record of a mine gas emission requiring action.</i> <i>Given the local geology surrounding the site, it is unlikely that there are any worked coal seams below the site at shallow influencing depth.</i>

	<i>The Coal Authority Report does not record any mine entry within 100m from the site.</i> <i>Given the local geology surrounding the site, it is unlikely that there are any worked coal seams below the site at shallow influencing depth.</i> <i>The overall risk to the surface stability of the site from possible underground workings is considered negligible.</i>
Radon	<i>The Envirocheck Report (Annex A) details that no radon protective measures are required for new developments on the investigation site.</i>
Recommended Site Investigation	<i>It is recommended that the following site investigation is undertaken:</i> <i>• Trial pitting to investigate the shallow ground conditions, carry out soakaway testing and take samples for contamination and soil property testing.</i> <i>• Mini-percussive drilling to assess the strength of deposits below the site, and to also assess any risk from potential ground gas to the development (if required)</i> <i>Chemical and geotechnical samples should be taken to confirm the characteristics of the ground/groundwater beneath the site to help inform on the foundation design and the need if any for site remediation.</i> <i>A suitable gas monitoring scheme should be undertaken across the site if significant made ground deposits are encountered.</i>

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Annexes

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Drawings

Drawing 01 Proposed Site Layout

SECTION 1 Introduction and Proposed Development

1.1 Introduction

Runtech Ltd (the Client) is proposing the commercial development of a storage unit on land situated off Harbour Way, Port Talbot.

TFW Group Limited have been commissioned by the Client to undertake a phase 1 desk study and coal mining risk assessment (CMRA) for the site.

The main objectives of the assessment programme are to:

- Provide information on past and current uses of the site and surrounding area
- Provide information on the nature of any hazards and physical constraints, for example buried structures/obstructions
- Provide information on the likely ground conditions beneath the site, including soil types, groundwater and if made ground is likely to be present
- Investigate the risk, if any, from historical shallow underground mining features
- Identify the likely potential environmental liabilities at the site associated with any soil and groundwater contamination from past site uses
- Identify if gas emissions either from the site or surrounding areas is likely to be present
- Produce an initial site conceptual model of the site, to detail the nature and extent of potential contamination, its source, potential pathways and likely receptors (pollutant linkage)
- Prepare a human health and environmental risk assessment for the site
- Provide data to assist in the design of an intrusive site investigation and give early indications of possible remediation requirements
- Provide tentative engineering foundation and floor slab recommendations for the proposed development

In order to achieve the above objectives, TFW Group Limited carried out an assessment programme including a review of existing data.

1.2 Limitations and Exceptions of Investigation

The Client has requested that a Phase 1 Desk Study (DS) and CMRA be undertaken to enable the outlined main objectives.

The DS was conducted, and this report has been prepared for the sole internal reliance of the Client and their design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of TFW Group Limited. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill. The report represents the findings and opinions of experience geoenvironmental and geotechnical consultants. TFW Group Limited does not provide legal advice and the advice of lawyers may be required.

1.3 Quality Assurance

The quality and environmental aspects of the assessment comply with TFW Group Ltd business management system which is UKAS Accredited to ISO 9001:2015 and ISO 14001:2015 standards.

SECTION 2 Review of Existing Data

2.1 Physical Setting and Current Site Use

The development site is square in shape and locates off Harbour Way, Port Talbot. The site centres on an approximate National Grid Reference of 276880, 189130, occupying a plan area of approximately 0.99 Hectares.

The site is currently used as a storage courtyard.

The site elevation is approximately 10m AOD and is generally level.

The site location can be seen on **Figure 2.1**.



Figure 2.1 Site Location (Envirocheck, 2023)

2.2 Site History

Historical maps of the site have been obtained in an Envirocheck Report, provided by Landmark Information Group. The history plans are supplied in **Annex A** of this report, and the most relevant editions are summarised in **Table 2.1**. Distances, where quoted are approximate, and any changes in-between map editions may not be recorded.

Table 2.1 Historical Development from Map Information

Map Edition & Scale	Key Features on Site	Key Features off Site
1876-77 1:2,500	The site is currently occupied by open land, possibly agricultural, with no major structures.	Much of the surrounding area is also comprised of open unoccupied land. A railway system is situated 90m northeast from the site. The 'Llewelyn Quay' is situated 10m west from the site.
1884-85 1:10,560	No significant changes have been made to the site since 1877.	Margam Copper Works is situated 500m southeast from the site.
1899 1:2,500		Two Tin Plate Works have been established 50m east and 100m north from the site.
1990 1:10,560		No significant changes have been made within the immediate surrounding area since 1899.
1917-19 1:2,500		A railway is now situated 0m west from the site, running north-south. Various residential developments have been established within the areas surrounding the tin plate works east of the site.
1921 1:10,560		No significant changes have been made within the immediate surrounding area since 1919.
1938-52 1:10,560	Several railways have been developed on-site, as part of an extension to the original railway. A small structure can be seen on the northern end of the site, details of what exactly the structure is are not given.	The eastern edge of the Llewelyn Quay has been infilled. No significant changes have been made within the immediate surrounding area since 1964.
1939-40 1:2,500	Further detail now shows the sites eastern edge to be occupied by a railway system, along with two structures.	
1949 1:10,560	No significant changes have been made to the site since 1940.	
1950-53 1:2,500	Further railway development has taken place along the eastern edge of the site. A further large structure is situated on the southern edge of the site. Details are not given for what this structure is.	
1952-62 1:2,500	The large structure situated on-site is no longer mapped.	
1953-54 1:2,500	No significant changes have been made to the site since 1952.	
1964-69 1:2,500		
1964-65 1:10,000		
1967-68 1:2,500		
1974 1:2,500	The railways across the site are labelled as dismantled.	
1980-82 1:10,000	No significant changes have been made to the site since 1974.	No significant changes have been made within the immediate surrounding area since 1974.
1988-91 1:2,500	The railway system across the site and in the immediate surrounding area has been removed.	
1991 1:2,500	No significant changes have been made to the site since 1988.	
1993 1:2,500		

1993-96 1:10,000		No significant changes have been made within the immediate surrounding area since 1974.
1995 1:2,500	A small structure is situated centrally on the western edge of the site.	
1999 1:10,000	No significant changes have been made to the site since 1995.	
2001 1:2,500 <i>Aerial</i>	Aerial photography shows the site to be used for storage, much like its present-day state.	
2006 1:10,000	No significant changes have been made to the site since 2001.	
2022 1:10,000		

2.3 Geological Setting

2.3.1 Geology

The 1:50,000 scale British Geological Maps of the area (247) were consulted for geology underlying the site. The site is shown to be underlain by the South Wales Middle Coal Measures Formation. Detailed stratigraphical information is provided in **Table 2.2**.

Table 2.2 Detailed Stratigraphical Information

Period	Group	Formation
Modern	/	MADE GROUND associated with historic buildings and railways that have been on site and subsequent possible demolition materials.
Holocene	/	Tidal flat deposits comprising mud flat and sand flat deposits.
Carboniferous	South Wales Coal Measures Group	South Wales Middle Coal Measures Formation: Grey, (productive) coal-bearing mudstones/siltstones, with seatearths and minor sandstones.

Strata in the local area have a dip of 24° north.

The site is situated on an area of landscaped ground.

The 1:10,000 scale map (SS78NE) shows the nearest coal seam to the site situated 780m northeast. This is the Wernddu coal seam. Strata in this local area dip towards the northeast, so this coal seam will not underlie the site.

On the 1:10,000 scale map (1952) the Upper Cwmgorse Marine Band is situated 1280m southeast from the site. On the update 1:50,000 scale map (2011), the Upper Cwmgorse Marine Band is situated 470m northeast of the site. This coal seam will therefore not underlie the site.

The 2ft 9 coal seam is the nearest mapped coal seam that would underlie the site. Situated 2750m southeast, and dipping 24° northeast, this coal seam is likely to underlie the site at a depth much greater than the influencing depth for ground stability.

It can be seen on the generalised vertical section that several coal seams situate between the Upper Cwmgorse Marine Band and the 2ft 9 seam. These are not mapped within the local area, possibly due to complex faulting and map inaccuracies. These coal seams are however unlikely to underlie the site at shallow depth.

