

Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace

Ground Investigation Report

Neath Port Talbot County Borough Council

08 June 2022



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1. Introduction

1.1. Background

Atkins, a member of the SNC Lavalin group, has been commissioned by Neath Port Talbot County Borough Council (NPTCBC) / Cyngor Castell-nedd Port Talbot to undertake a Ground Investigation Report (GIR) for a proposed flood alleviation scheme in Skewen, Neath Port Talbot.

The scheme comprises four proposed culverts between Caenant Terrace and an outlet to the Tennant Canal, as well as a weir structure at the outflow of the culverts, south of where the Tennant Canal crosses the River Clydach. A Ground Investigation (GI) to inform these proposed works was designed and supervised by Atkins, with fieldwork undertaken by SOCOTEC UK Ltd between 4th and 21st January 2022.

A previous phase of GI and reporting (referred to herein as “Phase 1”) was undertaken by Atkins in 2020. Phase 1 related to proposed works at Caenant Terrace and comprised a GI and subsequent Geotechnical and Geo-environmental Interpretive Report (dated 18 December 2020). The scope of the proposed drainage works has now been extended and the recent January 2022 GI works are therefore referred to herein as “Phase 2”.

A drawing showing the scheme is presented as ‘Caenant Full Scheme V2’ and enclosed in Appendix B.

1.2. Site Location

The site is located within the town of Skewen, Neath Port Talbot, South Wales in the Neath Valley. It is 1.8 km west of Neath and 8.7 km northeast of Swansea. A site location plan is provided in Appendix A.

The site is surrounded by mixed residential and industrial land uses, with multiple transport links intersecting the site in a general east to west orientation, including the A4230 New Road, B4290 Hen Heol / Old Road, the Great Western Railway (Vale of Neath Section) railway line and the Tennant Canal.

The proposed flood alleviation works include four overflow culverts, as shown in Table 1-1, below:

Table 1-1 - Approximate coordinates of the overflow culverts

Name	Location at mid-point of proposed culvert		Location description		Surface elevation (metres above Ordnance Datum (mAOD)) (north to south)
	Easting (m)	Northing (m)	Orientation	Transport link culvert proposed to pass underneath	
New Road Overflow	273141	197379	South to north	A4230 New Road	20.0 to 17.0
Old Road Overflow	273259	197341	Southwest to northeast	Old Road	10.7
Railway Crossing Overflow	273349	197307	Northwest to southeast in a z shape	Vale of Neath Section railway	11.8 to 8.1
Tennant Canal Overflow	273399	197289	North to south	None, but towards Tennant Canal	7.0 to 6.4

The proposed weir structure is to be located at 273886E/197280N, immediately south of where the Tennant Canal crosses the River Clydach.

1.3. Scope and Objectives

The purpose of this report is to summarise the findings of the desk study and Phase 2 GI undertaken to inform the development of this scheme. The objectives of this report are to:

- Summarise existing geotechnical and geo-environmental desk study information;

- Describe the GI works carried out;
- Provide a summary of ground conditions recorded during the GI;
- Summarise the geotechnical and geo-environmental laboratory test results recorded;
- Summarise and interpret findings of subsequent instrumentation monitoring;
- Determine the geotechnical soil parameters to be adopted for design purposes;
- Provide a land contamination assessment to identify potential risks to human health and controlled waters, together with recommendations for mitigation and inform the potential for material reuse / waste disposal;
- Identify geotechnical and geo-environmental risks to the project and recommendations for mitigation.

1.4. Limitations

The desk study findings contained within this report are based on information obtained from a variety of sources detailed in the report, which are considered to be reliable. However, the authenticity and reliability of the information cannot be guaranteed.

GI information is based on the Final Factual Report (rev 01) prepared by SOCOTEC UK Ltd (June, 2022), included in Appendix C.

This report is prepared and written in the context of an agreed scope of work and should not be used in a different context. Furthermore, new information, improved practices and changes in legislation may necessitate a re-interpretation of the report in whole or in part after its original submission.

Due to the inherent variability of the ground conditions between exploratory hole positions, interpretations are subject to the limitations of only assessing a relatively small proportion of sub-surface conditions at the site.

This report should be read in line with current legislation, statutory requirements and/or industry good practice applicable at the time of the works being undertaken. Any changes in this legislation, guidance or design may dictate the findings provided within this report to be reassessed.

Monitoring data provides information pertaining to specific discrete locations on particular dates. Recorded groundwater conditions may differ if this monitoring was to be undertaken on other dates.

2. Existing Information

The purpose of this section of the report is to summarise the key desk study information considered directly relevant to the geotechnical and geo-environmental elements of the proposed scheme. A detailed geotechnical and geo-environmental desk study was undertaken by Atkins in September 2021 (doc ref: NE04_001-ATK-GEN-SWMWREC-RP-CE-000001); reference should be made to this document for the full detailed desk study information.

2.1. Topography

The topography across the site slopes downhill towards Afon Nedd / River Neath. The elevation falls from 20mAOD at the A4230 New Road at the western limit of the site, to 6.8mAOD at the Tennant Canal Overflow, to 4.4 m AOD at the location where the weir structure is proposed to be located at the eastern limit of the site (Ordnance Survey, 2021). The land to the south of the A4230 appears to have been built up. There appears to be a cutting north of the railway, and a railway embankment / canal cutting south of the railway. The majority of the site appears to be at grade or on an embankment (Ordnance Survey, 2021). Specific elevation levels for each of the overflows are presented in Table 1-1.

2.2. Site History

A review of the historical development of the site and surrounding 500 m has been undertaken with reference to historical mapping contained within the Envirocheck Report (Landmark Information Group, 2021).

A summary of relevant development and industry features considered likely to present a potential geotechnical hazard or potential source of contamination is provided in Table 2-1, below:

Table 2-1 - Site History

Date and Scale	On-Site Development	Development in the surrounding area (within 500m of the site)
1876 – 1881 1:2,500	Two roads pass through the western and middle sections of the site in an east to west orientation.	The two large unnamed roads continue to the east and west of site in an east/north east to west/southwest orientation.
1884 1:10,560	A stream passes through the western half of site in a northwest to southeast orientation. A single-track tramway and a double track railway line passes through the eastern half of site in a northeast to southwest orientation. Embankments are present associated with the tracks in an area surrounded by marshland. A station is located on site between the tramway and railway line. A waterwheel is located adjacent southwest of the station. The Tennant Canal exists within the southern boundary of site in an east to west orientation, originally built between 1820 and 1824, contained within Skewen Cutting, a stone-line bed laid in 1821 (Cadw, 2021). The tramroad bridge over the Tennant Canal towards the Mines Royal Copper Works is first shown on the 1844 map (Cadw, 2021). At the location of the mine entry identified in the Coal Authority Report 33 m northeast of Old Road Overflow and 40 m northwest of	A stream orientated northwest to southeast is located up to 500 m northwest of the site. It then flows to the southeast joining the Tennant Canal on the southern boundary of site. The Tennant Canal continues east from the River Clydach and to the south up to 500 m from the site. A large pond is located 75 m to the south of site. The tramway and railways lines extend to the northeast and southwest of site. Additional tramway lines connect at a bridge 250 m south of site and extend to the northwest and southeast. An additional double tracked railway line is located 270 m to the north of site orientated east to west (the South Wales Mainline (SWML)). An additional branch railway line is present 15 m west of the New Road Overflow. A Mines Royal Works (Copper) is located 300 m to the south of site. An Old Quarry is located 350 m to the north of site.

	Railway Crossing Overflow, some buildings exist. The intersection between the River Clydach and Tennant Canal at the proposed weir structure is as present day.	Cheadle Works (Iron Shipbuilding), including a dry dock, are present 300 m southwest of the proposed weir structure, with more dry docks 200 m west of the proposed weir structure.
1899 1:2,500 1900 1:10,560	The two roads that pass through the site are known as New Road and Old Road. A level crossing is constructed between Old Road and the railway line towards Tennant Canal.	The Mines Royal Works is now labelled as disused. A drain is present trending southeast, immediately southeast of the proposed weir structure. This has been built on an embankment Another linear feature on an embankment trends north immediately north of the proposed weir structure. Springs are present within 100 m of the proposed weir structure. Cheadle Works 300 m southwest of the proposed weir structure are labelled as disused.
1918 1:2,500 1921 1:10,560	No significant changes.	The pond located 75 m to the south has been replaced by the Main Colliery (No. 1 Pit), which is present west of the junction between the branch line and the Vale of Neath Section. Canals are present along the River Clydach 100 m south of the proposed weir structure, including an aqueduct.
1938-40 1:10,560 1940 1:2,500	The tramway is decommissioned and replaced by undeveloped land.	The tramway has been decommissioned along with the Main Colliery and is replaced by undeveloped vacant land. The branch railway line is also decommissioned.
1951-52 1:1,250 1:10,560	No significant changes.	A refuse heap is located between 100 m and 150 m to the southeast of site and 400 m to the southwest of the proposed weir structure.
1952-71 1:2,500 1956-70 1:1,250 1970 1:10,000	The railway station is replaced by a Depot and large rectangular buildings.	The railway station has been replaced by large rectangular buildings known as Works up to 200 m to the northeast of site. A Depot and Tank are located 230 m to the southwest of site. The Dry Dock that was part of the Cheadle Works 300 m southwest of the proposed weir structure is labelled as disused.

1980 1:10,000	A Timber Yard is located in place of the Depot on-site between Old Road and the railway line. Another Depot and Corporation Yard is located in the western half of site.	A large building labelled a Works is located 150 m to the northwest of site.
1986-88 1:1,250	A Works is located in the southeast on-site. The railway that passes through the site has been renamed to Mineral Railway and now only has single tracks.	A Factory and Builders Yard and the Neath Abbey Adult Training Centre is located adjacent to the Tennant Canal between the proposed culverts and the proposed weir structure. A large Warehouse is located 75 m to the south of site. A single carriageway is constructed 220 m to the southeast of site orientated approximately northeast to southwest.
1992 1:10,000	No significant changes	The Mines Royal Works has been replaced by Neath Abbey Business Park located
1993 1:1,250		
1996 1:1,250	No significant changes.	An electrical substation is located 50 m to the northeast of proposed culverts.
1999 1:10,000	No significant changes.	A dual carriageway replaces the single carriageway 200 m to the south of site and is renamed as the A465.
2006 1:10,000	No significant changes.	No significant changes.
2021 1:10,000	No significant changes.	No significant changes.

2.3. Unexploded Ordnance

An Unexploded Bomb (UXO) risk map of the site, produced by Zetica, indicates that the site is in a Low-Risk area. This suggests that the site has a bombing density of 15 bombs per 1000 acres or less. However, the map indicates that a UXO was discovered approximately 350 m to the east of site.

On instruction from Atkins, Zetica also produced a Pre-Desk Study Assessment for the site in July 2021. which recommended a detailed desk study 'to assess, and potentially zone, the Unexploded Ordnance (UXO) hazard level on the site', on the basis of the presence of the following strategic targets:

- wharves and warehouses on the River Neath;
- transport infrastructure and public utilities;
- industries important to the war effort, including metal, engineering and chemical works;
- military camps, depots and training areas;
- Jersey Marine Airfield;
- anti-aircraft (AA) and anti-invasion defences; and
- two World War Two (WWII) bombing decoys present 3.2 km northwest of the site.

During WWII, the site was between Neath Municipal Borough (MB), which officially recorded 59 High Explosive (HE) bombs with a bombing density of 13.6 bombs per 405 hectares (ha), and Neath Rural District (RD), which officially recorded 205 HE bombs with a bombing density of 3.9 bombs per 405 ha. Readily available records have been found to indicate that several HE bombs fell in close proximity to the site during WWII. One WWII mortar bomb was found in Tennant Canal, Neath Abbey in July 2013, which was removed and safely disposed of.

The Pre-Desk Study Assessment recommends that a detailed desk study is commissioned to assess and potentially zone the Unexploded Ordnance (UXO) hazard at the site.

2.4. Published Geology

A summary of the geology underlying the site is provided based on published information from the British Geological Survey (BGS) website, the BGS 1:50,000 Sheet 247 Swansea (2011) and the Envirocheck Report (Landmark Information Group, 2021).

2.4.1. Made Ground

Made Ground is indicated to be present across the southern extent of the site from the Railway Crossing Overflow to the proposed weir structure, on both sides of the Tennant Canal. This is represented by the BGS as 'Landscaped Ground', where the land surface has been extensively remodelled where separate zones of made ground, worked ground or disturbed ground are impracticable or impossible to differentiate, leading to a variable composition (British Geological Survey, 2022). In addition, the Envirocheck Report also indicates an area of infilled ground across the central portion of the site (Landmark Information Group, 2021), which is not shown on the BGS website. A plan of the Made Ground as indicated on the BGS website is shown in Appendix C.

2.4.2. Superficial Deposits

Superficial deposits of Till (Diamicton), from the Devensian glacial period, are recorded to be present underlying the site, comprising a mixture of clay, sand, gravel and boulders (British Geological Survey, 2022).

Tidal Flat Deposits are shown to underlie the western portion of the site (British Geological Survey, 2022), typically comprising a consolidated soft silty clay, with layers of sand, gravel and peat. A plan of the superficial deposits is shown in Appendix C.

2.4.3. Bedrock

Bedrock of the Swansea Member, part of the Pennant Sandstone Formation overlying the South Wales Coal Measures Group, is recorded to underlie the entirety of the site, comprising green-grey, lithic arenites, with thin mudstone/siltstone and seatearth interbeds, and mainly thin coals (British Geological Survey, 2022). This bedrock has the potential to be highly weathered at the surface. The bedrock is shown to dip north of the site 18° to the northwest. Ferry Fault is present approximately 130 m west of New Road Overflow and the Cwm Felin Fault is present between the culverts and immediately west of the proposed weir structure. A plan of the bedrock geology is shown in Appendix C.

2.4.4. Mass Movement Deposits

BGS mapping indicates that there are no mass movement deposits on site (British Geological Survey, 2022).

2.5. Historical Borehole Records

Six boreholes have been identified from BGS mapping as being of similar geology to the site:

Table 2-2 - Summary of historical borehole records

Borehole	Distance and direction from site	Summary*	Thickness (m)	Groundwater Information
SS79NW96 (1967)	200 m southwest of the southern end of Tennant Canal Overflow	Clay	1.6	-
		Blue silty clay	3.1	
SS79NW99 (1967)	110 m south-southwest of Tennant Canal Overflow	Waste (ash, slag, rubble)	1.2	-
		Glacial deposits	1.9	
SS79NW13 (1967)	100 m south of Tennant Canal Overflow	Made Ground	0.5	Standing water levels were recorded at 0.4 m bgl and 0.9 m bgl
		Soft/firm, blue/grey, silty clay with dark brown bands	0.7	

Borehole	Distance and direction from site	Summary*	Thickness (m)	Groundwater Information
		Dark brown slightly sandy clay to light grey slightly clayey sand to dark grey clayey silt and gravel	1.5	
		Sand and gravel with cobbles and boulders	3	
SS79NW6 (1967)	20 m southeast of the proposed weir structure	Black granular fill Made Ground	1.7	Standing water was encountered at 1.5 m bgl and 3.6 m bgl
		Clayey sand and gravel	0.7	
		Very soft silty clay	0.8	
		Clayey medium/coarse sand with some gravel	0.7	
		Medium/coarse and gravel, cobbles and boulders	11.3	
SS79NW14 (1967)	140 m southwest of the proposed weir structure	Top soil and fill	0.1	Standing water level was encountered at 1.5 m bgl and water was also encountered at 3.0 m bgl
		Firm sandy clay and gravel	1.5	
		Black granular fill (coal)	0.8	
		Soft silty clay	5.5	
		Gravel and cobbles	0.3	
SS79NW74 (1967)	140 m southwest of the proposed weir structure	Fill	2.6	Water was first encountered at 6.2 m bgl and a water sample was taken at the water level at 2.6 m bgl.
		Soft sandy clay	2.6	
		Very dense coarse medium and fine gravel and coarse sand with some cobbles and boulders	4.3	

*All strata descriptions based on historical borehole logs dating back to 1967.

2.6. Phase 1 Ground Investigation (2020)

The Phase 1 GI was designed by Atkins and carried out by Quantum Geotech Ltd between the 1st and 10th September 2020, with a subsequent GIR undertaken by Atkins in December 2020. The objective of the ground investigation was to obtain geotechnical and geo-environmental information for a proposed new culvert and inlet structure at Caenant Terrace itself, approximately 250m northwest of the western edge of the Phase 2 site area. The ground investigation comprised:

- 2 no. Windowless Sample boreholes to a target depth of 8mbgl;
- 7 no. Hand Excavated Pits / Trenches to a depth of 1.2mbgl;
- 2 no. surface water samples;
- In-situ testing;
- Ground Penetrating Radar (GPR) Survey to identify underground services; and
- Associated geotechnical and geo-environmental laboratory testing.

The ground model developed for the site within the Atkins December 2020 GIR is summarised in Table 2-3, below:

Table 2-3 - Phase 1 Ground Model

Layer No.	Geology	Typical thickness (m)	Depth to top (m bgl)	Depth to base (m bgl)	Approx. Top of unit (m AOD)	Description
1	Asphalt	Min – 0.06 Max 0.12	0.00	Min – 0.06 Max 0.12	34.8	Wearing Course
2	Made Ground*	Min – 0.7 Max – 2.3	Min – 0.06 Max – 0.12	Min – 0.9 Max – 2.3	34.7	Grey, brown and black slightly sandy gravelly silty CLAY. Gravel is fine to course angular limestone (SUB-BASE). Sub rounded brick, clinker and sandstone.
3	Alluvium	Min – 0.9 Max – 1.4	Min – 0.9 Max – 1.9	Min – 2 Max – 3.3	34.2	Stiff grey very sandy SILT with many wood fragments. Sand is fine. Stiff grey gravelly CLAY (Alluvium).
3	Glacial Till	>2.55	Min – 0.90 Max – 3.10	Not proven	32.54	Stiff to very stiff grey very gravelly locally very sandy CLAY. Gravel is subrounded to rounded fine to coarse

2.7. Hydrogeology

The BGS online database (British Geological Survey, 2022) and the Envirocheck Report (Landmark Information Group, 2021) records that the superficial geology (Till and Tidal Flat Deposits) underlying the site is classified as a medium vulnerability Secondary Undifferentiated Aquifer. A Secondary Undifferentiated Aquifer has been assigned in cases where it has not been possible to attribute either category A or B to a rock type.

The bedrock geology at the site comprising the Swansea Member is classified as Secondary A Aquifer, which are permeable layers capable of supporting water supplies at a local rather than strategic scale.

The site is located within an area of medium groundwater vulnerability. However, the site is not located on or within 500 m of a groundwater source protection zone (SPZ) (Landmark Information Group, 2021).

2.7.1. Licenced Groundwater Abstractions

The Envirocheck Report (Landmark Information Group, 2021) records no active licensed groundwater abstractions within 1 km of the site. It should be noted that low volume private abstractions are unlicensed and do not appear on statutory database lists and therefore these may be present on or within 1 km of the site.

2.8. Hydrology

2.8.1. Hydrological and Drainage Information

The existing culvert and open channel/watercourse pass through the site in a northwest to southeast orientation, flowing to the southeast, with the Tennant Canal Overflow discharging some of the water into the Tennant Canal. The rest of the water continues along the existing culvert and existing watercourse to the River Clydach where it currently discharges, travelling parallel to the Tennant Canal on its north side, then crosses to the south side. The River Clydach and River Neath are located approximately 240 m and 350 m respectively to the south of site flowing in a south westerly direction.

2.8.2. Flood Risk

The Natural Resources Wales (NRW) long term flood risk maps (Natural Resources Wales, n.d.) record a strip of land along the route of the existing culvert and open channel/watercourse through the site which is within a high flood risk area from surface water and small watercourses. At the location of the proposed weir, NRW records River Clydach is at a high risk of flooding from rivers and at a high risk of flooding from the sea. The weir structure is labelled on the 1900 1:10,000 map with the *“highest point to which ordinary tide flows”* (Landmark Information Group, 2021).

NRW mapping indicates that the River Clydach is defined as a Main River. A Flood Risk Activity Permit (FRAP) will therefore be required for construction.

2.8.2.1. Licenced Surface Water Abstractions

The Envirocheck Report (Landmark Information Group, 2021) records no licensed surface water abstractions within 1 km of the site. It should be noted that low volume private abstractions are unlicensed and do not appear on statutory database lists and therefore these may be present on or within 500 m of the site.

2.8.2.2. Discharge Consents

The Envirocheck Report records one active discharge consent located on-site operated by Dŵr Cymru Cyfyngedig for sewage discharges into the existing culvert and open channel/watercourse that flows into the Tennant Canal.

Within 500 m of the site there are 12 active discharge consents to the unnamed canal that flows into the Tennant Canal and the River Clydach, including consents for sewage discharges of storm sewage overflow and trade discharges (Landmark Information Group, 2021).

2.9. Coal Mining

The site is within the South Wales Coalfield. The Swansea 5 Foot coal seam is present 180 m north of the nearest overflow, Railway Crossing Overflow, and 120 m west of the proposed weir structure, as shown in Appendix C. A Coal Authority Report obtained for the site is summarised in Table 2-4 and enclosed in the Atkins detailed geotechnical and geo-environmental desk study (doc ref: NE04_001-ATK-GEN-SWMWREC-RP-CE-000001). Mine entries within the Coal Authority Interactive Map Viewer are shown in Appendix A (The Coal Authority, 2021).

Table 2-4 – Coal Authority Report Summary

Coal Mining Activity/ Hazard	Description
Underground coal mining	Three seams of coal are present 30 to 90 m bgl, last worked in 1846. No underground mining is presently being undertaken, nor has the Coal Authority received an application for future underground mining.
Mine entries	One mine entry is present on the site, approximately 30 m east of Old Road Overflow and 40 m northwest of Railway Crossing Overflow at approximate British National Grid reference (273300E, 197340N) with no record of what or if treatment has been carried out. This is also present on the Coal Authority Interactive Map Viewer (The Coal Authority, 2021) and shown in Appendix A.
Opencast mining	No opencast mining has been carried out on site, is being carried out within 200 m of the site or licenced to be carried out within 800 m of the site in the future.
Coal mining subsidence	No damage notice or claim has been received by the Coal Authority on site or within 50 m of the site since 31 October 1994.
Mine gas	The Coal Authority has no record of a mine gas emission requiring action.

The report concludes that, as coal mining features have been identified or have the potential to be present, the Coal Authority would recommend that *“any planned or future development should follow detailed technical advice before beginning work on site”* (The Coal Authority, 2021).

2.10. Sensitive Land Uses and Designations

The Envirocheck Report (Landmark Information Group, 2021) and the DEFRA MAGIC Map (DEFRA, n.d.) records there are no Sites of Special Scientific Interest (SSSI) or Special Area of Conservation (SAC) within 500 m of the site.

National Forest Inventory broadleaved woodland is present immediately north of the proposed weir structure (DEFRA, n.d.).

The area around the proposed culverts is designated as part of Swansea Built Up Area (BUA) (DEFRA, n.d.).

2.10.1. Pollution Incidents to Controlled Waters

The Envirocheck Report (Landmark Information Group, 2021) records 12 pollution incidents to controlled waters within 500 m of the site, registered as occurring between 1991 to 1998. The nearest incident was 19 m to the northwest of site as a Category 2 'Significant Incident' with the release of mud, clay and soil by a Windows Factory on 12 September 1994.

2.10.2. Landfills

The Envirocheck Report (Landmark Information Group, 2021) records one historical landfill site within 500 m of the site. The historical landfill is located on-site in the southern portion, known as the Neath Abbey Refuse Site, with no further details supplied. This historic landfill extends further to the southeast up to 300 m and covers the area where a refuse heap from 1951-1952 within the former Mines Royal Works existed.

2.10.2.1. Potentially Infilled Land

The Envirocheck Report (Landmark Information Group, 2021) records an area of potentially infilled land within the site boundary mapped in 1992, but no details are available on the composition of the infill material. Based on the site history summarised in Section 2.2, a tramway existed through this portion of infilled ground until circa 1940, where it was removed and then replaced by a Warehouse and Timber Yard from 1980. It is likely that the infilled land relates to this tramway and its subsequent removal.

2.10.3. Waste Management Facilities

The Envirocheck Report (Landmark Information Group, 2021) records that there are no licences waste management facilities within 500 m of the site.

2.10.4. Fuel Station Entries

The Envirocheck Report (Landmark Information Group, 2021) records no fuel station entries within 500 m of the site.

2.11. Contemporary Trade Directory Entries

The Envirocheck Report (Landmark Information Group, 2021) records seven contemporary trade directories within 100 m of the site boundary that would be considered a major potential source of contamination. This is based on consideration of the likelihood of a particular activity storing large volumes liquids (fuel, chemicals) and thus their potential to create a sufficient plume of contamination in groundwater, or plume of vapours in unsaturated soils, that could have migrated onto site. This is summarised in Table 3-3 below.

Table 2-5 - Contemporary Trade Directories within 100 m of the Site

Orientation	Distance (m)	Name	Classification	Status
West	On-site	B & M Autocare	Car Breakdown and Repair Services	Active
West	On-site	Dragon Autos	Garage Services	Inactive
East	3	Abbey Services	MOT Testing Centre	Active
Northeast	12	Brookside Autos	Tyre Dealers	Inactive
Northwest	28	Kyle Evans Ltd	Refrigeration Equipment – Commercial	Active

Northwest	28	G P Auto Centre	Car Dealers – Used	Inactive
Southeast	57	Ace Minimix	Concrete and Mortar Ready Mixed	Active

2.12. Hazardous Substances

The Envirocheck Report (Landmark Information Group, 2021) indicates that there are no Control of Major Accident Hazards (COMAH), Registered Radioactive Substances, Explosive Sites, Notification of Installations Handling Hazardous Substances (NIHHS) or Planning Hazardous Substance Enforcements sites within 250 m of the Site.

3. Field and Laboratory Studies

3.1. Site Walkover

A site walkover was undertaken by Atkins in December 2021 to assess access and identify any site constraints ahead of the Phase 2 GI works.

3.2. Geomorphological/Geological and topographical mapping

No geomorphological or geological mapping was undertaken as part of this investigation.

3.3. Phase 2 Ground Investigation

3.3.1. Fieldworks

The Phase 2 GI was designed and supervised by Atkins, with fieldwork undertaken by SOCOTEC UK Ltd between 4th and 21st January 2022. The GI works comprised the following:

- Four dynamically sampled boreholes to depths between 8.0m bgl and 12.45m bgl;
- Four machine-excavated trial trenches to depths between 0.8m bgl and 1.3m bgl;
- One machine-excavated trial pit to a depth of 2m bgl;
- Associated geotechnical and geo-environmental sampling;
- Associated insitu and laboratory geotechnical and geo-environmental testing;
- Installation of three 50mm standpipes for groundwater and ground gas monitoring; and
- Five subsequent installation monitoring visits.

The SOCOTEC UK Ltd Factual Report (SOCOTEC UK Ltd, June 2022) is included in Appendix D. A GI location plan is included within Appendix D.

3.3.2. In-situ Testing

Standard Penetration Tests (SPTs) were carried out in the boreholes. The test results recorded are included in the SOCOTEC UK Ltd Factual Report (2022), which is included in Appendix D of this report.

3.3.3. Laboratory testing

Geotechnical and geo-environmental laboratory testing on selected samples retrieved during the GI site works were scheduled by Atkins. Geotechnical testing was undertaken by GEO Site & Testing Services Ltd and Eurofins Chemtest Ltd. Geo-environmental testing was undertaken by SOCOTEC UK Ltd.

Geotechnical Tests

The following geotechnical laboratory tests were undertaken:

- 15 Moisture content determination tests;
- 2 Atterberg Limit tests;
- 10 Particle size distribution (PSD) by wet sieving;
- 7 PSD – Sedimentation by Pipette; and
- 2 Direct Shear Strength Determination Tests (set of 3 x 60mm shear box specimens).

Geo-environmental Tests

The analytical suite was designed to inform the land contamination assessment summarised in section 6 of this report.

A total of sixteen soil samples were collected from the site and analysed for the following:

- Asbestos (and subsequent quantification if identified);
- pH;

- metals and metalloids – arsenic, boron, cadmium, chromium (total and hexavalent), copper, lead, mercury, nickel, selenium, zinc, vanadium, aluminium, antimony, barium, beryllium, iron, manganese, magnesium, molybdenum;
- water soluble sulphate (as SO₄), sulphate, sulphide, ammoniacal nitrogen as N, nitrate, nitrite;
- total, complex and free cyanide;
- speciated polycyclic aromatic hydrocarbons (17 PAHs);
- speciated total petroleum hydrocarbons criteria working group (TPH CWG) C5 – C44;
- soil organic matter (SOM);
- phenol;
- Benzene, toluene, ethylbenzene and xylenes (BTEX) (including methyl tert-butyl ether (MTBE)).

A total of nine soil-leachate samples were collected and analysed for the following;

- pH;
- water soluble sulphate (as SO₄), sulphide, ammoniacal nitrogen as N, nitrate, nitrite;
- total, complex and free cyanide;
- metals and metalloids – arsenic, boron, cadmium, chromium (total and hexavalent), copper, lead, mercury, nickel, selenium, zinc, vanadium, aluminium, antimony, barium, beryllium, iron, manganese, magnesium, molybdenum;
- speciated polycyclic aromatic hydrocarbons (17 PAHs);
- speciated total petroleum hydrocarbons criteria working group (TPH CWG) C5 – C44;
- phenol;
- BTEX (including MTBE).
- chemical oxygen demand (COD), biological oxygen demand (BOD)

A total of two surface water samples were collected and analysed for the following;

- pH;
- metals and metalloids – copper, lead, nickel, zinc, manganese;
- calcium, hardness (CaCO₃);
- chemical oxygen demand, biological oxygen demand;
- total organic carbon (TOC), dissolved organic carbon (DOC)

A total of three groundwater samples were collected and analysed for the following;

- pH;
- water soluble sulphate (as SO₄), sulphide, ammoniacal nitrogen as N, nitrate, nitrite;
- total, complex and free cyanide;
- metals and metalloids – arsenic, boron, cadmium, chromium (total and hexavalent), copper, lead, mercury, nickel, selenium, zinc, vanadium, aluminium, antimony, barium, beryllium, iron, manganese, magnesium, molybdenum;
- speciated polycyclic aromatic hydrocarbons (17 PAHs);
- speciated total petroleum hydrocarbons criteria working group (TPH CWG) C5 – C44;
- phenol;
- BTEX (including MTBE).
- chemical oxygen demand (COD), biological oxygen demand (BOD)

3.3.4. Drainage studies

No drainage tests were undertaken as part of the works.

3.4. Geophysical Surveys

All exploratory hole locations were surveyed for underground services, prior to any excavation, using PAS 128 Type B compliant, non-intrusive geophysical utility survey methods.

3.5. Other Fieldwork

No additional fieldwork was undertaken as part of this project.

4. Ground Conditions

The exploratory hole logs and geotechnical laboratory test results for all GI locations are included in SOCOTEC UK Ltd Factual Report (2022) contained within Appendix D. The ground conditions encountered at the site and results of geotechnical laboratory tests are summarised below.

4.1. Made Ground

Made Ground, associated with road construction and landscaped ground, was encountered at ground level (or directly underlying the road/pavement or topsoil) in all exploratory holes. The material was variable and is likely to have been sourced from nearby borrow areas within the Glacial Till and Tidal Flat Deposits.

The Made Ground was found to vary in thickness between 0.70m (BH03) and 2.75m (BH02A). It was generally described as a granular material of SAND or GRAVEL, with variable cobble, sand, silt and clay constituents. The gravel comprised brick, sandstone, limestone, concrete, slag, clinker, glass, plastic and macadam. The exploratory holes around the proposed Railway Crossing Overflow generally described a high ash content which is typical of old railway construction. Boulders were also encountered between 0.85m bgl and 1.2m bgl in TT01.

4.2. Glacial Till

Glacial Till was encountered to the west of the site in BH01 and BH02A, underlying the Made Ground. Both exploratory holes were terminated before proving the base of the stratum.

In BH01, the material was described as a medium dense greyish brown clayey SAND and GRAVEL. The sand was described as fine to coarse and the gravel was described as subangular fine to coarse of mudstone, limestone and sandstone. The proven thickness of the stratum was 6.6m upon termination of the exploratory hole.

In BH02A, the material was described as a soft to firm dark greyish brown sandy gravelly CLAY. The sand was described as fine to coarse and the gravel was described as subangular fine to coarse of mudstone, limestone and sandstone. The proven stratum thickness was 5m upon termination of the exploratory hole.

4.3. Tidal Flat Deposits

Tidal Flat Deposits were encountered to the east of the site in BH03, underlying the Made Ground. The exploratory hole was terminated before proving the base of the stratum, however the proven thickness was 11.7m. The material was described as a medium dense brown and/or grey sandy clayey GRAVEL. There was a layer of soft greyish brown slightly sandy slightly gravelly CLAY between 1.9m bgl and 2.8m bgl and a layer of soft bluish grey slightly gravelly sandy CLAY with pockets of black peat between 2.8m bgl and 4.3m bgl. The sand in all layers was generally described as fine to coarse and the gravel was described as subangular fine to coarse of sandstone, mudstone, limestone and quartzite.

4.4. Ground Model

GI was undertaken at each of the discrete structure locations for Phase 2 and, as such, reference should be made to the relevant borehole logs for details of the ground profile. Development of a site-wide ground model is not deemed appropriate for design due to the spatial spread of exploratory hole locations.

4.5. Groundwater

4.5.1. Groundwater Strikes

One groundwater strike was recorded during the Phase 2 GI works in BH01. The strike occurred within the Glacial Till (Granular) at a depth of 2.8m bgl, rising to 2.5m bgl after 20 mins, and was described as a medium inflow of water. It should be noted, however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions or other causes.

4.5.2. Monitoring

50mm Standpipes were installed in BH01, BH02A and BH03. Table 4-1, below, summarises the groundwater monitoring data:

Table 4-1 - Groundwater Monitoring Summary

Monitoring Round (Date)	Borehole ID	Response zone (m bgl)	Geological Strata	Groundwater depth m bgl / m AOD
1 (21/02/22)	BH01	1.9 – 8.0	Glacial Till	2.34 / 7.33
2 (10/03/22)				3.36 / 6.31
3 (19/04/22)				2.36 / 7.31
4 (17/05/22)				2.62 / 7.05
5 (13/06/22)				2.79 / 6.88
1 (21/02/22)	BH02A	1.9 – 8.0	Glacial Till	3.24 / 9.03
2 (10/03/22)				2.43 / 9.84
3 (19/04/22)				3.59 / 8.68
4 (17/05/22)				3.59 / 8.68
5 (13/06/22)				3.63 / 8.64
1 (21/02/22)	BH03	1.9 – 10.0	Tidal Flat Deposits	1.86 / 4.19
2 (10/03/22)				2.28 / 3.77
3 (19/04/22)				2.28 / 3.77
4 (17/05/22)				2.47 / 3.58
5 (13/06/22)				2.65 / 3.40

It should be noted that higher groundwater levels may be expected at different times of the year during higher rainfall periods.

4.6. Visual and Olfactory Evidence of Contamination

There was no visual and olfactory evidence of hydrocarbons, asbestos or Non-Aqueous Phase Liquids (NAPL) recorded within any of the logs.

Made Ground was encountered in all exploratory holes. Visual evidence of contamination within the soil comprised anthropogenic gravels of ash, slag and clinker. No olfactory signs of contamination were recorded at any of the sampling locations. A summary of visual evidence of contamination within soils is presented in Table 4-2 below.

Table 4-2 - Summary of Identified Visual Evidence of Contamination

Location	Description	Depth Range (m bgl)
BH01	Slag, ash and clinker	0.36 – 1.20
	Ash	1.20 – 1.40
BH02	Slag and clinker	0.70 – 2.10
BH02a	Slag, ash and clinker	0.70 – 1.20
	Ash and clinker	1.20 – 3.0
TP01	Ash and clinker	0.12 – 0.40
	Ash and clinker	0.5 – 2.0
TT01	Slag	0.1 – 0.38
	Slag	0.38 – 0.85

TT02A	Slag and ash	0.85 – 1.20
	Slag and clinker	0.2 – 0.8
TT03	Slag, clinker and ash	0.26 – 1.20
	Ash	0.6 – 1.20

5. Geotechnical Parameters

5.1. Derivation Methodology

This section provides an assessment of the geotechnical parameters of each stratum present at the Site for the purposes of informing future geotechnical design. Proposed geotechnical parameters have been determined primarily from interpretations of in situ and laboratory test data and recognised empirical relationships. Consideration has also been given to values in published literature. Empirical relationships used for parameter derivation are summarised below:

- Bulk Density - based on published values in BS8002 (2015) which takes into account the relative density of the soils based on SPT and particle size distribution curves, where available.
- Undrained shear strength, c_u – derived with the guidance from CIRIA 143 (1995), from characteristic SPT 'N' values, where $c_u = f_1 \cdot N_{60}$. f_1 is assumed to be between 4.5 – 6.0 and is conservatively taken as 4.5 for the purposes of this GIR.
- Internal angle of friction, ϕ' – derived from standard relationships
 - Granular soils – based on the relationships developed by Peck et al. (1974) and reported in Figure 36 of CIRIA 143 (1995) and the procedure outlined in BS8004 (2015) which takes into account grain angularity, uniformity coefficient of the soil grading and characteristic SPT 'N' values to determine the effective angle of shearing resistance.
 - Cohesive soils: where constant volume internal angle of friction, ϕ'_{cv} , is derived from the equation provided by BS 8004 (2015), $42^\circ - 12.5 \log_{10}(PI)$, where PI is the Plasticity Index.
- Stiffness, Young's Modulus, E' – derived from SPT 'N' values, based on the relationships developed by Stroud (1974) and reported in CIRIA 143 (1995):
 - Granular soils, $E' / N_{60} = 1 - 2$ MPa. Conservatively taken as 1MPa for the purposes of this GIR.
 - Cohesive soils (predominantly London Clay), $E' / N = 0.6 - 0.7$ MPa, or based on correlation $E' = 200c_u$ (Stroud and Butler, 1975).
- Undrained Young's Modulus, E_u , can be derived from the elastic relationship $E' = E_u / (1 + \nu') / (1 + \nu_u)$, where ν' and ν_u are the drained and undrained Poisson's Ratio, respectively.

Third parties undertaking design based on the recommendations contained within this report, including the parameters, must satisfy themselves as to their accuracy, validity and applicability of the recommendations and parameters.

Refer to Appendix E for graphical plots of test results and geotechnical parameters.

5.2. In-situ and Laboratory Testing Summary

5.2.1. Made Ground

A summary of the results from in-situ and laboratory geotechnical testing undertaken on the Made Ground is provided in Table 5-1, below:

Table 5-1 - Summary of in-situ and laboratory test results for Made Ground

Laboratory / in-situ test results			Results range (no. of tests)	Characteristic value	Appendix Ref.
SPT 'N ₆₀ '		Value	28 – 50 (5)	40	F.1
Classification	Bulk Density, γ	Mg/m ³	1.27 (1)	1.27	-
	Moisture Content	%	7.5 – 34 (6)	23	F.11
	Particle Size Distribution <i>Cobbles (Co), Gravel (Gr), Sand (Sa), Fines (Fi), Silt (Si), Clay (Cl)</i>	%	Gr = 2 - 71 (3) Sa = 23 – 89 (3) Si = 10 (1) Cl = 12 (1) <i>Fi = 6 & 9 (2)</i>	Gr = 39 Sa = 48 Si = 10 Cl = 12 <i>Fi = 8</i>	F.6

Shear Strength	Shear Box	ϕ'_p	°	34 (1)	34	-
		c'_p	kPa	19 (1)	19	

5.2.2. Glacial Till

The Glacial Till has been split into two separate units for geotechnical design purposes:

5.2.2.1. Glacial Till – Granular

A summary of the results from in-situ and laboratory geotechnical testing undertaken on the Glacial Till (Granular) is provided in Table 5-2, below:

Table 5-2 - Summary of in-situ and laboratory test results for Glacial Till (Granular)

Laboratory / in-situ test results			Results range (no. of tests)	Characteristic value	Appendix Ref.	
SPT ‘N ₆₀ ’			Value	20 – 33 (6)	25	F.2
Classification	Bulk Density, γ		Mg/m ³	2.08 (1)	2.08	-
	Moisture Content		%	15 & 17 (2)	16	-
	Particle Size Distribution <i>Cobbles (Co), Gravel (Gr), Sand (Sa), Fines (Fi), Silt (Si), Clay (Cl)</i>		%	Gr = 40 – 72 (3) Sa = 16 – 32 (3) Si = 12 & 13 (2) Cl = 14 & 15 (2) <i>Fi = 12 (1)</i>	Gr = 53 Sa = 27 Si = 13 Cl = 15 <i>Fi = 12</i>	F.7
	Shear Strength	Shear Box	ϕ'_p	°	23 (1)	23
c'_p			kPa	19 (1)	19	

5.2.2.2. Glacial Till – Cohesive

A summary of the results from in-situ and laboratory geotechnical testing undertaken on the Glacial Till (Cohesive) is provided in Table 5-3, below:

Table 5-3 - Summary of in-situ and laboratory test results for Glacial Till (Cohesive)

Laboratory / in-situ test results			Results range (no. of tests)	Characteristic value	Appendix Ref.
SPT ‘N ₆₀ ’		Value	19 – 41 (4)	29	F.3
Classification	Moisture Content	%	13 – 21 (3)	18	-
	Liquid Limit	%	Non-plastic (2)	Non-plastic	-
	Plastic Limit	%	Non-plastic (2)	Non-plastic	
	Plasticity Index	%	Non-plastic (2)	Non-plastic	
	Particle Size Distribution <i>Cobbles (Co), Gravel (Gr), Sand (Sa), Fines (Fi), Silt (Si), Clay (Cl)</i>	%	Gr = 8 (1) Sa = 23 (1) Si = 20 (1) Cl = 49 (1)	Gr = 8 Sa = 23 Si = 20 Cl = 49	F.8

It should be noted that while the borehole descriptions of this stratum, encountered in BH02A, indicate a cohesive material, the Atterberg limit test indicates that it is in fact non-plastic. Furthermore, the very high SPT N₆₀ values are not representative of a soft to firm CLAY. The core recovery in this material was very poor and, as such, it is difficult to determine its exact nature. It is likely to comprise variable granular and cohesive material.