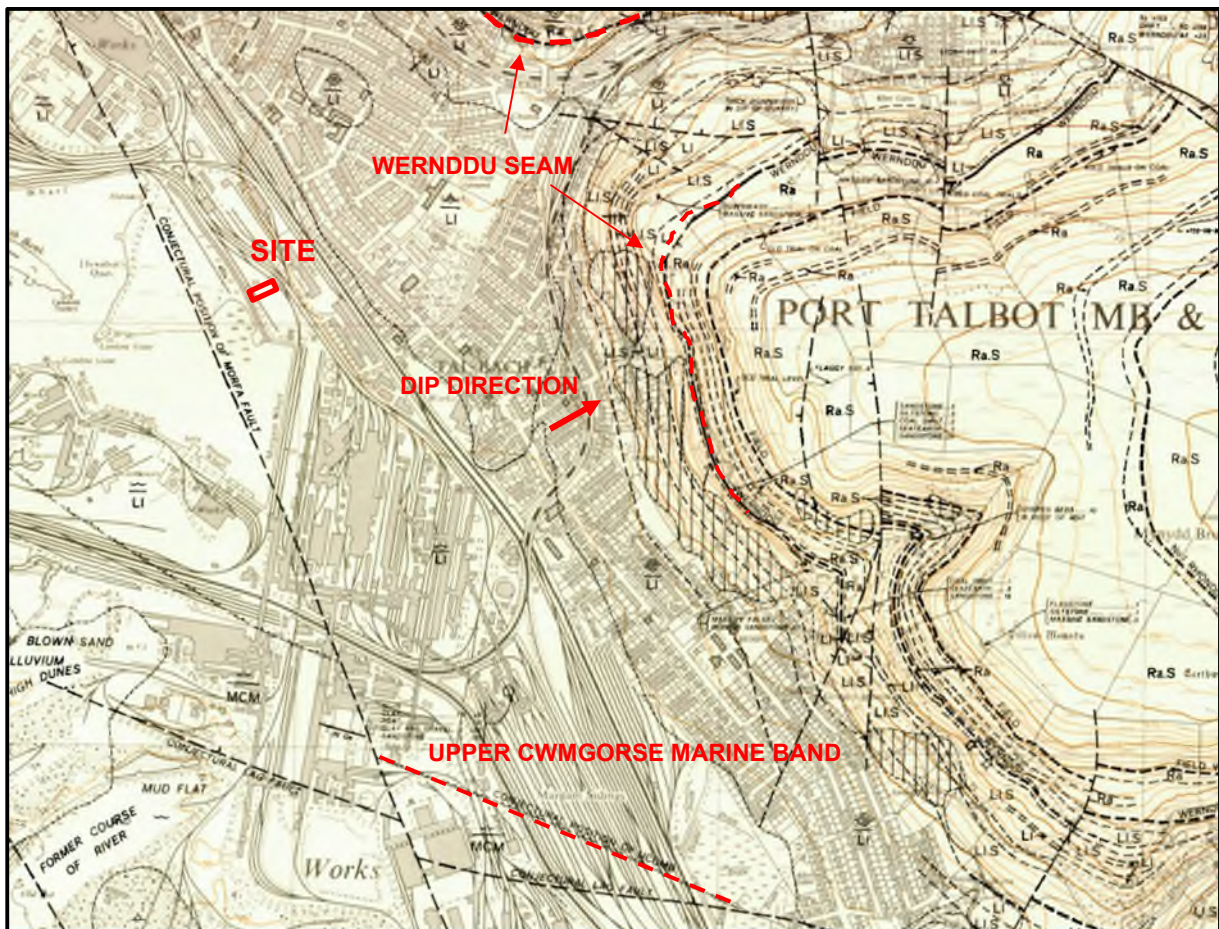


Figure 2.2 1:10,000 geological map extract (SS78NE)

2.3.2 BGS Borehole Information

BGS borehole record SS78NE88 is situated 130m southwest of the site.

Table 2.4 summarises the ground conditions from BGS borehole record SS78NE88.

Table 2.4 Summary of BGS Borehole record SS78NE88

Depth (m)			Stratum
G.L.	-	5.4	MADE GROUND consisting of hardcore
5.4	-	6.2	Soft brown sandy CLAY and stones
6.2	-	6.4	Soft brown sandy CLAY
6.4	-	6.7	Soft black PEAT
6.7	-	6.8	Soft blue very sandy silty CLAY
6.8	-	10.9	Fine to medium GRAVEL
10.9	-	13.4	Fine to medium SAND and GRAVEL
13.4	-	18.5	Fine to medium GRAVEL with boulders
18.5	-	19.8	Medium density brown stoney clayey SAND

2.3.3 Radon

The Envirocheck Report (**Annex A**) details that no radon protective measures are required for new developments on the investigation site.

2.3.4 Mining

The site situates within the South Wales Coal Fields.

The Coal Authority Report states that the property is not within a surface area that is affected by past underground mining.

In the probable unrecorded shallow workings section of the report, it is also confirmed that there are none. No spine roadways are recorded at shallow depth.

The report does not record any mine entries within 100m from the site.

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining at the site.

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.

The Coal Authority has no record of a mine gas emission requiring action.

Given the local geology surrounding the site, it is unlikely that there are any worked coal seams below the site at shallow influencing depth.

The Coal Authority Consultants Coal Mining Report is appended in (**Annex C**).

No BGS mineral sites are recorded in the Envirocheck Report.

2.3.5 Natural Hazards

The Envirocheck details the following hazard potentials for the site.

Ground Dissolution:	No Hazard
Collapsible Ground:	No Hazard
Compressible Ground:	No Hazard
Landslide:	No Hazard to Very Low
Running Sand:	No Hazard
Shrinking and Swelling Clays:	Very Low

2.4 Environmental Setting

The following sections have been compiled using the Landmark Information Group Envirocheck datasheet and maps which can be found in **Annex A**.

2.4.1 Hydrogeology

Superficial deposits beneath the site have an aquifer designation of secondary aquifer – Undifferentiated.

The bedrock deposits beneath the site have an aquifer designation of secondary aquifer - A.

Deeper groundwater flow within the underlying bedrock will be controlled by the strata dip and any fractures or bedding planes within the rock units.

The hydraulic gradient will be at its steepest during periods of heavy rainfall and aquifer recharge.

The site does not locate within a groundwater source protection zone.

The nearest groundwater abstraction point is located 138m southeast, operated by Costain Ltd. This abstraction is taken from surface waters and is used for construction (dust suppression).

2.4.2 Hydrology

The nearest surface water feature locates off site 20m south and comprises an inland river within the Afan catchment.

2.4.3 Flooding

The site is at risk from extreme flooding from rivers or sea.

The site is not at risk from flooding from surface water.

The Envirocheck report records the site to have potential for groundwater flooding at the surface.

2.4.4 Waste

There are no recorded landfill sites within 250m of the site.

There are two recorded Waste Management Facilities within a 250m radius of the site. These are summarised in **Table 2.5**.

Table 2.5 Waste Management Facilities Summary

Operator	Distance/ Direction from site	Category	License Status
Avalon Insulation Services	166m, southwest	Household, Commercial and Industrial Stations Special Waste Transfer Stations	Effective
Construction Recycle Management Ltd	215m, southwest	HCI Waste TS and treatment and asbestos	Issued

A discharge consent is situated 14m northwest, operated by Short Bros (Plant) Ltd. Unspecified water is discharged into River Afan.

2.4.5 Pollution

Five pollution incidents to controlled waters are recorded within 250m of the site. These are summarised in **Table 2.6**.

Table 2.6 Pollution Incidents Summary

Incident Date	Distance/ Direction from site	Pollutant	Severity
March 1998	238m, northwest	Oils – Diesel	Category 3 – Minor Incident

March 1998	241m, northwest	Oils – Diesel	Category 3 – Minor Incident
March 1998	243m, northwest	Oils – Diesel	Category 3 – Minor Incident
September 1994	245m, northwest	Mud/Clay/Soil	Category 2 – Significant Incident
May 1991	244m, northwest	Sewage – Septic Tank Effluent	Category 3 – Minor Incident

2.4.6 Sensitive Land Use

The site is not located within a sensitive land use area.

2.4.7 Estimated Urban Soil Chemistry

The BGS have published estimated urban soil chemistry concentrations locally to the site for a number of common contaminants, i.e., arsenic, cadmium, chromium, lead and nickel. All of the given determinants have anticipated concentrations that are below the recognised trigger levels for a commercial scenario.

2.4.8 Industrial Land Use

Relevant contemporary trade directory entries recorded within proximity of the site are summarised in **Table 2.7**.

Table 2.7 Relevant Contemporary Trade Summary

Company	Distance/Direction from site	Classification	Status
Cockburn South West Ltd	16m, northwest	Electrical Engineers	Inactive
Rhino Doors	53m, northwest	Door Manufacturers – Industrial	Active
Fairwood Holdings	92m, northwest	Metal Products – Fabricated	Inactive
B H L Rolls Manufacuring Ltd	92m, northwest	Metal Products – Fabricated	Inactive
Fairwood Engineering Ltd	92m, northwest	Precision Engineers	Active
K and J Pipeline Supplies	107m, west	Engineering Materials	Inactive
Talbot Hydraulics	108m, west	Hydraulic Equipment and Accessories – Sales and Service	Active
Quay Corporate Ltd	108m, west	Clothing and Fabrics – Manufacturers	Inactive
Turner Fluidpower	108m, west	Hydraulic Equipment and Accessories – Sales and Service	Inactive
Corporate Manufacturing Wales Ltd	108m, west	Clothing and Fabrics – Manufacturers	Inactive

2.4.9 Infilled Land

Potentially infilled land features within 250m of the site are summarised in **Table 2.8**.

Table 2.8 Potentially Infilled Land

Feature	Distance/Direction from site
Infilled Llewellyn's Quay	1m, southwest
Infilled stream	146m, south
Infilled ponds associated with Llewellyn's Quay	239m, northwest
Infilled Llewellyn's Quay	245m, northwest

SECTION 3 Coal Mining Risk Assessment

3.1 Geotechnical Risk

3.1.1 Underground Mining

Based upon geological map data and historic borehole records, the stratigraphical sequence within 30m of the ground surface of the site is illustrated in **Figure 3.1**.

Modern	MADE GROUND associated with historic buildings that have been on site and subsequent possible demolition materials.	2.0m
Holocene	Tidal flat deposits comprising mud flat and sand flat deposits.	20.0m
South Wales Middle Coal Measures	Coal Bearing Mudstone/Siltstone with Seatearth and minor Sandstone	30.00m

Figure 3.1 Geology and Strata Base below Ground Level

The site situates within the South Wales Coal Fields.

The Coal Authority Report states that the property is not within a surface area that is affected by past underground mining.

In the probable unrecorded shallow workings section of the report, it is also confirmed that there are none. No spine roadways are recorded at shallow depth.

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining at the site.

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.

The Coal Authority has no record of a mine gas emission requiring action.

Given the local geology surrounding the site, it is unlikely that there are any worked coal seams below the site at shallow influencing depth.

3.1.2 Shafts & Adits

The Coal Authority Report does not record any mine entry within 100m from the site.