5.2.3. Tidal Flat Deposits

The Tidal Flat Deposits has been split into two separate units for geotechnical design purposes:

5.2.3.1. Tidal Flat Deposits – Granular

A summary of the results from in-situ and laboratory geotechnical testing undertaken on the Tidal Flat Deposits (Granular) is provided in Table 5-4, below:

Table 5-4 - Summary of in-situ and laboratory test results for Tidal Flat Deposits (Granular)

Laboratory / in-situ test results		Value	Results range (no. of tests)	Characteristic value	Appendix Ref.
SPT 'N ₆₀ '			15 – 24 (6)	20	F.4
Classification	Moisture Content	%	15 – 22 (4)	19	-
	Particle Size Distribution <i>Cobbles (Co), Gravel (Gr), Sand (Sa), Fines (Fi), Silt (Si), Clay (Cl)</i>	%	Gr = 50 & 64 (2) Sa = 32 & 20 (2) Si = 8 & 7 (2) Cl = 10 & 9 (2)	Gr = 57 Sa = 26 Si = 7.5 Cl = 9.5	F.9

5.2.3.2. Tidal Flat Deposits – Cohesive

A summary of the results from insitu and laboratory geotechnical testing undertaken on the Tidal Flat Deposits (Cohesive) is provided in Table 5-5, below:

Table 5-5 - Summary of insitu and laboratory test results for Tidal Flat Deposits (Cohesive)

Laboratory / in-situ test results		Value	Results range (no. of tests)	Characteristic value	Appendix Ref.
SPT 'N ₆₀ '			8 – 15 (3)	9	F.5
Classification	Particle Size Distribution <i>Cobbles (Co), Gravel (Gr), Sand (Sa), Fines (Fi), Silt (Si), Clay (Cl)</i>	%	Gr = 1 (1) Sa = 31 (1) Si = 30 (1) Cl = 38 (1)	Gr = 1 Sa = 31 Si = 30 Cl = 38	F.10

5.3. Recommended Geotechnical Parameters

Table 5-6, below, summarises the characteristic geotechnical parameters recommended for the strata identified in Section 4. It should be noted that no recommendations have been made for the geotechnical parameters for the cohesive Glacial Till, encountered in BH02A, due to the absence of reliable in-situ and/or laboratory testing data.

Table 5-6 - Recommended Geotechnical Parameters

Strata	Bulk Density, γ (kN/m ³)	Shear strength			Stiffness	
		Effective angle of internal friction, ϕ' (°)	Effective cohesion, c' (kPa)	Undrained shear strength, c_u (kPa)	Drained Young's Modulus, E' (MPa)	Undrained Young's Modulus, E_u (MPa)
Made Ground	20	35	0	-	40	-
Glacial Till – Granular	18	32	0	-	25	-
Tidal Flat Deposits - Granular	18	30	0	-	20	-
Tidal Flat Deposits - Cohesive	17	21	1	40	8	10

5.4. Buried Concrete Design Classification

The following recommendations for use of buried concrete are provided for information. The guidance outlined in BRE Special Digest No. 1 - Concrete in Aggressive Ground (BRE, 2005) was followed to determine requirements

for buried concrete. The Site has been classified as a brownfield site. Groundwater is considered to be mobile in all encountered strata.

The results of the testing are summarised in Table 5-7, below. A design chemical class for at least 100-year design life is reported. The concrete composition can be determined from this classification by consulting Table D2 of the BRE document.

Table 5-7 - Buried concrete in aggressive ground classification

Strata	Sulphate 2:1 water/soil extract (SO ₄ mg/l)		pH		Design Sulphate Class for location	ACEC Class for location	DC Class
	Result(s) (no. of tests)	Characteristic value	Result(s) (no. of tests)	Characteristic value			
Made Ground	90 & 670 (2)	670	9.0 & 9.6 (2)	9.0	DS-2	AC-2	DC-2
Glacial Till	130 & 390 (2)	390	8.6 & 10.4 (2)	8.6	DS-1	AC-1	DC-1
Tidal Flat Deposits	70 (1)	70	9.2 (1)	9.2	DS-1	AC-1	DC-1

6. Land Contamination Assessment

6.1. Introduction

Land contamination is assessed through development of a conceptual site model (CSM) which describes the links between contamination which may be present from current and historical activities on-site (including any off-site activities from which contaminants may migrate onto a site), receptors to that contamination and pathways between the two.

Sources of contamination and associated contaminants, receptors to that contamination and the pathways are identified and assessed to determine whether all three are present or are likely to be present. If all three are present, then they form a potential contaminant linkage (PCL). These PCLs can then be subjected to the risk assessment process.

The approach adopted by Atkins is in general accordance with the Contaminated Land Exposure Assessment (CLEA) model produced by Defra and the Environment Agency and as outlined in the Environment Agency Land Contamination: Risk Management (LCRM) guidance (Environment Agency, n.d.). LCRM provides a technical framework for identifying and remediating contamination through the application of a risk management process. The decision of whether a risk is unacceptable in a particular case involves not only scientific and technical assessment, but also appropriate criteria by which to judge the risk and conclude exactly what level of risk would be unacceptable. Decisions regarding a site may be informed by:

- Tier 1 preliminary risk assessment, typically a desk study review to develop a preliminary CSM with an assessment of risk considering the likelihood and severity of the potential consequences associated with the PCLs);
- Tier 2 Generic Quantitative Risk Assessment (GQRA), typically a review of ground investigation and monitoring data, development of a CSM with an assessment of risk using precautionary Generic Assessment Criteria (GAC) relevant to the PCLs that represent minimal or tolerable risk; and
- Tier 3 Detailed Quantitative Risk Assessment (DQRA).

A Tier 1 PCSM assessment was prepared as part of the Atkins 2020 Desk Study. This section comprises a Tier 2 GQRA which updates the PCSM by considering the potential implications of the contaminant concentrations detected in the ground investigation, whether the material is appropriate for reuse and provides an initial waste classification.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination that may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations (United Kingdom Parliament, 2015), which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk. On this basis, it has been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers / site visitors during construction have therefore not been considered as part of this assessment.

6.2. Preliminary conceptual site model

6.2.1. Potential contamination sources

Based on the available information detailed in the desk study, Section 2 and updated following the SOCOTEC UK Ltd site investigation the following sources of contamination have been identified:

6.2.1.1. On-site

- Made Ground associated with the construction and operation of roads and railways including New Road and Old Road and Railway with the potential to contain a range of inorganic and organic contaminants including metals, hydrocarbons, PAHs and asbestos. Fuels and oils attributed to spills from vehicles on the road plus exhaust particulates; and,

- Made Ground associated with the construction, operation and demolition of former historical commercial and industrial land uses including a railway station, timber yard and tramway with the potential to contain a range of inorganic and organic contaminants including metals, hydrocarbons, PAHs and asbestos. Potential for ground gas and ground vapour generation.

6.2.1.2. Off-site

- Made Ground associated with the construction, operation and demolition of former historical commercial and industrial land uses within 500 m of the site the with potential to contain a range of inorganic and organic contaminants including metals, hydrocarbons, PAHs and asbestos. Potential for ground gas and ground vapour generation; and,
- Made Ground associated with the construction and operation of current industries including an electricity substation (50 m north), Neath Abbey Business Park (100-300 m south east) and a Depot and Tank (230 m south west). A range of inorganic and organic contaminants including metals, hydrocarbons, PCBs, PAHs and asbestos.

6.2.2. Receptors

Potential human health, controlled waters and property receptors to the sources of contamination identified include the following:

6.2.2.1. Human

- On-site workers during the construction phase of the culverts;
- On-site future maintenance workers;
- On-site residents and workers;
- Off-site workers, residents and members of the general public; and,
- Off-site future maintenance workers.

It is reasonable to assume that off-site workers will be completing their tasks using institutional controls (personal protective equipment, risk assessments etc.) that will mitigate their potential exposure.

6.2.2.2. Controlled Waters

- On-site surface water receptors including an unnamed canal, Tenant Canal and the River Clydach
- Off-site surface water receptors including the River Clydach (240 m south east) and the River Neath (350 m south);
- Groundwater within the superficial Secondary Undifferentiated Aquifer (Till and, river terrace deposits);
- Groundwater within the bedrock Secondary A Aquifer (Swansea Member).

6.2.2.3. Property

- On-site existing and future below ground infrastructure; and
- Off-site residential / commercial properties within the surrounding 500 m.

6.2.3. Pathways

The potential pathways depend upon the current and proposed end use of the site. The site predominately comprises residential use and tarmac roads. On this basis, the following potential pathways have been identified.

6.2.3.1. Human health

Potential exposure pathways to the identified on-site human receptors include:

- Dermal contact / ingestion / inhalation of contaminants in soil and soil-derived dust;
- Dermal contact / ingestion of contaminants in groundwater within excavations; and
- Inhalation of ground gas / vapours.

The potential exposure pathways to the identified off-site human receptors include:

- Dermal contact with and ingestion of contaminants in soil-derived dusts and water that may have migrated off-site; and

- Inhalation of soil-derived dust, fibres, gas and vapours which potentially have migrated off-site.

6.2.3.2. Controlled Waters

Potential pathways to controlled waters (groundwater and surface water) include:

- Leaching or dissolution of contaminants in soils and subsequent migration of contaminants in groundwater;
- Vertical migration of dissolved phase contaminants to the underlying groundwater;
- Lateral migration of dissolved phase contaminants in groundwater to surface water;
- Migration of contaminants entrained in surface water runoff; and
- Lateral migration of dissolved phase contaminants via preferential pathways such as drains and low permeability strata horizons.

6.2.3.3. Property

- Direct contact of contaminated soils / water with infrastructure, services and structures and subsequent chemical attack;
- Direct contact of migrating contaminated groundwater within infrastructure, services and structures; and
- Migration of ground gas along strata and preferential pathways such as service routes or differentially permeable strata leading to accumulation and explosion.

The Tier 1 PCSM presented in the desk study identified PCLs with moderate risks associated with human health and controlled waters receptors from Made Ground sources (on-site and off-site), based on a medium consequence and likely probability in accordance with risk assessment guidance in CIRIA 552 (CIRIA, 2001). These risks are further assessed in the Tier 2 GQRA presented below.

6.3. Generic Quantitative Risk Assessment

6.3.1. Selection of Human Health Generic Assessment Criteria

In order to evaluate potential risks to human health from site soils via direct contact exposure (inhalation of dust, ingestion and dermal contact), soil data have been screened against Category 4 Screening Levels (C4SLs) and Atkins' soil screening values (SSVs), collectively termed Generic Assessment Criteria (GAC). Based on identified on-site and off-site human receptors under the current and proposed land use soil data have been screened against GAC deemed protective of a public open space (parks) land use.

Atkins has produced SSVs for a variety of land uses based on soil organic matter (SOM) contents of 1 % and 6 %. The 1 % values provide more conservative SSVs and are based on a sandy soil type, whereas the 6 % values are based on a sandy loam soil type (the default within Science Report (SR) 3 (Environment Agency, 2009)). A total of 16 soil samples from the current ground investigation were analysed for organic matter content. The mean organic matter content was 21.5%. The 6% SOM SSVs have therefore been applied to the assessment.

Category 4 Screening Levels (C4SLs) are modelled using Contaminated Land Exposure Assessment (CLEA) v1.07 for standard land uses and are concentrations of contamination in soil (with 6 % SOM) which are considered by DEFRA to represent a 'low risk' derived from updated exposure assessment parameters and toxicological data based on a 'Low Level of Toxicological Concern' (DEFRA, 2014). As per the accompanying Policy Statement, DEFRA state that:

"A Low Level of Toxicological Concern represents an exposure equivalent to an intake of low concern but that definitely does not approach an intake level that could be defined as causing a Significant Possibility of Significant Harm to human health".

The C4SLs were derived based on remaining 'strongly precautionary' for the purposes of generic screening and with exception to benzene the change in SOM (to 6%) does not affect the criteria derivation. Therefore, where considered appropriate, Atkins has adopted C4SLs for the eight contaminants for which data is available including: arsenic, benzene, cadmium, chromium VI, lead, vinyl chloride, trichloroethene (TCE), tetrachloroethene (PCE) and 1,2-Dichloroethane.

PAHs have been assessed using benzo(a)pyrene (BaP) as a surrogate marker. The ratio of the concentrations of genotoxic PAH compounds has been compared against the upper and lower limits as set out on the C4SL guidance. The data indicate that the ratios to BaP are within the limits as defined in the toxicological study. Therefore, BaP is likely to be from the same source and so can be used as a marker compound for other genotoxic compounds in the assessment.

Atkins has derived SSVs for a number of volatile and potentially volatile contaminants based on both soil saturation limits (where the contaminant will theoretically reach saturation and form free phase product), and health-based modelled values (given by the CLEA model (DEFRA, 2004)) which can be used where site conditions indicate saturation has not been reached and no free phase product exists. No free product was identified in the soils during the site investigation, and therefore the health-based modelled values given by CLEA have been used.

Potential acute risks resulting from short term exposure of by construction workers to contamination involved with the proposed development cannot be assessed using these GACs because they relate to the long-term (chronic) risk. Risks to construction workers should be managed by the contractor through their Construction Environmental Management Plans (CEMPs) and as a minimum should include the use of appropriate Personal Protective Equipment (PPE) and appropriate working methods.

It should be noted that the GAC may change as new policy and technical guidance, including toxicological data, are published by Natural Resources Wales and other authoritative sources, but they are valid at the time of writing.

6.3.2. Comparison of Soil Concentration Data with Human Health GAC

A total of 16 samples, collected between the depths of 0.2 and 2.50 m bgl, were screened against GAC considerate of a public open space (parks) land use. Five exceedances of the GAC were identified which are summarised in Table 6-1, below.

The soils screening assessment is provided in Appendix D

Table 6-1 - Soil Determinants Exceeding EQS

Determinand	GAC (mg/kg)	No. of Samples	No. of Exceedances	Max Concentration (mg/kg)	Location of exceedances and depth (bgl)
Arsenic	168	16	1	459.8	TT01 1.20 m
Lead	1340	16	1	3,837	TT01 1.20 m
Benzo(a)pyrene	21.4	16	1	32.5	TT02 0.20 m, m

6.3.3. Asbestos

All sixteen soil samples collected between the depths of 0.2 and 2.50 m bgl were analysed for asbestos fibres. . Asbestos fibres were identified within one sample collected from the Made Ground in TT02 at a depth of 0.2 m bgl. The asbestos quantification identified Chrysotile fibres at a measured quantification of 0.005%. TT02 is located within the north west of the site below 0.05 m of Macadam. No visual evidence of asbestos containing material (ACM) was identified within TT02.

6.4. Ground Gas Assessment

A preliminary ground gas risk assessment has been undertaken in accordance with BS 8485:2015+2019 (British Standards, 2019) code of practice for design of protective measures for methane and carbon dioxide ground gases for buildings. This guidance provides a semi-quantitative assessment methodology for assessing the risk of permanent ground gas generation to buildings.

BS8485:2015 states that hazardous gas flow rates (Qhg) should be calculated for methane and carbon dioxide for every borehole for each visit and suggests the Qhgs be presented alongside the gas monitoring results in a database. Qhg is calculated using the maximum gas concentration recorded (unless lower values can be justified) and the steady state flow rate using the formula:

$$Qhg \text{ (l/hr)} = \text{flow rate (l/hr)} \times [\text{gas concentration (\%)} / 100]$$

The Gas Screening Value (GSV) is the flow rate of a specific hazardous gas considered to be representative of a site, following assessment of all borehole concentrations and gas flow rates, whilst taking account of other influencing factors. Such factors being, for example, whether a response zone was completed flooded (which can compromise gas data), the temporal/spatial nature of the data set and the acute one-off nature of the risk.

A decision must be made to determine whether the maximum Qhg in the dataset is appropriate to represent the site (and thereby be selected as the GSV), or whether maximum gas concentrations and maximum steady state flow rates should be combined from any borehole/visit to derive a “worst case GSV”.

The GSV considered representative for the site is then used to select a Characteristic Situation (CS), which is the ground gas regime assumed for design of gas protection measures for new buildings in accordance with BS8485:2015 (British Standards, 2019). The GSVs and CS are presented in Table 6-2.

Adopting a GSV based on peak flow measurements (i.e. those measured initially after the gas tap is opened) might result in a disproportionately high gas hazard prediction and assignment of an over-precautionary GSV and Characteristic Situation (CS), leading to overly conservative gas protection measures being incorporated into the development.

BS8485:2015 does not include an approach for assessing carbon monoxide or hydrogen sulphide. The relevant Workplace Exposure Limits (WELs) as outlined within the HSE EH40/2015 (2011) document (Health and safety executive, 2011) has been adopted for use in a preliminary assessment of carbon monoxide and hydrogen sulphide. The WELs used for carbon monoxide and hydrogen sulphide have been provided below:

- carbon monoxide: 30 parts per million (ppm) for long-term (eight hours) exposure limit and 200 ppm for short-term (15 minutes) exposure limit.
- hydrogen sulphide: 5 ppm for the long-term exposure limit and 10 ppm for the short-term exposure limit.

Table 6-2 - Site Characteristic GSV and Associated Characteristic Situation

CS	Risk Classification	GSV (l/hr)	Additional Factors
1	Very Low Risk	<0.07	Typical methane <1 % and/or carbon dioxide <5 %. Otherwise consider increase to characteristic Situation 2.
2	Low Risk	<0.7	Borehole air flow rate not to exceed 70 l/hr. Otherwise consider increase to Characteristic Situation 3
3	Moderate Risk	<3.5	-
4	Moderate to High Risk	<15	Quantitative risk assessment required to evaluate scope of protective measure
5	High Risk	<70	-
6	Very High Risk	>70	-

Note: ‘-’ denotes where a combination of protective measures are required

6.4.1. Carbon Dioxide and Methane Results

Three rounds of gas monitoring were undertaken by Socotec between February and May 2022. Gas monitoring records are provided within the ground investigation Factual Report (Socotec, 2022).

The Qhg of each monitoring well has been calculated and a summary of the maximum gas concentrations and steady state flow rates for each monitoring location is presented in Table 6-3.

Table 6-3 – Ground Gas Assessment

Location	Date / time	Max. Peak Recorded conc. (% v/v)		Max. Steady State Flow Rate (l/hr)	Qhg (l/hr) calculated for each well*		Risk Classification	Response Zone Flooded?
		Carbon Dioxide	Methane		Carbon Dioxide	Methane		
BH01 (1)	21 Feb 2022 11:05:00	0.2	2.6	0.1	0.0002	0.003	Very low risk	Partially
	19 Apr 2022 11:13:00	0.4	0.2	4.1	0.02	0.008	Very low risk	Partially
	17 May 2022 12:38:00	0.1	0.0	0.1	0.0001	0.0	Very low risk	Partially
BH02A (1)	21 Feb 2022 10:29:00	0.2	2.7	0.2	0.004	0.005	Very low risk	Partially
	19 Apr 2022 11:00:00	2.5	0.5	0.2	0.005	0.001	Very low risk	Partially
	17 May 2022 12:54:00	0.1	0.0	0.2	0.0002	0.0	Very low risk	Partially
BH03 (1)	19 Apr 2022 11:30:00	1.0	46.1	0.1	0.001	0.05	Low Risk	Partially
	17 May 2022 13:00:00	0.8	34.6	7.5	0.06	2.6	Moderate Risk	Partially

Note: '*' denotes that maximum gas concentrations combined with maximum steady state flow recorded on any site visit

The highest recorded methane and carbon dioxide concentrations were recorded as 46.1 % and 2.5 % respectively, all monitoring wells recovered values higher than 0 % during at least one monitoring round. Maximum concentration of methane were recorded in BH03 which targets the natural superficial deposits. Methane concentrations within BH01 and BH02A exceeded 1% during the initial round only (at concentrations of 2.6% in BH01 and 2.7% in BH02). Carbon dioxide concentrations were all < 5% in all locations.

Monitoring was undertaken at atmospheric pressures ranging from 1012 to 1019 mbar.

Groundwater for BH01 ranged between 2.34 m and 3.36 m bgl, groundwater for BH02A ranged between 2.43 m and 3.59 m bgl and groundwater for BH03 ranged between 1.86 m and 2.47 m. The response zone for BH03 ranged between 1.90 m and 10.0 m bgl, this in turn indicates that the response zone was partially flooded. The reported results do not indicate that dissociation of gas has occurred.

Based on the results, the Characteristic Situation for the site has been assessed as CS2 (low risk). No significant source of ground gas was encountered during the investigation with elevated concentrations of methane recorded in the natural superficial deposits (Clay and gravel). In addition, the development comprises culverts and not buildings, culverts will be sealed and any construction / maintenance workers entering confined spaces require to gas checks prior and during works. This, and given the groundwater level in relation to the response zone, it is considered acceptable to reduce the risk from a CS3 – moderate risk, to CS2 – low risk. Typically this classification requires no special precautions against ground gas are required for new development for this category.

6.4.2. Human Health Discussion

A total of 16 soil samples were analysed from the 2022 SOCOTEC UK Ltd (Socotec, 2022) site investigation for a range chemical analytes across the site. Five exceedances of the GAC public open space (residential) land use were identified for arsenic, lead and benzo(a)pyrene, each exceedance was within the same order of magnitude as the GAC. Metal exceedances were isolated to exploratory hole TT01 at a depth of 1.20 m. The exploratory log for TT01 indicate the presence of Made Ground composed of silty sandy gravel with cobbles of slag, limestone, macadam, quartzite and ash. It is reasonable to associate the observed metal exceedances are associated with the presence of slag and ash within the Made Ground. Exceedances of benzo(a)pyrene were observed within TT02 at a depth of 0.20 m and 0.60 m, the engineers logs indicate the presence of Made Ground composed of silty sands and concrete with cobbles of slag, brick, ash and clinker, observed exceedance are

potentially associated with the presence of slag/ash. Exceedances of benzo(a)pyrene were also observed with TT04 at a depth of 0.50 m, potentially associated with macadam seen in the trial pit logs. Metals and benzo(a)pyrene pose a risk to human health by direct contact, ingestion of dust / soil and inhalations of dust. The risk to future site users is considered very low given that any contaminant linkage will be broken by the presence of hard standing and the depth at which contamination was encountered.

Asbestos fibres were identified within TT02 at 0.20 m bgl with an asbestos quantification result of 0.005%. Made Ground was noted in the trial pit log (0.1 m bgl to 1.30 m bgl) to contain plastic, timber, and glass, ACM or potential ACM was not observed in the trial pit. Under a current land use and future land use the site will be covered in hardstanding and/or buildings which will act to limit dust generation, inhalation and direct contact pathways. The risk from asbestos to the identified human health receptors is evaluated as moderate-low considering a severe consequence and an unlikely probability of analysed contaminants present in soil is unlikely to present an unacceptable risk to human receptors.

The risks from asbestos should be assessed by the contractor during the construction works as bare soils will be exposed during excavation and construction workers and members of the public passing through the site could be exposed.

It is key to note that exceedances in metals and benzo(a)pyrene are isolated to two exploratory locations and fall within one order of magnitude above the GAC, therefore it is unlikely that observed exceedances pose direct risks to human health receptors. Furthermore, due to the depth of the observed metal exceedances, risk to human health receptors is further reduced.

The ground gas regime at the site has been initially classified as CS2 (low risk), which typically does not require special gas protection measures to be incorporated within buildings / structures.

6.5. Selection of Controlled Waters Assessment Criteria

The controlled waters GQRA has been undertaken to assess the potential risk posed to the identified Controlled Waters receptors from migration of contaminants from identified on-site and off-site sources. To assess the potential risks to the identified receptors, a comparison of soil-leachate and groundwater concentrations against pertinent water quality standards (WQS) has been undertaken.

The screening criteria for controlled waters assessment are dependent on the nature of the key receptor(s).

The site is underlain by superficial deposits comprising Till and Tidal Flat Deposits and the bedrock comprising Swansea Member. The superficial strata is classified as a Secondary Undifferentiated Aquifer and bedrock strata is classified as Secondary A Aquifer. The site is not located within a groundwater SPZ. The nearest surface water receptor is the onsite Tennant Canal and Clydach River.

Considering the hydrological and hydrogeological regime as summarised above, both surface water and groundwater are primary receptors for potential contamination. Soil leachate and groundwater monitoring data has been screened against Water Quality Standards (WQS) comprising Environmental Quality Standards for inland freshwater (EQS) (Water Resources, England and Wales, 2017), protective of aquatic life in surface water and Drinking Water Standards (DWS) (DEFRA, 2018) protective of groundwater.

6.5.1. Comparison of Soil Leachate Concentrations with WQS

There were 9 leachate samples from the 2022 ground investigation (Socotec, 2022) recovered from a range of depths between 0.50 and 2.50 m bgl in Made Ground and natural strata and subject to soil leachate analysis. Leachate samples were screened against EQS and DWS, a number of exceedances for a variety of determinands were seen for both the EQS and DWS, these exceedances include metals, organics, cyanide and ammoniacal nitrogen exceedances are presented in Table 6-4 and 6-5 respectively.

Table 6-4 – Soil Leachate EQS exceedances

Constituent	Units	EQS (mg/l)	Number of samples	Minimum concentration (mg/l)	Maximum concentration (mg/l)	Number of exceedances	Location & Depth (m bgl)
Ammoniacal Nitrogen as N	mg/l	0.2	9	0.02	0.07	2	BH03 2.50 m, TT01 0.80 m
Cyanide Free	mg/l	0.001	9	0.02	0.02	2	TP01 1.90 m, TT01 0.80 m
pH	pH units		9	7.5	8.4	3	BH02A 1.10 m TP01 1.90 m TT04 0.50 m
Cadmium	mg/l	0.00008	9	0.00002	0.00002	3	BH03 0.60 m, TT01 0.80 m, TT02 0.60 m
Copper	mg/l	0.001	9	0.001	0.009	8	BH01 1.00 m, BH02A 1.10 m, BH03 0.60 m, TP01 1.90 m, TT01 0.80 m, TT02 0.60 m, TT03 0.70 m, TT04 0.50 m
Iron	mg/l	1	9	0.01	0.01	1	TT01 0.80 m
Manganese	mg/l	0.123	9	0.002	0.002	1	BH03 2.50 m
Mercury	mg/l	0.00007	9	0.00003	0.00003	1	TT04 0.50 m
Aromatics >C12-16	mg/l	0.01	9	0.01	0.01	1	BH03 0.60 m
Aromatics >C21-35	mg/l	0.01	9	0.01	0.02	3	BH01 1.00 m, TT02 0.60 m, TT03 0.70 m

Table 6-5 – Soil Leachate DWS exceedances

Constituent	Units	DWS (mg/l)	Number of samples	Minimum concentration (mg/l)	Maximum concentration (mg/l)	Number of exceedances	Location & Depth (m bgl)
Ammoniacal Nitrogen as N	mg/l	0.39	9	0.02	0.07	2	BH03 2.50 m, TT01 0.80 m
Cyanide	mg/l	0.05	9	0.02	0.02	1	BH03 0.60 m
pH	pH units		9	7.5	8.4	2	BH02A 1.10 m, TP01 1.90 m
Sulphate as SO ₄	mg/l	250	9	12	109	2	BH03 0.60 m, TP01 1.90 m
Aluminium	mg/l	0.2	9	0.01	0.03	1	TP01 1.90 m

Constituent	Units	DWS (mg/l)	Number of samples	Minimum concentration (mg/l)	Maximum concentration (mg/l)	Number of exceedances	Location & Depth (m bgl)
Antimony	mg/l	0.005	9	0.001	0.003	3	BH01 1.00 m, BH03 0.60 m, TT01 0.80 m
Arsenic	mg/l	0.01	9	0.005	0.018	7	BH01 1.00 m, BH02A 1.10 m, BH03 0.60 m, TP01 1.90 m, TT01 0.80 m, TT03 0.70 m, TT04 0.50 m
Iron	mg/l	0.2	9	0.01	0.01	1	TT01 0.80 m
Manganese	mg/l	0.05	9	0.002	0.002	2	BH03 2.50 m, BH03 0.60 m
Molybdenum	mg/l	0.07	9	0.012	0.07	4	BH01 1.00 m, BH02A 1.10 m, BH03 2.50 m, TP01 1.90 m
Selenium	mg/l	0.01	9	0.001	0.004	1	TP01 1.90 m

6.5.2. Comparison of Groundwater Concentration Data with Controlled Waters Assessment Criteria

Three ground water samples were scheduled for groundwater analysis as part of the 2022 ground investigation (Socotec, 2022). A number of exceedances were observed for a variety of determinands for the EQS (ammoniacal nitrogen, sulphate, cadmium, hexavalent chromium, copper, iron, manganese, nickel, zinc, aliphatics (>C21-35), benzo(a)pyrene and fluoranthene). Exceedances were also observed for the DWS (Ammoniacal nitrogen, sulphate, iron and manganese). A summary of the EQS groundwater exceedances are summarised in Table 6-6 below.

Table 6-6 - Groundwater EQS Exceedances

Determinand	EQS (mg/l)	No. of Samples	No. of Exceedances	Max Concentration (mg/l)	Location of exceedances and depth (bgl)
Ammoniacal Nitrogen as N	0.2	3	2	1	BH02A 4.50 m, BH03 4.00 m
Sulphate as SO ₄	400	3	1	1030	BH02A 4.50 m
Cadmium	0.00008	3	1	0.00015	BH02A 4.50 m
Chromium Hexavalent	0.003	3	1	0.0034	BH01 4.00 m
Copper	0.001	3	1	0.0022	BH01 4.00 m
Iron	1	3	1	10.3	BH02A 4.50 m

Manganese	0.002	3	2	0.751	BH02A 4.50 m, BH03 4.00 m
Nickel	0.001	3	1	0.008	BH02A 4.50 m
Zinc	0.002	3	1	0.005	BH02A 4.50 m
Aliphatics >C21-35	0.01	3	3	0.05	BH01 4.00 m, BH02A 4.50 m, BH03 4.00 m
Benzo(a)pyrene	0.00001	3	2	0.00001	BH01 4.00 m, BH02A 4.50 m
Fluoranthene	0.00001	3	2	0.00002	BH01 4.00 m, BH02A 4.50 m

Table 6-7 - Groundwater DWS Exceedances

Determinand	DWS (mg/l)	No. of Samples	No. of Exceedances	Max Concentration (mg/l)	Location of exceedances and depth (bgl)
Ammoniacal Nitrogen as N	0.39	5	2	1	BH02A 4.50 m, BH03 4.00 m
Sulphate as SO ₄	250	5	1	1030	BH02A 4.50 m
Iron	0.2	5	1	10.3	BH02A 4.50 m
Manganese	0.05	5	3	0.751	BH01 4.00 m, BH02A 4.50 m, BH03 4.00 m

6.5.3. Comparison of Surface Water Concentration Data with Controlled Waters Assessment Criteria

Two surface water samples were taken from the Tennant Canal for analysis as part of the 2022 Ground Investigation. A number of exceedances for both the EQS and DWS were observed for the following determinands including copper, zinc and manganese.

Table 6-8 – Surface Water EQS Exceedances

Determinand	EQS (mg/l)	No. of Samples	No. of Exceedances	Max Concentration (mg/l)	Location of exceedances and depth (bgl)
Copper	0.001	2	2	0.004	SW01, SW02
Zinc	0.002	2	1	0.05	SW01, SW02

Table 6-9 – Surface Water DWS Exceedances

Determinand	DWS (mg/l)	No. of Samples	No. of Exceedances	Max Concentration (mg/l)	Location of exceedances and depth (bgl)
Manganese	0.05	2	2	0.69	SW01

6.5.4. Controlled Waters Discussion

Exceedances in both the EQS and DWS are seen for groundwater, exceedances include metals, organics, sulphate and ammoniacal nitrogen. Exceedances in groundwater are seen throughout the entire site extent, and occur in all of the sampled locations (BH01 4.00 m, BH02A 4.50 m and BH03 4.00 m), observed groundwater exceedances were recovered from groundwater within either superficial deposits including glacial till (BH01 and BH02A) and tidal flat deposits (BH03). No notable contaminant sources are present in either the superficial deposits (glacial till and river terrace deposits), therefore it is reasonable to assume that contaminants were sourced from the overlying Made Ground present in these exploratory holes which were noted to contain slag, ash, clinker and concrete. For the EQS all exceedances but manganese are within one order of magnitude above the screening criteria, manganese is within two orders of magnitude above the EQS. For the DWS all exceedances were within one order of magnitude of the screening criteria.

Leachate testing also saw exceedances in both the EQS and DWS, these exceedances include metals, organics, and ammoniacal nitrogen. Exceedances in organic compounds (aromatic >C12 – C16 and aromatic >C21 – C35) are noted to exceed the EQS in four locations (BH03 0.60 m, BH01 1.00 m, TT02 0.60 m and TT03 0.70 m), exceedances within TT02 and TT03 are potentially associated with macadam noted in the trial pit logs. Macadam was not noted within BH03 and BH01, however made ground comprising slag, ash, clinker and concrete was noted to be present and may represent the contaminant source. Metal exceedances in both the EQS and DWS are likely associated with slag, ash and clinker within the made ground.

No clear contaminant sources are present for the cyanide exceedances seen in BH03, TP01 and TT01 for the soil leachate testing, these exceedances are within one order of magnitude of the GAC and are unlikely to pose unreasonable risk to potential receptors.

It is unclear whether the observed surface water exceedances are associated with observed ground water exceedances, however, due to surface water samples being sourced from Tennant Canal, which is presumed to be lined it is reasonable to assume that observed exceedances represent natural background levels, furthermore all exceedances are noted to be marginal and within one order of magnitude.

6.6. Revised CSM

Based on the human health and controlled waters GQRAs presented above, the preliminary CSM presented in 6.2. has been revised based on the assessments completed.

The revised CSM resulting from the information discussed above is shown below in

Table 6-10 - Revised Conceptual Site Model

Source	Pathway		Contaminant Exposure / Migration Pathway	Potential Consequence	Probability	Risk Classification	Comments
<u>On-site</u> Made Ground associated with the construction and operation of roads and railways including New Road and Old Road and Railway with the potential to contain a range of inorganic and organic contaminants including metals, hydrocarbons, PAHs and asbestos. Fuels and oils attributed to spills from vehicles on the road plus exhaust particulates; Made Ground associated with the construction, operation and demolition of former historical commercial and industrial land uses	<u>Human Health</u> On-site	On-site workers during the construction phase of the culverts;	Dermal contact / ingestion / inhalation of contaminants in soil and soil-derived dust;	Severe	Unlikely	Moderate/Low Risk	It been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to operatives, maintenance workers and site visitors will be minimised. Risks to offsite users will be mitigated against through barriered off working zones and dust suppression techniques.
		On-site future maintenance workers	Dermal contact / ingestion of contaminants in groundwater within excavations; and	Medium	Unlikely	Low Risk	
		On-site workers during the construction phase of the culverts;	Inhalation of ground gas / vapours.	Medium	Unlikely	Low Risk	
		Future site users					
	<u>Human Health</u> Off-site	Off-site workers, residents and members of the general public;	Dermal contact with and ingestion of contaminants in soil-derived dusts and water that may have migrated off-site; and	Medium	Unlikely	Very Low Risk	Asbestos is detected at quantifiable concentrations. Under a current land use and future land use the site will be covered in hardstanding and/or buildings which will act to limit dust generation, inhalation and direct contact pathways. Furthermore, dust during construction will be mitigated through dust suppression methods. Observed exceedances for soil samples include lead, arsenic and benzo(a)pyrene. All observed exceedances are within one order of magnitude of the GAC and can be attributed to the Made Ground situated on-site. Benzo(a)pyrene exceedances, though not below 0.80 m are within one order of magnitude of the GAC and can be associated
		Off-site future maintenance workers	Inhalation of soil-derived dust, fibres, gas and vapours which potentially have migrated off-site.	Medium	Unlikely	Low Risk	

Source	Pathway		Contaminant Exposure / Migration Pathway	Potential Consequence	Probability	Risk Classification	Comments
including a railway station, timber yard and tramway with the potential to contain a range of inorganic and organic contaminants including metals, hydrocarbons, PAHs and asbestos. Potential for ground gas and ground vapour generation.							with macadam seen in trial pit logs. Due to the presence of buildings and hardstanding, and the depth of exceedances, the contaminant pathway will be broken, and there is not considered a risk to future site users. Future maintenance on the site may require localised excavation with potential for workers to come into direct contact with soils or inhale soil derived dusts. Risks to future maintenance workers will be managed through personal protective equipment (PPE) and health and safety best practices.
<u>Off-site</u> Made Ground associated with the construction, operation and demolition of former historical commercial and industrial land uses within 500 m of the site the with potential to contain a range of inorganic and organic contaminants including metals, hydrocarbons,	<u>Controlled Waters:</u> Surface Water	On-site surface water receptors including an unnamed canal, Tenant Canal and the River Clydach	Leaching or dissolution of contaminants in soils and subsequent migration of contaminants in groundwater; Vertical migration of dissolved phase contaminants to the underlying groundwater; Lateral migration of dissolved phase	Medium	Unlikely	Low Risk	The proposed works could result in the mobilisation of contamination in unsaturated soils, if present, through leaching/dissolution of, and subsequent migration into, the surface water and groundwater features, such as via migration in drainage. Furthermore, exceedances likely sourced from the overlying contaminated soils was observed in groundwater samples, therefore the likelihood of contamination is increased. The adjacent Tennant Canal is assumed to be lined and therefore is

Source	Pathway		Contaminant Exposure / Migration Pathway	Potential Consequence	Probability	Risk Classification	Comments
PAHs and asbestos. Potential for ground gas and ground vapour generation; Made Ground associated with the construction and operation of current industries including an electricity substation (50 m north), Neath Abbey Business Park (100-300 m south east) and a Depot and Tank (230 m south west).			contaminants in groundwater to surface water; Migration of contaminants entrained in surface water runoff; and				at low risk of being contaminated by dissolved contaminants in the groundwater.
		Off-site surface water receptors including the River Clydach (240 m south east) and the River Neath (350 m south);	Lateral migration of dissolved phase contaminants via preferential pathways such as drains and low permeability strata horizons.	Medium	Unlikely	Moderate Risk	The proposed works could result in the mobilisation of contamination in unsaturated soils, if present, through leaching/dissolution of, and subsequent migration into, the surface water and groundwater features, such as via migration in drainage. Furthermore, exceedances likely sourced from the overlying contaminated soils was observed in groundwater samples, therefore the likelihood of contamination is increased.

Source	Pathway		Contaminant Exposure / Migration Pathway	Potential Consequence	Probability	Risk Classification	Comments
A range of inorganic and organic contaminants including metals, hydrocarbons, PCBs, PAHs and asbestos.	<u>Controlled Waters:</u> Ground Water	Groundwater within the superficial Secondary Undifferentiated Aquifer (Till) and Tidal Flat Deposits.	Leaching or dissolution of contaminants in soils and subsequent migration of contaminants in groundwater; Vertical migration of dissolved phase contaminants to the underlying groundwater; Lateral migration of dissolved phase contaminants in groundwater to surface water; Migration of contaminants entrained in surface water runoff; and Lateral migration of dissolved phase contaminants via	Medium	Unlikely	Moderate Risk	The proposed works could result in the mobilisation of contamination in unsaturated soils, if present, through leaching/dissolution of, and subsequent migration into, the surface water and groundwater features, such as via migration in drainage. Furthermore, exceedances likely sourced from the overlying contaminated soils was observed in groundwater samples, therefore the likelihood of contamination is increased. Exceedances in both the EQS and DWS are seen for groundwater, exceedances include metals, organics, sulphate and ammoniacal nitrogen, all exceedances are within one order of magnitude of the GAC, contaminants are noted to be largely associated with the composition of the Made Ground beneath the site. No notable contaminant sources are present in the natural deposits present on site.

Source	Pathway		Contaminant Exposure / Migration Pathway	Potential Consequence	Probability	Risk Classification	Comments
		Groundwater within the bedrock Secondary A Aquifer (Swansea Member).	preferential pathways such as drains and low permeability strata horizons.	Medium	Unlikely	Low Risk	The proposed works could result in the mobilisation of contamination in unsaturated soils, if present, through leaching/dissolution of, and subsequent migration into, the surface water and groundwater features, such as via migration in drainage. Furthermore, exceedances likely sourced from the overlying contaminated soils was observed in groundwater samples, therefore the likelihood of contamination is increased. The Swansea Member was not encountered during the investigation. Significant vertical migration is considered unlikely due to the presence of clay bands within the superficial deposits.
	<u>Property</u>	On-site existing and future below ground infrastructure; and ground gas.	Direct contact of contaminated soils / water with infrastructure, services and structures and subsequent chemical attack; Direct contact of migrating contaminated groundwater within infrastructure,	Minor	Unlikely	Very Low Risk	It is unlikely that any works will adversely impact on below ground structures. It is assumed that mitigation measures would be implemented, and appropriate concrete classification used where required during any future works. No enclosed areas are located on-site, furthermore the only notable risk associated with ground gas was located within BH03 (A) (CS3), all other monitoring results present a very low risk (CS1) associated with ground gas, in turn

Source	Pathway		Contaminant Exposure / Migration Pathway	Potential Consequence	Probability	Risk Classification	Comments
			services and structures; and				the regime has been categorised as CS2 (low risk).
		Off-site residential / commercial properties within the surrounding 500 m.	Migration of ground gas along strata and preferential pathways such as service routes or differentially permeable strata leading to accumulation and explosion.	Minor	Unlikely	Very Low Risk	It is unlikely that any works will adversely impact on below ground structures. It is assumed that mitigation measures would be implemented, and appropriate concrete classification used where required during any future works. the only notable risk associated with ground gas was located within BH03 (A), all other monitoring results present a very low risk associated with ground gas in turn the regime has been categorised as CS2 (low risk).

6.7. Suitability for Reuse

Material arising from construction excavations can be reused if, among other parameters, it can be demonstrated that it does not pose a potential risk to human health or the environment.

Based on the sampling and laboratory testing undertaken, there is considered to be low risk to human health and low to moderate risk regarding controlled waters receptors from contaminants detected in soils from the site. This is due to the fact site works will only be temporary, site works will only be accessible by site workers and will not be accessible for recreational use.

The re-use of on-site excavated soils should be undertaken under the latest version of the CL:AIRE Definition of Waste, Development Industry Code of Practice (COP) (currently version 2 (CL:AIRE, 2011)). Under the CoP, materials excavated on-site are not deemed to be waste if they are suitable for re-use (chemically and geotechnically) at specified locations or generally within the site. A 'Qualified Person', as defined under the CoP, will review a Materials Management Plan (MMP), Risk Assessments and Remediation Strategy/Design Statement, together with documentation relating to Planning and Regulatory issues, and will sign a Declaration which is forwarded to the Environment Agency confirming compliance with the CoP.

Concentrations of metals and inorganics in soil-leachate were identified to exceed the EQS and DWS screening values. Appropriate criteria should be developed within the Materials Management Plan (MMP) to further assess the suitability for soil reuse. Any visual asbestos containing material (ACM) fragment should be sorted and removed if possible. Visual or olfactory evidence of contamination should be tested for acceptance. Material containing asbestos fibres or ACM is potentially not suitable for reuse, material if reused should be used under hardstanding with material locations recorded. Guidance in the Environment Agency WM3 Technical Guidance on classification and assessment of waste (Environment Agency, 2021) states that if the soil matrix contains free and dispersed fibres 0.1% or greater by volume, then the material would be classified as hazardous.

6.8. Preliminary Classification of Waste

Material that is surplus to requirements and where there is no clear strategy for reuse on-site is classified as waste and should be disposed of in accordance with Duty of Care as specified in the Landfill Regulations (DEFRA, 2016). [18]. If the scheme does not require all excavated material to be retained on-site it is a waste.

Waste is classified into three categories comprising inert, non-hazardous and hazardous, this cannot be assessed as no waste acceptance criteria (WAC) samples were undertaken. A preliminary waste assessment has been undertaken based on analysed concentrations of contaminants in the soil samples obtained during the ground investigation and using Atkins' on-line waste classification tool (CAT WAST.) (Atkins, 2018).

The results of the CAT-WASTE^{SOIL} assessment indicates that some soil samples recovered from the 2022 ground investigation would be classified as hazardous waste. BH03 and TT01 are noted to contain contaminated soils that would be classified as hazardous waste. BH03 (0.6 m) is noted to contain hazardous levels of zinc, TT01 (1.2 m) is noted to contain hazardous levels of copper, lead and zinc. Without WAC sample analysis, it is not possible to determine the disposal route, whether material can be disposed of as stable non reactive waste in a non-hazardous landfill or if it requires disposal as hazardous waste.

This classification is based on a limited number of samples and the actual material to be removed off-site for disposal must be appropriately classified based on the soil composition and agreed with the chosen landfill operator. It is the responsibility of the waste producer to classify, treat, manage, and dispose of waste appropriately and to ensure the chosen landfill is licensed to accept such material. Note that individual landfill sites may have their own soil and soil leachate limits for waste acceptance as stipulated in their waste permit.

Any disposal of material off-site will require appropriate pre-classification and pre-treatment to minimise the waste volume. It is recommended to maximise the re-use of materials on-site, where possible on grounds of both cost and sustainability. Early consideration of the re-use of material at planning stage is recommended, in order to maximise opportunities.

Though the overall risks to human health were low, and risks to controlled waters are moderate it may also be required that;

- appropriate health and safety measures are implemented at all times during any onsite works, e.g., when working with soils ensure correct PPE is worn

- best practice environmental management techniques are implemented during any onsite works; this may include the minimisation of dust generated.
- vigilance is maintained at all times for any contaminated materials or signs of contamination onsite, including asbestos and ACMs.

6.9. Conclusions and Recommendations

Based on the investigation and assessment presented herein, the overall contamination risk associated with the site is considered to be low to human health receptors and moderate to controlled waters receptors under the current and future end use.

In relation to the proposed project, the following is also likely to be required:

- adoption of appropriate health and safety measures, practices and procedures during construction to mitigate potential risks to construction workers and visitors;
- adoption of appropriate best practice environmental management during construction, e.g. minimisation of dust generation and migration, to mitigate potential risks to controlled waters, visitors and surrounding off-site users; and,
- vigilance to be maintained throughout the works for potential asbestos containing material at surface or other unexpected contamination during site clearance and earthworks in areas not previously investigated

6.10. Limitations of Contamination Assessment

It should be noted that, as with any physical ground investigation involving discrete sampling, test results will only be representative of the point sampled and further investigation and analysis may be required should ground conditions differ from those reported.

Based on the above findings, no further work is recommended. However, vigilance should be maintained during future development in the event that unidentified contaminants are identified. In this event, advice should be sought from a land contamination specialist.

The laboratory chemical analysis results reported deviations in soil samples, soil leachate samples and water samples. Deviations were noted to be caused by “A non-standard volume or mass has been used for this test which has resulted in a raised detection limit” and “Sample age exceeds stability time (sampling to extraction)”. Deviating determinands are as follows; TPHs, PAHs and SOM in the soil samples, TPH and PAHs for soil leachate samples and BOD and PAHs for water samples. It is considered that as the majority of the results are below the laboratory limits of detection and no significant sources of contamination were identified within the exploratory logs that the identified deviations are not deemed significant in the context of the assessment.

It should be noted that this a preliminary material classification has been provided in this assessment which is based on a limited number of samples.

If material is proposed to be re-used, appropriate sampling of the actual material excavated will be required with concentrations compared to appropriate reuse criteria to confirm suitability for reuse or otherwise.

Any material to be removed off-site for disposal must be appropriately analysed, classified and agreed with the chosen landfill operator. It is the responsibility of the waste producer to classify, treat, manage and dispose of waste appropriately and to ensure the chosen landfill is licensed to accept such material.

It should be noted that the human health and controlled waters GAC and CAT-WASTESOIL screen may change as new policy and technical guidance, including toxicological data, are published by the Environment Agency and other authoritative sources. If guidance alters in the future, then this assessment may need to be revisited accordingly.

Should the scope of the works change, further land contamination assessment may be required.

7. Engineering Assessment

The following section gives a preliminary engineering assessment for the proposed scheme based on the findings of the Phase 2 GI.

It should be noted that the exploratory holes undertaken as part of the Phase 2 GI represent a small proportion of the subsurface ground conditions at the site and it is likely that the thickness and composition of the Made Ground and Glacial Till is variable over short distances.

7.1. Proposed Culverts

The Made Ground at the location of the proposed culverts was generally found to be up to several meters thick (maximum of 2.75m in BH02A at the location of the proposed Railway Crossing Overflow inlet) and was typically described as a granular material of SAND or GRAVEL. SPTs indicate that the Made Ground is dense to very dense. Underlying the Made Ground was Glacial Till; this composition of this stratum was found to vary and was described as a medium dense SAND and GRAVEL in BH01 (Railway Crossing Overflow outlet) and a soft to firm CLAY in BH02A (Railway Crossing Overflow inlet). The depth of Glacial Till was not proven.

Construction is anticipated to take the form of cut and cover or thrust boring (or related drilling technique). The following considerations should be made in the method selection and construction planning:

- Temporary support or propping of any excavations is likely to be required;
- Any excavations within the Made Ground or Glacial Till (Granular) are unlikely to be self-supporting;
- The potential for obstructions or hard objects, including relic foundations within the Made Ground and cobbles/boulders within the Glacial Till, is to be considered in the selection of any excavation methodology;
- Groundwater ingress into excavations may be caused by possible perched water tables or ingress of water held within the Made Ground; and
- A potentially dense network of services, which will need to be considered in locating the chambers and construction planning.

Considering the likely depth of the proposed pipes and chambers, the net load at foundation level for the culvert structures is not expected to be significant. However, if encountered at foundation level, soft/loose and compressible ground may need to be excavated and replaced with suitable material to minimise the risk of differential settlement and bearing failure.

As part of the scheme, an undertrack crossing will be required for the 'Railway Crossing Overflow' culvert, beneath the Great Western Railway (Vale of Neath Section). This is required to be designed in accordance with Network Rail standard NR/L2/CIV/044 v4 'Planning, design and construction of undertrack crossings' (Network Rail, 2020).

7.2. Proposed Weir Structure

A 0.7m thick layer of Made Ground was encountered at ground level at the location of the proposed weir structure (BH03) and was described as a SAND and GRAVEL. No in-situ testing or descriptions of density in this material were possible. The Made Ground was underlain by Tidal Flat Deposits described as a medium dense sandy clayey GRAVEL. There was a layer of soft slightly sandy slightly gravelly CLAY between 1.9m bgl and 2.8m bgl and a layer of soft slightly gravelly sandy CLAY with pockets of black peat between 2.8m bgl and 4.3m bgl.

As summarised above, the Tidal Flat Deposits encountered at the site are variable, with interbedded layers of granular and cohesive material. The presence of soft CLAY and pockets of peat indicate that the material at foundation level is likely to be compressible and, if encountered, should be replaced with suitable material to minimise the risk of differential settlement and bearing failure.

8. Geotechnical Risk Register

8.1. Geotechnical Risk and Risk Matrix

For the purpose of this report, geotechnical risk is defined as the possibility of an adverse consequence arising from a ground hazard or circumstance. The Geotechnical Risk Register takes into account the identified geotechnical constraints, along with additional project details to ensure that all significant geotechnical risks are identified, recorded, analysed and controlled. The geotechnical risks are discussed in terms of probability, severity and risk, as defined below:

- Likelihood (L): The perceived likelihood of the identified geotechnical hazard actually occurring.
- Severity (S): The perceived severity, in terms of safety, financial, temporal, legal, or operational consequence, of the occurrence of the identified geotechnical hazard on the identified receptor(s)
- Risk (R): The perceived level of concern which should be assigned to the identified hazard, based on the likelihood of occurrence, and taking into due account the perceived severity of the impact.

The risk uses the following equation:

$$\text{Degree of Risk (R)} = \text{Likelihood (L)} \times \text{Severity (S)}$$

Table 8-1 - Likelihood and Severity rating

Likelihood		Severity			
		Health and Safety		Operational	
5	Certain	5	Fatality	5	Fatality
4	Probable	4	Major injury	4	Irreversible Damage
3	Likely	3	Reportable injury	3	Major Damage
2	Unlikely	2	Lost time injury	2	Minor Damage
1	Negligible	1	Minor injury	1	No Effect

Table 8-2 - Risk Matrix

Likelihood	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
Severity						

Table 8-3 - Perceived Degree of Risk

Risk Number	Risk Ranking	Comments
20 - 25	Unacceptable	Which cannot be justified except in extraordinary circumstances, where resources and finance are provided to control the risk irrespective of cost.
15 - 19	Substantial	Tolerable only if risk reduction is impracticable or if its cost is disproportionate to improvement.
7 - 12	Moderate Risk	Tolerable if cost of reduction would exceed the improvement gained in reducing the risk further.
0 - 6	Low	Tolerable

8.2. Risk Register

The Geotechnical Risk Register in Table 8-4, below, comprises an initial assessment of the risks identified, prior to the application of risk mitigation measures, and shows how the risks can be reduced by the application of certain measures.

Table 8-4 - Geotechnical Risk Register

Hazard	Impact	Initial Risk Rating			Mitigation Measures	Risk after mitigation		
		P	I	R		P	I	R
Presence of soft, loose and/or compressible strata (particularly BH02A where exact nature of Glacial Till is not known due to poor core recovery)	Presence of soft, loose and/or compressible Made Ground and/or superficial deposits may cause excessive differential settlement affecting the serviceability of the culverts and/or weir structure. Cost impact associated with repair/remediation.	3	4	12	Designer to consider variability of ground conditions and ensure design solution avoids founding on soft, loose and/or compressible strata as far as reasonably practicable. Appropriate conservatism to be used in design. Contractor to ensure formation level is inspected by experienced geotechnical engineer / engineering geologist and replace all soft, loose and/or compressible material with suitable well-compacted granular fill.	1	4	4
Presence of cobbles and/or boulders associated with Glacial Till	Presence of cobbles and/or boulders within Glacial Till preventing excavations required for culverts. Programme and cost implications associated with delays on site.	4	2	8	Contractor to ensure appropriate excavation techniques are implemented based on likely presence of cobbles and/or boulders within Glacial Till.	3	2	6
Variable groundwater level	Groundwater levels higher than anticipated during design could cause difficult excavating conditions. Programme and cost implications associated with delays on site and dewatering activities.	3	4	12	Designer to assess the effect of high groundwater conditions on design options. Contractor to consider undertaking construction in the summer when the floodplain may have lower groundwater levels. Contractor to implement control measures during construction to account for high groundwater level.	1	5	5
Surface water / watercourse flooding	Flooding from surface water or adjacent watercourse during construction. Programme and cost implications associated with delays on site and dewatering activities.	2	4	8	Contractor to consider undertaking construction in the summer. Contractor to implement control measures on site to prevent flooding of excavations and proposed culverts during heavy rainfall and high water levels.	1	4	4

Presence of coal mining workings at shallow depths	Potential for collapse of voids beneath the ground causing differential settlement, impacting the hydraulic gradient and subsequently the serviceability of the culvert. Cost impact associated with repair / remedial works. Unrecorded mine workings encountered on site resulting in delays.	2	4	8	Coal Authority Report obtained for the site and indicates coal seams are present between 30m bgl and 90m bgl. The closest mine entry is indicated to be 30m from the nearest proposed structure. The Phase 2 GI did not encounter any evidence of shallow mine workings at the site.	1	2	2
Presence of buried services	Services present along the route of the proposed culvert could be an obstacle to the culvert, leading to the design not achieving the required hydraulic gradient and therefore reaching the serviceability limit state. Cost and programme impact due to re-design. Damage to unknown services during construction causing delays, additional remedial costs, injury or death.	3	5	15	Designer to consider the presence of buried services recorded during GPR surveys as part of the Phase 2 GI. Contractor to review the presence and location of recorded services, preparing a method statement for the avoidance, protection or diversion of buried services. Contractor to conduct CAT scans of the surrounding area and undertake hand dug pits in case of unrecorded services prior to excavation works.	1	5	5
Culvert (UTX) underneath Network Rail asset	Potential for damage to railway infrastructure and impact on operation of the railway if settlement occurs due to UTX.	2	2	4	Designer to design UTX in accordance with Network Rail standard NR/L2/CIV/044 v4.	1	2	2
Presence of Unexploded Ordnance (UXO)	Cost and programme impact associated with disposal of UXO if encountered. Potential for damage to structures and injury to site operatives / public if UXO is struck during construction works.	2	5	10	Obtain a detailed UXO desk study and assess the risk before proceeding with construction Contractor to consider supervision by competent UXO engineer / watching brief based on results of UXO desk study.	1	5	5

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Appendices

Appendix A. Site Plans

A.1. Site Location Plan

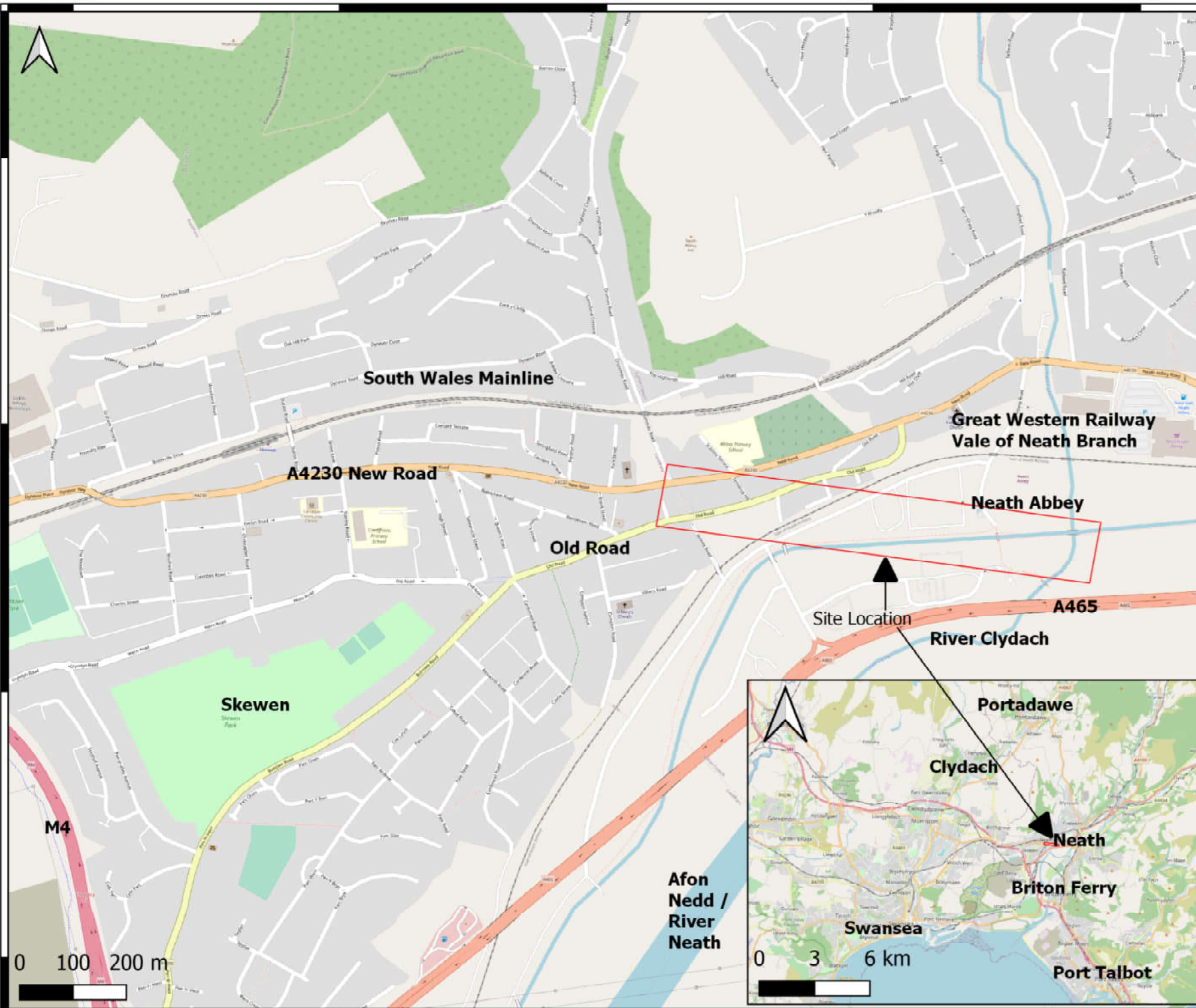
272000E 272500E 273000E 273500E 274000E

198000N

197500N

197000N

196500N



 Phase 2 Site Location

ATKINS

CLIENT
Neath Port Talbot County Borough Council

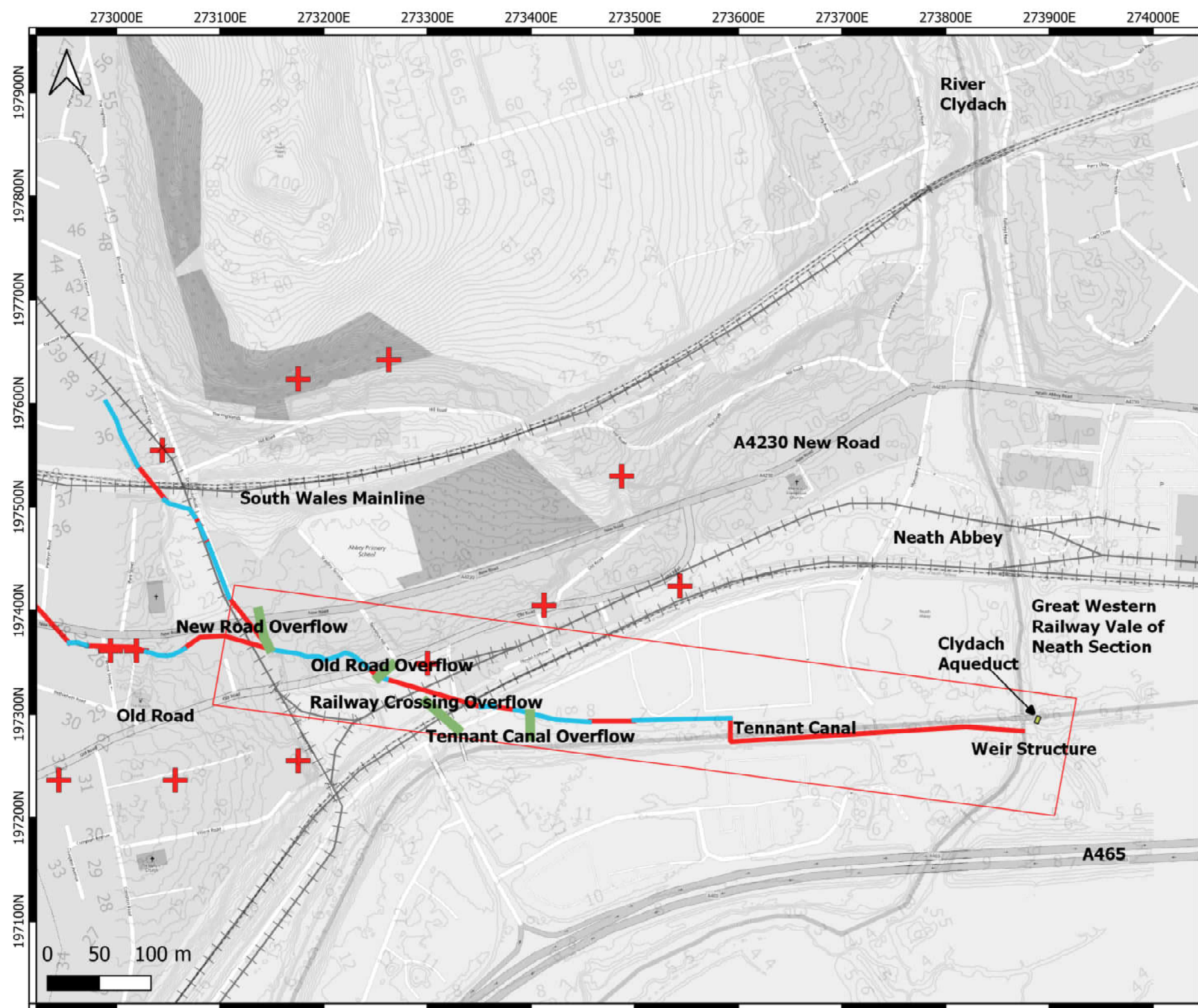
PROJECT
Neath Port Talbot Flood Alluviation Schemes:
Caenant Terrace

TITLE
Site Location Plan

OpenStreetMap standard mapping - <https://www.openstreetmap.org>



A.2. Site Layout Plan



Legend

Phase 2 Site Location

Culverts and Watercourses

Weir Structure

Proposed Culvert

Existing Open Channel Watercourse

Existing Culvert

Present and Historical Railways

+ Mine Entry

LIDAR

Contours (m AOD)

ATKINS

CLIENT

Neath Port Talbot County Borough Council

PROJECT

Neath Port Talbot Flood Alluviation Schemes:
Caenant Terrace

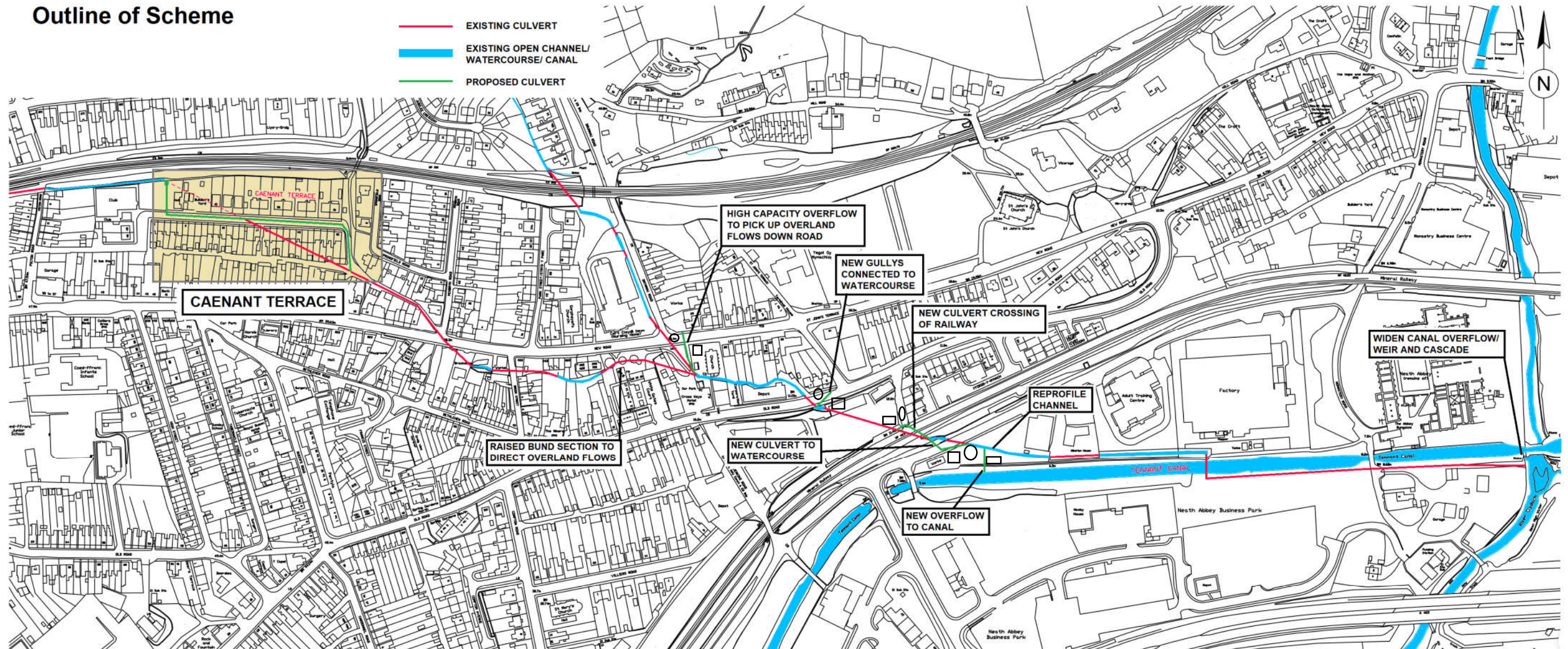
TITLE

Site Plan

OpenStreetMap standard mapping - <https://www.openstreetmap.org>

Appendix B. Scheme Drawing

Caenant Terrace Outline of Scheme



Appendix C. BGS Geology Plans

C.1. BGS Made Ground Plan

273000E

273500E

274000E

Legend

Boreholes

- 0 - 10 m
- 10 - 30 m
- >30 m
- Confidential
- Unknown

 Phase 2 Site Location

Culverts and Watercourses

 Proposed Culvert

New Road Overflow

Old Road Overflow

Railway Crossing Overflow

Tennant Canal Overflow

Weir Structure

Landscaped Ground

SS79NW181

SS79NW179

SS79NW180

SS79NW113

SS79NW6

SS79NW145 SS79NW74

SS79NW243

SS79NW

SS79NW99 SS79NW13

SS79NW245

SS79NW244

SS79NW96

SS79NW95

SS79NW97

SS79NW101

SS79NW100

SS79NW12

SS79NW102

SS79NW103

SS79NW98

197500N

197000N

0 50 100 m

ATKINS

CLIENT

Neath Port Talbot County Borough Council

PROJECT

Neath Port Talbot Flood Alluviation Schemes:
Caenant Terrace

TITLE

Made Ground Plan

OpenStreetMap standard mapping - [https://
www.openstreetmap.org](https://www.openstreetmap.org)

C.2. BGS Superficial Deposits Plan

273000E

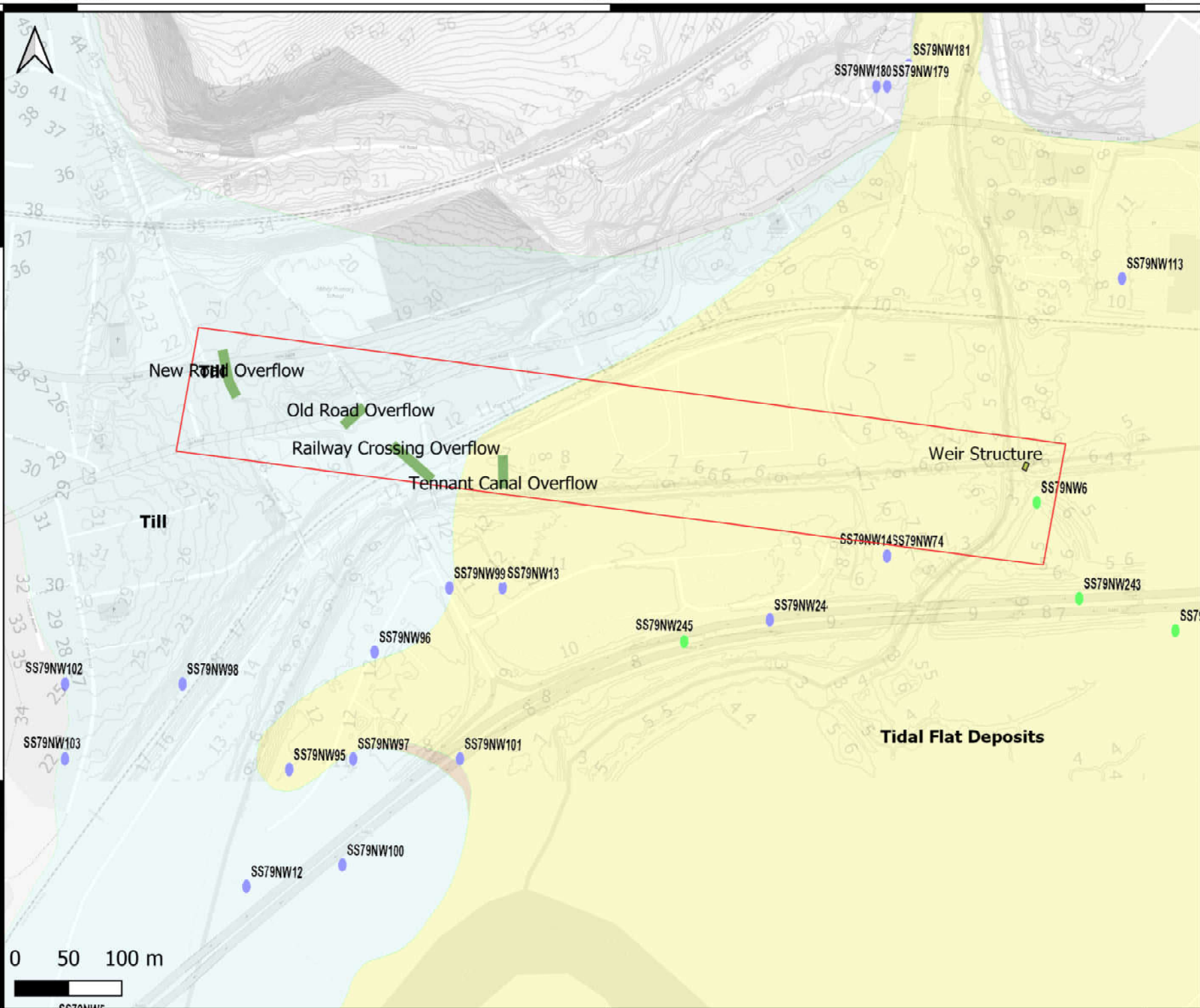
273500E

274000E



197500N

197000N



0 50 100 m

Legend

Boreholes

- 0 - 10 m
- 10 - 30 m
- >30 m
- Confidential
- Unknown

Phase 2 Site Location

Culverts and Watercourses

Proposed Culvert

ATKINS

CLIENT

Neath Port Talbot County Borough Council

PROJECT

Neath Port Talbot Flood Alluviation Schemes:
Caenant Terrace

TITLE

Superficial Deposits Plan

OpenStreetMap standard mapping - <https://www.openstreetmap.org>

C.3. Bedrock Geology Plan

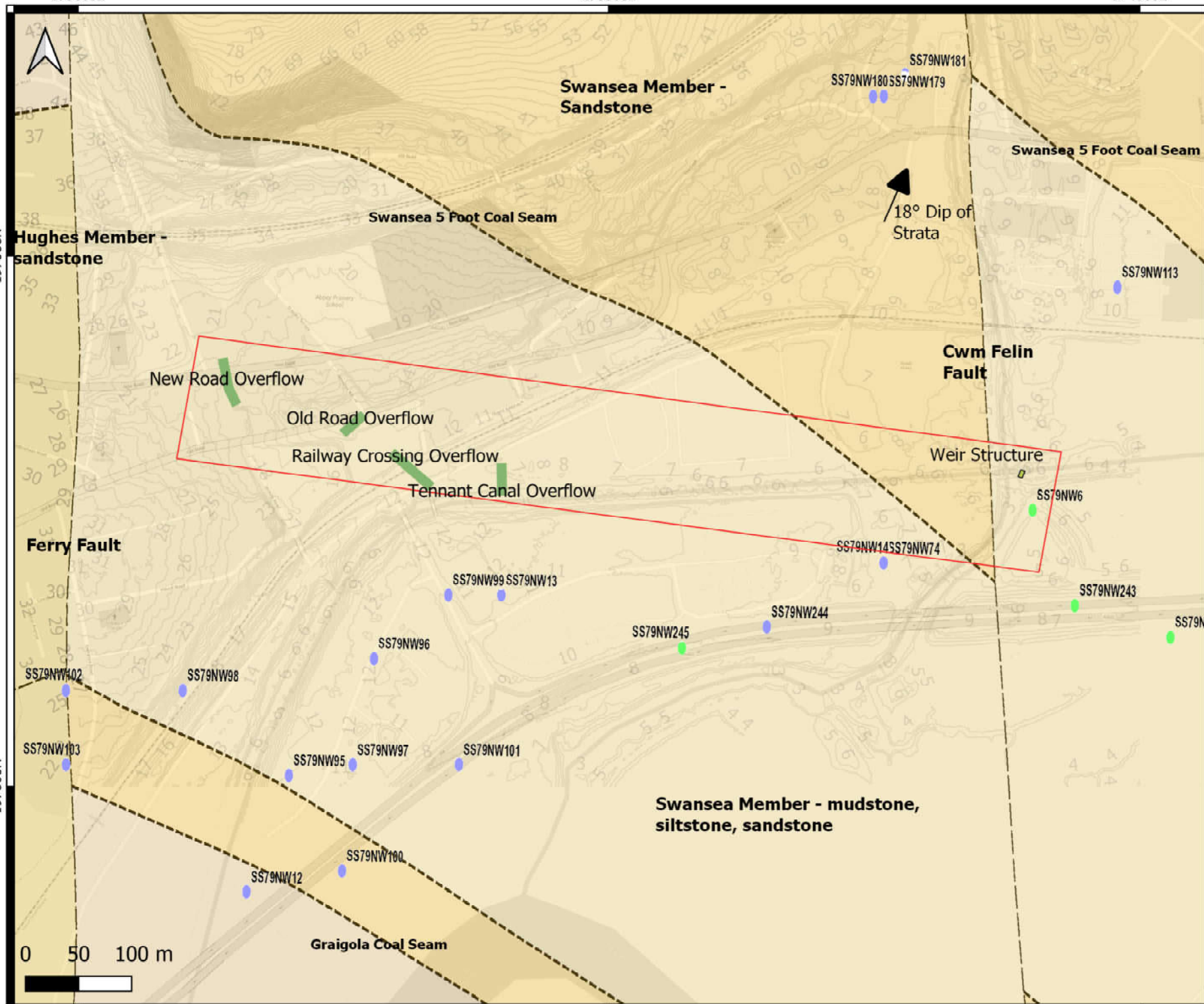
273000E

273500E

274000E

197500N

197000N



Legend

Boreholes

- 0 - 10 m
- 10 - 30 m
- >30 m
- Confidential
- Unknown

Phase 2 Site Location

Culverts and Watercourses

Proposed Culvert

ATKINS

CLIENT

Neath Port Talbot County Borough Council

PROJECT

Neath Port Talbot Flood Alluviation Schemes:
Caenant Terrace

TITLE

Bedrock Geology Plan

OpenStreetMap standard mapping - <https://www.openstreetmap.org>

Appendix D. SOCOTEC UK Ltd Phase 2 GI Factual Report

NEATH PORT TALBOT FLOOD ALLEVIATION SCHEMES: CAENANT TERRACE SCHEMES

FACTUAL REPORT ON GROUND INVESTIGATION

Report No H1069-21

June 2022

Issue No 1

Carried out for:
Neath Port Talbot County Borough Council
The Quays
Neath
SA11 2GG

Engineer / Investigation Supervisor:
Atkins Limited
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Report No H1069-21

ISSUE No DATE	STATUS	PREPARED BY	CHECKED BY	APPROVED BY
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		SIGNATURE 	SIGNATURE 	SIGNATURE 

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APPENDIX A FIGURES AND DRAWINGS**APPENDIX B EXPLORATORY HOLE RECORDS****APPENDIX C INSTRUMENTATION AND MONITORING****APPENDIX D GEOTECHNICAL LABORATORY TEST RESULTS****APPENDIX E GEOENVIRONMENTAL LABORATORY TEST RESULTS****APPENDIX F PHOTOGRAPHS**

1 INTRODUCTION

SOCOTEC UK Limited (SOCOTEC) was commissioned in December 2021 by Atkins Limited (Atkins), on behalf of Neath Port Talbot County Borough Council to carry out a ground investigation for the proposed construction of four culverts and a weir structure for the proposed flood alleviation works at Skewen.

The scope of the investigation was specified by Atkins and comprised boreholes, trial pits and trial trenches, monitoring, laboratory testing and reporting. The fieldwork was carried out between 4 and 21 January 2022.

The investigation was performed in accordance with the contract specification (Document reference: NE04_001-ATK-GEN-SWMWREC-SP-CE-000001, 21 October 2021), and the general requirements of BS 5930:2015+A1 (2020), BS EN 1997-2 (2007), BS EN ISO 22475-1 (2021) and other relevant related standards identified.

This report presents the factual records of the fieldwork, monitoring and laboratory testing. The information is also presented in digital data format as defined in AGS (2017).

2 SITE SETTING

2.1 Location and Description

Neath Port Talbot Flood Alleviation Scheme, Caenant Terrace is located in Skewen, Neath Port Talbot in the Neath Valley. It is located approximately 1.8 km west of Neath and 9 km northeast of Swansea, at National Grid reference SS 732973, see Site Location Plan in Appendix A. A representative postcode of the site is: SA10 7LT.

The Neath Port Talbot Flood Alleviation Scheme: Caenant Terrace project was undertaken at five separate locations situated within the town of Skewen covering a linear area approximately 730 m long from New Road (northwest extent) to the Tenant Canal (eastern extent).

Tenant Canal: The eastern extent of the site is located adjacent to (and southwest of) the point at which the Tenant Canal and the River Clydach meet. A borehole (BH03) was undertaken at this

location, in addition to a surface water sample (SW02, Easting: 273869 Northing: 197297) from the Canal. The site is bound by a residential dwelling to the south and mature trees and hedgerows elsewhere. The Neath Abbey (archaeologically protected) is located to the north of the Canal.

Monastery Road: TT03 and BH01 (borehole progressed through backfilled trial pit) were undertaken to the north of the Tenant Canal approximately 550 m west of BH03. The railway is located to the north and the Tenant Canal is located to the south. A surface water sample (SW01, Easting: 273341 Northing: 197267) was taken from the Tenant Canal at this location. A trial trench (TT03) was undertaken approximately 550m to the west of BH03.

Abbey Services Yard: TP01, BH02 and BH02A were undertaken within the Abbey Services Yard. This is located approximately 70 m northwest of the Monastery Road location. This area was on hardstanding and bound by palisade fencing with Abbey Services MOT Garage to the north and east, and bound by the railway to the south and a large steel fabrication factory to the west.