3.1.3 Conclusion

Given the local geology surrounding the site, it is unlikely that there are any worked coal seams below the site at shallow influencing depth.

The overall risk to the surface stability of the site from possible underground workings is considered negligible.

SECTION 4 Preliminary Human Health and Environmental Risk Assessment

4.1 General

The preliminary human health and environmental risk assessment is a qualitative evaluation of unacceptable risks to human health or the environment from potential 'contaminated land', based on reviewed information in preceding sections of this report.

For 'contaminated land' to exist as defined in Part 2A of the Environmental Protection Act (EPA) 1990, a Pollutant Linkage needs to be identified. Pollutant linkages are defined by having a valid 'source – pathway – receptor' as established in the preliminary conceptual site model.

For our definitions of pollution linkage and how we define risk please refer to **Annex B** which includes our classifications of consequence and probability, and risk assessment matrix.

4.2 Potential Sources of Contamination

Potential or known sources of contamination associated the sites current and historical land use are summarised in **Table 4.1**.

Table 4.1 Contamination Sources

ID	Source	Contaminant
S1	Made ground soils across the site associated with past site uses	Metals, TPH CWG, PAH, Asbestos, Ground gas PCB's

No other significant potential on-site or off-site sources of contamination have been identified during the desk study.

4.3 Potential Pollution Pathways

Potential contaminant pathways associated with a residential with home grown produce land use are as follows.

- P1 – Direct soil and dust ingestion
- ~~P2 – Consumption of home grown produce~~
- P3 – Dermal contact
- P4 – Inhalation of dust and vapours
- P5 – Vertical migration of leachates (unsaturated zone)
- P6 – Horizontal and vertical migration of contaminants (saturated zone)
- P7 – Artificial contaminant pathway (borehole, pile, excavation etc)
- P8 – Surface run-off
- ~~P9 – Plant uptake~~
- P10 – Horizontal and vertical migration of ground gasses and vapours
- P11 – Direct contact with construction materials
- P12 – Inhalation of asbestos fibres

4.4 Potential Receptors

There are human and hydrological receptors to any contamination that may be present on site. Potential receptors include.

- R1 – Construction and maintenance workers
- R2 – Future site users (employees)
- R3 – Passers-by or neighbouring site users
- R4 – Groundwater (aquifer)
- R5 – Surface waters (river/lake)
- R6 – Area of public open space
- R7 – Construction materials (concrete/potable water pipes)

4.5 Preliminary Conceptual Site Model

The preliminary conceptual site model establishes potential pollutant linkages between contaminants (source), pathways and receptors, realised during the preparation of the desk study report. Where a potential pollutant linkage is identified an assessment of risk is subsequently undertaken. The preliminary conceptual site model is tabulated in **Table 4.2**.

Outcomes of the preliminary conceptual site model are used as a basis for the design and implementation of the site investigation, whereby areas of potential contamination can be targeted as well as investigating the wider site.

Findings of the site investigation can in turn be used to develop and refine the conceptual site model.

Table 4.2 Preliminary Conceptual Site Model

Source	Pathway	Receptor	Preliminary Risk Assessment		
			Consequence	Probability	Risk
Human Health					
Contaminated Soils S1	Direct soil and dust ingestion P1 Dermal contact P3 Inhalation of dust and vapours P4	Construction and maintenance workers R1	Medium	Unlikely	Medium Risk - COSHH assessment and good level of PPE/ hygiene by site workers/ staff; dust suppression measures if required. Suitably designed site investigation recommended
		Passers-by or neighbouring site users R3	Medium	Unlikely	Low Risk - Significant contamination could be encountered on-site, and dust suppression measures would likely prove effective against low levels of contamination. However, additional precautions may be required if ACMs are present within the made ground deposits.
		Future site users (employees) R2	Medium	High Likelihood	High Risk – Based upon the findings of the desk study, made ground associated with the dismantled railway is very likely to be encountered. This material would likely contain certain amounts of chemical contamination. Suitably designed site investigation recommended.
Radon Gas	Horizontal and vertical migration of ground gasses and vapours P10	Future site users (employees) R2	Medium	Unlikely	Negligible Risk - No radon protection measures required
Ground Gas S1		Future site users (employees) R2 Construction and maintenance workers R1	Severe	Low Likelihood	Medium Risk – Depending upon the thickness of made ground deposits encountered on-site, ground gas could pose a risk to human health. Suitable ground gas monitoring scheme recommended, depending upon the findings of a suitable site investigation.
Mine Gas S2		Unlikely		Low Risk – No significant sources of mine gas were identified during the desk study. The local area of Port Talbot was not heavily mined as it is on the outer limits of the coal fields.	
Impacted Groundwaters S1	Horizontal and vertical migration of contaminants (saturated zone) P6 Dermal contact P3	Construction and maintenance workers R1	Medium	Likely	Medium Risk – Given the proximity of the site to water features, it is likely that a shallow depth groundwater level could be encountered. Depending upon the thickness of made ground across the site, groundwater within this material may contain elevated levels of contamination. Suitably designed site investigation recommended.

Contaminated Soils S1	Direct Contact P11	Construction materials (water pipes) R7	Mild	High Likelihood	Medium Risk - Chemical analysis of the soils should be undertaken and the appropriate classification of concrete should be specified as per BRE Special Digest 1: Concrete in Aggressive Ground.
		Construction materials (concrete) R7			
Aquatic Environment					
Contaminated Soils S1	Vertical migration of leachates (unsaturated zone) P5	Groundwater (aquifer) R4 Surface waters (river/lake) R5	Mild	Likely	Low Risk – Depending upon made ground thickness and groundwater levels across the site, alteration of this ground may present a risk t the aquatic environment. Alteration of contaminated ground with contaminated groundwater may result in movement of groundwater contamination into the nearby area, including the Llewyn’s Quay. Suitably designed site investigation recommended.
	Surface run-off P8	Surface waters (river/lake) R5			
	Horizontal and vertical migration of contaminants (saturated zone) P6				

SECTION 5 Anticipated Ground Conditions

5.1 Geology

Based on the available desk study information and previous site investigation, anticipated ground conditions at the site are summarised in **Table 5.1**.

Table 5.1 Anticipated Ground Conditions

Stratum	Depth (m)
MADE GROUND associated with historic buildings that have been on site and subsequent possible demolition materials.	1.0/2.0
Tidal flat deposits comprising mud flat and sand flat deposits.	20.0
South Wales Middle Coal Measures	>30.0

5.2 Groundwater

Groundwater is anticipated within SAND and GRAVEL deposits that may underlie the site.

SECTION 6 Preliminary Engineering Recommendations

Recommendations given in this section are based upon the available desk study information and need to be confirmed by a relevant intrusive investigation.

6.1 Preparation of Site

Areas of hardstanding including all roots should be stripped and removed from beneath the proposed development site.

Contingencies should be made for the protection/diversion of any underground/overhead services present beneath/above the site brought about as a result of the proposed works.

Any reduced levels should be brought up to the required levels with suitable inert mainly granular materials. Department of Transport (DTp) type 2 sub-base or similar should be used and compacted in layers to the requirements of the Specification for Highway Works.

Allowances should also be made for the excavation of any soft spots/areas and their replacement with well compacted imported granular materials.

In accordance with EC Regulation 1272/2008 and Environment Agency Guidance WM3 soils and other materials destined for off-site disposal should be classified on the basis of their hazard phrases prior to disposal. Soils are classified as a mirror entry waste and should be classified on the basis of their specific chemical properties. TFW Group Ltd offer this service if required.

6.2 Tentative Foundation and Floor Slab Solution

Given the likelihood of encountering medium dense to dense MADE GROUND, it is likely that a reinforced concrete strip foundation founded at shallow on abed of inert hardcore would prove suitable for the proposed residential developments. The allowable bearing pressure is likely to be no more than 40kN/m² in order to keep settlements tolerable.

Floor slabs may be designed as grounded.

If low strength deposits are recorded to significant depth, a piled foundation solution may prove more suitable.

All foundation and floor slab solutions must be confirmed with a suitably designed site investigation.

Foundation and floor slab solutions must be backed up by suitable site investigation findings.

6.3 Excavations and Formations

Excavations could encounter shallow groundwater flows. Any inflows together with rainwater infiltration should be dealt with by conventional pumping techniques.

The sides of any excavations deeper than 1.2m should be supported by planking and strutting or other proprietary means.

The sub-formations/formations will be highly susceptible to loosening, softening and deterioration by exposure to weather (rain, frost and drying conditions), the action of water (flood water or removal of groundwater) and site traffic. Formations should never be left unprotected and continuously exposed to rain causing degradation, or left exposed/uncovered overnight, unless permitted by a qualified engineer.

Construction plant and other vehicular traffic should not be operated on unprotected formations.

6.4 Protection of Buried Concrete

Within BRE Special Digest 1 the chemical agents that aggressively attack concrete are sulphate, sulphides, magnesium ions, ammonium ions, carbon dioxide, chloride ions and phenols.

Aggressive ground conditions may be encountered at the site.

It is recommended that soils are tested to facilitate a classification.

6.5 Access Roads and Car Parking Areas

For car parking and road area formations the CBR value for shallow soils should be determined by in-situ CBR testing.

Allowances should be made for the removal of any 'soft spots/areas' and their replacement with well-compacted granular materials as previously described.

Please note that the Local Council / Highways Authority may require in-situ CBR testing to be undertaken before a road is adopted. In-situ CBR Testing should be performed following earthworks to verify the performance of the engineered fill.

6.6 Storm Water Drainage

Soakaway drainage may be feasible for the proposed development, though this will be dependent on the clay/silt content of the superficial deposits.

The suitability of stormwater drainage should be confirmed by in-situ soakaway testing.