Old Road: TT01 was undertaken across Old Road (B4290) which is located approximately 60 m northwest of the Abbey Services. This area is bound by residential dwellings to the north, a steel fabrication factory to the south and Old Road runs in an east west orientation.

New Road: TT02 and TT04 were undertaken across and to the south of New Road (A4230) which is the most northerly area of the site located approximately 125 m to the northwest of Old Road. Cwrt-Clwydi Gwyn Care Home is located to the north of New Road, trees are located to the south of New Road at this location. New Road runs in an east west orientation.

2.2 Published Geology

The published geological map for the area, BGS Sheet 247 (2011), and the BGS GeoIndex Onshore online viewer (2022) show the site located on recent Glacial Till deposits, predominantly comprised of gravel and sand.

The underlying bedrock is indicated to comprise the Pennant Sandstone Formation (Swansea Member) of Carboniferous age, characterised by mudstones, siltstones and sandstones.

3 FIELDWORK

3.1 General

The exploratory hole locations were selected by Atkins and set out from local features. The positions were surveyed by SOCOTEC to National Grid and Ordnance Datum, and the locations are shown on the Site Plan in Appendix A.

Information on the locations of underground services was provided to SOCOTEC by Atkins to ensure exploratory holes were positioned at suitable distance from known utilities.

All exploratory hole locations were surveyed for underground services, prior to any excavation, using PAS 128 Type B compliant, non-intrusive geophysical utility survey methods. Hand dug service inspection pits were then excavated to a depth of 1.2 m with simultaneous scanning using a Cable Avoidance Tool (CAT).

3.2 Exploratory Holes

The exploratory holes are listed in Table 1.

TABLE 1 SUMMARY OF EXPLORATORY HOLES

TYPE	QUANTITY	DEPTH RANGE (m)	REMARKS
Dynamic Sampling Boreholes	4	2.10 to 12.45	BH01 (progressed through backfilled TT03), BH02, BH02A and BH03
Trial Trenches (Machine Dug)	4	0.80 to 1.30	TT01, TT02, TT03 (backfilled, BH01 progressed) and TT04. Additional logs provided for TT02 and TT04 due to variation in material, refer to sketches TT02 and TT04. Lengths ranging from 6.90 m to 13.40 m.
Trial Pits (Machine Dug)	1	2.00	TP01

The exploratory hole logs are presented in Appendix B. These include descriptions of the strata encountered together with details of the equipment and methods used, sampling and field testing carried out, water depths and other field observations. Explanations of the terms and abbreviations used on the logs are given in the Key to Exploratory Hole Records in Appendix B, along with other

explanatory information. The geological material descriptions are in accordance with BS 5930:2015+A1 (2020), following BS EN ISO 14688-1 (2018) and BS EN ISO 14689 (2018) for soils and rocks respectively.

Standard penetration tests (SPT) in the boreholes were carried out in accordance with BS EN ISO 22476-3+A1 (2011). The SPT hammer energy ratio certificate is included in Appendix B. The results are presented on the logs without any corrections to the measured blow-counts or derived N values.

Geotechnical samples were transferred from site to the Bridgend office of SOCOTEC for temporary retention. Samples taken for geoenvironmental testing were transferred directly from site to the SOCOTEC environmental chemistry laboratory at Bretby, near Burton-on-Trent.

Photographs of trial pits and trial trenches are presented in Appendix F.

3.3 Groundwater and Ground Gas Monitoring

Ground gas and groundwater monitoring instrumentation was installed in selected boreholes specified by Atkins; details are shown on the logs and summarised in Appendix C.

Monitoring carried out by SOCOTEC after the main fieldwork period is listed in Table 2. The records are included in Appendix C.

TABLE 2 SUMMARY OF MONITORING

TYPE	REMARKS
Well Development	15 February 2022 (BH01, BH02A and BH03)
Gas monitoring visits	21 February 2022 (BH01 and BH02A) 19 April 2022 (BH01, BH02A and BH03) 17 May 2022 (BH01, BH02A and BH03) Final Visit to be undertaken in June 2022



TYPE	REMARKS
Groundwater monitoring visits	BH01, BH02A and BH03: 21 February 2022 10 March 2022 19 April 2022 17 May 2022 Final Visit to be undertaken in June 2022

3.4 Groundwater Sampling

Sampling of groundwater from borehole installations was carried out by SOCOTEC after the main fieldwork period, as listed in Table 3. The results of subsequent laboratory testing on the samples are included in Appendix E.

TABLE 3 SUMMARY OF BOREHOLE INSTALLATION SAMPLING

TYPE	QUANTITY	REMARKS
Groundwater Sampling Visits	2	BH01, BH02A and BH03: 21 February 2022 10 March 2022

4 LABORATORY TESTING

4.1 Geotechnical Testing

Geotechnical laboratory testing of selected samples was scheduled by Atkins. The testing was carried out by GSTL at the Llanelli laboratory and Eurofins Chemtest Ltd in Newmarket, near Cambridge depending on the testing requirements, in accordance with test methods as stated within the test reports. The scope of testing is listed in Table 4 and the results are presented in Appendix D.

TABLE 4 SUMMARY OF GEOTECHNICAL LABORATORY TESTS

TYPE	QUANTITY	REMARKS
Moisture Content	11	
Atterberg Limits	2	
Particle Size Distribution	10	



TYPE	QUANTITY	REMARKS
Determination of Shear Strength by Direct Shear	2	
SD1 Suite D (Brownfield site – pyrite present)	5	Undertaken by Eurofins Chemtest

4.2 Geoenvironmental Testing

Geoenvironmental laboratory testing was scheduled by Atkins on selected soil and surface water samples recovered during the fieldwork, and water samples taken by SOCOTEC from the installations. The testing was carried out by SOCOTEC at the environmental chemistry laboratory at Bretby, near Burton-on-Trent, in accordance with test methods as stated within the test reports. The scope of testing is listed in Table 5 and the results are presented in Appendix E.

TABLE 5 SUMMARY OF GEOENVIRONMENTAL LABORATORY TESTS

TYPE	QUANTITY	REMARKS
Suite E – Soil samples	16	Arsenic, Boron, Cadmium, Chromium (total and hexavalent), Copper, Lead, Mercury, Nickel, Selenium, Zinc, Vanadium, Aluminium, Antimony, Barium, Beryllium, Iron, Manganese, Magnesium, Molybdenum, Asbestos (and subsequent quantification if identified), pH, Water soluble sulphate (as SO ₄), Soil organic matter, Sulphate, Sulphide, Ammoniacal Nitrogen as N, Nitrate, Nitrite, Cyanide (total, free and complex), Speciated polycyclic aromatic hydrocarbons (17 PAHs), Phenol, TPH CWG (UK), BTEX (incl MTBE)
Suite F – Soil leachate samples	9	Arsenic, Boron, Cadmium, Chromium (total and hexavalent), Copper, Lead, Mercury, Nickel, Selenium, Zinc, Vanadium, Aluminium, Antimony, Barium, Beryllium, Iron, Manganese, Magnesium, Molybdenum, Chemical Oxygen Demand, Biological Oxygen Demand, pH, Water soluble sulphate (as SO ₄), Sulphide, Ammoniacal Nitrogen as N, Nitrate, Nitrite, Cyanide (total, free and complex), Speciated polycyclic aromatic hydrocarbons (17 PAHs), Phenol, BTEX and MTBE, Speciated aliphatic/aromatic TPH
Suite G – Surface water samples	2	Copper, Lead, Nickel, Zinc, Manganese, Chemical Oxygen Demand, Biological Oxygen Demand, pH, Calcium, Hardness (CaCO ₃), Total organic carbon, Dissolved organic carbon



TYPE	QUANTITY	REMARKS
Suite H – Groundwater samples	5	Arsenic, Boron, Cadmium, Chromium (total and hexavalent), Copper, Lead, Mercury, Nickel, Selenium, Zinc, Vanadium, Aluminium, Antimony, Barium, Beryllium, Iron, Manganese, Magnesium, Molybdenum, Chemical Oxygen Demand, Biological Oxygen Demand, pH, Water soluble sulphate (as SO ₄), Sulphide, Ammoniacal Nitrogen as N, Nitrate, Nitrite, Cyanide (total, free and complex), Speciated polycyclic aromatic hydrocarbons (17 PAHs), Phenol, BTEX and MTBE, TPH CWG Two surface water samples and three groundwater samples from installations

5 REFERENCES

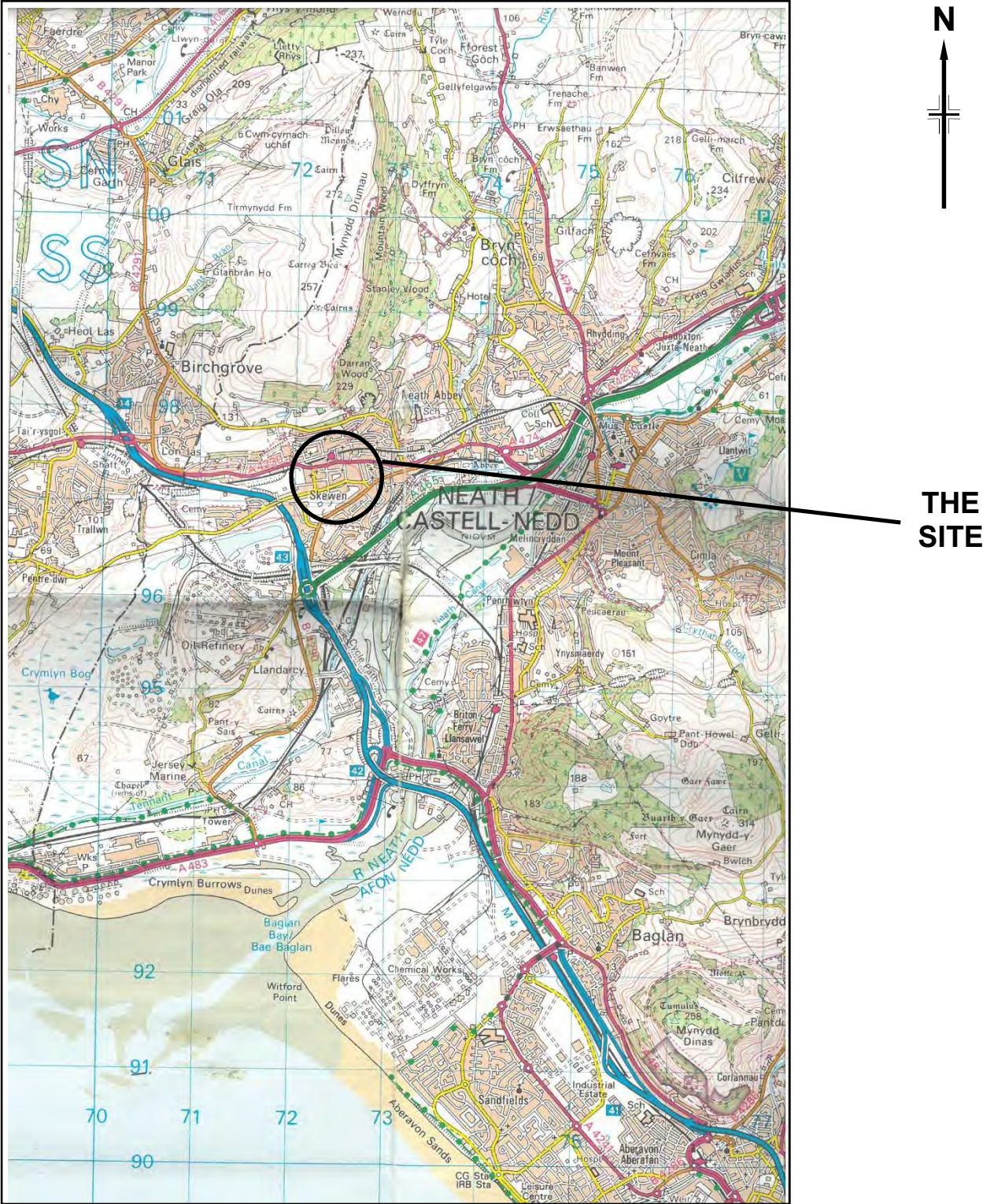
- AGS : 2017 : Electronic Transfer of Geotechnical and Geoenvironmental Data (Edition 4.1 December 2017). Association of Geotechnical and Geoenvironmental Specialists.
- BGS England and Wales Sheet 247 : 2011 : Swansea. 1:50000 geological map (Bedrock). British Geological Survey.
- BGS GeoIndex Onshore : 2022. www.bgs.ac.uk. British Geological Survey.
- BRE Special Digest 1 : 2005 : Concrete in aggressive ground. Building Research Establishment.
- BS 1377 : 1990 : Methods of test for soils for civil engineering purposes. British Standards Institution.
- BS 5930:2015+A1 : 2020 : Code of practice for ground investigations. British Standards Institution.
- BS 10175:2011+A2:2017 : Investigation of potentially contaminated sites – Code of practice
- BS EN 1997-2 : 2007 (Incorporating corrigendum June 2010) : Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. British Standards Institution.
- BS EN ISO 14688-1:2018 : Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description
- BS EN ISO 14688-2:2018 : Geotechnical investigation and testing - Identification and classification of soil - Part 2 Principles for a classification
- BS EN ISO 17892-1 : 2014 : Geotechnical investigation and testing – Laboratory Testing of soil – Determination of water content.
- BS EN ISO 22475-1 : 2021 : Geotechnical investigation and testing – Sampling methods and groundwater measurements - Part 1 Technical principles for execution. British Standards Institution.
- BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing - Field testing - Part 3 Standard penetration test. British Standards Institution.

APPENDIX A

FIGURES AND DRAWINGS

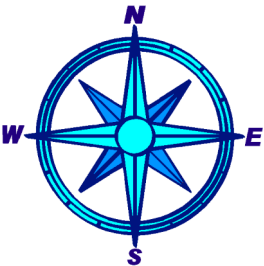
Site Location Plan	A1
Site Plan (West)	A2.1
Site Plan (East)	A2.2

Site Location Plan



Reproduced from the 2002 Ordnance Survey 1:50 000 scale Landranger map No 170 by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office, © Crown copyright, Environmental Services Group Limited. All rights reserved. Licence Number 100006060

Notes: Scale 1:50 000	Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes Project No. H1069-21 Carried out for Neath Port Talbot County Borough Council	Figure A1
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Notes:

Scale:

1:1000

Surveyed By:

Surveyed Date:

Key:

-  Borehole
-  Trial Pits / Trial Trenches
-  Surface Water Sample Locations

Site Plan (West)



Project ID:

H1069-21

Project Title:

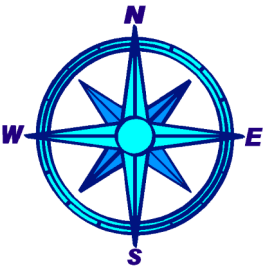
Neath Port Talbot Flood Alleviation Schemes:
Caenant Terrace Schemes

Client:

Neath Port Talbot County Borough Council

Figure:

A2.1



Notes:

Scale:
1:1000

Surveyed By:

Surveyed Date:

- Key:
- Boreholes
 - Trial Pits / Trial Trenches
 - ▲ Surface Water Sample Locations

Site Plan (East)



Project ID:
H1069-21

Project Title:
Neath Port Talbot Flood Alleviation Schemes:
Caenant Terrace Schemes

Client:
Neath Port Talbot County Borough Council

Figure:
A2.2

APPENDIX B

EXPLORATORY HOLE RECORDS

Key to Exploratory Hole Records	Key
Hammer Energy Ratio Report	Hammer Reference TECH1
Borehole Logs	BH01, BH02, BH02A and BH03
Trial Pit Logs	TP01
Trial Trench Logs (and sketches where applicable)	TT01, TT02, TT02A, TT02B, TT03, TT04, TT04A and TT04B

Key to Exploratory Hole Records

SAMPLES

Undisturbed

U	Driven tube sample	} nominally 100 mm diameter and 100% recovery unless otherwise stated
UT	Driven thin wall tube sample	
TW	Pushed thin wall tube sample	
P	Pushed piston sample	
CBR	CBR mould sample	
BLK	Block sample	
C	Core sample (from rotary core) taken for laboratory testing.	

Disturbed

D	Small sample (including samples recovered from SPT)
B	Bulk sample
LB	Large Bulk sample (comprising more than one container as required)

Other

W	Water sample	
G	Gas sample	
ES	Soil sample	} Environmental chemistry samples (in more than one container where appropriate)
EW	Water sample	

Comments to samples

Sequential sample reference numbers are assigned to every sample taken during hole construction.

NR - No Recovery. Used where tube sampling has been attempted but no sample obtained (for whatever reason).

Samples not shown on exploratory hole logs:

- subsamples / specimens taken for on-site testing, eg point load testing
- samples taken from borehole installations (ie water or gas) after hole construction

DYNAMIC SAMPLING

DYS	Dynamic sampling range showing tube / liner recovery (rec.) and diameter. Material retained as separate samples.
L	Retained complete liner sample (with sample reference number)

IN SITU/FIELD TESTS

SPT S or SPT C	Standard Penetration Test, open shoe (S) or solid cone (C). The Standard Penetration Test is defined in BS EN ISO 22476-3:2005+A1:2011. The open shoe configuration is used without a sample liner unless shown otherwise. Samples recovered by SPT open shoe are shown as type D. The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self-weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach the limiting value (usually 50) the total blow count beyond the seating drive is given (without the N = prefix). See Note 7 also.
IV	<i>in situ</i> /field vane shear strength, peak (p) and remoulded (r), kPa
HV	Hand vane shear strength, peak (p) and remoulded (r), kPa
PP	Pocket penetrometer test, converted to shear strength, kPa
KFH, KRH, KPI	Permeability tests : KFH = falling head, KRH = rising head, KPI = packer inflow (water pressure test). Results presented on separate report sheets.
PID	VOC concentration using hand-held photo-ionisation detector, ppmv

DRILLING RECORDS

Classification of discontinuity state - as defined in BS 5930:2015+A1:2020

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm - presented as minimum, mode (or 'typical' value) and maximum spacing.
FI	Fracture Index - presented as number of fractures per metre. (Used as alternative to Fracture Spacing)
NI	Non-intact - used to indicate where the core is fragmented (ie non-Solid Core).
NA	Not-applicable - used where a measurement is inappropriate (eg for non-rock materials, zones of no recovery)
NIDD	Non-intact Drilling Induced – used to indicate where rock believed to be non-fractured in the ground has been recovered as Non-intact due to the drilling process. (Used only where specified)
NDP	No Discontinuities Present – used to indicate where core is non-fractured. (Used only where specified as alternative representation to showing a single If value for the depth range of non-fractured core.)
CRF	Core Recovered in the Following run (length in m) – used to indicate length adjustment to TCR (and SCR, RQD and If accordingly) where slipped/dropped core from a core run has been recovered in the subsequent run.
AZCL	Assessed Zone of Core Loss – used to indicate estimated depth range corresponding to core loss (for TCR<100 %). Assumed to be at the start of the core run where no judgement is possible. Not shown for core loss less than 5 %.
Flush returns – presented as estimated percentage in the Records column, with colour where relevant.	

Key to Exploratory Hole Records

GROUNDWATER



Groundwater entry



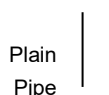
Depth to groundwater after observation period

INSTALLATIONS

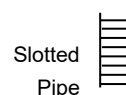
Any installations are shown on the Exploratory Hole Record in the rightmost Backfill column with appropriate graphic.

Standpipe/ piezometer

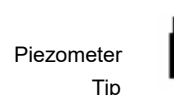
SP	Standpipe
SPIE	Standpipe piezometer
PPIE	Pneumatic piezometer
EPIE	Electronic piezometer



Plain
Pipe



Slotted
Pipe



Piezometer
Tip

Inclinometer or Slip Indicator

ICE	Biaxial inclinometer
ICM	Inclinometer tubing for use with probe
SLIP	Slip indicator



Pressure Cells

Settlement Points

ESET	Electronic settlement cell/gauge
ETM	Magnetic extensometer settlement point



EPCE	Electronic embedment pressure cell
PPCE	Electronic push-in pressure cell



INSTALLATION / BACKFILL LEGENDS

A legend describing the installation is shown in the rightmost column. Legend symbols used to describe the backfill materials are indicated below.

Macadam



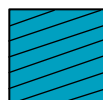
Concrete



Grout



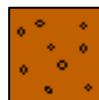
Bentonite



Sand



Gravel



Arisings



STRATUM LEGENDS

The legend symbols used for graphical representation of soils, rocks and other materials on the borehole logs are shown below. For soils with significant proportions of secondary soil types, a combination of two or more symbols is used.

Note that the Made Ground / Fill stratum legend does not differentiate between engineered and non-engineered anthropogenic materials.

Macadam



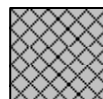
Concrete



Topsoil



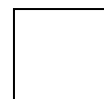
Made Ground / Fill



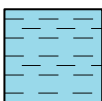
Peat



Void or No Information



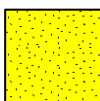
Clay



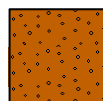
Silt



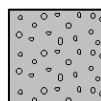
Sand



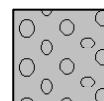
Gravel



Cobbles



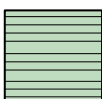
Boulders



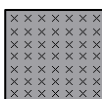
Coal



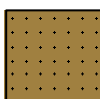
Mudstone



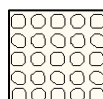
Siltstone



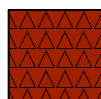
Sandstone



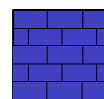
Conglomerate



Breccia



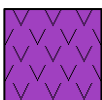
Limestone



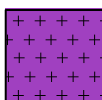
Chalk



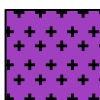
Igneous
(Fine)



Igneous
(Med)



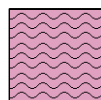
Igneous
(Coarse)



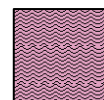
Metamorphic
(Fine)



Metamorphic
(Med)



Metamorphic
(Coarse)



Tuff



Key to Exploratory Hole Records

NOTES

- 1 **Geological materials** are described in accordance with BS 5930:2015+A1:2020, which is compliant with BS EN ISO 14688-1:2018 and 14689-1:2018 for soils and rocks respectively.
- 2 The **consistency** determined during description for fine soils (clay and silt) is reported for strata where undisturbed samples are available. Where the logger considers that the samples may not be representative of the in situ condition, for whatever reason, the reported consistency may be omitted, or qualified using the terms *Probably* (where the logger is reasonably confident of the assessment, or *Possibly* where there is less certainty.
- 3 The presence of **very coarse particles** (cobbles and boulders) is included in the stratum descriptions on logs using the proportional terminology of BS 5930 where possible. However, due to their relatively large size in relation to the diameter of boreholes, and volumes of samples recovered, these records may not be fully representative of their size and frequency in the ground. Where sample mass precludes a reliable estimate of the proportion of very coarse particles, their presence may be described using undefined qualitative terms, eg occasional, frequent, etc, or by noting the number of cobbles/boulders observed.
- 4 The **declination of bedding and joints** is given with respect to the normal to the core axis, ie perpendicular to the direction of drilling. In a vertical borehole this will therefore correspond to the dip.
- 5 The assessment of **SCR, RQD and Fracture Spacing** excludes all non-natural fractures (ie drilling induced) where these can be positively identified.
- 6 Observations of discernible **groundwater entries** during the advancement of the exploratory hole are given at the foot of the log and in the Legend column. The absence of a recorded groundwater entry should not, however, be interpreted as a groundwater level below the base of the borehole. Under certain conditions groundwater entry may not be observed, for instance, drilling with water flush or overwater, or boring at a rate faster than water can accumulate in the borehole. Similarly, where water entry observations do exist, groundwater may also be present at higher elevations in the ground than where recorded in the borehole. In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.
- 7 The borehole logs present the results of **Standard Penetration Tests** recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.
- 8

Date	Time
Casing	Water

 Overnight pauses in hole progress are shown by a horizontal line together with records of casing depth and water level at the start and end of shift, together with the corresponding date and time. Casing depths and water levels are also shown at the time of tube sampling and Standard Penetration Tests.

REFERENCES

- 1 BS EN ISO 14688-1:2018 : Geotechnical investigation and testing - Identification and classification of soil. Part 1 Identification and description. British Standards Institution
- 2 BS EN ISO 14689 : 2018 : Geotechnical investigation and testing - Identification and classification of rock. British Standards Institution
- 3 BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing - Field testing. Part 3 Standard penetration test. British Standards Institution
- 4 BS 5930:2015+A1:2020 : Code of practice for ground investigations. British Standards Institution



Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Dynamic Sampling
Unit 8
Victory Park
Victory Road
Derby
DE248ZF

Hammer Ref: TECH1
Test Date: 28/01/2022
Report Date: 28/01/22
File Name: TECH1.spt
Test Operator: B HUNTER

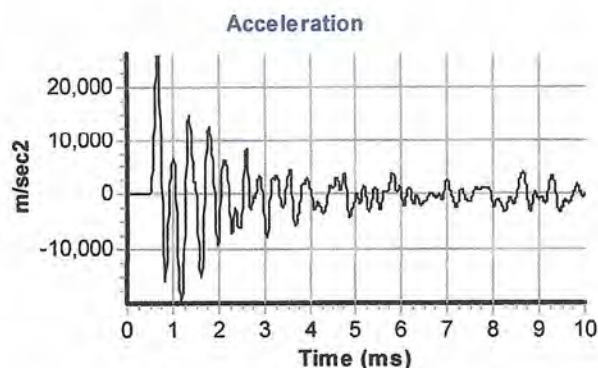
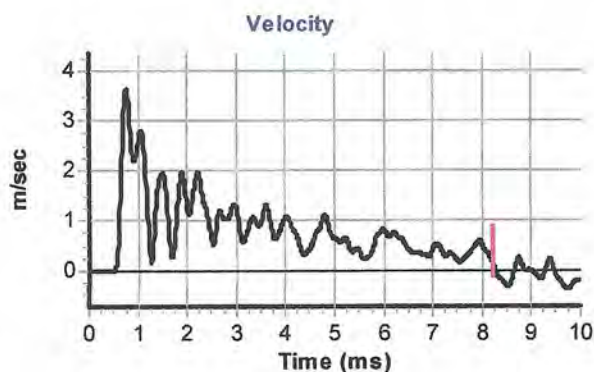
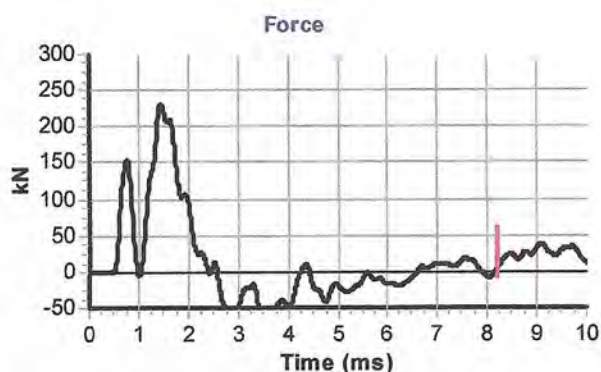
Instrumented Rod Data

Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 62901
Accelerometer No.2: 62902

Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
String Length L (m): 10.0

Comments / Location



Calculations

Area of Rod A (mm^2): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 312

Energy Ratio E_r (%): **66**

Signed: B Hunter
Title: Operations Manager

The recommended calibration interval is 12 months

Borehole Log



Checked		Depth	Dates		Method			Equipment		Rig Crew	Logger	Logged	Hole		Casing		Depth Related Remarks		Ground Level		Coordinates		
R Blair		0.00 - 1.20 1.20 - 8.00	17 Jan 22 - 17 Jan 22 17 Jan 22 - 17 Jan 22		Hand excavated insoection pit from 0.00m to 1.20m. Dynamic sampling from 1.20m to 8.00m. Hole extended by SPT to 8.45m.			Insulated Hand Tools. Berreta T44 Rotary Coring Rig.		KO/CD KO/CD	GP MG	17 Jan 22 17 Jan 22	Depth 8.00	Dia. (mm) 168	Depth 8.00	Dia. (mm) 168	Depth	Remarks	9.67 mOD		E 273330.40		
Approved																				National Grid		N 197286.77	
H Woodroffe																						System	

0	Date	Time	Samples			Field Tests			Samp / Test		Coring Depth (Diameter)	TCR % SCR % RQD %	Water added Flush details	Depth (Thickness)	Level	Legend	Strata Description		Chisel.	Water Entry	Backfill					
	Casing	Water	Depth	Type & No.	Records	Depth	Type	Records	Casing	Water							Main	Detail								
0	17 Jan 22	0800	0.20	ES 1		0.20	PID	0.0 ppmv						(0.13)	+9.54		Strong black MACADAM. 70%-80% aggregate of subangular fine to coarse limestone. 20%-30% matrix. <1% 2mm-6mm voids. (WEARING COURSE) Reddish grey sandy slightly silty angular to subangular fine to coarse GRAVEL of limestone, sandstone and rare quartzite with low cobble content. Cobbles are subrounded of limestone and rare sandstone. Sand is fine to coarse. (SUB BASE) Dark greyish brown very sandy slightly silty angular to subangular fine to coarse GRAVEL of brick, sandstone, limestone and concrete with high ash content and rare gravel sized fragments of slag and clinker. Sand is fine to coarse. Locally soft orangish brown slightly sandy clay (<300mm). (MADE GROUND) Dark grey to black gravelly slightly silty fine to coarse SAND and ASH. Gravel is subangular fine to medium of brick, concrete and limestone. (MADE GROUND) Minimal recovery. Material recovered as D samples. Recovered material comprises medium dense greyish brown clayey GRAVEL and SAND. Gravel is subangular fine of mudstone, sandstone and limestone. Sand is fine to coarse. (GLACIAL TILL)				0.50					
			0.25	B 4																						
			0.40	D 5		0.50	PID	0.1 ppmv																		
			0.50	ES 2																						
1			0.90	B 6		1.00	PID	0.1 ppmv						(0.84)								1.90				
			1.00	ES 3																						
			1.10	D 7		1.20 - 1.65	SPT S	N=28 (4,6/8,6,7,7) ID TECH1 Er 66%	1.20	Dry																
			1.20	D 2A																						
2			1.20 - 2.00	DYS	10% rec									(0.20)	+8.27											
			2.00	D 4A		2.00 - 2.45	SPT S	N=23 (4,3/5,6,6,6) ID TECH1 Er 66%	2.00	Dry																
			2.00 - 3.50	DYS																						
3			3.50	D 6A		3.50 - 3.95	SPT S	N=20 (3,4/4,5,6,5) ID TECH1 Er 66%	3.50	Damp																
			3.50 - 4.50	DYS																						
4			4.50	D 8		4.50 - 4.95	SPT S	N=25 (5,6/6,6,7,6) ID TECH1 Er 66%	4.50	Damp																
			4.50 - 5.50	DYS																						
5			5.50	D 10		5.50 - 5.95	SPT S	N=33 (5,9/12,7,7,7) ID TECH1 Er 66%	5.50	Damp																
			5.50 - 7.00	DYS																						
6			7.00	D 12		7.00 - 7.45	SPT S	N=27 (3,4/6,6,8,7) ID TECH1 Er 66%	7.00	Damp																
			7.00 - 8.00	DYS																						
7			8.00			8.00 - 8.45	SPT S	N=30 (4,6/7,8,7,8) ID TECH1 Er 66%	8.00	Damp																
8	17 Jan 22	1700																								
9																										
10																										

General Remarks																Hard Boring / Chiselling			Groundwater Entries			Sealed	
																Depths	Duration (mins)	Tool	No.	Depth	Remarks		
																			1	2.80	Rose to 2.50 m after 20 minutes. Medium inflow.		
																Status			Scale			Borehole	
																FINAL			1:50			BH01	
																			Printed 27 May 2022 13:59:29				
																			© Copyright SOCOTEC UK Limited				

Notes		Project		Project No.		Carried out for		Status		Scale		Borehole	
For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.		Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes		H1069-21		Neath Port Talbot County Borough Council		FINAL		1:50		BH01	

Borehole Log

[illegible]

Borehole Log



Checked	Depth	Dates	Method	Equipment	Rig Crew	Logger	Logged	Hole		Casing		Depth Related Remarks		Ground Level	Coordinates		National Grid	System
	0.00 - 1.20 1.20 - 8.00	19 Jan 22 - 19 Jan 22 19 Jan 22 - 19 Jan 22	Hand dug inspection pit from 0.00m to 1.20m. Dynamic sampling from 1.20m to 8.00m. Hole extended by SPT to 8.45m.	Hand Insulated Tools. Berreta T44 Rotary Coring Rig.	KO/CD KO/CD	GP MG	19 Jan 22 19 Jan 22	Depth 8.00 8.45	Dia. (mm) 168 21	Depth 8.00	Dia. (mm) 168	Depth 0.00 - 8.00	Remarks No groundwater encountered.	12.27 mOD	E 273286.69	N 197304.79		
Approved																		
H Woodroffe																		

0	Date	Time	Samples			Field Tests			Samp / Test		Coring Depth (Diameter)	TCR % SCR % RQD %	Water added Flush details	Depth (Thickness)	Level	Legend	Strata Description		Chisel.	Water Entry	Backfill	
	Casing	Water	Depth	Type & No.	Records	Depth	Type	Records	Casing	Water							Main	Detail				
1	19 Jan 22	0800												(0.25)			Strong grey CONCRETE. 60%-80% subangular to subrounded fine to coarse aggregate of limestone and quartzite. 10%-20% matrix. Small 2-6mm voids. (MADE GROUND)					
			0.30	ES 1		0.30	PID	0.1 ppmv (Test ES1)						0.25	+12.02		(Old wall structure). Recovered as: brownish grey slightly sandy angular to subangular fine to coarse GRAVEL and COBBLES of limestone and rare concrete. (MADE GROUND)					0.50
			0.40 - 0.60	B 4		0.60	PID	0.0 ppmv (Test ES2)						0.70	+11.57		Dark brownish grey gravelly slightly silty fine to coarse SAND with high ash content and low cobble content. Gravel is angular to subangular fine to coarse of slag, limestone, sandstone and clinker. Cobbles are subangular of limestone and sandstone. (MADE GROUND)					
			0.60	ES 2										(0.50)			Minimal recovery. Material recovered as D samples. Recovered material comprises dense becoming medium dense dark grey slightly gravelly clayey fine to coarse SAND with rare ash content. Gravel is subangular fine to medium of brick, concrete and clinker. (MADE GROUND)					
			0.90	D 5		1.10	PID	0.2 ppmv (Test ES3)	1.20	Dry				1.20	+11.07							
			1.00 - 1.20	B 6		1.20 - 1.27	SPT S	50 (25 for 40mm/50 for 30mm)														
			1.10	ES 3				ID TECH1 Er 66%														
			1.20	D 2A																		
			1.20 - 2.00	DYS	10% rec																	
2			2.00	D 4A		2.00 - 2.45	SPT S	N=35 (4,7/9,9,8,9)	2.00	Dry				(1.80)								
			2.00 - 3.00	DYS	10% rec			ID TECH1 Er 66%														
3			3.00	D 6A		3.00 - 3.45	SPT S	N=27 (3,5/6,7,7,7)	3.00	Dry				3.00	+9.27		Minimal recovery. Material recovered as D samples. Recovered material comprises soft to firm dark greyish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mudstone, limestone and sandstone. (GLACIAL TILL)					
			3.00 - 4.00	DYS	10% rec			ID TECH1 Er 66%						(1.00)								
4			4.00 - 5.00	DYS	80% rec	4.00 - 4.45	SPT S	N=19 (2,3/3,5,5,6)	4.00	Dry				4.00	+8.27		Soft to firm dark greyish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mudstone, limestone and sandstone. (GLACIAL TILL)					
													(1.00)									
5			5.00	D 10		5.00 - 5.45	SPT S	N=41 (12,10/8,11,10,12)	5.00	Dry				5.00	+7.27		Minimal recovery. Material recovered as D samples. Recovered material comprises soft to firm dark greyish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mudstone, limestone and sandstone. (GLACIAL TILL)					
			5.00 - 6.50	DYS	10% rec			ID TECH1 Er 66%						(1.50)								
6			6.50 - 7.50	DYS	50% rec	6.50 - 6.95	SPT S	N=27 (3,3/3,8,7,9)	6.50	Dry				6.50	+5.77		Soft to firm dark greyish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mudstone, limestone and sandstone. (GLACIAL TILL)					
													(1.00)									
7			7.50 - 8.00	D 14		7.50 - 8.00							7.50	+4.77		Minimal recovery. Material recovered as D samples. Recovered material comprises soft to firm dark greyish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mudstone, limestone and sandstone. (GLACIAL TILL)						
			7.50 - 8.00	DYS	10% rec								(0.50)									
8	19 Jan 22	1700				8.00 - 8.45	SPT S	N=27 (5,6/6,7,7,7)	8.00	Dry				8.00	+4.27							8.00 SP
	8.00	Dry						ID TECH1 Er 66%														
9																						
10																						

General Remarks												Hard Boring / Chiselling			Groundwater Entries			
												Depths	Duration (mins)	Tool	No.	Depth	Remarks	Sealed

Notes	Project	Status	Scale	Borehole
For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes	FINAL	1:50	BH02A
	Project No. H1069-21		Printed 27 May 2022 13:59:30	
	Carried out for Neath Port Talbot County Borough Council		© Copyright SOCOTEC UK Limited	

Sheet 1 of 1

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Borehole Log



Checked R Blair	Depth 0.00 - 1.20 1.20 - 12.00		Dates 21 Jan 22 - 21 Jan 22 21 Jan 22 - 21 Jan 22		Method Hand excavated inspection pit from 0.00m to 1.20m. Dynamic sampling from 1.20m to 12.00m. Hole extended by SPT to 12.45m.			Equipment Insulated Hand Tools. Berreta T44 Rotary Coring Rig.		Rig Crew KO/CD KO/CD		Logger GP GP		Logged 24 Jan 22 24 Jan 22		Hole Depth 12.00 Dia. (mm) 168		Casing Depth 12.00 Dia. (mm) 168		Depth Related Remarks Depth Remarks		Ground Level 6.05 mOD Coordinates E 273857.25 National Grid N 197286.85 System		
	Approved H Woodroffe																							
10	Date Casing	Time Water	Samples Depth Type & No. Records			Field Tests Depth Type Records			Samp / Test Casing Water		Coring Depth (Diameter)	TCR % SCR % RQD %	Water added Flush details	Depth (Thickness)	Level	Legend	Strata Description Main Detail		Chisel.	Water Entry	Backfill			
11			11.00 11.00 - 12.00	D 18 DYS	10% rec	11.00 - 11.45	SPT S	N=19 (2,4/4,5,5,5) ID TECH1 Er 66%	11.00	Damp				11.00	-4.95		Minimal recovery. Material recovered as D samples. Recovered material comprises medium dense grey sandy clayey subangular to rounded fine to coarse GRAVEL of sandstone, limestone and quartzite. Sand is fine to coarse. (TIDAL FLAT DEPOSITS)							
12	21 Jan 22 1700 12.00 4.30					12.00 - 12.45	SPT S	N=21 (3,3/5,6,5,5) ID TECH1 Er 66%	12.00	Damp				12.00	-5.95		Minimal recovery. Material recovered as D samples. Recovered material comprises medium dense brown sandy subangular to subrounded fine to coarse GRAVEL of sandstone, mudstone and quartzite. (TIDAL FLAT DEPOSITS)					12.00		
13																	END OF EXPLORATORY HOLE							
14																								
15																								
16																								
17																								
18																								
19																								
20																								
General Remarks																Hard Boring / Chiselling Depths Duration (mins) Tool			Groundwater Entries No. Depth Remarks Sealed					
Notes For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes Project No. H1069-21 Carried out for Neath Port Talbot County Borough Council						Status FINAL			Scale 1:50 Printed 27 May 2022 13:59:31 © Copyright SOCOTEC UK Limited			Borehole BH03 Sheet 2 of 2						

Trial Pit Log



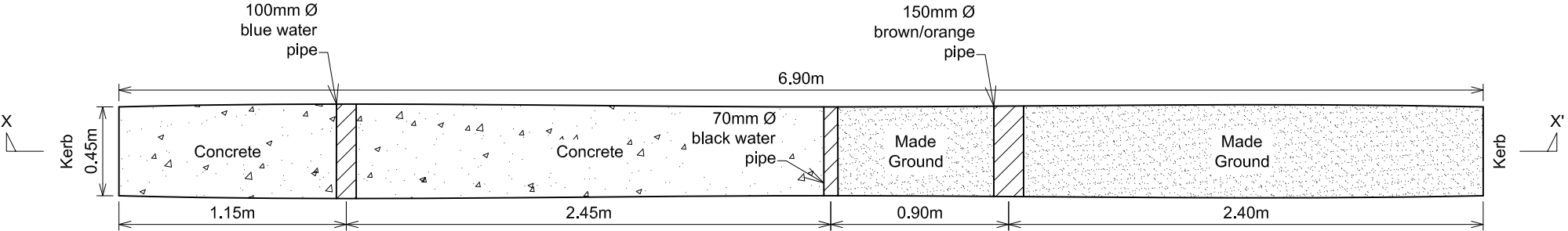
Checked R Blair	Depth 0.00 - 2.00	Dates 19 Jan 22 - 19 Jan 22	Method Machine and hand dug trial pit from 0.00m to 2.00m.	Equipment Machine 360 Excavator and Hand Insulated Tools.	Rig Crew RA	Logger MG	Logged 19 Jan 22	Dimensions and Orientation Width 0.80 m Length 2.50 m C B A D ➡ 92 (Deg)	Depth 0.00 - 2.00	Depth Related Remarks Remarks No groundwater encountered during excavation.	Ground Level 12.25 mOD	Coordinates E 273283.03 N 197312.87	System	
Approved H Woodroffe														
0	Date 19 Jan 22	Time 0800	Samples			Field Tests		Depth (Thickness)	Level	Legend	Strata Description		Water Entry	Backfill
			Depth	Type & No.	Records	Depth	Type				Records	Main		
			0.20	D 2		0.20	PID	0.0 ppmv	(0.12)	+12.13		Medium strong light grey reinforced CONCRETE. 10-20% aggregate of round fine gravel of flint. 90% matrix. 6mm rebar at 60mm depth with 150mm spacing. (FLOOR SLAB)		
			0.20 - 0.50	B 3								Dark grey gravelly fine to coarse SAND with medium ash content and medium cobble content. Gravel is angular to subangular fine to coarse of brick, concrete and clinker. Cobbles are subangular of brick and concrete. (MADE GROUND)		
			0.20	ES 1		0.20	PID	0.0 ppmv	(0.28)					
			0.50 - 1.00	B 6										
			0.70	D 5		0.70	PID	0.0 ppmv	(0.40)	+11.85		Medium strong light grey reinforced CONCRETE. 10-20% aggregate of round fine gravel of flint. 90% matrix. 6mm rebar at 60mm depth with 150mm spacing. (FLOOR SLAB)		
			0.70	ES 4								Dark grey gravelly fine to medium SAND with medium ash content and medium cobble content. Gravel is angular to subangular fine to coarse of brick, concrete and clinker. Cobbles are subangular of brick and concrete. (MADE GROUND)		
			0.90	D 8		0.90	PID	0.0 ppmv	(0.10)	+11.75				
			0.90	ES 7										
			1.00 - 1.50	B 9					(1.50)					
			1.50 - 2.00	B 12										
	19 Jan 22	1800	1.90	D 11		1.90	PID	0.0 ppmv	2.00	+10.25		END OF EXPLORATORY HOLE		
			1.90	ES 10										

Trial Pit Log



Checked R Blair	Depth 0.00 - 1.20	Dates 20 Jan 22 - 20 Jan 22	Method Machine and hand dug trial trench from 0.00m to 1.20m.	Equipment Machine 360 Excavator and Insulated Hand Tools.	Rig Crew RA	Logger CB	Logged 20 Jan 22	Dimensions and Orientation Width 0.45 m Length 6.90 m C B A D ➡	Depth 0.00 - 1.20	Remarks No groundwater encountered during excavation.	Depth Related Remarks						
											Ground Level Coordinates National Grid	10.95 mOD E 273239.29 N 197335.12 System					
Approved H Woodroffe																	
0 1 2 3 4 5	Date	Time	Samples			Field Tests			Depth (Thickness)	Level	Legend	Strata Description		Water Entry	Backfill		
	Water	Depth	Type & No.	Records	Depth	Type	Records	Main				Detail					
		0.15 - 0.32	B 4			0.40	PID	0.1 ppmv	0.10 (0.10) +10.85 (0.28)	Medium strong to strong black MACADAM. 60-80% aggregate of subangular fine to coarse gravel of limestone. 0% voids. (WEARING COURSE) Dark greyish black slightly sandy angular to subangular fine to coarse GRAVEL of limestone and rare quartzite with low cobble content. Sand is fine to coarse. Cobbles are subangular of limestone and rare macadam and slag. (MADE GROUND)		0.10					
		0.40 - 0.75 0.40	B 5 ES 1					0.38 (0.47) +10.57	Dark greyish black sandy slightly silty angular to subangular fine to coarse GRAVEL of limestone with medium cobble content. Sand is fine to coarse. Cobbles are subangular of limestone, macadam and slag. (MADE GROUND)								
		0.80 0.87 - 1.10	ES 2 B 6			0.80	PID	0.2 ppmv	0.85 (0.35) +10.10	Reddish brownish black sandy slightly silty angular to subangular fine to coarse GRAVEL of limestone, sandstone and rare quartzite with medium cobble and boulder content and high ash content. Cobbles and boulders are subangular of limestone, sandstone, brick, slag and concrete. Sand is fine to coarse. (MADE GROUND)							
	1.20	ES 3			1.20	PID	0.8 ppmv	1.20 +9.75	END OF EXPLORATORY HOLE			1.20					
General Remarks Refer to TT01 sketch.										Stability Stable. Shoring None. Weather Clear.			Groundwater Entries No. Depth Remarks Sealed				
Notes For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Project No. Carried out for					Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes H1069-21 Neath Port Talbot County Borough Council		Status FINAL		Scale 1:25 Printed 27 May 2022 13:59:32 © Copyright SOCOTEC UK Limited		Trial Pit TT01 Sheet 1 of 1	

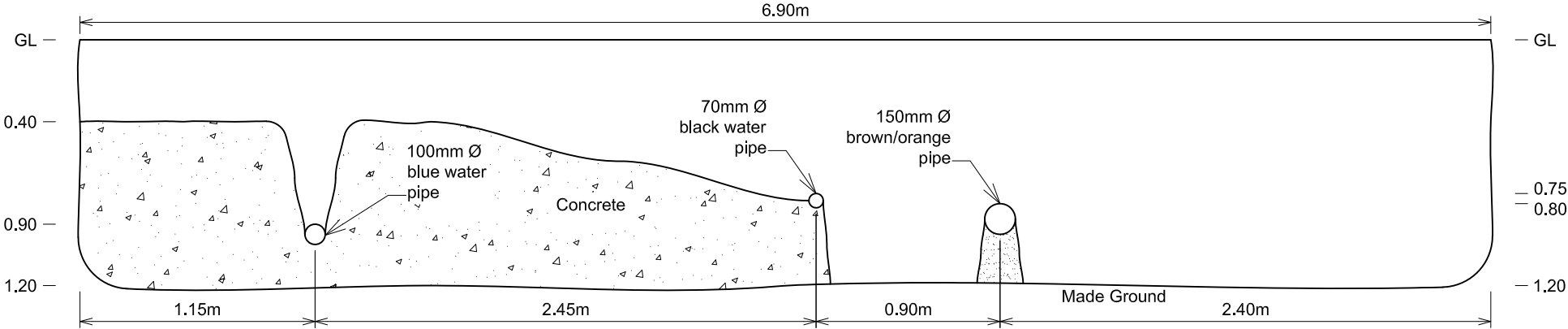
Trial Pit Drawing



PLAN VIEW

All dimensions in metres. Scale: 1:30	A4	Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes Project no. H1069-21 Client Neath Port Talbot County Borough Council	TP No. TT01
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Trial Pit Drawing



SECTION X-X'

All dimensions in metres. Scale: 1:30	A4	Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes Project no. H1069-21 Client Neath Port Talbot County Borough Council	TP No. TT01
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Trial Pit Log



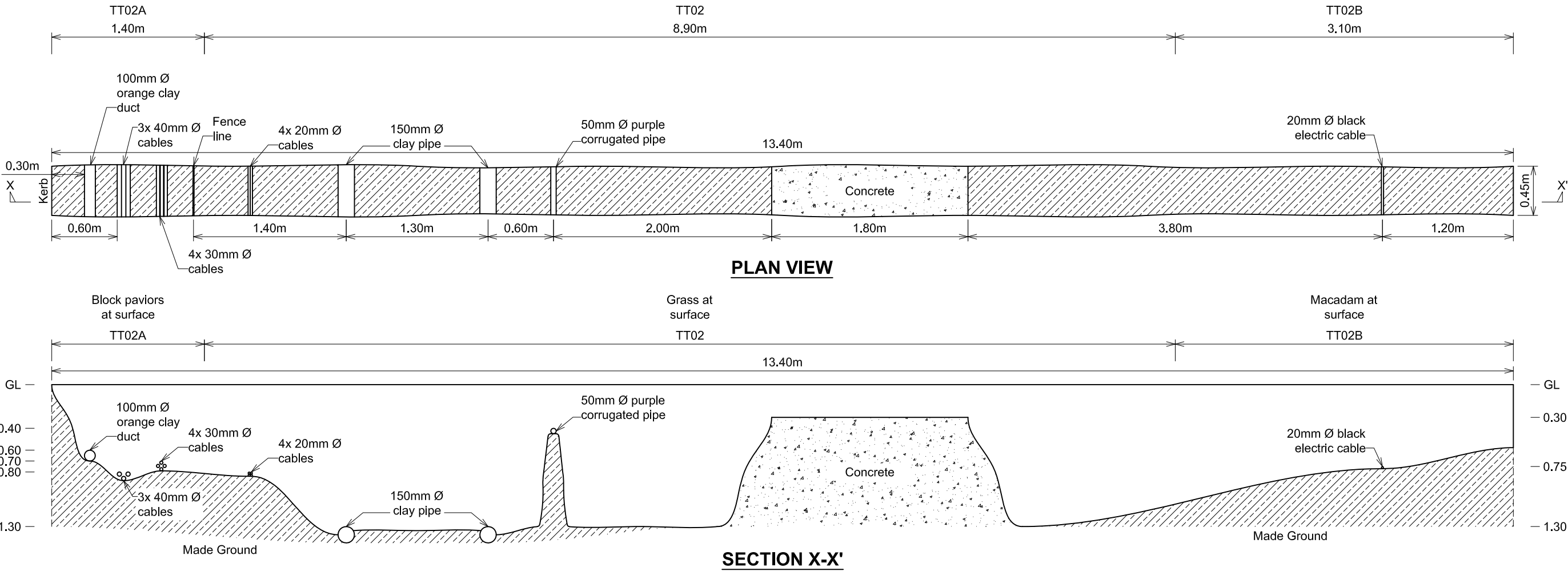
Checked R Blair	Depth 0.00 - 1.30	Dates 18 Jan 22 - 18 Jan 22	Method Manchine and hand dug trial trench from 0.00m to 1.30m.	Equipment Machine 360 Excavator and Insulated Hand Tools.	Rig Crew RA	Logger GP/CB	Logged 18 Jan 22	Dimensions and Orientation Width 0.45 m Length 13.40 m C B D A ➡ 70 (Deg)	Depth 0.00 - 1.30 1.30 - 1.30	Depth Related Remarks Remarks No groundwater encountered during excavation. Concrete encountered, trial trench terminated.	Ground Level 19.92 mOD Coordinates E 273104.90 National Grid N 197377.48 System		
												Approved H Woodroffe	
0 18 Jan 22 0800 18 Jan 22 1800	Water 0.20 0.30 - 0.70 0.40 0.60 0.90 0.90 - 1.20 1.00 1.30	Samples DepthType & No.Records ES 1 B 5 D 4 ES 2 D 6 B 7 ES 3 D 8	Field Tests DepthTypeRecords 0.20PID0.8 ppmv 0.60PID0.1 ppmv 1.00PID0.6 ppmv	DepthLevel (Thickness) (0.10) 0.10+19.82 (0.30) 0.40+19.52 (0.90) 1.30+18.62	Legend	Strata Description		Water Entry	Backfill				
						Main				Detail			
						Brown silty clayey fine to coarse SAND. Occasional rootlets. (TOPSOIL)							
						Reddish brown gravelly slightly clayey fine to coarse SAND. Gravel is angular to subangular fine to medium of limestone. (MADE GROUND)							
						Dark brown slightly sandy clayey angular to subangular fine to coarse GRAVEL of brick, limestone, concrete and sandstone with high cobble content. Localised gravel sized fragments of plastic, timber and glass. Sand is fine to coarse. Cobbles are subangular of brick limestone, concrete and sandstone. (MADE GROUND)							
END OF EXPLORATORY HOLE													
General Remarks Refer to TT02 sketch. Also refer to TT02A and TT02B logs.								Stability Stable. Shoring None. Weather Clear.		Groundwater Entries No. Depth Remarks Sealed			
Notes For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.				Project Project No. Carried out for Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes H1069-21 Neath Port Talbot County Borough Council				Status FINAL		Scale 1:25 Printed 27 May 2022 13:59:31 © Copyright SOCOTEC UK Limited		Trial Pit TT02 Sheet 1 of 1	

Checked R Blair	Depth 0.00 - 0.80	Dates 18 Jan 22 - 18 Jan 22	Method Machine and hand dug trial trench from 0.00m to 0.80m.	Equipment Machine 360 Excavator and Insulated Hand Tools.	Rig Crew RA	Logger GP	Logged 18 Jan 22	Dimensions and Orientation Width Length C B A D ➔ 70 (Deg)	Depth 0.00 - 0.80 0.80 - 0.80	Depth Related Remarks Remarks No groundwater encountered during excavation. Trial trench terminated due to service observed.	Ground Level Coordinates National Grid System

0	Date 18 Jan 22	Time 0800	Samples			Field Tests			Depth (Thickness)	Level	Legend	Strata Description		Water Entry	Backfill
			Depth	Type & No.	Records	Depth	Type	Records				Main	Detail		
												Red concrete to block pavioours. (PATHWAY)			
												Light brown slightly silty fine to coarse SAND. (SUB BASE)			
												Strong medium strong grey CONCRETE. 60% subangular to subrounded aggregate of limestone and quartzite. 20-30% matrix. 10-20% voids. (SLAB)			
												Dark brown sandy slightly silty angular to subangular fine to coarse GRAVEL of sandstone, limestone, quartzite and concrete with rare subangular slag and clinker content. (MADE GROUND)			

Trial Pit Log

[illegible]

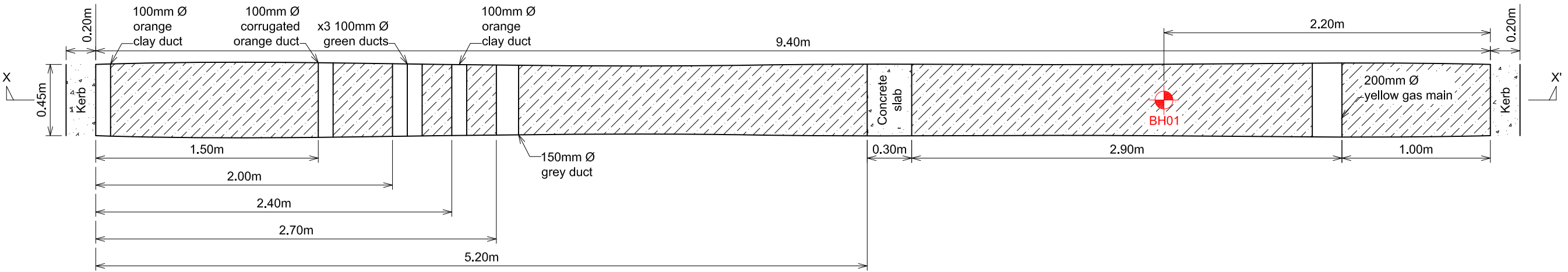


All dimensions in metres. Scale: 1:40	Project	Neath Port Talbot Flood Alleviation Schemes:	TP No. TT02
	Project no.	Caenant Terrace Schemes	
	Client	H1069-21 Neath Port Talbot County Borough Council	

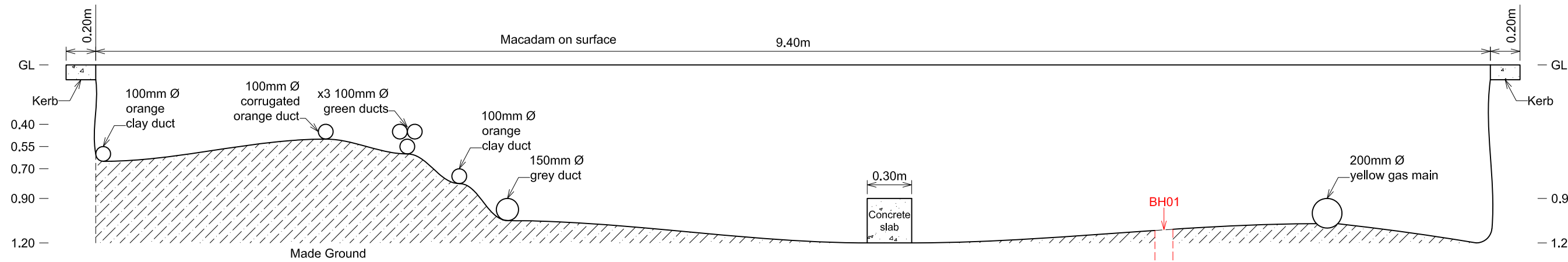
Trial Pit Log



Checked R Blair	Depth 0.00 - 1.20	Dates 17 Jan 22 - 17 Jan 22	Method Machine and hand dug trial trench from 0.00m to 1.20m.	Equipment Machine360 Excavator and Insulated Hand Tools.	Rig Crew	Logger GP/CB	Logged 17 Jan 22	Dimensions and Orientation Width 0.45 m Length 9.40 m C B A D ➔ 86 (Deg)	Depth 0.00 - 1.20	Depth Related Remarks Remarks No groundwater encountered during excavation.	Ground Level 9.64 mOD Coordinates E 273330.99 National Grid N 197284.69 System						
												Approved H Woodroffe					
0	Date 17 Jan 22	Time 0800	Samples			Field Tests			Depth (Thickness)	Level	Legend	Strata Description		Water Entry	Backfill		
			Depth	Type & No.	Records	Depth	Type	Records				Main	Detail				
1	17 Jan 22	1800	0.15	B 4					(0.10)	+9.54		Strong black MACADAM, 70-80% aggregate of subangular fine to coarse GRAVEL of limestone. 20-30% matrix. <1% 2-5mm small voids. (WEARING COURSE)					
			0.20	D 5					(0.16)			Reddish grey sandy slightly silty angular to subangular fine to coarse GRAVEL of limestone, sandstone and rare quartzite with low cobble content. Sand is fine to coarse. Cobbles are subangular of limestone and rare concrete.(SUB BASE/MADE GROUND)					
			0.30	ES 1					0.26			Dark greyish brown slightly silty very sandy angular to subangular fine to coarse GRAVEL of brick, sandstone, limestone, concrete, quartzite with high ash content and rare subrounded slag and clinker. (MADE GROUND)					
			0.50	ES 2					(0.94)								
			0.60	B 6													
			0.70	ES 2													
			0.80	D 7													
			0.90	B 8													
			1.00	D 9													
			1.10	ES 3													
2			1.20	B 10					+8.44		END OF EXPLORATORY HOLE						
3																	
4																	
5																	
General Remarks TT03 excavated and backfilled with arisings. BH01 progressed through TT03.												Stability Stable. Shoring None. Weather Clear.		Groundwater Entries No. Depth Remarks Sealed			
Notes For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes Project No. H1069-21 Carried out for Neath Port Talbot County Borough Council							Status FINAL		Scale 1:25 Printed 27 May 2022 13:59:32 © Copyright SOCOTEC UK Limited		Trial Pit TT03 Sheet 1 of 1	



PLAN VIEW



SECTION X-X'

Trial Pit Log



Checked R Blair	Depth 0.00 - 1.20	Dates 19 Jan 22 - 19 Jan 22	Method Machine and hand excavated trial trench from 0.00m to 1.20m.	Equipment Machine 360 Excavator and Insulated Hand Tools.	Rig Crew RA	Logger GP	Logged 19 Jan 22	Dimensions and Orientation Width 0.45 m Length 9.50 m C B A D ➔ 70 (Deg)	Depth 0.00 - 1.20 1.20 - 1.20	Depth Related Remarks Remarks No groundwater encountered during excavation. Trial trench terminated due to service observed.	Ground Level 10.95 mOD Coordinates E 273239.29 National Grid N 197335.16 System

0	Date 19 Jan 22	Time 0800	Samples			Field Tests			Depth (Thickness)	Level	Legend	Strata Description		Water Entry	Backfill																																											
			Depth	Type & No.	Records	Depth	Type	Records				Main	Detail																																													
1	19 Jan 22	1800	0.10	ES 1		0.10	PID	0.1 ppmv	(0.10)	+10.85		Brown slightly gravelly slightly silty clayey fine to coarse SAND. Gravel is angular to subangular fine to coarse of limestone, sandstone, macadam and concrete. Rare rootlets. (MADE GROUND) Brown sandy slightly clayey angular to subangular fine to coarse GRAVEL of limestone, concrete, brick and sandstone. (MADE GROUND)																																														
			0.20	D 4		0.50	PID	0.8 ppmv	(0.50)																																																	
			0.20 - 0.50	B 8																																																						
			0.50	ES 2																																																						
			0.70	D 5																																																						
2			0.90	ES 3		1.00	PID	0.2 ppmv	(0.60)		Dark brown gravelly slightly silty fine to coarse SAND with low cobble content and high ash content. Gravel is angular to subangular fine to coarse of concrete, brick and limestone. Cobbles are subangular of brick and concrete. (MADE GROUND)																																															
			1.00	B 7																																																						
			1.20	D 6																																																						
3												END OF EXPLORATORY HOLE																																														
4																																																										
5																																																										

General Remarks Refer to TT04 sketch. Also refer to TT04A and TT04B logs.										Stability Stable. Shoring None. Weather Clear.			Groundwater Entries No. Depth Remarks Sealed			
Notes For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes Project No. H1069-21 Carried out for Neath Port Talbot County Borough Council					Status FINAL		Scale 1:25 Printed 27 May 2022 13:59:32 © Copyright SOCOTEC UK Limited		Trial Pit TT04 Sheet 1 of 1		

Trial Pit Log



Checked R Blair	Depth 0.00 - 1.00	Dates 19 Jan 22 - 19 Jan 22	Method Machine and hand excavated trial trench from 0.00m to 1.00m.	Equipment Machine 360 Excavator and Hand Pitting.	Rig Crew RA	Logger GP	Logged 19 Jan 22	Dimensions and Orientation Width Length C B A D ➔ 70 (Deg)	Depth 0.00 - 1.00 1.00 - 1.00	Depth Related Remarks Remarks No groundwater encountered. Trial trench terminated due to service observed.	Ground Level Coordinates National Grid System

0	Date 19 Jan 22	Time 0800	Samples			Field Tests			Depth (Thickness)	Level	Legend	Strata Description		Water Entry	Backfill
			Depth	Type & No.	Records	Depth	Type	Records				Main	Detail		
												Red concrete block paviours. (PATHWAY)			
												Light brown slightly silty fine to coarse SAND. (SUB BASE)			
												Strong medium strong grey concrete. 60% aggregate of subangular to subrounded fine to coarse limestone and quartzite. 40% matrix. 2-6mm voids. (SLAB)			
												Dark brown slightly silty gravelly fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of limestone, brick and concrete. Cobbles are subangular of concrete and brick. (MADE GROUND)			

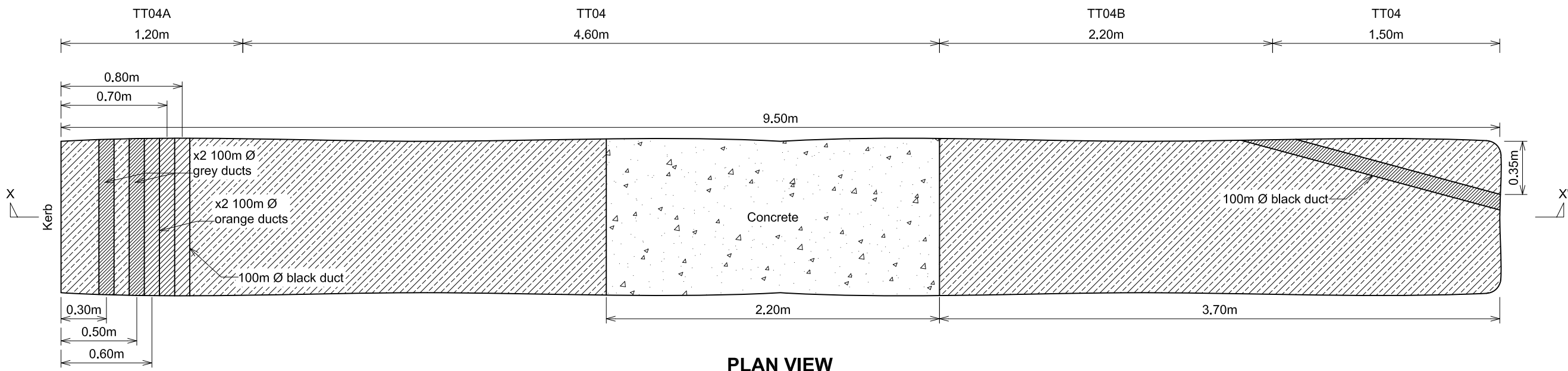
Trial Pit Log



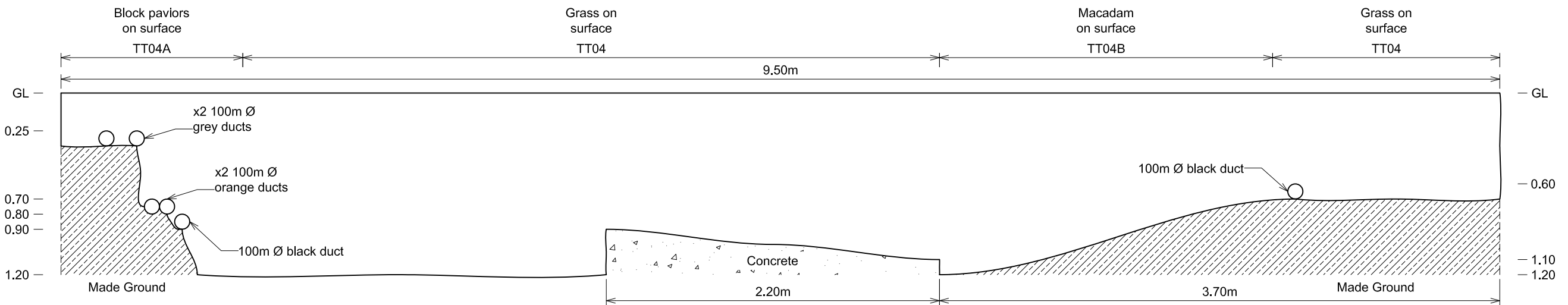
Checked R Blair		Depth 0.00 - 1.20	Dates 19 Jan 22 - 19 Jan 22		Method Machine and hand dug trial trench from 0.00m to 1.20m.		Equipment Machine 360 Excavator and Hand Insulated Tools.		Rig Crew RA	Logger GP	Logged 19 Jan 22	Dimensions and Orientation Width Length C B A D ➔ 70 (Deg)		Depth 0.00 - 1.20	Depth Related Remarks No groundwater encountered during excavation.		Ground Level Coordinates National Grid System	
Approved H Woodroffe																		

0	Date	Time	Samples			Field Tests			Depth	Level	Legend	Strata Description		Water Entry	Backfill
			Depth	Type & No.	Records	Depth	Type	Records	(Thickness)			Main	Detail		
1	19 Jan 22	0800							(0.05)			Strong to medium strong black MACADAM. 60%-80% aggregate subangular fine to coarse GRAVEL of limestone. 20-40% matrix. 2-6mm voids. (WEARING COURSE)			
								0.05		Light pinkish brown gravelly slightly silty coarse SAND with low cobble content. Gravel is subangular to subrounded fine to coarse of limestone and concrete. Cobbles are subangular of limestone and concrete. (MADE GROUND)					
								0.35		Dark brown gravelly slightly silty fine to coarse SAND. Gravel is angular to subangular fine to coarse of limestone, sandstone, concrete and brick with rare gravel sized fragments of glass and timber. (MADE GROUND)					
								(0.85)							
	19 Jan 22	1800							1.20			END OF EXPLORATORY HOLE			1.20
2															
3															
4															
5															

General Remarks Refer to TT04 sketch. Also refer to TT04 and TT04B logs.										Stability Stable. Shoring None. Weather Clear		Groundwater Entries No. Depth Remarks		Sealed	
Notes For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Project No. Carried out for					Status FINAL		Scale 1:25 Printed 27 May 2022 13:59:33 © Copyright SOCOTEC UK Limited		Trial Pit TT04B	



PLAN VIEW



SECTION X-X'

All dimensions in metres. Scale: 1:30	A3	Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes Project no. H1069-21 Client Neath Port Talbot County Borough Council	TP No. TT04
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APPENDIX C

INSTRUMENTATION AND MONITORING

Groundwater Monitoring Installation Details	Table C1
Groundwater Monitoring	Table C2
Gas Monitoring	Table C3
BH01 Water Sample Records	21/02/2022 and 10/03/2022
BH02A Water Sample Records	21/02/2022 and 10/03/2022
BH03 Water Sample Records	21/02/2022 and 10/03/2022

Monitoring Installations Summary

Instrument Reference	Instrument Type (See Notes)	Installation Date, dd/mm/yyyy	Pipe Diameter, mm	Instrument Base, mbgl	Response Zone Range, mbgl	Pipe Top Details	Headworks	Remarks
BH01 (1)	SP	17/01/2022	50	8.00	1.90 to 8.00			
BH02A (1)	SP	19/01/2022	50	8.00	1.90 to 8.00			
BH03 (1)	SP	21/01/2022	50	10.00	1.90 to 10.00			

Notes: Type: SP - Standpipe, SPIE - Standpipe Piezometer, HPIE - Hydraulic Piezometer, PPIE - Pneumatic Piezometer, EPIE - Vibrating Wire Piezometer, PWEL - Pumping Well



Project
Project No.
Carried out for

Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
H1069-21
Neath Port Talbot County Borough Council

Table

C1

Groundwater Monitoring

Instrument Reference	Instrument Type	Instrument Base, mbgl	Date Time dd/mm/yyyy hh:mm:ss	Result	Comments
BH01	SP	8.00	21/02/2022 11:05:00	2.34	Post FW Monitoring Round 1
BH01	SP	8.00	10/03/2022 13:40:00	3.36	Post FW Monitoring Round 2
BH01	SP	8.00	19/04/2022 11:13:00	2.63	Post FW Monitoring Round 3
BH01	SP	8.00	17/05/2022 12:38:00	2.62	Post FW Monitoring Round 4
BH02A	SP	8.00	21/02/2022 10:29:00	3.24	Post FW Monitoring Round 1
BH02A	SP	8.00	10/03/2022 15:20:00	2.43	Post FW Monitoring Round 2
BH02A	SP	8.00	19/04/2022 11:00:00	3.59	Post FW Monitoring Round 3
BH02A	SP	8.00	17/05/2022 12:54:00	3.59	Post FW Monitoring Round 4
BH03	SP	10.00	21/02/2022 13:00:00	1.86	Post FW Monitoring Round 1
BH03	SP	10.00	10/03/2022 14:30:00	2.28	Post FW Monitoring Round 2
BH03	SP	10.00	19/04/2022 11:30:00	2.28	Post FW Monitoring Round 3
BH03	SP	10.00	17/05/2022 13:00:00	2.47	Post FW Monitoring Round 4

Notes: Type: SP - Standpipe, SPIE - Standpipe Piezometer, HPIE - Hydraulic Piezometer, PPIE - Pneumatic Piezometer, EPIE - Vibrating Wire Piezometer, PWEL - Pumping Well



Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

C2

Gas Monitoring Summary



Notes: Peak gas concentrations represent the highest value (or lowest value for oxygen) recorded during monitoring period of up to 3 mins. Where values are continuing to rise or fall after 3 mins of monitoring this is indicated in the remarks. Values below the limit of detection (LoD) are recorded as the LoD value preceded by '<' (eg <0.01). The date and time recorded represents the start of the monitoring event. Associated groundwater information recorded on Groundwater Monitoring Results sheet.						Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes				C3	
						Project No. H1069-21					
						Carried out for Neath Port Talbot County Borough Council					
Location	Date Time	Baro Press, mbar	CH4 (st), %LEL	CH4 (pk), %vol	CH4 (st), %vol	CO2 (pk), %vol	CO2 (st), %vol	O2 (pk), %vol	O2 (st), %vol	Equipment	Remarks
BH01 (1)											
	21 Feb 2022 11:05:00	1012	52	2.6	2.6	0.2	0.2	21.4	21.4	Equipment:GA5000. Model:G506919. Cal:07-Sep-21	Operator: Robert Trapnell
	19 Apr 2022 11:13:00	1018	4	0.2	0.2	0.4	0.1	19.8	20.5	Equipment:GA5000. Model:G506166. Cal:13-Nov-21	Operator: Daniel Barnard
	17 May 2022 12:38:00	1013	0	0	0	0.1	0.1	19.7	20.8	Equipment:GA5000. Model:G506919. Cal:24-Mar-22	Operator: Daniel Barnard
BH02A (1)											
	21 Feb 2022 10:29:00	1012	52	2.7	2.6	0.2	0.2	21.1	21.2	Equipment:GA5000. Model:G506919. Cal:07-Sep-21	Operator: Robert Trapnell
	19 Apr 2022 11:00:00	1017	4	0.5	0.2	2.5	2.5	18.5	18.5	Equipment:GA5000. Model:G506166. Cal:13-Nov-21	Operator: Daniel Barnard
	17 May 2022 12:54:00	1013	0	0	0	0.1	0	19.5	20.4	Equipment:GA5000. Model:G506919. Cal:24-Mar-22	Operator: Daniel Barnard
BH03 (1)											
	19 Apr 2022 11:30:00	1019	0	46.1	46	1	1	1.8	1.8	Equipment:GA5000. Model:G506166. Cal:13-Nov-21	Operator: Daniel Barnard
	17 May 2022 13:00:00	1014	0	34.6	34.5	0.8	0.8	4.5	4.5	Equipment:GA5000. Model:G506919. Cal:24-Mar-22	Operator: Daniel Barnard

Project No	H1069-21
Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Client	Neath Port Talbot County Borough Council
Borehole No	BH01
Site Area	
Date	21/02/2022

Purging Data

Initial Water Level, mBGL (a)	2.34	Guideline Water Volumes	
		Borehole Diameter (mm)	Volume (litres/m)
Base of Installation, m BGL (b)	8	17	0.23
		50	2.0
Saturated Depth, m (c) (b-a)	5.66	95	7.1
		100	8
Diameter of Installation, mm (d)	50	150	18
		200	32
Base of Borehole, m (e)	8	380	113

Well Volume, litres (f) $(\pi d^2 c/4) \times 10^{-3}$	11.11338	Readings taken during purging					
Number of Well Volumes (g)	1.33	Water Level, mBGL	2.34	-	-	-	-
Purging Device	Wasp	Temperature, degC	11.01	10.66	10.46	10.37	10.4
Flow Rate, l/min (h)	0.46	pH	6.98	6.98	6.96	6.89	6.88
Time to purge, min (gf/h)	32	Dissolved O2, mg/l	7.44	7.91	8.43	8.46	10.4
Volume Purged, litres	15	Conductivity, uS/m	432	419.7	402.6	404	402.8
		Redox Potential, mV	280.2	276.7	258.9	248.3	239.6

Sampling Data

Sample Collection Depth, mBGL	4	Oil	N/A
Sample No (use ddmmyy) EWM	210222	Appearance and Colour	Clear
Time Collected (hh:mm:ss)	114000	Odour	None
Time since purge (minutes)	5	Sediment	None
Containers: Number	9	Type	See comments

Remarks

Weather	Cloudy
Notes and Comments	Water container types: 2 x 1L AJ, 2 x 500ml AJ, 2 x 40ml vial, 2 x 125ml AJ, 1 x 1L plastic.

Name	Signature
-------------	------------------

Project No	H1069-21		
Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes		
Client	Neath Port Talbot County Borough Council		
Borehole No	BH01	Site Area	
Date	10/03/2022		

Purging Data

Initial Water Level, mBGL (a)	3.36	Guideline Water Volumes						
Base of Installation, m BGL (b)	8	Borehole Diameter (mm)		Volume (litres/m)				
Saturated Depth, m (c) (b-a)	4.64	17	0.23					
Diameter of Installation, mm (d)	50	50	2.0					
Base of Borehole, m (e)	8	95	7.1					
		100	8					
		150	18					
		200	32					
		380	113					
Well Volume, litres (f) $(\pi d^2 c/4) \times 10^{-3}$	9.110619	Readings taken during purging						
Number of Well Volumes (g)	2.5	Water Level, mBGL	3.36	-	-	-	-	-
Purging Device	Low flow	Temperature, degC	11.71	11.62	11.52	11.43	11.52	11.66
Flow Rate, l/min (h)	1	pH	6.52	6.44	6.42	6.4	6.38	6.37
Time to purge, min (gf/h)	23	Dissolved O2, mg/l	2.37	1.39	1.3	1.18	1.07	0.7
Volume Purged, litres	23	Conductivity, uS/m	#####	#####	2171	2171	2166	2154
		Redox Potential, mV	137.2	148.7	148.5	145.3	143.4	139.4

Sampling Data

Sample Collection Depth, mBGL	6.5	Oil	None
Sample No (use ddmmyy) EWM	100322	Appearance and Colour	Clear
Time Collected (hh:mm:ss)	134000	Odour	None
Time since purge (minutes)	5	Sediment	Silt
Containers: Number	8	Type	See notes and comments

Remarks

Weather	Overcast
Notes and Comments	2 x 1l glass, 2 x 500ml glass, 1x 1l plastic, 2 x 40ml vial, 1 x 125ml cyanide, 1 x 250ml glass

Name	Signature
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Project No	H1069-21
Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Client	Neath Port Talbot County Borough Council
Borehole No	BH02A
Site Area	
Date	21/02/2022

Purging Data

Initial Water Level, mBGL (a)	3.24	Guideline Water Volumes	
Base of Installation, m BGL (b)	8	Borehole Diameter (mm)	Volume (litres/m)
Saturated Depth, m (c) (b-a)	4.76	17	0.23
Diameter of Installation, mm (d)	50	50	2.0
Base of Borehole, m (e)	8.45	95	7.1
		100	8
		150	18
		200	32
		380	113

Well Volume, litres (f) ($\pi d^2 c/4$)x10 ⁻³	9.346238	Readings taken during purging						
Number of Well Volumes (g)	1.76	Water Level, mBGL	3.24	-	-	-	-	
Purging Device	Wasp	Temperature, degC	11.57	11.48	11.43	11.45	11.5	
Flow Rate, l/min (h)	1	pH	6.44	6.41	6.39	6.37	6.54	
Time to purge, min (gf/h)	15	Dissolved O2, mg/l	0.48	0.45	0.36	0.33	10.69	
Volume Purged, litres	15	Conductivity, uS/m	2184	2174	2170	2167	19.11	
		Redox Potential, mV	107.9	113.9	116.3	118.5	134.3	

Sampling Data

Sample Collection Depth, mBGL	4.5	Oil	N/A
Sample No (use ddmmyy) EWM		Appearance and Colour	Clear
Time Collected (hh:mm:ss)	135000	Odour	None
Time since purge (minutes)	0	Sediment	None
Containers: Number	9	Type	See comments

Remarks

Weather	Cloudy
Notes and Comments	Water container: 2 x 1L AJ, 2 x 500ml AJ, 2 x 40ml Vial, 2 x 125ml AJ, 1 x 1L Plastic.