Proposed soakaways should be positioned at least 5.0m away from any structure.

SECTION 7 Recommended Site Investigation

7.1 General

An intrusive site investigation designed and justified in accordance with guidance provided in BS10175:2011+A2:2017 should be undertaken to achieve the following objectives:

- Identify the potential environmental liabilities at the site associated with any soil, gas, vapour and groundwater contamination from past site uses, to substantiate and enhance the conceptual site model, for a commercial scenario with enclosed spaces.
- Provide a suitable foundation and floor slab solution
- Provide recommendations regarding any relevant geotechnical aspects pertaining to the development.

7.2 Intrusive Investigation

It is recommended that the following site investigation is undertaken:

- Trial pitting to investigate the shallow ground conditions, carry out soakaway testing and take samples for contamination and soil property testing.
- Mini-percussive drilling to assess the strength of deposits below the site, and to also assess any risk from potential ground gas to the development (if required)

Chemical and geotechnical samples should be taken to confirm the characteristics of the ground/groundwater beneath the site to help inform on the foundation design and the need if any for site remediation.

A suitable gas monitoring scheme should be undertaken across the site if significant made ground deposits are encountered.

**Annex A
Envirocheck Report**

Annex B
Risk Assessment Definitions

The contaminated land regime is set out in Part 2A of the Environmental Protection Act (EPA) 1990 and was introduced on the 1st April 2000 in England and 1st July 2001 in Wales. A similar regime was introduced in Scotland on 14th July 2000.

Part 2A was introduced to achieve three overarching objectives:

- (a) To identify and remove unacceptable risks to human health and the environment.
- (b) To seek to ensure that contaminated land is made suitable for its current use.
- (c) To ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of sustainable development.

Under Part 2A the statutory definition of 'contaminated land' is:

"any land which appears to the local authority in whose area it is situated, to be in such a condition, by reason of substances in, on, or under the land, that:

- (a) Significant harm is being caused or there is a significant possibility of such harm being caused; or
- (b) Pollution of controlled waters is being, or is likely to be, caused."

Under Part 2A, for land to be classified as 'Contaminated Land' there must be one or more contaminant, pathway, receptor linkages, known as the '**Pollutant Linkage**'. A pollutant linkage requires three essential elements:

- (a) A **CONTAMINANT** (SOURCE) – a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of controlled waters.
- (b) A **RECEPTOR** – something which could be adversely affected by a contaminant.
- (c) A **PATHWAY** – a route by which a receptor is or might be exposed to or affected by a contaminant.

The term 'Risk' is widely used in different contexts and situations, but a prescriptive definition is given by the Guidelines for Environmental Risk Assessment and Management (DEFRA *et al*, 2000):

'Risk is a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence'.

Model Procedures for the Management of Land Contamination – Contamination Land Report 11 (2004) defines a 'Hazard' as

'a property or situation that in particular circumstances could lead to harm'.

A framework for qualitative risk assessment is provided in CIRIA publication C552 Contaminated Land Risk Assessment – A Guide to Good Practice (2001). The method requires an assessment of the magnitude of the probability of the risk occurring and the magnitude of the potential consequence. Classifications of consequences and probability, levels and descriptions of risk have been devised from the above publication and are defined in the following sections.

Classification of Consequence

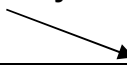
Table A Classification of Consequence	
Classification	Definition
Severe	• Short term (acute) risk to human health likely to result in significant harm • Short term risk to controlled waters • Catastrophic damage to buildings/structures • Short term risk to an ecosystem or organism within the particular ecosystem
Medium	• Chronic damage to human health (long term risk) • Pollution of a sensitive water resource • A significant change in an ecosystem or organism within the ecosystem
Mild	• Pollution of non-sensitive water resources • Significant damage to buildings/structures • Damage to sensitive buildings/structure/services or the environment
Negligible	• Harm (not necessarily significant) which may result in financial loss • Non-permanent health effects to humans (easily prevented by PPE for example) • Easily repairable effects of structural (building) damage

Classification of Probability

Table B Classification of Probability	
Classification	Definition
High Likelihood	• There is a complete pollution linkage and an event appears very likely to occur in the short term and is inevitable in the long term. • Evidence of harm to the receptor
Likely	• There is a complete pollution linkage which means that it is probable that an event will occur • The event is not inevitable but possible in short term and likely in the long term
Low Likelihood	• There is a complete pollution linkage and circumstances are possible under which an event could occur • It is not certain that an event will occur in the long term, and it is less likely to occur in the short term
Unlikely	• There is a complete pollution linkage but circumstances are such that it is improbable that an event would occur even in the long term

Risk Assessment Matrix

By comparing the consequences of a risk and the probability of the risk of a pollution linkage, the likely risk category can be determined as shown in **Table C** below.

Table C Risk Assessment Matrix					
Increasing acceptability 		Consequence			
		Severe	Medium	Mild	Negligible
Probability	High Likelihood	High risk	High risk	Medium risk	Low risk
	Likely	High risk	Medium risk	Low risk	Near zero risk
	Low Likelihood	Medium risk	Low risk	Low risk	Near zero risk
	Unlikely	Low risk	Near zero risk	Near zero risk	Near zero risk

Description of Risks and Likely Actions

High Risk

There is a high probability that severe harm could arise to a receptor, or there is evidence that a receptor is currently being severely harmed. The risk if realised is likely to result in liability, and urgent investigation or remediation will be required.

Medium Risk

It is probable that harm will arise to a receptor. However, it is relatively unlikely that such harm would be severe, or if harm does occur the harm is likely to be relatively mild. Investigation will be required to determine the liability, and some remedial works may be required in the long term.

Low Risk

It is possible that harm may arise to a receptor, but it is likely that the harm would be mild.

Near Zero Risk

There is a very low risk of harm to the receptor. In the event of harm being realised the harm is not likely to be severe.

Annex C
Coal Authority Report and Map

DRAWINGS



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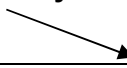
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Description of Risks and Likely Actions

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Medium Risk

It is probable that harm will arise to a receptor. However, it is relatively unlikely that such harm would be severe, or if harm does occur the harm is likely to be relatively mild. Investigation will be required to determine the liability, and some remedial works may be required in the long term.

Low Risk

It is possible that harm may arise to a receptor, but it is likely that the harm would be mild.

Near Zero Risk

There is a very low risk of harm to the receptor. In the event of harm being realised the harm is not likely to be severe.

**ANNEX C
Trial Pit Logs**

Trial Pit Log

Trial Pit No:
SA01
Sheet 1 of 1

Project Name: Runtech

Project No:
17730

Co-ords: 276884.00 - 189091.00
Level: 8.00

Date:
20/04/2023

Location: Port Talbot

Dimensions:

Depth
1.30

Scale:
1:25

Logged:
SO

Client: Runtech Ltd

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.50	ES		0.70	7.30		[Dense] dark grey sandy fine to coarse angular to subrounded slag GRAVEL with low subangular slag cobble content. Sand is fine to coarse. (MADE GROUND)	
	1.20	ES		1.30	6.70		[Dense] black silty gravelly fine to coarse SAND. Gravel is fine to coarse angular to subrounded slag and coal. (MADE GROUND)	1
▼							End of Pit at 1.300m	2
								3
								4
								5

Stability:

Remarks: 1] Consistency, strength and density indicators are based upon field judgement. 2] Density indicator is in brackets and is for guidance only and is not in accordance with BS 5930:2015. 3] Trial pit terminated due to groundwater. 4] Trial pit backfilled with arisings on completion of test.

Trial Pit Log

Trial Pit No:
SA02
Sheet 1 of 1

Project Name: Runtech

Project No:
17730

Co-ords: 276861.00 - 189123.00
Level: 8.00

Date:
20/04/2023

Location: Port Talbot

Dimensions:

Depth
1.60

Scale:
1:25

Logged:
SO

Client: Runtech Ltd

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.25	7.75		Loose grey sandy fine to coarse rounded to angular concrete, slag, and brick GRAVEL. Sand is fine to coarse. (MADE GROUND)	
							[Dense] grey slightly sandy fine to coarse subangular to subrounded slag GRAVEL with low subangular slag cobbles. Sand is medium to coarse. (MADE GROUND)	
	0.60	ES		0.60	7.40			
	0.70	ES		0.70	7.30		[Dense] grey silty slightly sandy fine to coarse subangular to subrounded slag GRAVEL with low subangular slag cobble content and frequent timber and creosote odour. Sand is medium to coarse. (MADE GROUND)	
							<i>Railway sleepers and metal sheeting</i>	
	1.10	ES					[Dense] dark grey sandy fine to coarse angular to subrounded slag GRAVEL with low subangular slag cobble content. Sand is fine to coarse. (MADE GROUND)	1
				1.30	6.70			
							[Dense] black silty gravelly fine to coarse SAND. Gravel is fine to coarse angular to subrounded slag and coal. (MADE GROUND)	
				1.60	6.40		End of Pit at 1.600m	
								2
								3
								4
								5

Stability:

Remarks: 1] Consistency, strength and density indicators are based upon field judgement. 2] Density indicator is in brackets and is for guidance only and is not in accordance with BS 5930:2015. 3] Trial pit terminated due to groundwater. 4] Trial pit backfilled with arisings on completion of test.