Name	Signature
------	-----------

Project No	H1069-21
Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Client	Neath Port Talbot County Borough Council
Borehole No	BH02A
Site Area	
Date	10/03/2022

Purging Data

Initial Water Level, mBGL (a)	2.43	Guideline Water Volumes	
Base of Installation, m BGL (b)	8	Borehole Diameter (mm)	Volume (litres/m)
Saturated Depth, m (c) (b-a)	5.57	17	0.23
Diameter of Installation, mm (d)	50	50	2.0
Base of Borehole, m (e)	8.45	95	7.1
		100	8
		150	18
		200	32
		380	113
Well Volume, litres (f) $(\pi d^2 c/4) \times 10^{-3}$	10.93667	Readings taken during purging	
Number of Well Volumes (g)	1.5	Water Level, mBGL	2.43 - - - - -
Purging Device	Low flow	Temperature, degC	11.3 10.84 10.83 11.01 11.01 - -
Flow Rate, l/min (h)	1	pH	7.02 7.11 7.24 7.25 7.26 - -
Time to purge, min (gf/h)	15	Dissolved O2, mg/l	8.45 7.41 8.96 9.92 10.16 - -
Volume Purged, litres	15	Conductivity, uS/m	424.5 429.1 410.1 402.8 396.5 - -
		Redox Potential, mV	220.2 252 259.1 267.1 264.2 - -

Sampling Data

Sample Collection Depth, mBGL	4.5	Oil	None
Sample No (use ddmmyy) EWM	100322	Appearance and Colour	Clear
Time Collected (hh:mm:ss)	152000	Odour	None
Time since purge (minutes)	5	Sediment	Silt
Containers: Number	8	Type	See notes and comments

Remarks

Weather	Cloudy
Notes and Comments	2 x 1l glass, 2 x 500ml glass, 1x 1l plastic, 2 x 40ml vial, 1 x 125ml cyanide, 1 x 250ml glass

Name	Signature
------	-----------

Project No	H1069-21
Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Client	Neath Port Talbot County Borough Council
Borehole No	BH03
Site Area	
Date	21/02/2021

Purging Data

Initial Water Level, mBGL (a)	1.86	Guideline Water Volumes	
		Borehole Diameter (mm)	Volume (litres/m)
Base of Installation, m BGL (b)	10	17	0.23
		50	2.0
Saturated Depth, m (c) (b-a)	8.14	95	7.1
		100	8
Diameter of Installation, mm (d)	50	150	18
		200	32
Base of Borehole, m (e)	12.45	380	113

Well Volume, litres (f) $(\pi d^2 c/4) \times 10^{-3}$	15.98285	Readings taken during purging					
Number of Well Volumes (g)	0.91	Water Level, mBGL	1.86	-	-	-	-
Purging Device	Wasp	Temperature, degC	11.66	11.9	12.03	12.04	12.06
Flow Rate, l/min (h)	0.75	pH	6.84	6.88	6.87	6.85	7.2
Time to purge, min (gf/h)	20	Dissolved O2, mg/l	0.34	0.14	0.08	0.05	9.82
Volume Purged, litres	15	Conductivity, uS/m	700.7	702.7	766	827.3	2.6
		Redox Potential, mV	-0.2	1.3	22	39.2	148

Sampling Data

Sample Collection Depth, mBGL	4	Oil	N/a
Sample No (use ddmmyy) EWM		Appearance and Colour	Clear
Time Collected (hh:mm:ss)	130000	Odour	None
Time since purge (minutes)	5	Sediment	None
Containers: Number	9	Type	See comments

Remarks

Weather	Cloudy
Notes and Comments	Water container types: 2 x 1L AJ, 2 x 500ml AJ, 2 x 40ml vial, 2 x 125ml AJ, 1x 1L Plastic

Name	Signature
------	-----------

Project No	H1069-21
Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Client	Neath Port Talbot County Borough Council
Borehole No	BH03
Site Area	
Date	10/03/2022

Purging Data

Initial Water Level, mBGL (a)	2.28	Guideline Water Volumes	
		Borehole Diameter (mm)	Volume (litres/m)
Base of Installation, m BGL (b)	10	17	0.23
		50	2.0
Saturated Depth, m (c) (b-a)	7.72	95	7.1
		100	8
Diameter of Installation, mm (d)	50	150	18
		200	32
Base of Borehole, m (e)	12.45	380	113

Well Volume, litres (f) $(\pi d^2 c/4) \times 10^{-3}$	15.15818	Readings taken during purging					
Number of Well Volumes (g)	1	Water Level, mBGL	2.28	-	-	-	-
Purging Device	Low flow	Temperature, degC	11.36	11.62	11.76	11.85	11.91
Flow Rate, l/min (h)	1	pH	6.7	6.72	6.74	6.74	6.75
Time to purge, min (gf/h)	15	Dissolved O2, mg/l	0.83	0.36	0.27	0.22	0.49
Volume Purged, litres	15	Conductivity, uS/m	713.8	748.1	763.8	768.5	782.3
		Redox Potential, mV	40.8	29.3	29.4	30.5	40.5

Sampling Data

Sample Collection Depth, mBGL	9.5	Oil	None
Sample No (use ddmmyy) EWM	100322	Appearance and Colour	Clear
Time Collected (hh:mm:ss)	143000	Odour	None
Time since purge (minutes)	5	Sediment	Silt
Containers: Number	9	Type	See notes and comments

Remarks

Weather	Overcast
Notes and Comments	2 x 1l glass, 2 x 500ml glass, 1x 1l plastic, 2 x 40ml vial, 1 x 125ml cyanide, 1 x 250ml glass

Name	Signature
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APPENDIX D

GEOTECHNICAL LABORATORY TEST RESULTS

Descriptions	1 Sheet
Natural Moisture Content	1 Sheet
Natural Moisture, Liquid Limit, Plastic Limit and Plasticity Index	2 Sheets
Particle Size Distribution Tests	10 Sheets
Direct Shearbox Test Results	5 Sheets
SD1 Suite D (Brownfield site – pyrite present)	22-04686 and 22-04694



Laboratory Report



Contract Number: 58012

Client Ref: **H1069-21**Report Date: **28-02-2022**

Client PO:

Client **SOCOTEC****Unit 15, Crosby Yard Industrial Estate
Wildmill, Bridgend
CF31 1JZ**Contract Title: **Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes**
For the attention of: **Ruth Blair**Date Received: **09-02-2022**Date Completed: **28-02-2022**

Test Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	11
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	2
PSD Wet Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	10
PSD: Sedimentation by pipette carried out with Wet Sieve (Wet Sieve must also be selected) BS 1377:1990 - Part 2 : 9.4 - * UKAS	7
Consolidated Drained Peak Shear Strength - set of 3 - 60 x 60mm Shear Box Specimens by Direct Shearing (3 days) BS 1377:1990 - Part 7 : 4 - * UKAS	1
Samples Received - @ Non Accredited Test	22
Immediate Shear Strength - set of 3 60 x 60 mm Shear Box Specimens by Direct Shearing (note suitable for free draining material only) BS 1377:1990 - Part 7 : 4 - * UKAS	1

Notes: Observations and Interpretations are outside the UKAS Accreditation
* - denotes test included in laboratory scope of accreditation
- denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories:

Emma Sharp (Business Support Manager) - Paul Evans (Director) - Richard John (Quality/Technical Manager)

Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Wayne Honey (Quality Assistant / Administrator / Health and Safety Coordinator)

GEO Site & Testing Services Ltd

Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN

Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk



Laboratory Report



GEO Site & Testing Services Ltd

Contract Number: 58012

Test Description	Qty
Disposal of samples for job	1

Notes: Observations and Interpretations are outside the UKAS Accreditation

* - denotes test included in laboratory scope of accreditation

- denotes test carried out by approved contractor

@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories:

Emma Sharp (Business Support Manager) - Paul Evans (Director) - Richard John (Quality/Technical Manager)

Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Wayne Honey (Quality Assistant / Administrator / Health and Safety Coordinator)

GEO Site & Testing Services Ltd

Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN

Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

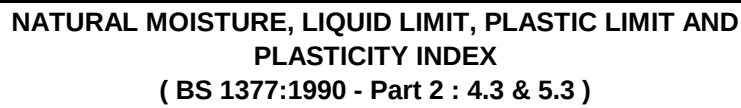
**Natural Moisture Content
(BS 1377:1990 - Part 2 : 3.2)**

Contract Number	58012	
Site Name	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes	
Date Tested	18/02/2022	

[illegible]

Operators	Checked	28/02/2022	Richard John (Advanced Testing Manager)
Clayton Jenkins	Approved	28/02/2022	Paul Evans (Quality/Technical Manager)

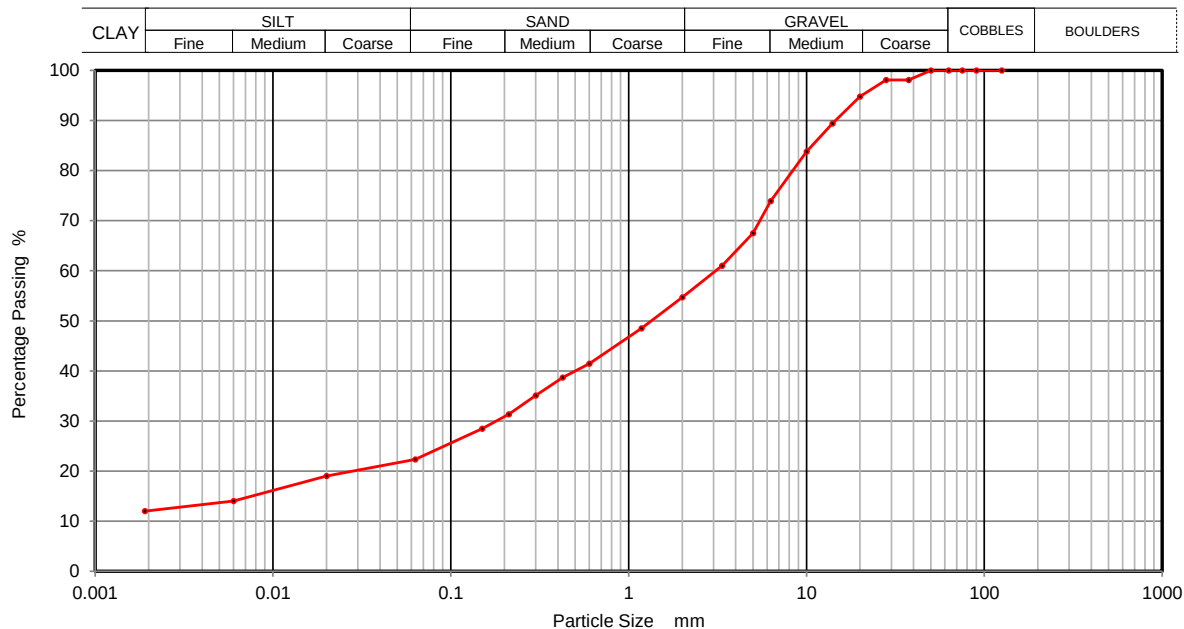


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PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Contract Number	58012
	Borehole/Pit No. BH01
Site Name	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Soil Description	Black silty clayey fine to coarse sandy fine to coarse GRAVEL
	Depth Top 0.90
Date Tested	22/02/2022
Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	19
90	100	0.0060	14
75	100	0.0020	12
63	100		
50	100		
37.5	98		
28	98		
20	95		
14	89		
10	84		
6.3	74		
5	68		
3.35	61		
2	55		
1.18	49		
0.6	41		
0.425	39		
0.3	35		
0.212	31		
0.15	28		
0.063	22		

Sample Proportions	% dry mass
Cobbles	0
Gravel	45
Sand	33
Silt	10
Clay	12

Remarks
 Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	27/02/2022	Richard John	
David	Approved	28/02/2022	Paul Evans	





**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number 58012

Borehole/Pit No. BH01

Site Name Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes

Sample No. 4

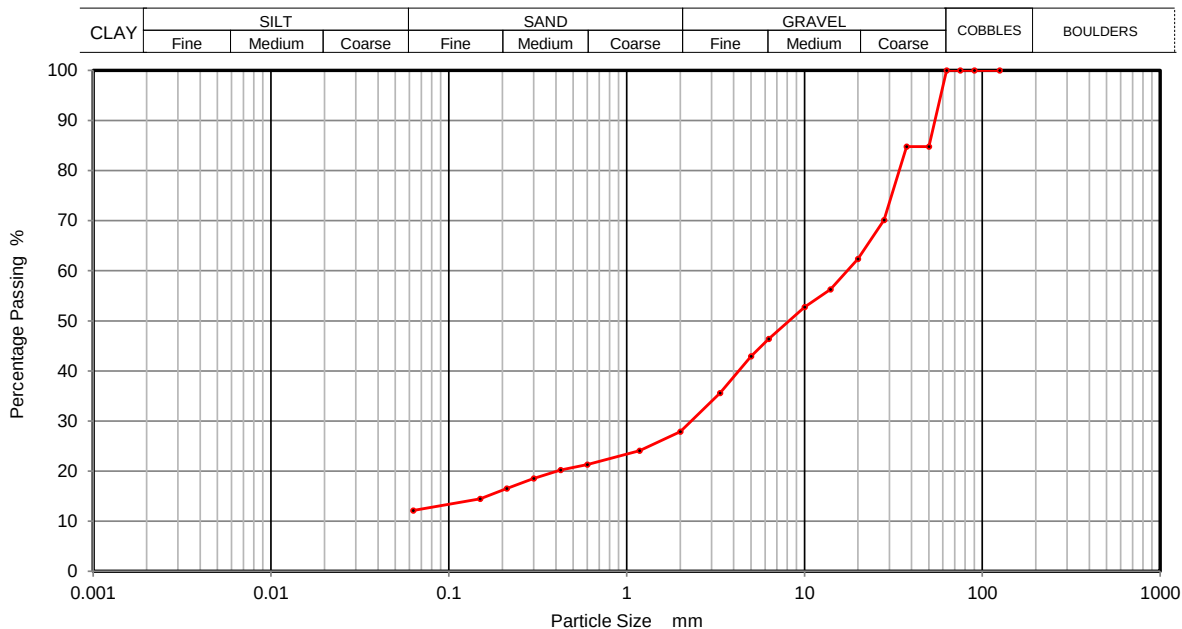
Soil Description Brown clayey/silty fine to coarse sandy fine to coarse GRAVEL

Depth Top 2.00

Depth Base

Date Tested 22/02/2022

Sample Type D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	85		
37.5	85		
28	70		
20	62		
14	56		
10	53		
6.3	46		
5	43		
3.35	36		
2	28		
1.18	24		
0.6	21		
0.425	20		
0.3	19		
0.212	17		
0.15	14		
0.063	12		

Sample Proportions	% dry mass
Cobbles	0
Gravel	72
Sand	16
Silt and Clay	12

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	27/02/2022	Richard John	
David	Approved	28/02/2022	Paul Evans	

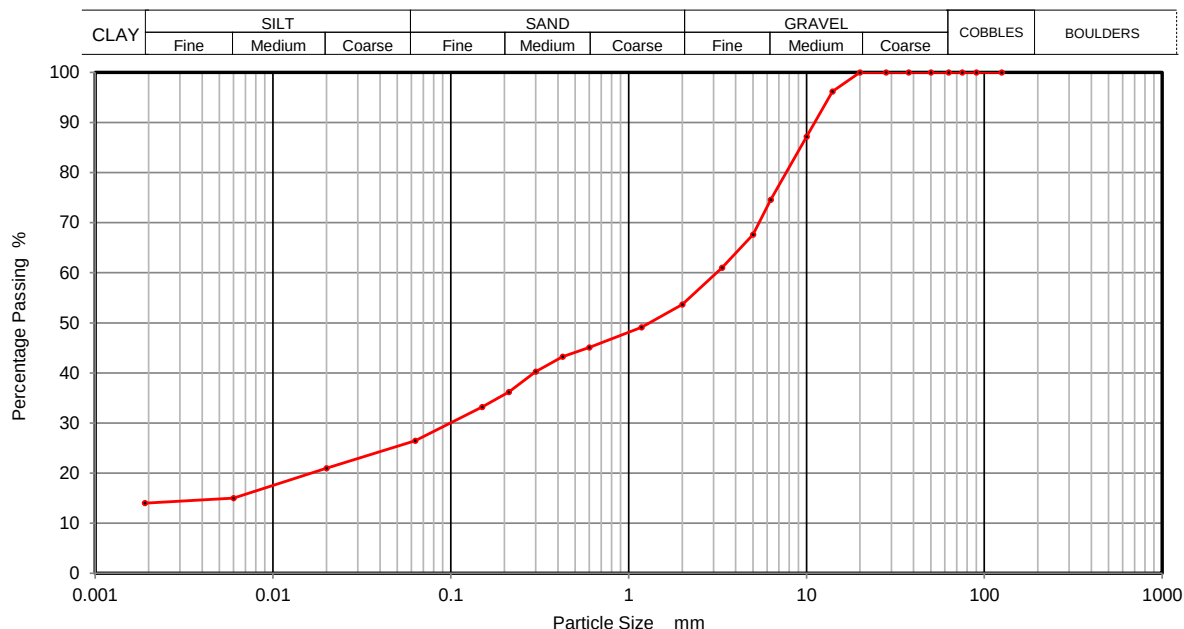


2788



PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Contract Number	58012
	Borehole/Pit No.
Borehole/Pit No.	BH01
Sample No.	10
Depth Top	5.50
Depth Base	
Sample Type	D
Site Name	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Soil Description	Green/ brown silty clayey fine to coarse sandy fine to coarse GRAVEL
Date Tested	22/02/2022



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	21
90	100	0.0060	15
75	100	0.0020	14
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	96		
10	87		
6.3	75		
5	68		
3.35	61		
2	54		
1.18	49		
0.6	45		
0.425	43		
0.3	40		
0.212	36		
0.15	33		
0.063	26		

Sample Proportions	% dry mass
Cobbles	0
Gravel	46
Sand	28
Silt	12
Clay	14

Remarks
 Preparation and testing in accordance with BS1377 unless noted below

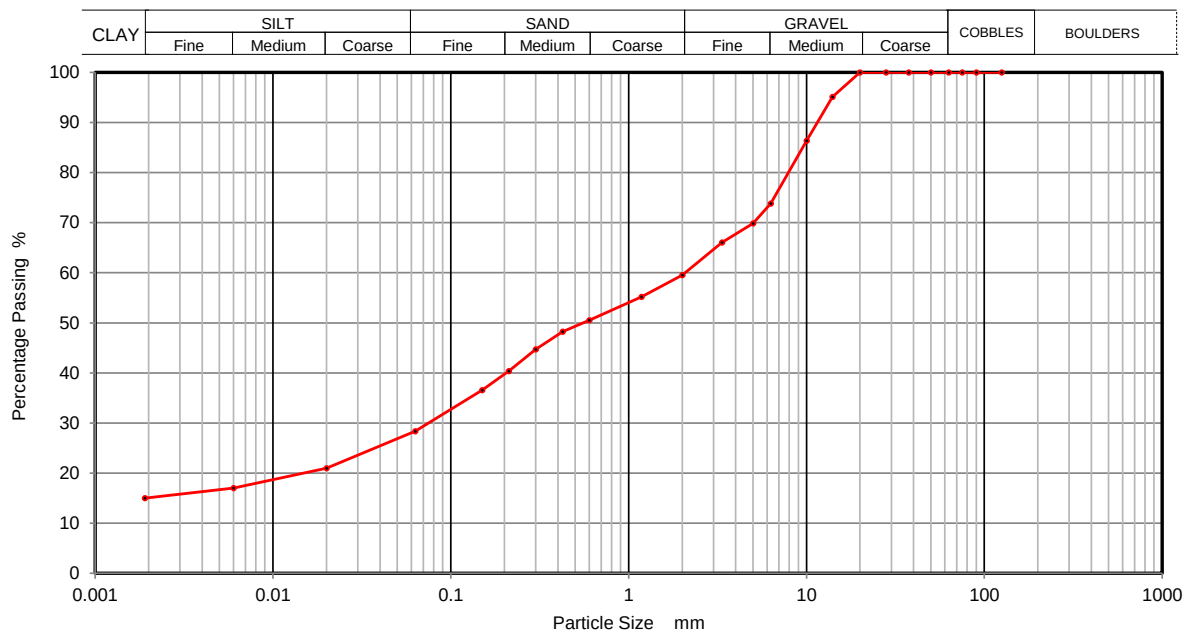
Operator	Checked	27/02/2022	Richard John	
David	Approved	28/02/2022	Paul Evans	





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

		Contract Number	58012
		Borehole/Pit No.	BH01
Site Name	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes	Sample No.	12
Soil Description	Brown silty clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	7.00
		Depth Base	
Date Tested	22/02/2022	Sample Type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	21
90	100	0.0060	17
75	100	0.0020	15
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	95		
10	86		
6.3	74		
5	70		
3.35	66		
2	60		
1.18	55		
0.6	51		
0.425	48		
0.3	45		
0.212	40		
0.15	37		
0.063	28		

Sample Proportions	% dry mass
Cobbles	0
Gravel	40
Sand	32
Silt	13
Clay	15

Remarks
 Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	27/02/2022	Richard John	
David	Approved	28/02/2022	Paul Evans	





**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number 58012

Borehole/Pit No. BH02A

Site Name Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes

Sample No. 6

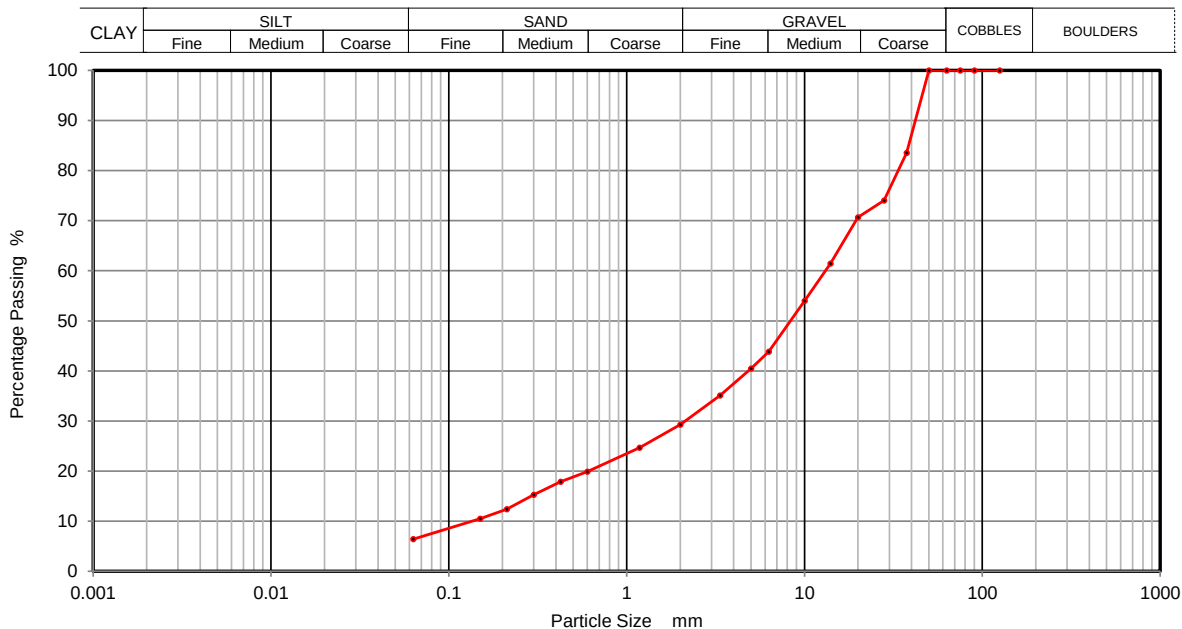
Soil Description Black slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL

Depth Top 1.00

Depth Base

Date Tested 22/02/2022

Sample Type B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	84		
28	74		
20	71		
14	61		
10	54		
6.3	44		
5	40		
3.35	35		
2	29		
1.18	25		
0.6	20		
0.425	18		
0.3	15		
0.212	12		
0.15	10		
0.063	6		

Sample Proportions	% dry mass
Cobbles	0
Gravel	71
Sand	23
Silt and Clay	6

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	27/02/2022	Richard John	
David	Approved	28/02/2022	Paul Evans	

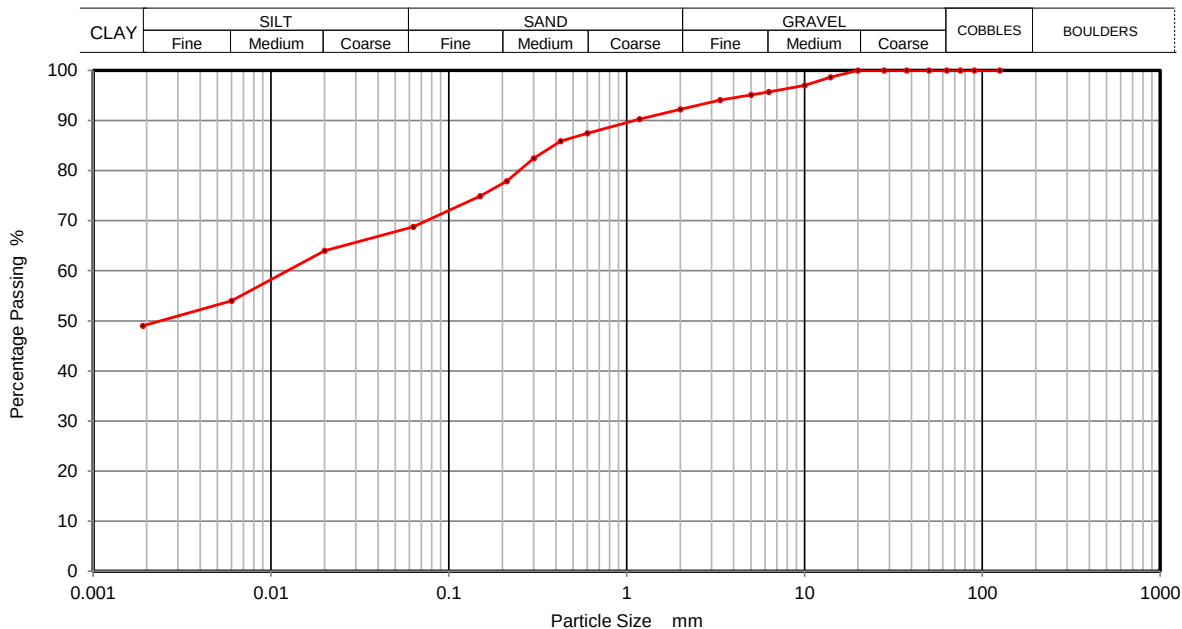


2788



PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

		Contract Number	58012
		Borehole/Pit No.	BH02A
Site Name	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes	Sample No.	10
Soil Description	Grey slightly gravelly silty fine to coarse sandy CLAY	Depth Top	5.00
		Depth Base	
Date Tested	22/02/2022	Sample Type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	64
90	100	0.0060	54
75	100	0.0020	49
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	97		
6.3	96		
5	95		
3.35	94		
2	92		
1.18	90		
0.6	87		
0.425	86		
0.3	82		
0.212	78		
0.15	75		
0.063	69		

Sample Proportions	% dry mass
Cobbles	0
Gravel	8
Sand	23
Silt	20
Clay	49

Remarks
 Preparation and testing in accordance with BS1377 unless noted below

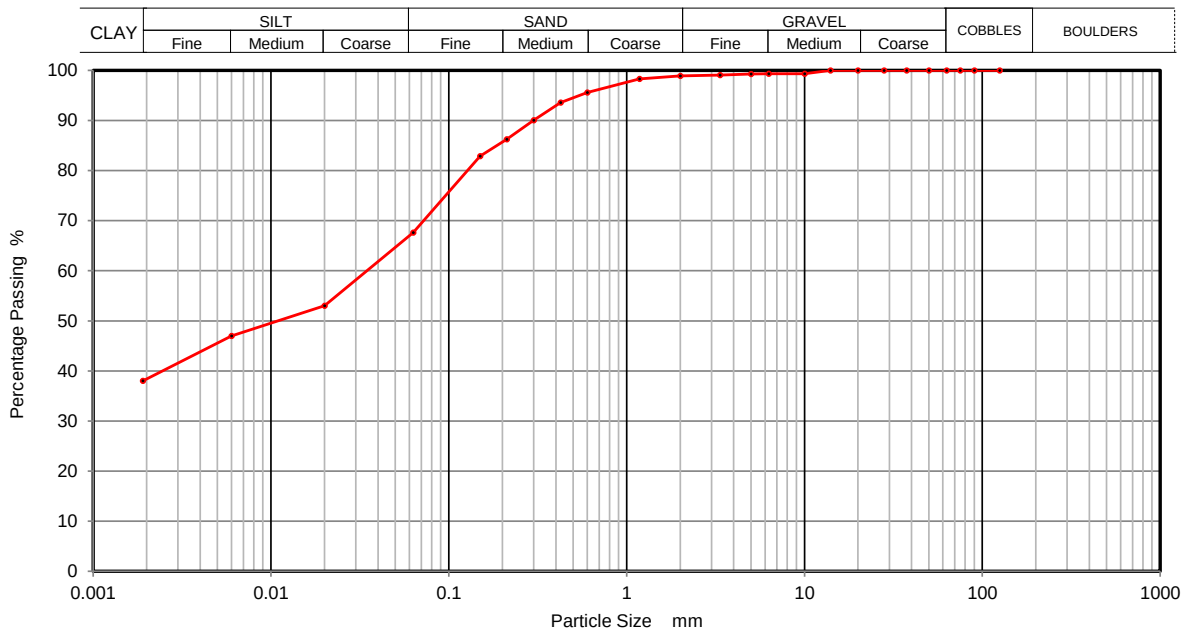
Operator	Checked	27/02/2022	Richard John	
David	Approved	28/02/2022	Paul Evans	





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

		Contract Number	58012
		Borehole/Pit No.	BH03
Site Name	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes	Sample No.	8
Soil Description	Grey slightly gravelly silty fine to coarse sandy CLAY	Depth Top	4.00
		Depth Base	
Date Tested	22/02/2022	Sample Type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	53
90	100	0.0060	47
75	100	0.0020	38
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	99		
5	99		
3.35	99		
2	99		
1.18	98		
0.6	96		
0.425	94		
0.3	90		
0.212	86		
0.15	83		
0.063	68		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	31
Silt	30
Clay	38

Remarks
 Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	27/02/2022	Richard John	
David	Approved	28/02/2022	Paul Evans	

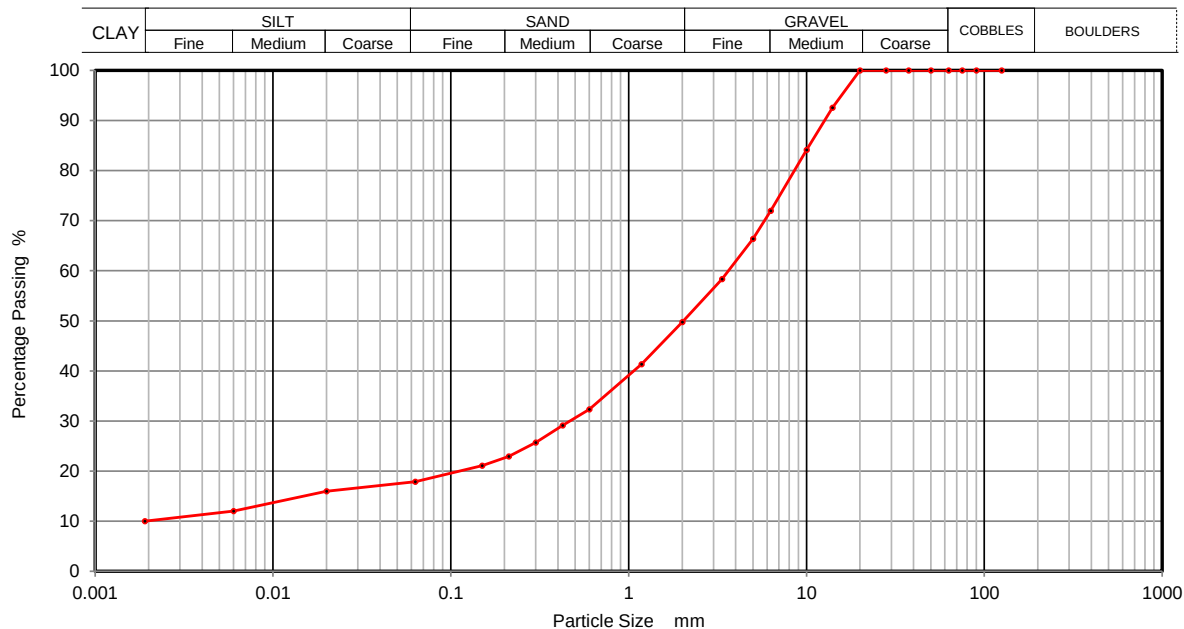




PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Contract Number	58012
	Borehole/Pit No.
Borehole/Pit No.	BH03
Sample No.	10
Depth Top	5.00
Depth Base	
Sample Type	D

Site Name	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Soil Description	Grey slightly silty clayey fine to coarse sandy fine to coarse GRAVEL
Date Tested	22/02/2022



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	16
90	100	0.0060	12
75	100	0.0020	10
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	93		
10	84		
6.3	72		
5	66		
3.35	58		
2	50		
1.18	41		
0.6	32		
0.425	29		
0.3	26		
0.212	23		
0.15	21		
0.063	18		

Sample Proportions	% dry mass
Cobbles	0
Gravel	50
Sand	32
Silt	8
Clay	10

Remarks
Preparation and testing in accordance with BS1377 unless noted below

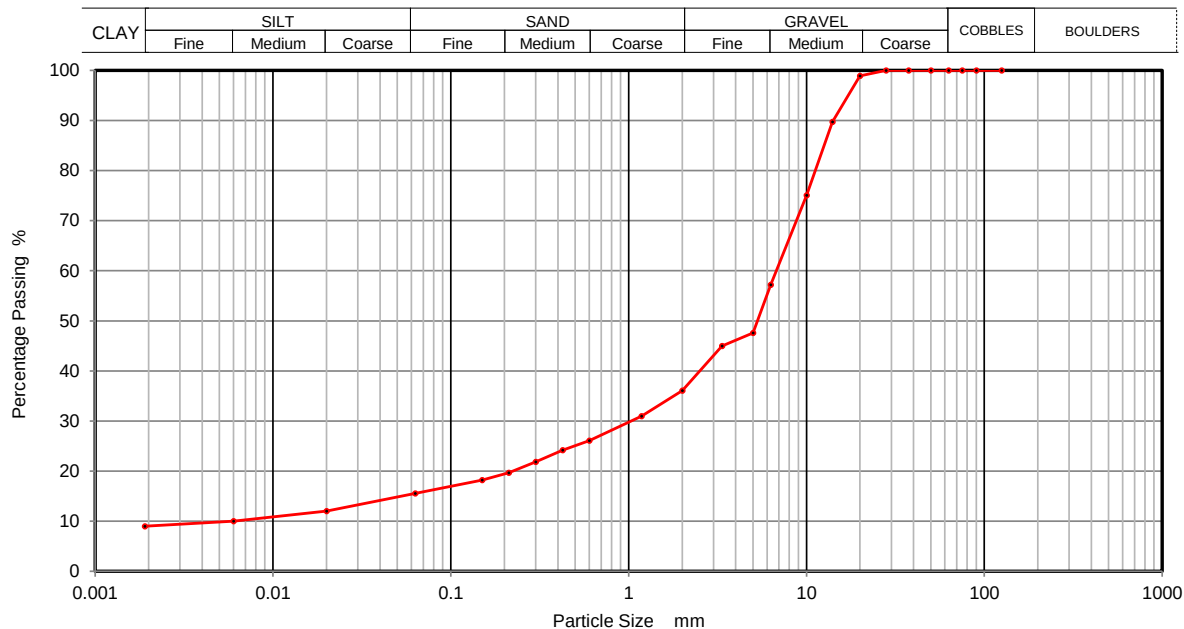
Operator	Checked	27/02/2022	Richard John	
David	Approved	28/02/2022	Paul Evans	





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Contract Number	58012
	Borehole/Pit No.
Borehole/Pit No.	BH03
Site Name	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Sample No.	14
	Depth Top
Depth Top	8.00
Depth Base	
Date Tested	22/02/2022
Sample Type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	12
90	100	0.0060	10
75	100	0.0020	9
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	90		
10	75		
6.3	57		
5	48		
3.35	45		
2	36		
1.18	31		
0.6	26		
0.425	24		
0.3	22		
0.212	20		
0.15	18		
0.063	16		

Sample Proportions	% dry mass
Cobbles	0
Gravel	64
Sand	20
Silt	7
Clay	9

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	27/02/2022	Richard John	
David	Approved	28/02/2022	Paul Evans	





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 58012

Borehole/Pit No. TP01

Site Name Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes

Sample No. 9

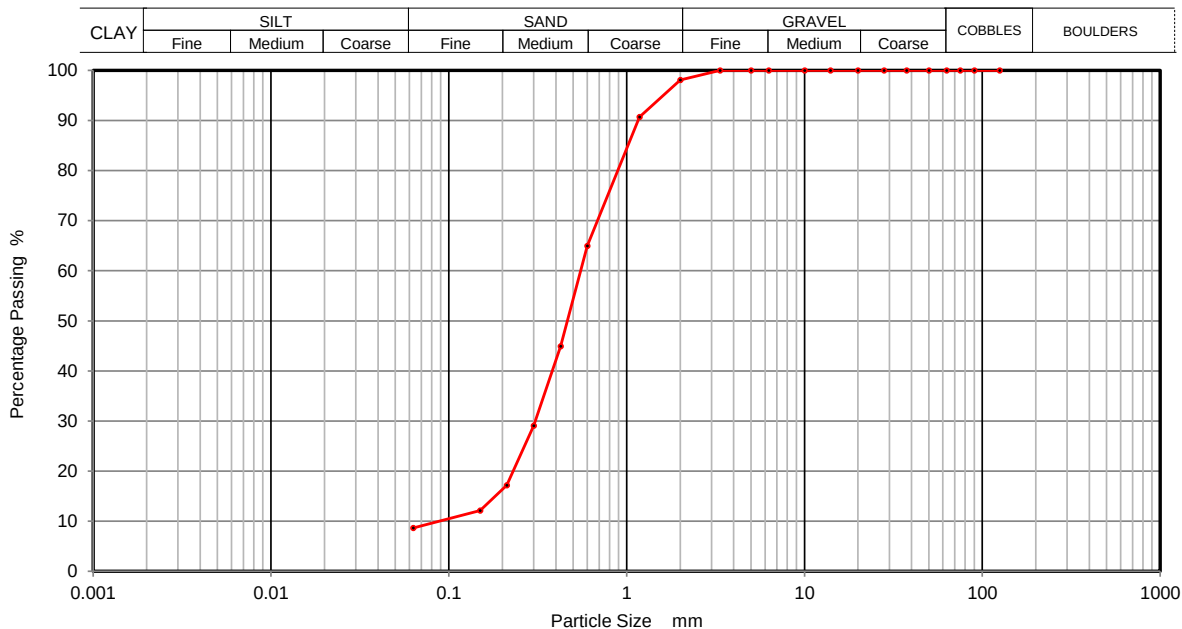
Soil Description Brown slightly fine gravelly clayey/silty fine to coarse SAND

Depth Top 1.00

Depth Base 1.50

Date Tested 22/02/2022

Sample Type B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	98		
1.18	91		
0.6	65		
0.425	45		
0.3	29		
0.212	17		
0.15	12		
0.063	9		

Sample Proportions	% dry mass
Cobbles	0
Gravel	2
Sand	89
Silt and Clay	9

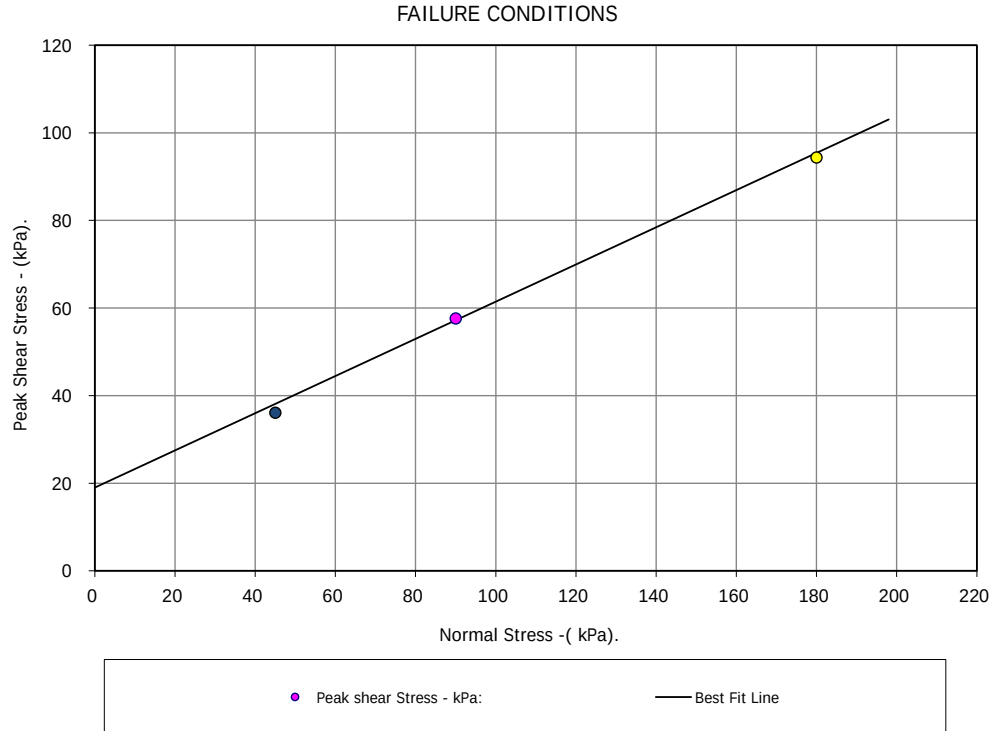
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	27/02/2022	Richard John	
David	Approved	28/02/2022	Paul Evans	



Borehole Number:	BH01	Depth from (m):	4.50
Sample Number :	8.0		
Sample Type:	B		
Particle Density - Mg/m3:	2.65 (Assumed)		
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.		
Sample Description: Brown sandy CLAY			
STAGE	1	2	3
Initial Conditions			
Height - mm:	23.89	23.89	23.89
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	19	19	19
Bulk Density - Mg/m3:	2.08	2.08	2.08
Dry Density - Mg/m3:	1.75	1.74	1.75
Voids Ratio:	0.5186	0.5191	0.5183
Degree of Saturation - %:	96.94	96.84	97.00
Normal Pressure- kPa	45	90	180
Consolidation			
Consolidated Height - mm:	22.40	21.92	20.77
Shear			
Rate of Horizontal Displacement (mm/min)	9.843	9.843	4.921
Horizontal Displacement at Peak Shear Stress (mm)	12.20	12.09	9.87
Peak shear Stress - kPa:	36	58	94
PEAK			
Angle of Shearing Resistance:(θ)	23.0		
Effective Cohesion - kPa:	19		



Contract No.:
58012

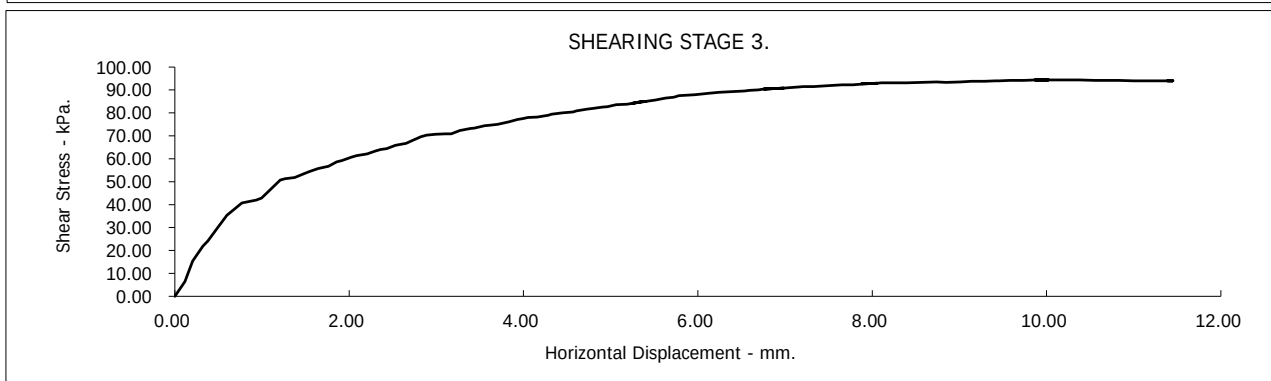
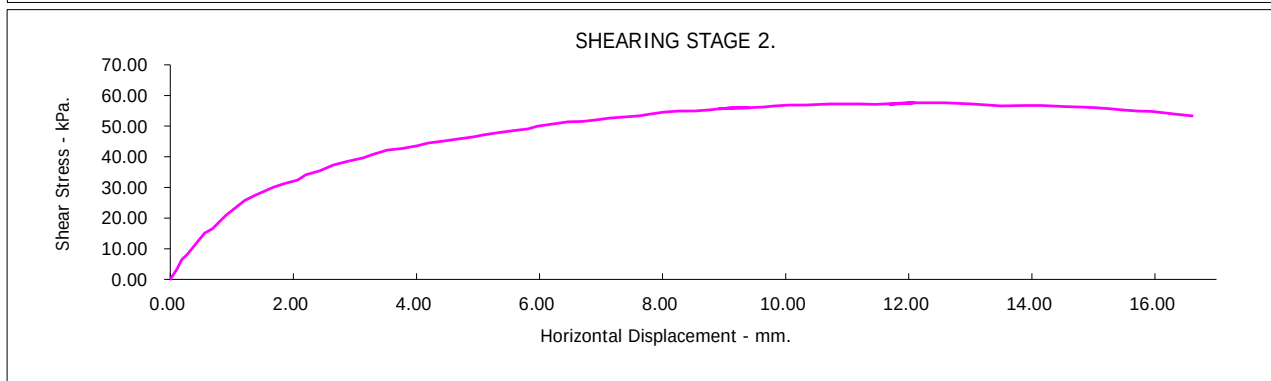
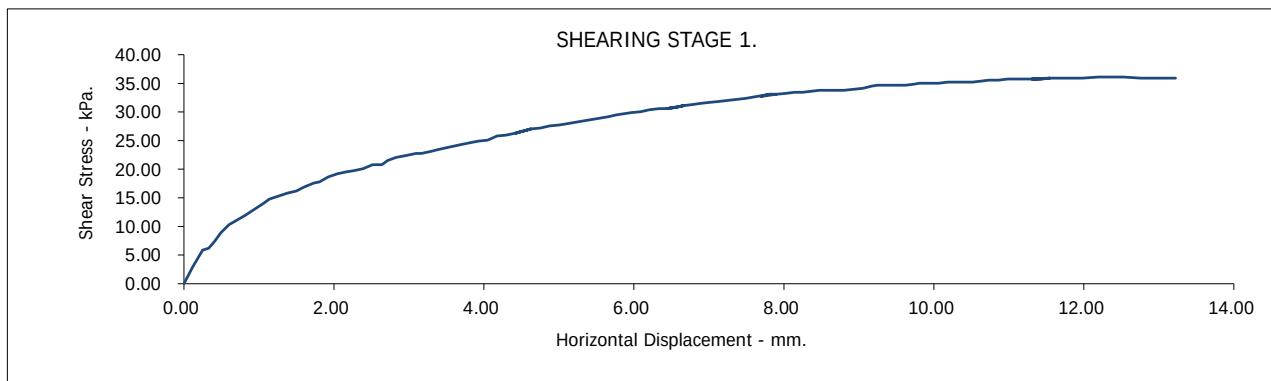
Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes

Client Ref Number:

H1069-21

Borehole Number: BH01
Sample Number : 8

Depth from (m): 4.50
Depth to (m):



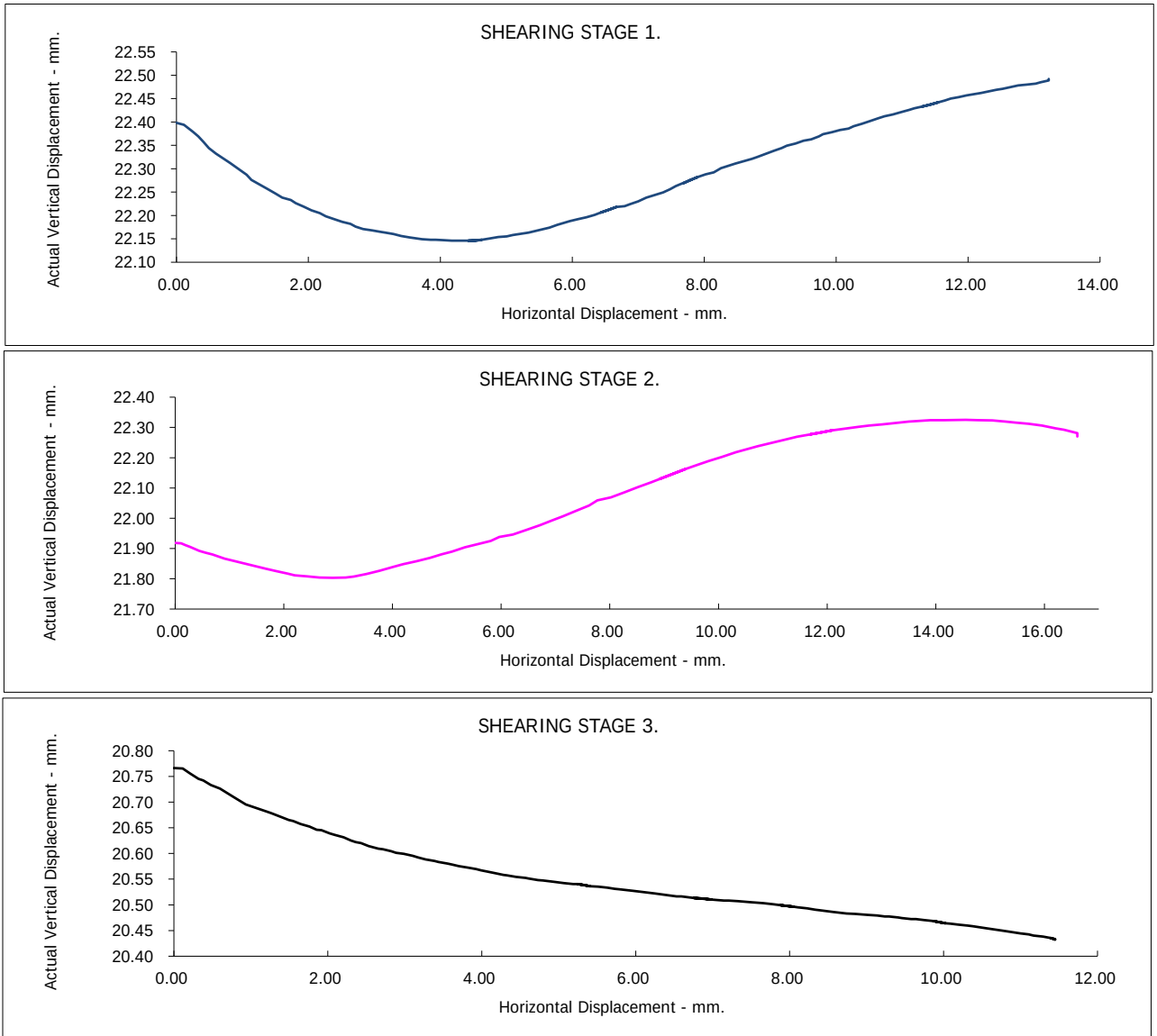
Contract No.:
58012

Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes

Client Ref Number:
H1069-21
Figure.

Borehole Number: BH01
Sample Number : 8

Depth from (m): 4.50
Depth to (m):



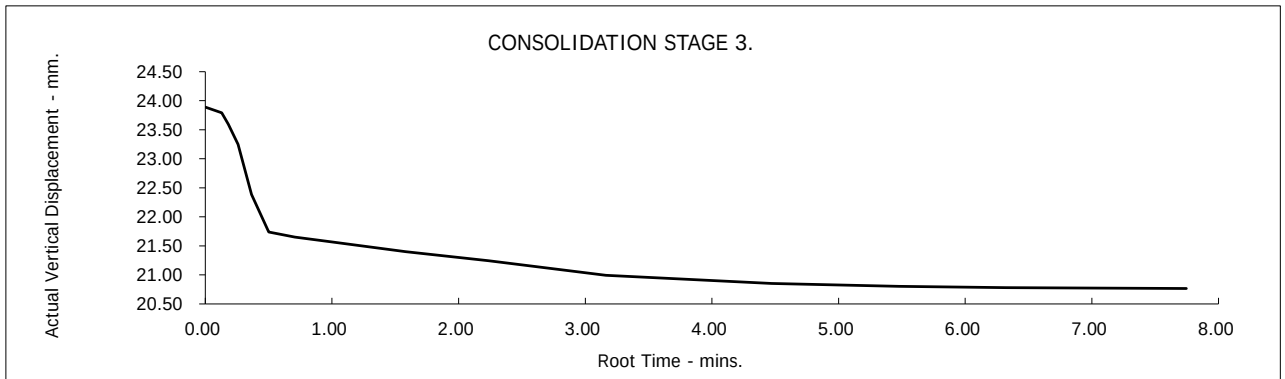
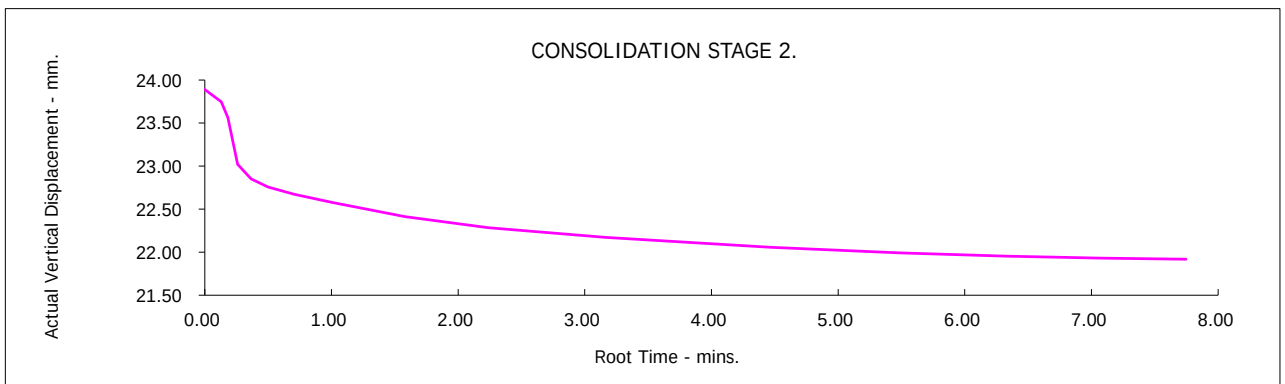
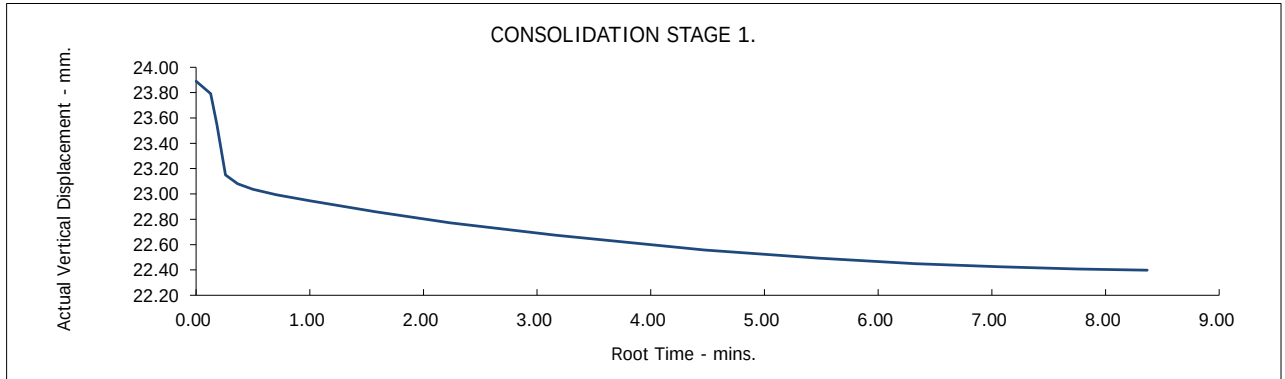
Contract No.:
58012

Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes

Client Ref Number:
H1069-21

Borehole Number: BH01
Sample Number : 8

Depth from (m): 4.50
Depth to (m):



Checked Pages 1-4 by: Date: 28/02/2022

Approved Pages 1-4 by: Date: 28/02/2022

Contract No.: 58012

Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes

Client Ref Number: H1069-21

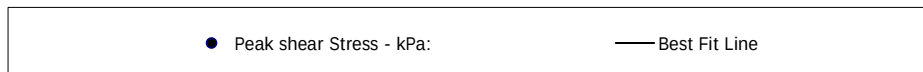
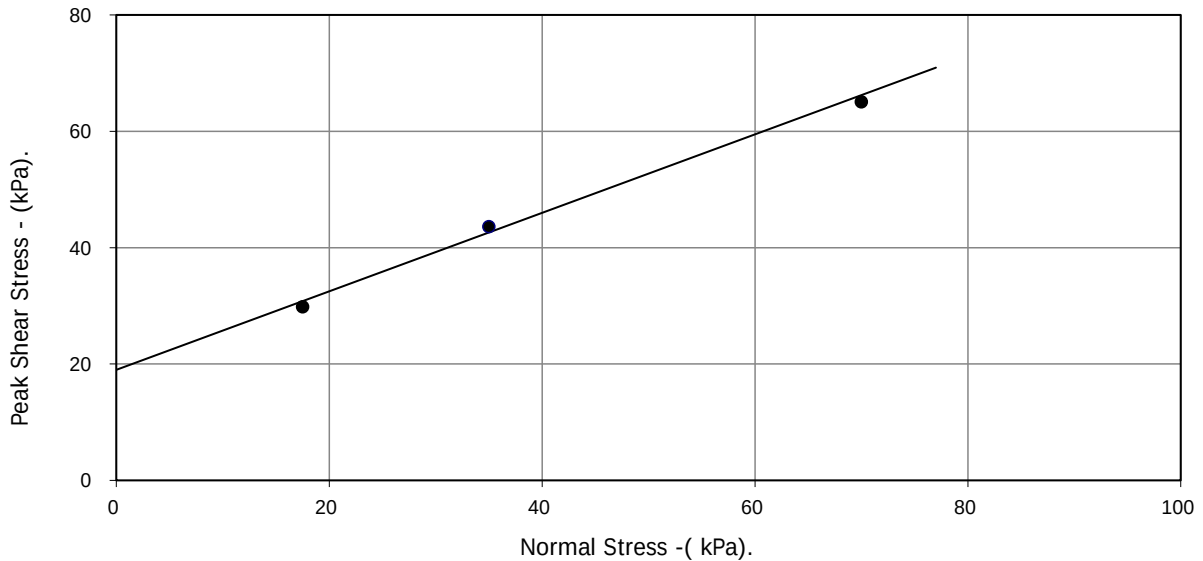
Test Report: Direct Shearbox Test

BS1377:Part 7:4.5 :1990.

Borehole: TP01 Depth (m) from: 1.50
Sample Number : 12 Depth (m) to: 2.00

Sample Type:	B		
Particle Density - Mg/m3:	2.65 (Assumed)		
Specimen Tested:	Submerged, Remoulded material above 2.00mm removed		
Sample Description: Black SAND			
STAGE	1	2	3
Initial Conditions			
Height - mm:	23.89	23.89	23.89
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	38	38	38
Bulk Density - Mg/m3:	1.27	1.27	1.27
Dry Density - Mg/m3:	0.92	0.92	0.92
Voids Ratio:	1.8920	1.8941	1.8949
Degree of Saturation - %:	53.57	53.51	53.49
Normal Pressure- kPa	18	35	70
Consolidation			
Consolidated Height - mm:	23.24	23.05	22.70
Shear			
Rate of Horizontal Displacement (mm/min)	0.500	0.500	0.500
Horizontal Displacement at Peak Shear Stress (mm)	4.21	5.41	6.74
Peak shear Stress - kPa:	30	44	65
PEAK			
Angle of Shearing Resistance:(θ)	34		
Effective Cohesion - kPa:	19		

FAILURE CONDITIONS



R.John

28/02/2022

R.John

28/02/2022

Approved Page 1 by:

Date

Checked Page 1 by:

Date



Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes

Contract No.:
58012

Client Ref Number:
H1069-21



Final Report

Report No.:	22-04686-1		
Initial Date of Issue:	18-Feb-2022		
Client	SOCOTEC		
Client Address:	Unit 15 Crosby Yard Industrial Estate Wildmill Bridgend CF31 1JZ		
Contact(s):	Ruth Blair		
Project	H1069-21 NPT Neath Port Talbot Flood Alleviation Schemes		
Quotation No.:	Q19-19027	Date Received:	09-Feb-2022
Order No.:	H4508	Date Instructed:	09-Feb-2022
No. of Samples:	1		
Turnaround (Wkdays):	7	Results Due:	17-Feb-2022
Date Approved:	18-Feb-2022		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - Soil

Project: H1069-21 NPT Neath Port Talbot Flood Alleviation Schemes

Client: SOCOTEC	Chemtest Job No.:				22-04686
Quotation No.: Q19-19027	Chemtest Sample ID.:				1368184
Order No.: H4508	Client Sample Ref.:				11
	Sample Location:				TP01
	Sample Type:				SOIL
	Top Depth (m):				1.9
	Date Sampled:				19-Jan-2022
Determinand	Accred.	SOP	Units	LOD	
Moisture	N	2030	%	0.020	24
Soil Colour	N	2040		N/A	Black
Other Material	N	2040		N/A	Stones
Soil Texture	N	2040		N/A	Gravel
pH (2.5:1)	N	2010		4.0	9.6
Sulphate (2:1 Water Soluble) as SO ₄	M	2120	g/l	0.010	0.67
Total Sulphur	M	2175	%	0.010	0.55
Sulphate (Acid Soluble)	U	2430	%	0.010	0.16

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
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.

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



Final Report

Report No.: 22-04694-1
Initial Date of Issue: 15-Feb-2022
Client SOCOTEC
Client Address:
Unit 15 Crosby Yard Industrial Estate
Wildmill
Bridgend
CF31 1JZ

Contact(s): Ruth Blair

Project H1069-21 NPT Nealth Port Talbot
Flood Alleviation Schemes

Quotation No.: Q19-19027

Date Received: 09-Feb-2022

Order No.: H4508

Date Instructed: 09-Feb-2022

No. of Samples: 4

Turnaround (Wkdays): 7

Results Due: 17-Feb-2022

Date Approved: 15-Feb-2022

Approved By:

Details: Stuart Henderson, Technical
Manager

Results - Soil

Project: H1069-21 NPT Nealth Port Talbot Flood Alleviation Schemes

Client: SOCOTEC	Chemtest Job No.:				22-04694	22-04694	22-04694	22-04694
Quotation No.: Q19-19027	Chemtest Sample ID.:				1368226	1368227	1368228	1368229
Order No.: H4508	Client Sample Ref.:				6	4	6	10
	Sample Location:				BH01	BH02A	BH02A	BH03
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				3.5	0.4	3	5
	Date Sampled:				17-Jan-2022	19-Jan-2022	19-Jan-2022	21-Jan-2022
Determinand	Accred.	SOP	Units	LOD				
Moisture	N	2030	%	0.020	17	19	13	15
Soil Colour	N	2040		N/A	Brown	Black	Black	Grey
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Clay	Gravel	Gravel	Gravel
pH (2.5:1)	N	2010		4.0	8.6	9.0	10.4	9.2
Sulphate (2:1 Water Soluble) as SO ₄	M	2120	g/l	0.010	0.13	0.093	0.39	0.071
Total Sulphur	M	2175	%	0.010	0.037	0.53	0.19	0.14
Sulphate (Acid Soluble)	U	2430	%	0.010	0.033	0.11	0.34	0.016

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
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U/S	Unsuitable Sample
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The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

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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

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

customerservices@chemtest.com

APPENDIX E

GEOENVIRONMENTAL LABORATORY TEST RESULTS

Certificate of Analysis – (Soil/Leachate and Water)

22011105_V01, 22011124_V01,
22011389_V01, 22011523_V01,
22011525_V01, 22011640_V01
and 22021918_V01



Environmental
Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22011105

Quote: BEC220124006 V1.1

Project Ref: H1069-21

Site: H1069-21

Contact: Dave Sadler

Address: Unit 15, Crosby Yard
Wildmill
Bridgend
Mid Glamorgan
CF31 1JZ

E-Mail: dave.sadler@socotec.com

Phone: 01926 819320

No. Samples Received: 6

Date Received: 20/01/2022

Analysis Date: 02/03/2022

Date Issued: 02/03/2022

Report Type: Final Version 01

This report supercedes any versions previously issued by the laboratory

Account Manager
Martin Elliott-Palmer
01283 554137

Authorised by the Operations Manager
Becky Batham



Client: SOCOTEC Geotechnical
Project Name: H1069-21
Project No: 22011105
Date Issued: 02/03/2022

Samples Analysed

<u>Sample Reference</u>	<u>Text ID</u>	<u>Sample Date</u>	<u>Sample Type</u>	
TT03-2-ES-0.70	22011105-001	17/01/2022 12:00:00	SOLID	
TT03-3-ES-1.10	22011105-002	17/01/2022 12:00:00	SOLID	
BH01-2-ES-0.50	22011105-003	17/01/2022 12:00:00	SOLID	
BH01-3-ES-1.00	22011105-004	17/01/2022 12:00:00	SOLID	
SW01-170122-EW-0.00	22011105-005	17/01/2022 14:30:00	WATER	Surface Water
SW02-170122-EW-0.00	22011105-006	17/01/2022 14:30:00	WATER	Surface Water



Analysis Results

Client: SOCOTEC Geotechnical
Project Name: H1069-21
Project No: 22011105
Date Issued: 02/03/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	003	004		005
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
Ammoniacal Nitrogen as N	KONENS	0.01	mg/l	U		0.13				0.20		
Ammoniacal Nitrogen (Exchangeable) as N	AMMAR	0.5	mg/kg^	UM			0.60	<0.59	0.60		1.20	
Ammoniacal Nitrogen as N	KONENS	0.01	mg/l	U								<0.01
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N		<0.100				<0.100		
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N		<0.100				<0.100		
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N		<0.005				<0.005		
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N		<0.100				<0.100		
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.02	mg/l	N		<0.020				<0.020		
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N		<0.100				<0.100		
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N		<0.005				<0.005		
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.1	mg/l	U		<0.100				<0.100		
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM			<0.225	<0.235	<0.222		<0.222	
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM			<0.225	<0.235	<0.222		<0.222	
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM			<0.011	<0.012	<0.011		<0.011	
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM			<0.225* _B	<0.235* _B	<0.222* _B		<0.222* _B	
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.04	mg/kg^	UM			0.071	0.049	<0.045		<0.045	
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM			<0.225	<0.235	<0.222		<0.222	
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM			0.111	0.048	0.023		0.027	
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.2	mg/kg^	UM			0.322	<0.235	<0.222		<0.222	



Analysis Results

Client: SOCOTEC Geotechnical
 Project Name: H1069-21
 Project No: 22011105
 Date Issued: 02/03/2022



					Sample ID
					006
					Customer ID
					SW02-170122-EW-0.00
					Sample Type
					WATER
					Sampling Date
					17/01/2022
Analysis	Method Code	MDL	Units	Accred.	
Ammoniacal Nitrogen as N	KONENS	0.01	mg/l	U	
Ammoniacal Nitrogen (Exchangeable) as N	AMMAR	0.5	mg/kg^	UM	
Ammoniacal Nitrogen as N	KONENS	0.01	mg/l	U	0.02
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N	
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.02	mg/l	N	
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N	
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.1	mg/l	U	
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM	
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.04	mg/kg^	UM	
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM	
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.2	mg/kg^	UM	



Analysis Results

Client: SOCOTEC Geotechnical
Project Name: H1069-21
Project No: 22011105
Date Issued: 02/03/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	003	004		005
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N								<0.100
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N								<0.100
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	U								<0.005
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N								<0.100
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.02	mg/l	U								<0.020
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N								<0.100
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	U								<0.005
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.1	mg/l	U								<0.100
pH	PHCONDW	1	pH units	U		8.2				8.0		
pH	PHCONDW	1	pH units	U								7.6
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM			8.4	8.4	8.4		8.5	
Chromium (VI) as Cr	KONENS	0.003	mg/l	U		<0.003				<0.003		
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N			<0.1	<0.1	<0.1		<0.1	
Chromium (VI) as Cr	KONENS	0.003	mg/l	U								<0.003
Nitrite as N	KONENS	0.01	mg/l	U		<0.01				0.04		
Nitrite as N	KONENS	0.01	mg/l	U								<0.01
Nitrate as N	KONENS	0.2	mg/l	U		0.60				0.47		
Nitrate as N	KONENS	0.2	mg/l	U								0.5
Nitrite as N	KONENS	0.02	mg/kg^	N			0.03	0.09	0.07		0.04	



Client: SOCOTEC Geotechnical
Project Name: H1069-21
Project No: 22011105
Date Issued: 02/03/2022



					Sample ID	006
					Customer ID	SW02-170122-EW-0.00
					Sample Type	WATER
					Sampling Date	17/01/2022
					Analysis	Method Code
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.100	
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.100	
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	U	<0.005	
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.100	
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.02	mg/l	U	<0.020	
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.100	
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	U	<0.005	
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.1	mg/l	U	<0.100	
pH	PHCONDW	1	pH units	U		
pH	PHCONDW	1	pH units	U	7.5	
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM		
Chromium (VI) as Cr	KONENS	0.003	mg/l	U		
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N		
Chromium (VI) as Cr	KONENS	0.003	mg/l	U	<0.003	
Nitrite as N	KONENS	0.01	mg/l	U		
Nitrite as N	KONENS	0.01	mg/l	U	<0.01	
Nitrate as N	KONENS	0.2	mg/l	U		
Nitrate as N	KONENS	0.2	mg/l	U	0.4	
Nitrite as N	KONENS	0.02	mg/kg^	N		

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	003	004		005
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
Nitrate as N	KONENO3	0.4	mg/kg^	N			10.3	11.4	7.8		4.7	
Complex Cyanide	SFAPI	0.02	mg/l	U		<0.02				<0.02		
Complex Cyanide	SFAPI	0.5	mg/kg^	UM			<0.6	<0.6	<0.6		<0.6	
Complex Cyanide	SFAPI	0.02	mg/l	U								<0.02
Free Cyanide	SFAPI	0.02	mg/l	U		<0.02				<0.02		
Free Cyanide	SFAPI	0.5	mg/kg^	UM			<0.6	<0.6	<0.6		<0.6	
Free Cyanide	SFAPI	0.02	mg/l	U								<0.02
Phenol Index	SFAPI	0.05	mg/l	U		<0.05				<0.05		
Phenol Index	SFAPI	0.5	mg/kg^	U			<0.6	<0.6	<0.6		<0.6	
Phenol Index	SFAPI	0.05	mg/l	U								<0.05
Sulphide as S	SFAPI	0.02	mg/l	U		<0.02				0.12		
Sulphide as S	SFAPI	0.5	mg/kg^	N			<0.6	<0.6	<0.6		<0.6	
Sulphide as S	SFAPI	0.02	mg/l	U								<0.02
Total Cyanide	SFAPI	0.02	mg/l	U		<0.02				<0.02		
Total Cyanide	SFAPI	0.5	mg/kg^	UM			<0.6	<0.6	<0.6		<0.6	
Total Cyanide	SFAPI	0.02	mg/l	U								<0.02
COD (Filtered)	WSLM11	5	mg/l	N		5				22		
COD (Settled)	WSLM11	5	mg/l	U								12
Soil Organic Matter	WSLM59	0.04	% m/m^	U			16.1* B	17.0* B	14.7* B		14.3* B	



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					Sample ID
					006
					Customer ID
					SW02-170122-EW-0.00
					Sample Type
					WATER
					Sampling Date
					17/01/2022
Analysis	Method Code	MDL	Units	Accred.	
Nitrate as N	KONENO3	0.4	mg/kg^	N	
Complex Cyanide	SFAPI	0.02	mg/l	U	
Complex Cyanide	SFAPI	0.5	mg/kg^	UM	
Complex Cyanide	SFAPI	0.02	mg/l	U	<0.02
Free Cyanide	SFAPI	0.02	mg/l	U	
Free Cyanide	SFAPI	0.5	mg/kg^	UM	
Free Cyanide	SFAPI	0.02	mg/l	U	<0.02
Phenol Index	SFAPI	0.05	mg/l	U	
Phenol Index	SFAPI	0.5	mg/kg^	U	
Phenol Index	SFAPI	0.05	mg/l	U	<0.05
Sulphide as S	SFAPI	0.02	mg/l	U	
Sulphide as S	SFAPI	0.5	mg/kg^	N	
Sulphide as S	SFAPI	0.02	mg/l	U	<0.02
Total Cyanide	SFAPI	0.02	mg/l	U	
Total Cyanide	SFAPI	0.5	mg/kg^	UM	
Total Cyanide	SFAPI	0.02	mg/l	U	<0.02
COD (Filtered)	WSLM11	5	mg/l	N	
COD (Settled)	WSLM11	5	mg/l	U	13
Soil Organic Matter	WSLM59	0.04	% m/m^	U	



Analysis Results

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Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	003	004		005
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
BOD (Leached 5 Day)	WSLM20	1	mg O2/l	N		<1.0				4.5		
BOD (5 day)	WSLM20	1	mg O2/l	U								<1.0* B
Dissolved Organic Carbon	WSLM13	0.2	mg/l	N								4.3
Total Organic Carbon	WSLM13	0.2	mg/l	U								4.4
Antimony as Sb	ICPMSS	0.1	mg/kg^	U			<0.1	<0.1	<0.1		<0.1	
Arsenic as As	ICPMSS	0.3	mg/kg^	UM			5.3	6.6	29.2		17.2	
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM			0.4	0.3	0.4		0.3	
Copper as Cu	ICPMSS	1.6	mg/kg^	UM			20.9	23.6	35.8		27.9	
Lead as Pb	ICPMSS	0.7	mg/kg^	UM			23.4	98.8	32.4		30.9	
Manganese as Mn	ICPMSS	1	mg/kg^	UM			1223	528.1	692.3		597.4	
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM			<0.5	<0.5	<0.5		<0.5	
Molybdenum as Mo	ICPMSS	0.5	mg/kg^	UM			0.8	1.3	1.7		1.4	
Nickel as Ni	ICPMSS	2	mg/kg^	UM			9.4	18.2	31.0		19.5	
Selenium as Se	ICPMSS	0.5	mg/kg^	UM			<0.5	<0.5	<0.5		<0.5	
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM			18.0	29.7	31.6		23.6	
Vanadium as V	ICPMSS	0.6	mg/kg^	N			18.1	31.0	47.9		39.5	
Zinc as Zn	ICPMSS	16	mg/kg^	UM			55.4	92.3	105.2		104.4	
Aluminium as Al	ICPSOIL	10	mg/kg^	U			5690	29700	13200		14900	
Barium as Ba	ICPSOIL	0.5	mg/kg^	UM			303	445	94.4		141	



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					Sample ID
					006
					Customer ID
					SW02-170122-EW-0.00
					Sample Type
					WATER
					Sampling Date
					17/01/2022
Analysis	Method Code	MDL	Units	Accred.	
BOD (Leached 5 Day)	WSLM20	1	mg O2/l	N	
BOD (5 day)	WSLM20	1	mg O2/l	U	10.4* _B
Dissolved Organic Carbon	WSLM13	0.2	mg/l	N	4.3
Total Organic Carbon	WSLM13	0.2	mg/l	U	4.4
Antimony as Sb	ICPMSS	0.1	mg/kg^	U	
Arsenic as As	ICPMSS	0.3	mg/kg^	UM	
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM	
Copper as Cu	ICPMSS	1.6	mg/kg^	UM	
Lead as Pb	ICPMSS	0.7	mg/kg^	UM	
Manganese as Mn	ICPMSS	1	mg/kg^	UM	
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM	
Molybdenum as Mo	ICPMSS	0.5	mg/kg^	UM	
Nickel as Ni	ICPMSS	2	mg/kg^	UM	
Selenium as Se	ICPMSS	0.5	mg/kg^	UM	
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM	
Vanadium as V	ICPMSS	0.6	mg/kg^	N	
Zinc as Zn	ICPMSS	16	mg/kg^	UM	
Aluminium as Al	ICPSOIL	10	mg/kg^	U	
Barium as Ba	ICPSOIL	0.5	mg/kg^	UM	



Analysis Results

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Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	003	004		005
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
Beryllium as Be	ICPSOIL	0.1	mg/kg^	U			0.23	0.61	0.55		0.31	
Iron as Fe	ICPSOIL	36	mg/kg^	UM			15800	20600	47000		33800	
Magnesium as Mg	ICPSOIL	10	mg/kg^	U			78400	30300	4930		12700	
Boron as B	ICPBOR	0.5	mg/kg^	UM			1.0	0.8	1.2		1.1	
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM			306	159	300		198	
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM			773	491	960		632	
Antimony as Sb	ICPMSW (Dissolved)	0.001	mg/l	U		0.002				0.025		
Antimony as Sb	ICPMSW (Dissolved)	0.001	mg/l	U								<0.001
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U		0.021				0.036		
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U								0.002
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U		<0.00002				<0.00002		
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U								0.00007
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U		0.001				<0.001		
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U								<0.001
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U		0.006				0.008		
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U								0.004
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U		<0.001				<0.001		
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U								<0.001
Manganese as Mn	ICPMSW (Dissolved)	0.002	mg/l	U		<0.002				0.015		



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					Sample ID
					006
					Customer ID
					SW02-170122-EW-0.00
					Sample Type
					WATER
					Sampling Date
					17/01/2022
Analysis	Method Code	MDL	Units	Accred.	
Beryllium as Be	ICPSOIL	0.1	mg/kg^	U	
Iron as Fe	ICPSOIL	36	mg/kg^	UM	
Magnesium as Mg	ICPSOIL	10	mg/kg^	U	
Boron as B	ICPBOR	0.5	mg/kg^	UM	
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM	
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM	
Antimony as Sb	ICPMSW (Dissolved)	0.001	mg/l	U	
Antimony as Sb	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U	
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U	0.002
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U	
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U	0.00003
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U	
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U	
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U	0.003
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U	
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001
Manganese as Mn	ICPMSW (Dissolved)	0.002	mg/l	U	

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	003	004		005
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
Manganese as Mn	ICPMSW (Dissolved)	0.002	mg/l	U								0.085
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U		<0.00003				<0.00003		
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U								<0.00003
Molybdenum as Mo	ICPMSW (Dissolved)	0.001	mg/l	U		0.030				0.081		
Molybdenum as Mo	ICPMSW (Dissolved)	0.001	mg/l	U								<0.001
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U		<0.001				<0.001		
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U								0.002
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U		0.004				0.005		
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U								<0.001
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U		0.002				0.003		
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U								<0.001
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U		0.002				<0.002		
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U								0.049
Aluminium as Al	ICPWATVAR (Dissolved)	0.01	mg/l	U		0.01				0.03		
Aluminium as Al	ICPWATVAR (Dissolved)	0.01	mg/l	U								<0.01
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U		0.04				0.03		
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U								0.05
Beryllium as Be	ICPWATVAR (Dissolved)	0.01	mg/l	N		<0.01				<0.01		
Beryllium as Be	ICPWATVAR (Dissolved)	0.01	mg/l	N								<0.01



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					Sample ID	006
					Customer ID	SW02-170122-EW-000
					Sample Type	WATER
					Sampling Date	17/01/2022
					Analysis	Method Code
Manganese as Mn	ICPMSW (Dissolved)	0.002	mg/l	U	0.029	
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U		
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U	<0.00003	
Molybdenum as Mo	ICPMSW (Dissolved)	0.001	mg/l	U		
Molybdenum as Mo	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001	
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U		
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U	0.002	
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U		
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001	
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U		
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001	
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U		
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U	0.050	
Aluminium as Al	ICPWATVAR (Dissolved)	0.01	mg/l	U		
Aluminium as Al	ICPWATVAR (Dissolved)	0.01	mg/l	U	<0.01	
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U		
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.05	
Beryllium as Be	ICPWATVAR (Dissolved)	0.01	mg/l	N		
Beryllium as Be	ICPWATVAR (Dissolved)	0.01	mg/l	N	<0.01	

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	003	004		005
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
Boron as B	ICPWATVAR (Dissolved)	0.01	mg/l	U		0.08				0.11		
Boron as B	ICPWATVAR (Dissolved)	0.01	mg/l	U								0.04
Calcium as Ca	ICPWATVAR (Dissolved)	1	mg/l	U								45
Iron as Fe	ICPWATVAR (Dissolved)	0.01	mg/l	U		<0.01				<0.01		
Iron as Fe	ICPWATVAR (Dissolved)	0.01	mg/l	U								0.08
Magnesium as Mg	ICPWATVAR (Dissolved)	1	mg/l	U		4				4		
Magnesium as Mg	ICPWATVAR (Dissolved)	1	mg/l	U								6
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U		76				109		
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U								30
Total Hardness as CaCO3	ICPWATVAR (Dissolved)	6.6	mg/l	U								139
MTBE	BTEXHSA	10	µg/l	N		<10				<10		
MTBE	BTEXHSA	20	µg/kg^	U			<23	<24	<22		<22	
MTBE	BTEXHSA	10	µg/l	U								<10
Benzene HS_1D_AR	BTEXHSA	5	µg/l	N		<5				<5		
Ethylbenzene HS_1D_AR	BTEXHSA	5	µg/l	N		<5				<5		
m/p-Xylene HS_1D_AR	BTEXHSA	10	µg/l	N		<10				<10		
o-Xylene HS_1D_AR	BTEXHSA	5	µg/l	N		<5				<5		
Toluene HS_1D_AR	BTEXHSA	5	µg/l	N		<5				<5		
Benzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			111	48	23		27	



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					Sample ID
					006
					Customer ID
					SW02-170122-EW-0.00
					Sample Type
					WATER
					Sampling Date
					17/01/2022
Analysis	Method Code	MDL	Units	Accred.	
Boron as B	ICPWATVAR (Dissolved)	0.01	mg/l	U	
Boron as B	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.04
Calcium as Ca	ICPWATVAR (Dissolved)	1	mg/l	U	47
Iron as Fe	ICPWATVAR (Dissolved)	0.01	mg/l	U	
Iron as Fe	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.07
Magnesium as Mg	ICPWATVAR (Dissolved)	1	mg/l	U	
Magnesium as Mg	ICPWATVAR (Dissolved)	1	mg/l	U	7
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U	
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U	29
Total Hardness as CaCO3	ICPWATVAR (Dissolved)	6.6	mg/l	U	143
MTBE	BTEXHSA	10	µg/l	N	
MTBE	BTEXHSA	20	µg/kg^	U	
MTBE	BTEXHSA	10	µg/l	U	<10
Benzene HS_1D_AR	BTEXHSA	5	µg/l	N	
Ethylbenzene HS_1D_AR	BTEXHSA	5	µg/l	N	
m/p-Xylene HS_1D_AR	BTEXHSA	10	µg/l	N	
o-Xylene HS_1D_AR	BTEXHSA	5	µg/l	N	
Toluene HS_1D_AR	BTEXHSA	5	µg/l	N	
Benzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM	



Analysis Results

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Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	003	004		005
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
Ethylbenzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			37	13	<11		<11	
m/p-Xylene HS_1D_AR	BTEXHSA	20	µg/kg^	UM			<23	<24	<22		<22	
o-Xylene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<11	<12	<11		<11	
Toluene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<11	<12	<11		<11	
Benzene HS_1D_AR	BTEXHSA	5	µg/l	U								<5
Ethylbenzene HS_1D_AR	BTEXHSA	5	µg/l	U								<5
m/p-Xylene HS_1D_AR	BTEXHSA	10	µg/l	U								<10
o-Xylene HS_1D_AR	BTEXHSA	5	µg/l	U								<5
Toluene HS_1D_AR	BTEXHSA	5	µg/l	U								<5
Acenaphthene	PAHMSW	0.01	µg/l	U		0.10				<0.02 D		
Acenaphthylene	PAHMSW	0.01	µg/l	U		0.01				<0.02 D		
Anthracene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 D		
Benzo[a]anthracene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 D		
Benzo[a]pyrene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 D		
Benzo[b]fluoranthene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 D		
Benzo[g,h,i]perylene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 D		
Benzo[k]fluoranthene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 D		
Chrysene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 D		
Coronene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 D		