**ANNEX D
Soakaway Results**

SOAKAWAY TEST



SOAKAWAY TEST

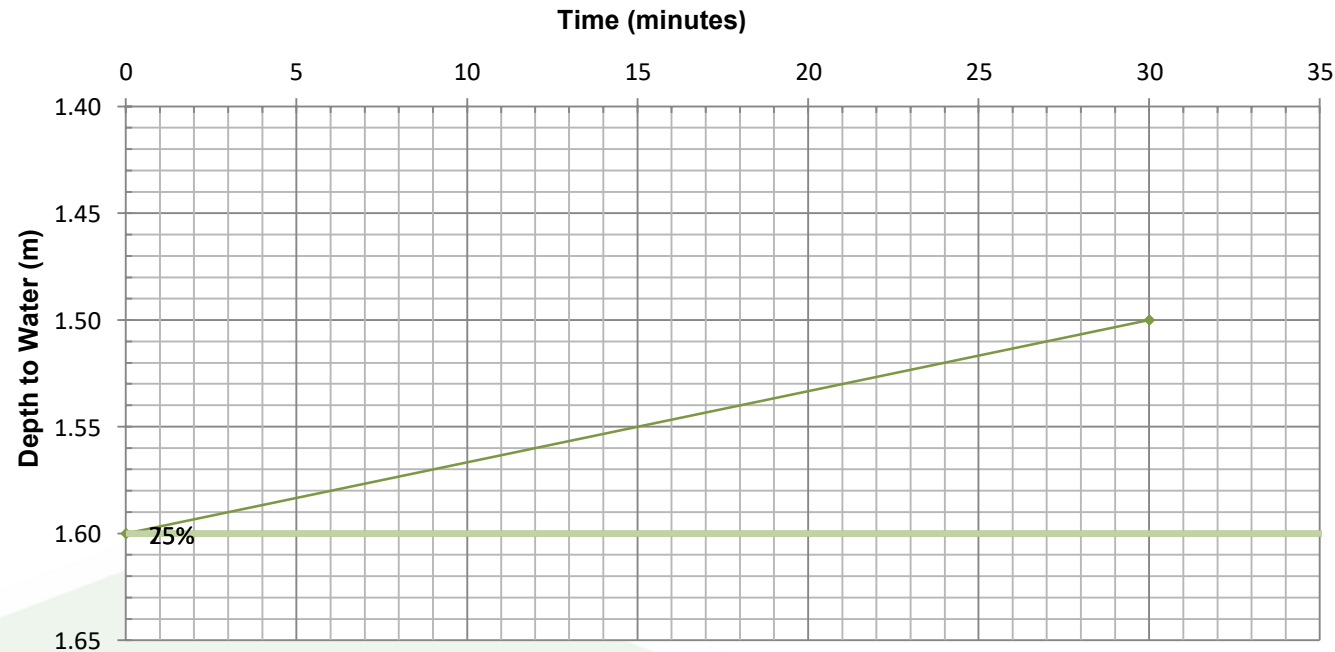
Site Name: Runtech
Project Number: 17730
Date: 20/04/2023
Engineer: Sam Oemering

Trial Pit: SA01

TEST 1

Length	1.90 m	V_{p75-25}	0 m ³
Width	0.75 m	a_{p50}	1.425 m ²
Depth	1.60 m	t_{p75-25}	N/A minutes
Fill Level	1.60 m	Soil Infiltration Rate, f	N/A ms ⁻¹

Time (mins)	Depth to Water (m)
0	1.60
30	1.50



REMARKS:

Test carried out in accordance with BRE Digest 365 (2016)

SOAKAWAY TEST



SOAKAWAY TEST

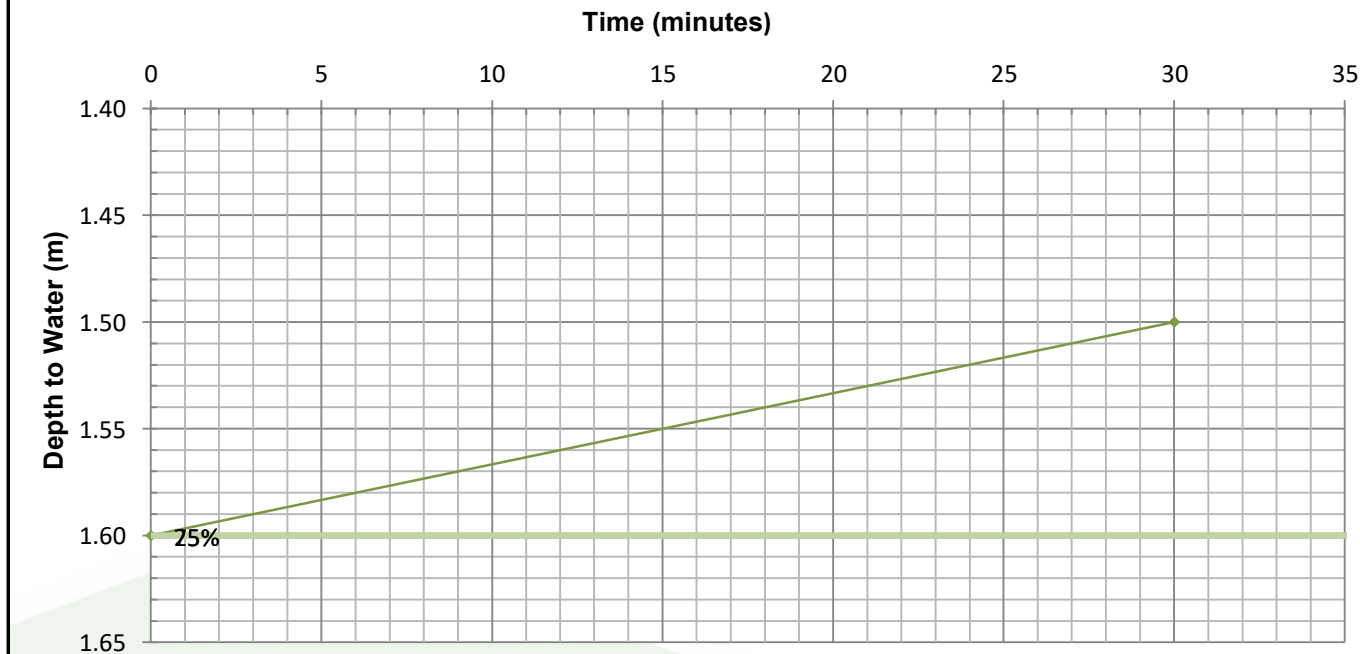
Site Name: Runtech
Project Number: 17730
Date: 20/04/2023
Engineer: Sam Oemering

Trial Pit: SA02

TEST 1

Length 2.30 m V_{p75-25} 0 m³
Width 0.70 m a_{p50} 1.61 m²
Depth 1.60 m t_{p75-25} N/A minutes
Fill Level 1.60 m **Soil Infiltration Rate, f** N/A ms⁻¹

Time (mins)	Depth to Water (m)
0	1.60
30	1.50



REMARKS:

Test carried out in accordance with BRE Digest 365 (2016)

**ANNEX E
Borehole Logs**

Borehole Log

Borehole No.

WS01

Sheet 1 of 1

Project Name:	Runtech	Project No:	17730	Co-ords:	276873E - 189108N	Hole Type	WS
Location:	Port Talbot	Level:	8.00m	Scale	1:50	Logged By	SO
Client:	Runtech Ltd	Dates:	19/04/2023 - 19/04/2023				

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description	
	Depth (m)	Type	Results						
	0.20 - 0.40	ES		0.10	7.90			Loose grey sandy fine to coarse subangular to angular limestone GRAVEL. Sand is fine to coarse. (MADE GROUND)	
	1.00	SPT	N=8 (2,3/2,2,2,2)	0.80	7.20			Medium dense blackish brown slightly silty sandy fine to coarse subangular to angular limestone and slag GRAVEL with infrequent rootlets. Sand is fine to coarse. (MADE GROUND)	1
	1.50 - 1.70	ES						Loose black gravelly fine to coarse SAND. Gravel is fine to coarse subangular to angular slag and coal. (MADE GROUND)	
	2.00	SPT	N=3 (1,1/1,0,1,1)						2
	2.60 - 2.80	D		2.50	5.50			Very soft grey sandy SILT/CLAY with frequent rootlets. Sand is fine. (TIDAL FLAT DEPOSITS)	
	3.00	SPT	N=12 (1,1/2,2,4,4)	3.00	5.00			Dark grey clayey sandy fine to coarse rounded to subangular sandstone GRAVEL. Sand is fine to coarse. (VIAL FAN DEPOSITS)	3
	3.60	SPT	50 (9,12/50 for 190mm)	3.60	4.40			End of Borehole at 3.600m	4
									5
									6
									7
									8
									9
									10

Remarks: 1] Borehole terminated on refusal. 2] On completion a 50mm standpipe (50mm) was installed to 2.0m depth. Slotted pipe with granular response zone from 1.0m-2.0m, solid standpipe with bentonite seal GL-1.0m, and a flush cover. 3] No groundwater recorded.



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Borehole Log

Borehole No.

WS02

Sheet 1 of 1

Project Name: Runtech	Project No: 17730	Co-ords: 276886E - 189111N	Hole Type WS
Location: Port Talbot		Level: 8.00m	Scale 1:50
Client: Runtech Ltd		Dates: 19/04/2023 - 19/04/2023	Logged By SO

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description	
	Depth (m)	Type	Results						
	0.90	SPT	50 (11,13/50 for 160mm)	0.90	7.10			Medium dense grey sandy fine to coarse subangular to angular limestone GRAVEL. Sand is fine to coarse. (MADE GROUND)	
								End of Borehole at 0.900m	1
									2
									3
									4
									5
									6
									7
									8
									9
									10

Remarks: 1] Borehole terminated on refusal. 2] On completion borehole backfilled with arisings. 3] No groundwater recorded.

 Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk Geotechnical & Geoenvironmental Specialists <td colspan="4"> Borehole Log </td> <td colspan="2"> Borehole No. WS02A Sheet 1 of 1 </td>						Borehole Log				Borehole No. WS02A Sheet 1 of 1	
Project Name: Runtech				Project No: 17730		Co-ords: 276885E - 189113N		Hole Type WS			
Location: Port Talbot						Level: 8.00m		Scale 1:50			
Client: Runtech Ltd						Dates: 19/04/2023 - 19/04/2023		Logged By SO			
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description			
	Depth (m)	Type	Results								
	0.60	SPT	50 (10,14/50 for 160mm)	0.60	7.40			Medium dense grey sandy fine to coarse subangular to angular limestone GRAVEL. Sand is fine to coarse. (MADE GROUND)			
								End of Borehole at 0.600m	1		
									2		
									3		
									4		
									5		
									6		
									7		
									8		
									9		
									10		
Remarks: 1] Borehole terminated on refusal. 2] On completion borehole backfilled with arisings. 3] No groundwater recorded.											

Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project Name: Runtech	Project No: 17730	Co-ords: 276874E - 189100N	Hole Type WS
Location: Port Talbot	Level: 8.00m	Scale 1:50	Logged By SO
Client: Runtech Ltd	Dates: 19/04/2023 - 19/04/2023		

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description	
	Depth (m)	Type	Results						
	0.10 - 0.80	ES		0.10	7.90			Loose grey sandy fine to coarse subangular to angular limestone GRAVEL. Sand is fine to coarse. (MADE GROUND)	
	1.00	SPT	N=6 (2,3/2,1,2,1)	0.90	7.10			Medium dense blackish brown slightly silty sandy fine to coarse subangular to angular limestone and slag GRAVEL with infrequent rootlets. Sand is fine to coarse. (MADE GROUND)	1
	1.60 - 1.70	ES						Loose black gravelly fine to coarse SAND. Gravel is fine to coarse subangular to angular slag and coal. (MADE GROUND)	
	2.00	SPT	N=4 (1,1/1,1,1,1)						2
	2.90 - 3.00	D SPT	N=35 (1,0/2,6,9,18)	2.55	5.45			Very soft grey sandy SILT/CLAY with frequent rootlets. Sand is fine. (TIDAL FLAT DEPOSITS)	
	3.00	SPT	50 (10,14/50 for 160mm)	3.00	5.00			Dense grey clayey sandy fine to coarse rounded to subrounded sandstone GRAVEL. Sand is fine to coarse. (ALLUVIAL FAN DEPOSITS)	3
	3.50	SPT		3.50	4.50			End of Borehole at 3.500m	
									4
									5
									6
									7
									8
									9
									10

Remarks: 1] Borehole terminated on refusal. 2] On completion a 50mm standpipe (50mm) was installed to 2.0m depth. Slotted pipe with granular response zone from 1.0m-2.0m, solid standpipe with bentonite seal GL-1.0m, and a flush cover. 3] No groundwater recorded.



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Geotechnical & Geoenvironmental Specialists

Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: Runtech	Project No: 17730	Co-ords: 276889E - 189121N	Hole Type WS
Location: Port Talbot	Level: 8.00m	Scale 1:50	Logged By SO
Client: Runtech Ltd	Dates: 19/04/2023 - 19/04/2023		

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description	
	Depth (m)	Type	Results						
	0.40 - 0.50 0.40	ES SPT	0/50 for 10mm/0 for 0mm) 	0.40	7.60			Medium dense grey sandy fine to coarse subangular to angular limestone GRAVEL. Sand is fine to coarse. (MADE GROUND) End of Borehole at 0.400m	1 2 3 4 5 6 7 8 9 10

Remarks: 1] Borehole terminated on refusal. 2] On completion borehole backfilled with arisings. 3] No groundwater recorded.

 Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk Geotechnical & Geoenvironmental Specialists						Borehole Log				Borehole No. WS04A Sheet 1 of 1	
Project Name: Runtech						Project No: 17730		Co-ords: 276891E - 189121N		Hole Type WS	
Location: Port Talbot						Level: 8.00m				Scale 1:50	
Client: Runtech Ltd						Dates: 19/04/2023 - 19/04/2023				Logged By SO	
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description			
	Depth (m)	Type	Results								
	0.50	SPT	0 (50 for 10mm/0 for 0mm)	0.50	7.50			Medium dense grey sandy fine to coarse subangular to angular limestone GRAVEL. Sand is fine to coarse. (MADE GROUND)			
								End of Borehole at 0.500m			
										1	
										2	
										3	
										4	
										5	
										6	
										7	
										8	
										9	
										10	
Remarks: 1] Borehole terminated on refusal. 2] On completion borehole backfilled with arisings. 3] No groundwater recorded.											

ANNEX F
Laboratory Soil Chemical Test Results



Final Report

Report No.:	23-13352-1		
Initial Date of Issue:	03-May-2023		
Client	Terra Firma (Wales) Ltd		
Client Address:	5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA		
Contact(s):	sam@terrafirmawales.co.uk		
Project	Runtech		
Quotation No.:	Q20-21666	Date Received:	24-Apr-2023
Order No.:	17730 SO	Date Instructed:	24-Apr-2023
No. of Samples:	9		
Turnaround (Wkdays):	7	Results Due:	03-May-2023
Date Approved:	03-May-2023		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - Soil

Project: Runtech

Client: Terra Firma (Wales) Ltd	Chemtest Job No.:				23-13352	23-13352	23-13352	23-13352	23-13352	23-13352	23-13352	23-13352	23-13352
Quotation No.: Q20-21666	Chemtest Sample ID.:				1628116	1628117	1628118	1628119	1628120	1628121	1628122	1628124	1628125
	Client Sample ID.:				WS01	WS01	WS03	WS03	WS04	SA01	SA01	SA02	SA02
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.2	1.5	0.7	1.6	0.4	0.5	1.2	0.7	1.1
	Bottom Depth (m):				0.4	1.7	0.8	1.7	0.5				
	Date Sampled:				19-Apr-2023	19-Apr-2023	19-Apr-2023	19-Apr-2023	19-Apr-2023	20-Apr-2023	20-Apr-2023	20-Apr-2023	20-Apr-2023
	Time Sampled:				12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD									
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	12	8.7	4.1	46	6.6	5.9	22	15	14
Soil Colour	N	2040		N/A	Brown	Black	Brown	Black	Brown	Brown	Black	Brown	Brown
Other Material	N	2040		N/A	Stones and Roots	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Sand	Sand	Sand	Sand	Sand
pH	M	2010		4.0	8.4	8.2	10.6	9.5	9.9	10.2	9.4	9.2	9.1
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	3.9	0.79	1.4	1.1	2.7	3.6	4.4	3.0	2.7
Cyanide (Complex)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphate (Acid Soluble)	U	2430	%	0.010	0.070	< 0.010	0.068	0.029	0.092	0.16	0.071	0.096	0.099
Arsenic	M	2455	mg/kg	0.5	8.0	11	1.4	3.3	7.6	6.8	12	23	12
Beryllium	U	2455	mg/kg	0.5	1.0	0.8	< 0.5	0.5	1.7	0.9	1.2	1.0	3.1
Cadmium	M	2455	mg/kg	0.10	2.8	0.16	< 0.10	0.11	0.53	0.43	0.25	0.80	0.45
Chromium	M	2455	mg/kg	0.5	300	14	870	130	290	610	28	160	170
Mercury Low Level	M	2450	mg/kg	0.05	0.09	0.11	< 0.05	< 0.05	< 0.05	< 0.05	0.06	0.09	0.06
Manganese	M	2455	mg/kg	1.0	6900	380	20000	3100	7100	15000	920	3600	6200
Molybdenum	M	2455	mg/kg	0.5	7.8	1.5	2.1	1.3	16	12	2.9	40	8.9
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	2.1	2.2	< 2.0	2.7	< 2.0
Copper	M	2455	mg/kg	0.50	84	61	12	22	100	68	53	190	68
Nickel	M	2455	mg/kg	0.50	33	29	10	20	25	20	36	26	19
Lead	M	2455	mg/kg	0.50	140	22	8.0	11	100	230	60	120	110
Selenium	M	2455	mg/kg	0.25	0.78	1.2	0.28	0.41	0.96	0.77	1.2	0.93	1.4
Zinc	M	2455	mg/kg	0.50	700	93	58	39	510	340	91	370	270
Chromium (Trivalent)	N	2490	mg/kg	1.0	300	14	860	130	290	610	28	160	170
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	0.21	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aliphatic EPH >C10-C12	M	2690	mg/kg	2.00	2.2	2.4	2.3	4.2	2.7	< 2.0	2.2	3.9	2.3
Aliphatic EPH >C12-C16	M	2690	mg/kg	1.00	1.8	2.6	1.1	2.3	2.5	1.3	1.2	23	3.8
Aliphatic EPH >C16-C21	M	2690	mg/kg	2.00	< 2.0	2.5	< 2.0	2.5	2.1	2.8	< 2.0	66	25

Results - Soil

Project: Runtech

Client: Terra Firma (Wales) Ltd	Chemtest Job No.:				23-13352	23-13352	23-13352	23-13352	23-13352	23-13352	23-13352	23-13352	23-13352
Quotation No.: Q20-21666	Chemtest Sample ID.:				1628116	1628117	1628118	1628119	1628120	1628121	1628122	1628124	1628125
	Client Sample ID.:				WS01	WS01	WS03	WS03	WS04	SA01	SA01	SA02	SA02
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.2	1.5	0.7	1.6	0.4	0.5	1.2	0.7	1.1
	Bottom Depth (m):				0.4	1.7	0.8	1.7	0.5				
	Date Sampled:				19-Apr-2023	19-Apr-2023	19-Apr-2023	19-Apr-2023	19-Apr-2023	20-Apr-2023	20-Apr-2023	20-Apr-2023	20-Apr-2023
	Time Sampled:				12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD									
Aliphatic EPH >C21-C35	M	2690	mg/kg	3.00	< 3.0	4.9	< 3.0	25	5.3	110	< 3.0	1400	1700
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Total Aliphatic EPH >C10-C35	M	2690	mg/kg	5.00	6.3	12	5.3	34	13	120	6.1	1500	1700
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00	< 10	12	< 10	34	13	120	< 10	1500	1700
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	< 1.0	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	7.3	1.8
Aromatic EPH >C16-C21	N	2690	mg/kg	2.00	2.2	130	< 2.0	2.9	< 2.0	< 2.0	2.0	17	7.0
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	61	190	< 2.0	3.6	8.6	11	< 2.0	190	200
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	2.0	16	< 1.0	1.1	< 1.0	1.5	< 1.0	< 1.0	< 1.0
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	63	340	< 5.0	7.0	11	13	< 5.0	220	210
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00	65	360	< 10	< 10	11	15	< 10	220	210
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00	69	360	< 10	41	23	130	< 10	1800	1900
Total EPH >C10-C40	N	2690	mg/kg	10.00	71	370	< 10	42	23	130	< 10	1800	1900
Naphthalene	M	2700	mg/kg	0.10	< 0.10	1.9	< 0.10	0.89	0.69	< 0.10	0.99	0.44	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	2.3	< 0.10	0.49	1.1	< 0.10	0.34	1.7	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	4.2	< 0.10	0.37	0.59	< 0.10	0.68	1.2	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	3.5	< 0.10	0.37	0.78	< 0.10	0.66	1.7	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	1.5	36	0.52	1.9	2.4	1.1	4.3	5.1	2.3
Anthracene	M	2700	mg/kg	0.10	0.73	11	0.25	0.46	1.5	0.46	1.0	2.4	0.83
Fluoranthene	M	2700	mg/kg	0.10	1.9	37	0.65	1.3	2.0	1.9	4.4	5.6	3.4
Pyrene	M	2700	mg/kg	0.10	2.1	37	0.66	1.4	2.3	1.8	4.2	5.5	3.0
Benzo[a]anthracene	M	2700	mg/kg	0.10	1.6	17	0.44	0.67	2.8	1.6	2.4	4.9	3.4
Chrysene	M	2700	mg/kg	0.10	2.1	21	0.54	1.4	3.1	2.1	2.8	4.0	2.8
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	2.3	19	< 0.10	0.93	2.3	1.7	2.6	5.6	3.1
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	0.90	7.4	< 0.10	0.29	0.78	0.61	1.3	3.4	2.5
Benzo[a]pyrene	M	2700	mg/kg	0.10	1.5	15	< 0.10	0.74	2.3	1.1	1.9	3.6	3.3
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	9.3	< 0.10	< 0.10	< 0.10	< 0.10	1.4	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	2.7	< 0.10	< 0.10	< 0.10	< 0.10	0.71	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	8.7	< 0.10	< 0.10	< 0.10	< 0.10	1.3	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	15	230	3.1	11	23	12	31	45	25
Total Phenols	M	2920	mg/kg	0.10	< 0.10	0.18	0.17	0.18	0.19	< 0.10	0.23	< 0.10	< 0.10
Organic Matter BS1377	N	2930	%	0.10	5.4	4.0	0.60	4.0	4.5	3.1	4.2	4.1	2.5

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8–C10 Aromatics: >C5–C7,>C7–C8,>C8–C10	Water extraction / Headspace GCxGC FID detection
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
2930	Organic Matter	Organic Matter	Acid Dichromate digestion/Titration

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

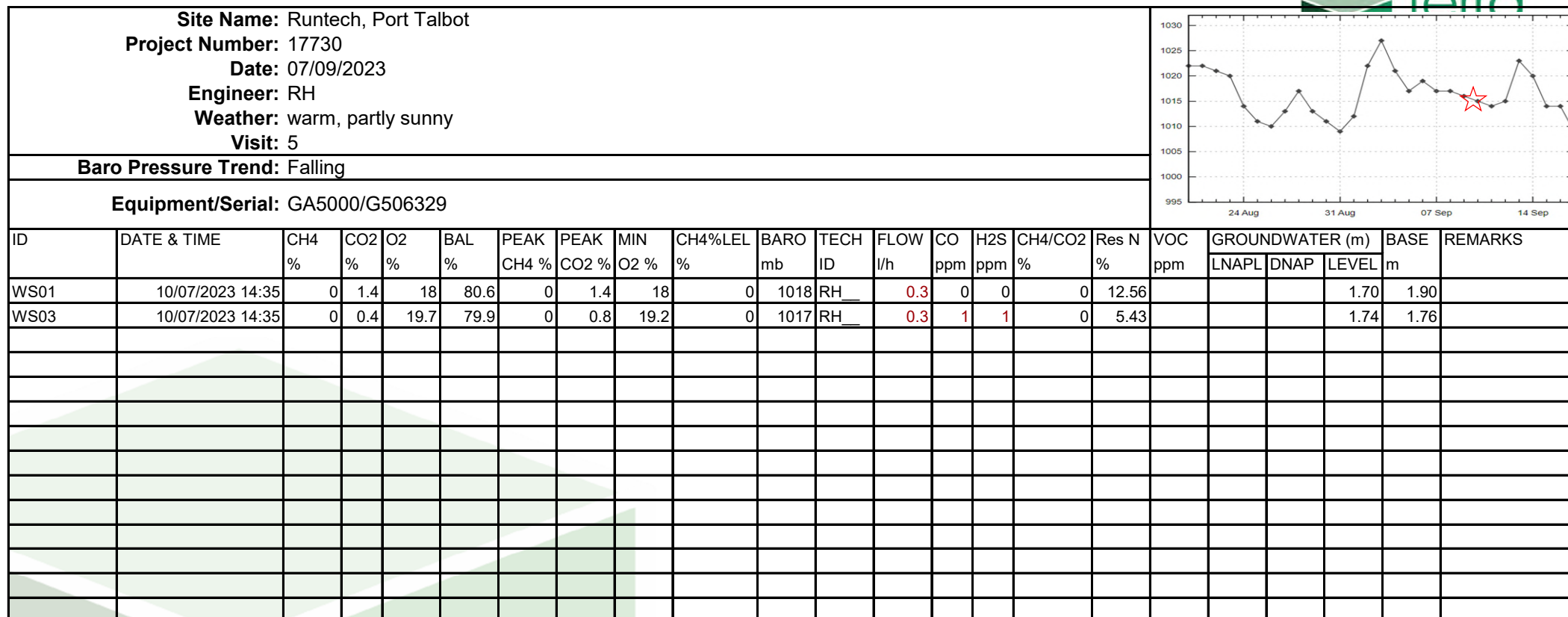
ANNEX G
Ground Gas Monitoring Results





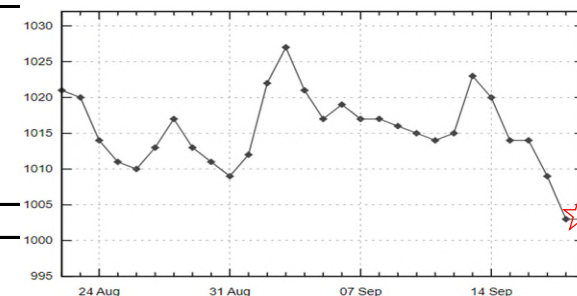








Equipment/Serial: GA5000/G506329

[illegible]

ANNEX H
Geotechnical Testing Results



Results Summary

Apex Testing Solutions Limited

Sturmi Way
Village Farm Industrial Estate
Pyle
Bridgend
CF33 6BZ

Telephone: 01656 746762

E-mail: andrew.grogan@apex-drilling.com

laura.davis@apex-drilling.com

<u>Reporting Details</u>		<u>Key Information</u>	
Company Name:	TFW Group Ltd	Site Name:	17730 - Runtech
Address:	5 Deryn Court Wharfdale Road Cardiff CF23 7HA	Job Number:	D23188
Contact Name:	Sam Oemering	Date Received:	24/04/2023
Contact Number:		Job Coordinator:	G. Llewellyn

Item No.	Tests Undertaken	Number of Tests
1	Moisture Content - BS1377 -2: 1990	2
2	Atterburg Limits (4 point) - BS1377-2: 1990	2

Results Issued: 27/04/2023

Comments

Results herein relate only to samples received in the laboratory and where not sampled by Apex Testing Solutions personnel relate to the samples as received.

Where tests are UKAS accredited any Opinion and/or Interpretation expressed herein are outside the scope of the UKAS Accreditation. The reports shall not be reproduced in full without the written approval of the laboratory.

Please contact the job coordinator should any further information be required.

TEST REPORT
Determination Of Water Content
ISO 17892-1: 2014

Project No: D23188
Project Name: 17730 - Runtech

Client: TFW Group Ltd
Address: 5 Deryn Court
Wharfdale Road
Cardiff
CF23 7HA

ATS Sample No: 32610

Site Ref / Hole ID: WS01

Depth (m): 2.60 - 2.80

Sample No:

Sample Type: Disturbed

Sampling Certificate Received: No

Material Description: Grey slightly gravelly slightly sandy CLAY

Location in Works: N/a

Material Source: Ex-Site

Date Sampled: Unknown

Material Supplier: Ex-Site

Sampled By: Client

Specification: BS1377

Date Received: 24 April 2023

Date Tested: 25 April 2023

Test Results

Moisture Content (%)

23.8

Remarks:

QA Ref.

EN ISO 17892-1:2014 E



Apex Testing Solutions

Sturmi Way, Village Farm Industrial Est,
Pyle, Bridgend, CF33 6BZ

Tel: 01656 746762 Fax: 01656 749096



7771

Approver

G Llewellyn

Date

27/04/2023

Fig

MC

G Llewellyn, Senior Technician

TEST REPORT
LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990. Clause 4.3/5.3/5.4

Project No: D23188
Project Name: 17730 - Runtech

Client: TFW Group Ltd
Address: 5 Deryn Court
Wharfdale Road
Cardiff
CF23 7HA

ATS Sample No: 32610

Site Ref / Hole ID: WS01

Depth (m): 2.60 - 2.80

Sample No:

Sample Type: Disturbed

Sampling Certificate Received: No

Material Description: Grey slightly gravelly slightly sandy CLAY

Location in Works: N/a

Material Source: Ex-Site

Date Sampled: Unknown

Material Supplier: Ex-Site

Sampled By: Client

Specification: BS1377

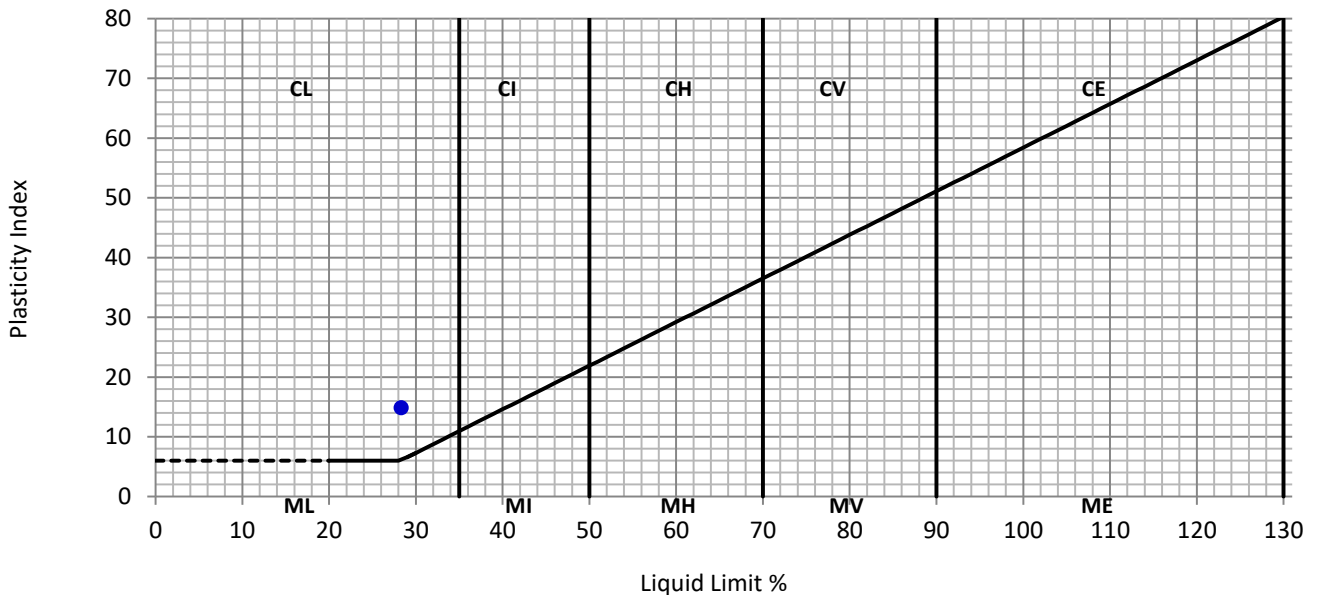
Date Received: 24 April 2023

Date Tested: 26 April 2023

Test Results

Liquid Limit	28	%
Plastic Limit	13	%
Plasticity Index	15	%

Preparation:	4.2.4 Sieved Specimen
Proportion retained on 425µm sieve:	9 %



Remarks:

QA Ref.

BS1377 - 2
Rev. 3.0



Apex Testing Solutions

Sturmi Way, Village Farm Industrial Est, Pyle,
Bridgend, CF33 6BZ
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7771

Approver

G Llewellyn

G Llewellyn, Senior Technician

Date

27/04/2023

Fig.

ATT

TEST REPORT
Determination Of Water Content
ISO 17892-1: 2014

Project No: D23188
Project Name: 17730 - Runtech

Client: TFW Group Ltd
Address: 5 Deryn Court
Wharfdale Road
Cardiff
CF23 7HA

ATS Sample No: 32611

Site Ref / Hole ID: WS03

Depth (m): 2.90 - 3.00

Sample No:

Sample Type: Disturbed

Sampling Certificate Received: No

Material Description: Brownish grey slightly
gravelly slightly sandy
CLAY

Location in Works: N/a

Material Source: Ex-Site

Date Sampled: Unknown

Material Supplier: Ex-Site

Sampled By: Client

Specification: BS1377

Date Received: 24 April 2023

Date Tested: 25 April 2023

Test Results

Moisture Content (%)

18.9

Remarks:

QA Ref.

EN ISO 17892-
1:2014 E



Apex Testing Solutions

Sturmi Way, Village Farm Industrial Est,
Pyle, Bridgend, CF33 6BZ

Tel: 01656 746762 Fax: 01656 749096



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Approver

G Llewellyn

Date

27/04/2023

Fig

MC

G Llewellyn, Senior Technician

TEST REPORT
LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX
BS 1377:Part 2:1990. Clause 4.3/5.3/5.4

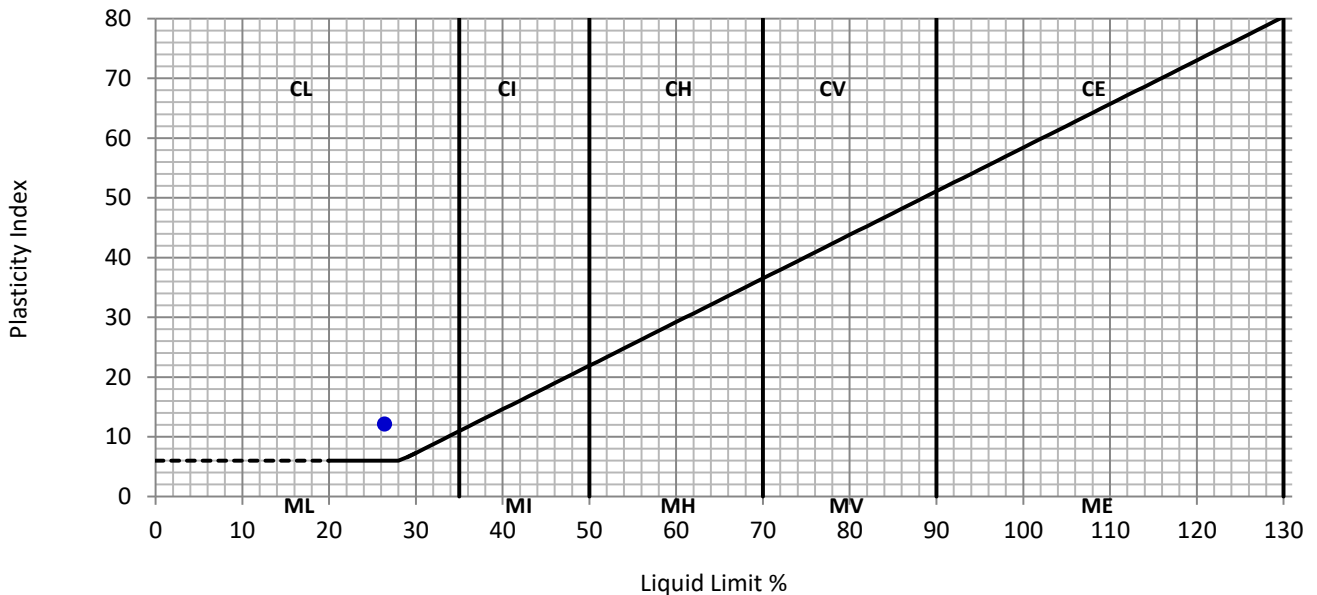
Project No:	D23188	Client:	TFW Group Ltd
Project Name:	17730 - Runtech	Address:	5 Deryn Court Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	32611		

Site Ref / Hole ID:	WS03	Depth (m):	2.90 - 3.00
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Brownish grey slightly gravelly slightly sandy CLAY
Location in Works:	N/a	Material Source:	Ex-Site
Date Sampled:	Unknown	Material Supplier:	Ex-Site
Sampled By:	Client	Specification:	BS1377
Date Received:	24 April 2023	Date Tested:	26 January 2023

Test Results

Liquid Limit	26	%
Plastic Limit	14	%
Plasticity Index	12	%

Preparation:	4.2.4 Sieved Specimen
Proportion retained on 425µm sieve:	11 %



Remarks:

QA Ref.

BS1377 - 2
Rev. 3.0



Apex Testing Solutions

Sturmi Way, Village Farm Industrial Est, Pyle,
Bridgend, CF33 6BZ
Tel: 01656 746762 Fax: 01656 749096



7771

Approver

G Llewellyn

G Llewellyn, Senior Technician

Date

27/04/2023

Fig.

ATT

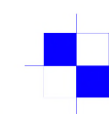
DRAWINGS



Legend



Windowless Sample



Trial Pit Locations



Proposed Storage Building Location

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SCALE: 1:250 (approx. @A3)

Project

Runtech, Port Talbot

Drawing 02:

Investigation Point Plan

TERRA FIRMA WALES
5 Deryn Court, Wharfedale Road
Cardiff CF23 7HA Tel:
info@terrafirmawales.com



Terra Firma (Wales) Ltd. 5 Deryn Court, Wharfedale Road, Pentwyn, Cardiff CF23 7HA
Tel: 029 2073 5354 **Fax:** 029 2073 5433 **Email:** info@terrafirmawales.co.uk www.terrafirmawales.co.uk