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					Sample ID
					006
					Customer ID
					SW02-170122-EW-0.00
					Sample Type
					WATER
					Sampling Date
					17/01/2022
Analysis	Method Code	MDL	Units	Accred.	
Ethylbenzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM	
m/p-Xylene HS_1D_AR	BTEXHSA	20	µg/kg^	UM	
o-Xylene HS_1D_AR	BTEXHSA	10	µg/kg^	UM	
Toluene HS_1D_AR	BTEXHSA	10	µg/kg^	UM	
Benzene HS_1D_AR	BTEXHSA	5	µg/l	U	<5
Ethylbenzene HS_1D_AR	BTEXHSA	5	µg/l	U	<5
m/p-Xylene HS_1D_AR	BTEXHSA	10	µg/l	U	<10
o-Xylene HS_1D_AR	BTEXHSA	5	µg/l	U	<5
Toluene HS_1D_AR	BTEXHSA	5	µg/l	U	<5
Acenaphthene	PAHMSW	0.01	µg/l	U	
Acenaphthylene	PAHMSW	0.01	µg/l	U	
Anthracene	PAHMSW	0.01	µg/l	U	
Benzo[a]anthracene	PAHMSW	0.01	µg/l	U	
Benzo[a]pyrene	PAHMSW	0.01	µg/l	U	
Benzo[b]fluoranthene	PAHMSW	0.01	µg/l	U	
Benzo[g,h,i]perylene	PAHMSW	0.01	µg/l	U	
Benzo[k]fluoranthene	PAHMSW	0.01	µg/l	U	
Chrysene	PAHMSW	0.01	µg/l	U	
Coronene	PAHMSW	0.01	µg/l	U	



Analysis Results

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Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	003	004		005
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
Dibenzo[a,h]anthracene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 _D		
Fluoranthene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 _D		
Fluorene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 _D		
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 _D		
Naphthalene	PAHMSW	0.01	µg/l	U		0.02				0.05		
Phenanthrene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 _D		
Pyrene	PAHMSW	0.01	µg/l	U		<0.01				<0.02 _D		
Total PAH 16	PAHMSW	0.16	µg/l	U		0.32				0.34		
Acenaphthene	PAHMSUS	0.08	mg/kg [^]	UM			<0.09	<0.09	0.21		0.15	
Acenaphthylene	PAHMSUS	0.08	mg/kg [^]	U			<0.09	0.63	0.22		0.11	
Anthracene	PAHMSUS	0.08	mg/kg [^]	U			0.15	0.19	0.68		0.33	
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg [^]	UM			0.32* _B	0.19* _B	1.84* _B		0.86* _B	
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg [^]	UM			0.25	0.13	1.76		0.79	
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg [^]	UM			0.44	0.32	2.55		1.18	
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg [^]	UM			0.13	<0.09	0.94		0.42	
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg [^]	UM			0.14	0.09	0.84		0.43	
Chrysene	PAHMSUS	0.08	mg/kg [^]	UM			0.48	0.47	2.07		1.05	
Coronene	PAHMSUS	0.08	mg/kg [^]	N			<0.09	<0.09	0.27		0.12	
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg [^]	UM			<0.09	<0.09	0.40		0.19	



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					Sample ID
					006
					Customer ID
					SW02-170122-EW-0.00
					Sample Type
					WATER
					Sampling Date
					17/01/2022
Analysis	Method Code	MDL	Units	Accred.	
Dibenzo[a,h]anthracene	PAHMSW	0.01	µg/l	U	
Fluoranthene	PAHMSW	0.01	µg/l	U	
Fluorene	PAHMSW	0.01	µg/l	U	
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	µg/l	U	
Naphthalene	PAHMSW	0.01	µg/l	U	
Phenanthrene	PAHMSW	0.01	µg/l	U	
Pyrene	PAHMSW	0.01	µg/l	U	
Total PAH 16	PAHMSW	0.16	µg/l	U	
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	
Anthracene	PAHMSUS	0.08	mg/kg^	U	
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	
Chrysene	PAHMSUS	0.08	mg/kg^	UM	
Coronene	PAHMSUS	0.08	mg/kg^	N	
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	003	004		005
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM			0.62	0.50	2.90		1.40	
Fluorene	PAHMSUS	0.08	mg/kg^	UM			<0.09	0.20	0.25		0.17	
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM			0.19	0.11	1.38		0.62	
Naphthalene	PAHMSUS	0.08	mg/kg^	UM			0.29	1.87	0.51		0.47	
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM			0.69	1.26	1.59		1.15	
Pyrene	PAHMSUS	0.08	mg/kg^	UM			0.43	0.38	2.24		1.08	
Total PAH 16	PAHMSUS	1.28	mg/kg^	U			4.49	6.62	20.4		10.4	
Acenaphthene	PAHMSW	0.01	µg/l	U								<0.01
Acenaphthylene	PAHMSW	0.01	µg/l	U								<0.01
Anthracene	PAHMSW	0.01	µg/l	U								<0.01
Benzo[a]anthracene	PAHMSW	0.01	µg/l	U								<0.01* B
Benzo[a]pyrene	PAHMSW	0.01	µg/l	U								<0.01
Benzo[b]fluoranthene	PAHMSW	0.01	µg/l	U								<0.01
Benzo[g,h,i]perylene	PAHMSW	0.01	µg/l	U								<0.01
Benzo[k]fluoranthene	PAHMSW	0.01	µg/l	U								<0.01
Chrysene	PAHMSW	0.01	µg/l	U								<0.01
Coronene	PAHMSW	0.01	µg/l	U								<0.01
Dibenzo[a,h]anthracene	PAHMSW	0.01	µg/l	U								<0.01
Fluoranthene	PAHMSW	0.01	µg/l	U								<0.01



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					Sample ID
					006
					Customer ID
					SW02-170122-EW-0.00
					Sample Type
					WATER
					Sampling Date
					17/01/2022
Analysis	Method Code	MDL	Units	Accred.	
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	
Fluorene	PAHMSUS	0.08	mg/kg^	UM	
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	
Pyrene	PAHMSUS	0.08	mg/kg^	UM	
Total PAH 16	PAHMSUS	1.28	mg/kg^	U	
Acenaphthene	PAHMSW	0.01	µg/l	U	<0.01
Acenaphthylene	PAHMSW	0.01	µg/l	U	<0.01
Anthracene	PAHMSW	0.01	µg/l	U	<0.01
Benzo[a]anthracene	PAHMSW	0.01	µg/l	U	<0.01* _B
Benzo[a]pyrene	PAHMSW	0.01	µg/l	U	<0.01
Benzo[b]fluoranthene	PAHMSW	0.01	µg/l	U	<0.01
Benzo[g,h,i]perylene	PAHMSW	0.01	µg/l	U	<0.01
Benzo[k]fluoranthene	PAHMSW	0.01	µg/l	U	<0.01
Chrysene	PAHMSW	0.01	µg/l	U	<0.01
Coronene	PAHMSW	0.01	µg/l	U	<0.01
Dibenzo[a,h]anthracene	PAHMSW	0.01	µg/l	U	<0.01
Fluoranthene	PAHMSW	0.01	µg/l	U	<0.01



Analysis Results

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Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	003	004		005
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
Fluorene	PAHMSW	0.01	µg/l	U								<0.01
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	µg/l	U								<0.01
Naphthalene	PAHMSW	0.01	µg/l	U								0.01
Phenanthrene	PAHMSW	0.01	µg/l	U								<0.01
Pyrene	PAHMSW	0.01	µg/l	U								<0.01
Total PAH 16	PAHMSW	0.16	µg/l	U								0.16
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		<0.01* _B				<0.02* _{B,D}		
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		<0.01* _B				<0.02* _{B,D}		
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		<0.01				<0.02 _D		
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		<0.01				<0.02 _D		
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		<0.01				<0.02 _D		
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg [^]	U			<4.50	<4.70	<4.45		<4.45	
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg [^]	U			<4.50	<4.70	<4.45		<4.45	
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg [^]	U			<4.50* _B	<4.70* _B	8.17* _B		6.48* _B	
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	10	mg/kg [^]	U			<11.3	<11.8	19.3		13.5	
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	20	mg/kg [^]	U			<22.5	<23.5	32.9		24.7	
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U								<0.01
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U								<0.01
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U								<0.01



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					Sample ID
					006
					Customer ID
					SW02-170122-EW-0.00
					Sample Type
					WATER
					Sampling Date
					17/01/2022
Analysis	Method Code	MDL	Units	Accred.	
Fluorene	PAHMSW	0.01	µg/l	U	<0.01
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	µg/l	U	<0.01
Naphthalene	PAHMSW	0.01	µg/l	U	0.01
Phenanthrene	PAHMSW	0.01	µg/l	U	<0.01
Pyrene	PAHMSW	0.01	µg/l	U	<0.01
Total PAH 16	PAHMSW	0.16	µg/l	U	0.17
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U	
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U	
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U	
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	10	mg/kg^	U	
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	20	mg/kg^	U	
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01



Analysis Results

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Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	003	004		005
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U								<0.01
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U								<0.01
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		<0.01				<0.02 _D		
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		<0.01				<0.02 _D		
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		<0.01				<0.02 _D		
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		0.02				0.03		
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		0.04				0.05		
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg ^A	U			<4.50	5.34	<4.45		<4.45	
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg ^A	U			<4.50	8.86	8.11		4.96	
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg ^A	U			5.84	13.2	23.5		11.6	
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	10	mg/kg ^A	U			18.2	25.6	91.1		43.0	
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	20	mg/kg ^A	U			29.1	55.9	134		62.8	
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U								<0.01
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U								<0.01
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U								<0.01* _B
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U								<0.01
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U								0.01
Total Moisture at 35°C	CLANDPREP	0.1	%	N			11.2	14.9	10.1		10.1	
Description of Solid Material	CLANDPREP		-	N			SILT	SILT	SILT		SILT	



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Sample ID Customer ID Sample Type Sampling Date					006
					SW02-170122-EW-0.00
					WATER
					17/01/2022
Analysis	Method Code	MDL	Units	Accred.	
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U	
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U	
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U	
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	10	mg/kg^	U	
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	20	mg/kg^	U	
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.01
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.01
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.01* B
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.01
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	0.02
Total Moisture at 35°C	CLANDPREP	0.1	%	N	
Description of Solid Material	CLANDPREP		-	N	

					Sample ID	001	002	003	004		005	
					Customer ID	TT03-2-ES-0.70		TT03-3-ES-1.10	BH01-2-ES-0.50	BH01-3-ES-1.00		SW01-170122-EW-0.00
					Sample Type	LPL	SOLID	SOLID	SOLID	LPL	SOLID	WATER
					Sampling Date	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022	17/01/2022
					Analysis	Method Code	MDL	Units	Accred.			
Equivalent Weight of Dry Material (kg)	Leachate Prep CEN 2:1		kg	N		0.400				0.400		
Fraction above 4 mm (%)	Leachate Prep CEN 2:1		%	N		0				69.6		
Fraction of non-crushable material (%)	Leachate Prep CEN 2:1		%	N		0				0		
Volume of Water for 2:1 Leach (ltr)	Leachate Prep CEN 2:1		l	N		0.731				0.740		
Weight of Sample Leached (kg)	Leachate Prep CEN 2:1		kg	N		0.469				0.460		
Asbestos Identification	SUB020		-	N		NAIIS	NAIIS	NAIIS		NAIIS		



Client: SOCOTEC Geotechnical
 Project Name: H1069-21
 Project No: 22011105
 Date Issued: 02/03/2022



					Sample ID
					006
					Customer ID
					SW02-170122-EW-0.00
					Sample Type
					WATER
					Sampling Date
					17/01/2022
Analysis	Method Code	MDL	Units	Accred.	
Equivalent Weight of Dry Material (kg)	Leachate Prep CEN 2:1		kg	N	
Fraction above 4 mm (%)	Leachate Prep CEN 2:1		%	N	
Fraction of non-crushable material (%)	Leachate Prep CEN 2:1		%	N	
Volume of Water for 2:1 Leach (ltr)	Leachate Prep CEN 2:1		l	N	
Weight of Sample Leached (kg)	Leachate Prep CEN 2:1		kg	N	
Asbestos Identification	SUB020		-	N	

CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: SOCOTEC UK Ltd
Environmental Chemistry
PO Box 100
Burton upon Trent
Staffordshire
DE15 0XD

CONTRACT NO: S23162-2

DATE OF ISSUE: 31.01.22

DATE SAMPLES RECEIVED: 24.01.22

DATE ANALYSIS COMPLETED: 31.01.22

DESCRIPTION: Four soil/loose aggregate samples each weighing approximately 0.9-1.1kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of soil/loose aggregate samples for mass determination of asbestos.

METHODS:

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

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies *et al*, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in any of the soil samples by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.



CONTRACT NO: S23162-2
DATE OF ISSUE: 31.01.22

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 22011105

IOM sample number	SOCOTEC Sample ID	Client Sample ID	ACM type detected	PLM result
S87573	22011105-001-28	TT03-2-ES-0.70	-	No Asbestos Detected
S87574	22011105-002-15	TT03-3-ES-1.10	-	No Asbestos Detected
S87575	22011105-003-15	BH01-2-ES-0.50	-	No Asbestos Detected
S87576	22011105-004-28	BH01-3-ES-1.00	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.

AUTHORISED BY:

D Third
Scientific Technician



Client: SOCOTEC Geotechnical
 Project Name: H1069-21
 Project No: 22011105
 Date Issued: 02/03/2022

Deviating Sample Report

Sample Reference	Text ID	Reported Name	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time
TT03-2-ES-0.70	22011105-001	GROHSA/BTEXHSA						✓
TT03-2-ES-0.70	22011105-001	WSLM20						✓
TT03-2-ES-0.70	22011105-001	BTEXHSA						✓
BH01-3-ES-1.00	22011105-004	GROHSA/BTEXHSA						✓
BH01-3-ES-1.00	22011105-004	WSLM20						✓
BH01-3-ES-1.00	22011105-004	BTEXHSA						✓
SW01-170122-EW-0.00	22011105-005	SFAPI				✓		
SW01-170122-EW-0.00	22011105-005	SFAPI				✓		
SW01-170122-EW-0.00	22011105-005	SFAPI				✓		
SW01-170122-EW-0.00	22011105-005	SFAPI				✓		
SW01-170122-EW-0.00	22011105-005	SFAPI				✓		
SW01-170122-EW-0.00	22011105-005	WSLM20						✓
SW01-170122-EW-0.00	22011105-005	TPHFID (Aliphatic)						✓
SW01-170122-EW-0.00	22011105-005	TPHFID (Aromatic)						✓
SW02-170122-EW-0.00	22011105-006	SFAPI				✓		
SW02-170122-EW-0.00	22011105-006	SFAPI				✓		
SW02-170122-EW-0.00	22011105-006	SFAPI				✓		
SW02-170122-EW-0.00	22011105-006	SFAPI				✓		
SW02-170122-EW-0.00	22011105-006	SFAPI				✓		
SW02-170122-EW-0.00	22011105-006	WSLM20						✓
SW02-170122-EW-0.00	22011105-006	TPHFID (Aliphatic)						✓
SW02-170122-EW-0.00	22011105-006	TPHFID (Aromatic)						✓



Client: SOCOTEC Geotechnical
 Project Name: H1069-21
 Project No: 22011105
 Date Issued: 02/03/2022

Analysis Method

<u>Analysis</u>	<u>Analysis Type</u>	<u>Analysis Method</u>
AMMAR	INORGANIC	As Received
BTEXHSA	ORGANIC	As Received
CLANDPREP	PHYS	As Received
GROHSA/BTEXHSA	ORGANIC	Filtered
ICPACIDS	METALS	Air Dried & Ground
ICPBOR	METALS	Air Dried & Ground
ICPMSS	METALS	Air Dried & Ground
ICPMSW (Dissolved)	METALS	Filtered
ICPSOIL	METALS	Air Dried & Ground
ICPWATVAR (Dissolved)	METALS	Filtered
ICPWSS	METALS	Air Dried & Ground
KONENO3	INORGANIC	Air Dried & Ground
KONENS	INORGANIC	Filtered
Leachate Prep CEN 2:1	PHYS	As Received
PAHMSUS	ORGANIC	As Received
PAHMSW	ORGANIC	Filtered
PHCONDW	INORGANIC	Unfiltered
PHSOIL	INORGANIC	As Received
SFAPI	INORGANIC	As Received
SUB020	SUBCON	
TPHFID (Aliphatic)	ORGANIC	Filtered
TPHFID (Aromatic)	ORGANIC	Unfiltered
TPHFIDUS (Aliphatic)	ORGANIC	As Received
TPHFIDUS (Aromatic)	ORGANIC	As Received
WSLM11	INORGANIC	Filtered
WSLM13	INORGANIC	Unfiltered
WSLM20	INORGANIC	Unfiltered
WSLM59	INORGANIC	Air Dried & Ground



Client: SOCOTEC Geotechnical
Project Name: H1069-21
Project No: 22011105
Date Issued: 02/03/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes.
The report notes are as follows:

<u>Letter</u>	<u>Note</u>
A	Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
B	The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
C	Due to matrix interference the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
D	A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
E	Due to recoveries beyond our calibration range and following the maximum size of dilution allowed, the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
F	Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
G	The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u>	<u>Description</u>
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e everything extracted by the solvent(s)
CU	Clean up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
+	Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Client: SOCOTEC Geotechnical
Project Name: H1069-21
Project No: 22011105
Date Issued: 02/03/2022

Additional Information

This report refers to samples as received, and SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

In the accreditation column of analysis report the codes are as follows:

U = UKAS accredited analysis
M = MCERT accredited analysis
N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35° c.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full and with approval from the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis
NA = Sample is not amenable for the required analysis
ND = Results cannot be determined

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the Subcontracted lab for information regarding any deviancies for this analysis.

End of Certificate of Analysis



Environmental
Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22011124

Quote: BEC220124006 V1.1

Project Ref: H1069-21

Site: Heath Port Talbot FAS

Contact: Ruth Blair

Address: Unit 15, Crosby Yard
Wildmill
Bridgend
Mid Glamorgan
CF31 1JZ

E-Mail: Ruth.Blair@socotec.com

Phone: 07483 097285

No. Samples Received: 2

Date Received: 20/01/2022

Analysis Date: 10/02/2022

Date Issued: 10/02/2022

Job Status: Complete

Report Type: Final Version 01

This report supercedes any versions previously issued by the laboratory

Account Manager
Martin Elliott-Palmer
01283 554137

Authorised by the Operations Manager
Becky Batham



Client: SOCOTEC Geotechnical
Project Name: H1069-21
Project No: 22011124
Date Issued: 10/02/2022

Samples Analysed

<u>Sample Reference</u>	<u>Text ID</u>	<u>Sample Date</u>	<u>Sample Type</u>
TT02-1-ES-0.20	22011124-001	18/01/2022 12:00:00	SOLID
TT02-2-ES-0.60	22011124-002	18/01/2022 12:00:00	SOLID



Client: SOCOTEC Geotechnical
 Project Name: Heath Port Talbot FAS
 Project No: 22011124
 Date Issued: 10/02/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	
					Customer ID	TT02-1-ES-0.20		TT02-2-ES-0.60	
					Sample Type	SOLID		LPL	SOLID
					Sampling Date	18/01/2022		18/01/2022	18/01/2022
Ammoniacal Nitrogen as N	KONENS	0.01	mg/l	U				0.05	
Ammoniacal Nitrogen (Exchangeable) as N	AMMAR	0.5	mg/kg^	UM		0.70			<0.65
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N				<0.100	
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N				<0.100	
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N				<0.005	
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N				<0.100	
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.02	mg/l	N				<0.020	
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N				<0.100	
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N				<0.005	
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.1	mg/l	U				<0.100	
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.269			<0.258
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.269			<0.258
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM		<0.014			<0.013
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.269* _B			<0.258* _B
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.04	mg/kg^	UM		<0.055			<0.052
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.269			<0.258
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM		0.022			0.023
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.269			<0.258
pH	PHCONDW	1	pH units	U				8.2	



Client: SOCOTEC Geotechnical
 Project Name: Heath Port Talbot FAS
 Project No: 22011124
 Date Issued: 10/02/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	
					Customer ID	TT02-1-ES-0.20		TT02-2-ES-0.60	
					Sample Type	SOLID		LPL	SOLID
					Sampling Date	18/01/2022		18/01/2022	18/01/2022
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM		8.6			8.6
Chromium (VI) as Cr	KONENS	0.003	mg/l	U				<0.003	
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N		<0.1			<0.1
Nitrite as N	KONENS	0.01	mg/l	U				<0.01	
Nitrate as N	KONENS	0.2	mg/l	U				2.22	
Nitrite as N	KONENS	0.02	mg/kg^	N		<0.02			0.03
Nitrate as N	KONENO3	0.4	mg/kg^	N		26.2			25.2
Complex Cyanide	SFAPI	0.02	mg/l	U				<0.02	
Complex Cyanide	SFAPI	0.5	mg/kg^	UM		<0.7			<0.6
Free Cyanide	SFAPI	0.02	mg/l	U				<0.02	
Free Cyanide	SFAPI	0.5	mg/kg^	UM		<0.7			<0.6
Phenol Index	SFAPI	0.05	mg/l	U				<0.05	
Phenol Index	SFAPI	0.5	mg/kg^	U		<0.7			<0.6
Sulphide as S	SFAPI	0.02	mg/l	U				<0.02	
Sulphide as S	SFAPI	0.5	mg/kg^	N		<0.7			<0.6
Total Cyanide	SFAPI	0.02	mg/l	U				<0.02	
Total Cyanide	SFAPI	0.5	mg/kg^	UM		<0.7			<0.6
COD (Filtered)	WSLM11	5	mg/l	N				10	
Soil Organic Matter	WSLM59	0.04	% m/m^	U		19.4			15.9



Client: SOCOTEC Geotechnical
 Project Name: Heath Port Talbot FAS
 Project No: 22011124
 Date Issued: 10/02/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	
					Customer ID	TT02-1-ES-0.20		TT02-2-ES-0.60	
					Sample Type	SOLID		LPL	SOLID
					Sampling Date	18/01/2022		18/01/2022	18/01/2022
BOD (Leached 5 Day)	WSLM20	1	mg O2/l	N				<1.0	
Antimony as Sb	ICPMSS	0.1	mg/kg^	U		3.8			2.8
Arsenic as As	ICPMSS	0.3	mg/kg^	UM		53.0			45.9
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM		2.8			2.6
Copper as Cu	ICPMSS	1.6	mg/kg^	UM		280.7			235.4
Lead as Pb	ICPMSS	0.7	mg/kg^	UM		358.5			269.3
Manganese as Mn	ICPMSS	1	mg/kg^	UM		719.1			586.4
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM		0.5			<0.5
Molybdenum as Mo	ICPMSS	0.5	mg/kg^	UM		2.0			2.3
Nickel as Ni	ICPMSS	2	mg/kg^	UM		34.8			35.6
Selenium as Se	ICPMSS	0.5	mg/kg^	UM		<0.5			<0.5
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM		32.8			23.6
Vanadium as V	ICPMSS	0.6	mg/kg^	N		34.6			32.0
Zinc as Zn	ICPMSS	16	mg/kg^	UM		978.6			826.9
Aluminium as Al	ICPSOIL	10	mg/kg^	U		10600			10900
Barium as Ba	ICPSOIL	0.5	mg/kg^	UM		352			375
Beryllium as Be	ICPSOIL	0.1	mg/kg^	U		0.54			0.53
Iron as Fe	ICPSOIL	36	mg/kg^	UM		33500			29900
Magnesium as Mg	ICPSOIL	10	mg/kg^	U		4860			4460



Client: SOCOTEC Geotechnical
 Project Name: Heath Port Talbot FAS
 Project No: 22011124
 Date Issued: 10/02/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	
					Customer ID	TT02-1-ES-0.20		TT02-2-ES-0.60	
					Sample Type	SOLID		LPL	SOLID
					Sampling Date	18/01/2022		18/01/2022	18/01/2022
Boron as B	ICPBOR	0.5	mg/kg^	UM		0.7			0.7
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM		111			77
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM		614			578
Antimony as Sb	ICPMSW (Dissolved)	0.001	mg/l	U				0.005	
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U				0.005	
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U				0.00013	
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U				<0.001	
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U				0.009	
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U				<0.001	
Manganese as Mn	ICPMSW (Dissolved)	0.002	mg/l	U				<0.002	
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U				<0.00003	
Molybdenum as Mo	ICPMSW (Dissolved)	0.001	mg/l	U				0.012	
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U				<0.001	
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U				0.003	
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U				0.001	
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U				0.008	
Aluminium as Al	ICPWATVAR (Dissolved)	0.01	mg/l	U				0.02	
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U				0.06	
Beryllium as Be	ICPWATVAR (Dissolved)	0.01	mg/l	N				<0.01	



Client: SOCOTEC Geotechnical
 Project Name: Heath Port Talbot FAS
 Project No: 22011124
 Date Issued: 10/02/2022



					Sample ID	001	002	
					Customer ID	TT02-1-ES-0.20	TT02-2-ES-0.60	
					Sample Type	SOLID	LPL	SOLID
					Sampling Date	18/01/2022	18/01/2022	18/01/2022
Analysis	Method Code	MDL	Units	Accred.				
Boron as B	ICPWATVAR (Dissolved)	0.01	mg/l	U			0.04	
Iron as Fe	ICPWATVAR (Dissolved)	0.01	mg/l	U			0.03	
Magnesium as Mg	ICPWATVAR (Dissolved)	1	mg/l	U			2	
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U			12	
MTBE	BTEXHSA	10	µg/l	N			<10	
MTBE	BTEXHSA	20	µg/kg^	U		<27		<26
Benzene HS_1D_AR	BTEXHSA	5	µg/l	N			<5	
Ethylbenzene HS_1D_AR	BTEXHSA	5	µg/l	N			<5	
m/p-Xylene HS_1D_AR	BTEXHSA	10	µg/l	N			<10	
o-Xylene HS_1D_AR	BTEXHSA	5	µg/l	N			<5	
Toluene HS_1D_AR	BTEXHSA	5	µg/l	N			<5	
Benzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM		22		23
Ethylbenzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM		<14		<13
m/p-Xylene HS_1D_AR	BTEXHSA	20	µg/kg^	UM		<27		<26
o-Xylene HS_1D_AR	BTEXHSA	10	µg/kg^	UM		<14		<13
Toluene HS_1D_AR	BTEXHSA	10	µg/kg^	UM		<14		<13
Acenaphthene	PAHMSW	0.01	µg/l	U			<0.01	
Acenaphthylene	PAHMSW	0.01	µg/l	U			<0.01	
Anthracene	PAHMSW	0.01	µg/l	U			<0.01	



Client: SOCOTEC Geotechnical
 Project Name: Heath Port Talbot FAS
 Project No: 22011124
 Date Issued: 10/02/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	
					Customer ID	TT02-1-ES-0.20		TT02-2-ES-0.60	
					Sample Type	SOLID		LPL	SOLID
					Sampling Date	18/01/2022		18/01/2022	18/01/2022
Benzo[a]anthracene	PAHMSW	0.01	µg/l	U				<0.01	
Benzo[a]pyrene	PAHMSW	0.01	µg/l	U				<0.01	
Benzo[b]fluoranthene	PAHMSW	0.01	µg/l	U				<0.01	
Benzo[g,h,i]perylene	PAHMSW	0.01	µg/l	U				<0.01	
Benzo[k]fluoranthene	PAHMSW	0.01	µg/l	U				<0.01	
Chrysene	PAHMSW	0.01	µg/l	U				<0.01	
Coronene	PAHMSW	0.01	µg/l	U				<0.01	
Dibenzo[a,h]anthracene	PAHMSW	0.01	µg/l	U				<0.01	
Fluoranthene	PAHMSW	0.01	µg/l	U				<0.01	
Fluorene	PAHMSW	0.01	µg/l	U				<0.01	
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	µg/l	U				<0.01	
Naphthalene	PAHMSW	0.01	µg/l	U				0.03	
Phenanthrene	PAHMSW	0.01	µg/l	U				<0.01	
Pyrene	PAHMSW	0.01	µg/l	U				<0.01	
Total PAH 16	PAHMSW	0.16	µg/l	U				0.24	
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM		5.45			0.65
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U		0.93			0.93
Anthracene	PAHMSUS	0.08	mg/kg^	U		10.5			2.76
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM		49.1			13.9



Analysis Results

Client: SOCOTEC Geotechnical
Project Name: Heath Port Talbot FAS
Project No: 22011124
Date Issued: 10/02/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	
					Customer ID	TT02-1-ES-0.20		TT02-2-ES-0.60	
					Sample Type	SOLID		LPL	SOLID
					Sampling Date	18/01/2022		18/01/2022	18/01/2022
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM		32.5			12.1
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM		55.6			19.5
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM		19.3			8.89
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM		18.1			6.32
Chrysene	PAHMSUS	0.08	mg/kg^	UM		53.6			15.3
Coronene	PAHMSUS	0.08	mg/kg^	N		6.04			3.10
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM		9.73			3.48
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM		84.4			21.2
Fluorene	PAHMSUS	0.08	mg/kg^	UM		6.18			0.75
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM		27.5			12.0
Naphthalene	PAHMSUS	0.08	mg/kg^	UM		0.69			1.14
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM		53.1			8.04
Pyrene	PAHMSUS	0.08	mg/kg^	UM		53.4			16.2
Total PAH 16	PAHMSUS	1.28	mg/kg^	U		480			143
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U				<0.01* B	
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U				<0.01* B	
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U				<0.01	
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U				<0.01	
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U				<0.01	



Analysis Results

Client: SOCOTEC Geotechnical
Project Name: Heath Port Talbot FAS
Project No: 22011124
Date Issued: 10/02/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002	
					Customer ID	TT02-1-ES-0.20		TT02-2-ES-0.60	
					Sample Type	SOLID		LPL	SOLID
					Sampling Date	18/01/2022		18/01/2022	18/01/2022
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<5.38			<5.16
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		7.81			5.51
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		15.1			41.1
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	10	mg/kg^	U		92.2			288
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	20	mg/kg^	U		132			376
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U				<0.01	
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U				<0.01	
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U				<0.01	
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U				0.02	
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U				0.05	
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		<5.38			<5.16
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		27.5			12.6
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		270			81.8
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	10	mg/kg^	U		685			348
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	20	mg/kg^	U		1000			469
Total Moisture at 35°C	CLANDPREP	0.1	%	N		25.7			22.5
Description of Solid Material	CLANDPREP		-	N		SILT			SILT
Equivalent Weight of Dry Material (kg)	Leachate Prep CEN 2:1		kg	N					0.400
Fraction above 4 mm (%)	Leachate Prep CEN 2:1		%	N					0



Client: SOCOTEC Geotechnical
 Project Name: Heath Port Talbot FAS
 Project No: 22011124
 Date Issued: 10/02/2022



					Sample ID	001	002	
					Customer ID	TT02-1-ES-0.20	TT02-2-ES-0.60	
					Sample Type	SOLID	LPL	SOLID
					Sampling Date	18/01/2022	18/01/2022	18/01/2022
					Analysis	Method Code	MDL	Units
Fraction of non-crushable material (%)	Leachate Prep CEN 2:1		%	N			0	
Volume of Water for 2:1 Leach (ltr)	Leachate Prep CEN 2:1		l	N			0.707	
Weight of Sample Leached (kg)	Leachate Prep CEN 2:1		kg	N			0.493	
Asbestos Identification	SUB002		-	N	CH		NAIIS	
Asbestos Stage 3	SUB002	0.001	%	N	0.005			

[illegible]



Client: SOCOTEC Geotechnical
 Project Name: Heath Port Talbot FAS
 Project No: 22011124
 Date Issued: 10/02/2022

Deviating Sample Report

Sample Reference	Text ID	Reported Name	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time
TT02-2-ES-0.60	22011124-002	GROHSA/BTEXHSA						✓
TT02-2-ES-0.60	22011124-002	WSLM20						✓
TT02-2-ES-0.60	22011124-002	BTEXHSA						✓

Analysis Method

Analysis

AMMAR
 BTEXHSA
 CLANDPREP
 GROHSA/BTEXHSA
 ICPACIDS
 ICPBOR
 ICPMSS
 ICPMSW (Dissolved)
 ICPSOIL
 ICPWATVAR (Dissolved)
 ICPWSS
 KONENO3
 KONENS
 Leachate Prep CEN 2:1
 PAHMSUS
 PAHMSW
 PHCONDW
 PHSOIL
 SFAPI
 SUB002
 SUB020
 TPHFID (Aliphatic)
 TPHFID (Aromatic)
 TPHFIDUS (Aliphatic)
 TPHFIDUS (Aromatic)
 WSLM11
 WSLM20
 WSLM59

Analysis Type

INORGANIC
 ORGANIC
 PHYS
 ORGANIC
 METALS
 METALS
 METALS
 METALS
 METALS
 METALS
 METALS
 INORGANIC
 INORGANIC
 PHYS
 ORGANIC
 ORGANIC
 INORGANIC
 INORGANIC
 INORGANIC
 SUBCON
 SUBCON
 ORGANIC
 ORGANIC
 ORGANIC
 ORGANIC
 INORGANIC
 INORGANIC
 INORGANIC

Analysis Method

As Received
 As Received
 As Received
 Filtered
 Air Dried & Ground
 Air Dried & Ground
 Air Dried & Ground
 Filtered
 Air Dried & Ground
 Filtered
 Air Dried & Ground
 Air Dried & Ground
 Air Dried & Ground
 Air Dried & Ground
 As Received
 As Received
 Filtered
 Filtered
 As Received
 As Received
 As Received
 Filtered
 Filtered
 As Received
 As Received
 Filtered
 Filtered
 Air Dried & Ground



Client: SOCOTEC Geotechnical
Project Name: Heath Port Talbot FAS
Project No: 22011124
Date Issued: 10/02/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes.
The report notes are as follows:

<u>Letter</u>	<u>Note</u>
A	Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
B	The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
C	Due to matrix interference the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
D	A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
E	Due to recoveries beyond our calibration range and following the maximum size of dilution allowed, the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
F	Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
G	The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u>	<u>Description</u>
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e everything extracted by the solvent(s)
CU	Clean up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
+	Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Client: SOCOTEC Geotechnical
Project Name: Heath Port Talbot FAS
Project No: 22011124
Date Issued: 10/02/2022

Additional Information

This report refers to samples as received, and SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

In the accreditation column of analysis report the codes are as follows:

U = UKAS accredited analysis
M = MCERT accredited analysis
N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35° c.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full and with approval from the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis
NA = Sample is not amenable for the required analysis
ND = Results cannot be determined

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the Subcontracted lab for information regarding any deviancies for this analysis.

End of Certificate of Analysis



Environmental
Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22011389

Quote: BEC220124006 V1.1

Project Ref: H1069-21

Site: H1069-21 NPT FAS

Contact: Ruth Blair

Address: Unit 15, Crosby Yard
Wildmill
Bridgend
Mid Glamorgan
CF31 1JZ

E-Mail: Ruth.Blair@socotec.com

Phone: 07483 097285

No. Samples Received: 6

Date Received: 25/01/2022

Analysis Date: 09/02/2022

Date Issued: 09/02/2022

Job Status: Complete

Report Type: Final Version 01

This report supercedes any versions previously issued by the laboratory

Account Manager
Martin Elliott-Palmer
01283 554137

Authorised by the Operations Manager
Becky Batham



Client: SOCOTEC Geotechnical
Project Name: H1069-21
Project No: 22011389
Date Issued: 09/02/2022

Samples Analysed

<u>Sample Reference</u>	<u>Text ID</u>	<u>Sample Date</u>	<u>Sample Type</u>	
TP01-4-ES-0.70	22011389-001	19/01/2022 12:00:00	SOLID	
TP01-10-ES-1.90	22011389-002	19/01/2022 12:00:00	LPL	Soil Sample
TT04-2-ES-0.50	22011389-003	19/01/2022 12:00:00	SOLID	
TT04-3-ES-0.90	22011389-004	19/01/2022 12:00:00	SOLID	
BH2A-1-ES-0.30	22011389-005	19/01/2022 12:00:00	SOLID	
BH2A-3-ES-1.10	22011389-006	19/01/2022 12:00:00	SOLID	



Analysis Results

Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT FAS
Project No: 22011389
Date Issued: 09/02/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002		003		004	005
					Customer ID	TP01-4-ES-0.70		TP01-10-ES-1.90		TT04-2-ES-0.50		TT04-3-ES-0.90	BH2A-1-ES-0.30
					Sample Type	SOLID		LPL	SOLID	LPL	SOLID	SOLID	SOLID
					Sampling Date	19/01/2022		19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Ammoniacal Nitrogen as N	KONENS	0.01	mg/l	U				0.07		0.06			
Ammoniacal Nitrogen (Exchangeable) as N	AMMAR	0.5	mg/kg^	UM		<0.64			<0.64		<0.57	<0.61	<0.60
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N				<0.200 D		<0.200 D			
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N				<0.200 D		<0.200 D			
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N				<0.005		<0.005			
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N				<0.200 D		<0.200 D			
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.02	mg/l	N				<0.020		<0.020			
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N				<0.200 D		<0.200 D			
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N				<0.005		<0.005			
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.1	mg/l	U				0.228		<0.200 D			
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.256			<0.256		<0.230	<0.244	<0.240
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.256			<0.256		<0.230	<0.244	<0.240
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM		<0.013			<0.013		<0.012	<0.012	<0.012
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.256			<0.256		<0.230	<0.244	<0.240
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.04	mg/kg^	UM		<0.052			<0.052		<0.047	<0.049	<0.048
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.256			<0.256		<0.230	<0.244	<0.240
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM		<0.013			<0.013		<0.012	<0.012	<0.012
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.2	mg/kg^	UM		0.260			<0.256		<0.230	<0.244	<0.240
pH	PHCONDW	1	pH units	U				10.9		9.4			



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT FAS
 Project No: 22011389
 Date Issued: 09/02/2022



					Sample ID	
					006	
					Customer ID	
					BH2A-3-ES-1.10	
					Sample Type	
					LPL	SOLID
					19/01/2022	19/01/2022
					Sampling Date	
Analysis	Method Code	MDL	Units	Accred.		
Ammoniacal Nitrogen as N	KONENS	0.01	mg/l	U	0.02	
Ammoniacal Nitrogen (Exchangeable) as N	AMMAR	0.5	mg/kg^	UM		<0.64
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.200 D	
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.200 D	
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N	<0.005	
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.200 D	
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.02	mg/l	N	<0.020	
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.200 D	
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N	<0.005	
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.1	mg/l	U	<0.200 D	
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.256
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.256
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM		<0.013
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.256
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.04	mg/kg^	UM		<0.052
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.256
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM		<0.013
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.256
pH	PHCONDW	1	pH units	U	9.8	

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001	002	003	004	005
					Customer ID	TP01-4-ES-0.70	TP01-10-ES-1.90	TT04-2-ES-0.50	TT04-3-ES-0.90	BH2A-1-ES-0.30
					Sample Type	SOLID	LPL	SOLID	LPL	SOLID
					Sampling Date	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM		8.1	7.8	8.4	8.0	8.4
Chromium (VI) as Cr	KONENS	0.003	mg/l	U			<0.003	<0.003		
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N		<0.1	<0.1	<0.1	<0.1	<0.1
Nitrite as N	KONENS	0.01	mg/l	U			0.10	<0.01		
Nitrate as N	KONENS	0.2	mg/l	U			29.9	16.4		
Nitrite as N	KONENS	0.02	mg/kg^	N		0.33	0.96	0.48	0.30	0.62
Nitrate as N	KONENO3	0.4	mg/kg^	N		103	115	>52.0 E	49.5	19.6
Complex Cyanide	SFAPI	0.02	mg/l	U			<0.02	<0.02		
Complex Cyanide	SFAPI	0.5	mg/kg^	UM		<0.6	<0.6	<0.6	<0.6	<0.6
Free Cyanide	SFAPI	0.02	mg/l	U			0.02	<0.02		
Free Cyanide	SFAPI	0.5	mg/kg^	UM		<0.6	<0.6	<0.6	<0.6	<0.6
Phenol Index	SFAPI	0.05	mg/l	U			<0.05	<0.05		
Phenol Index	SFAPI	0.5	mg/kg^	U		<0.6	<0.6	<0.6	<0.6	<0.6
Sulphide as S	SFAPI	0.02	mg/l	U			<0.02	<0.02		
Sulphide as S	SFAPI	0.5	mg/kg^	N		<0.6	<0.6	<0.6	<0.6	<0.6
Total Cyanide	SFAPI	0.02	mg/l	U			<0.02	<0.02		
Total Cyanide	SFAPI	0.5	mg/kg^	UM		<0.6	<0.6	<0.6	<0.6	<0.6
COD (Filtered)	WSLM11	5	mg/l	N			26	10		
Soil Organic Matter	WSLM59	0.04	% m/m^	U		>43.0* E	>43.0* E	40.8	33.1	37.9



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					Sample ID	
					006	
					Customer ID	
					BH2A-3-ES-1.10	
					Sample Type	
					LPL	SOLID
					19/01/2022	19/01/2022
					Sampling Date	
Analysis	Method Code	MDL	Units	Accred.		
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM		8.1
Chromium (VI) as Cr	KONENS	0.003	mg/l	U	<0.003	
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N		<0.1
Nitrite as N	KONENS	0.01	mg/l	U	0.02	
Nitrate as N	KONENS	0.2	mg/l	U	19.8	
Nitrite as N	KONENS	0.02	mg/kg^	N		0.66
Nitrate as N	KONENO3	0.4	mg/kg^	N		92.1
Complex Cyanide	SFAPI	0.02	mg/l	U	<0.02	
Complex Cyanide	SFAPI	0.5	mg/kg^	UM		<0.6
Free Cyanide	SFAPI	0.02	mg/l	U	<0.02	
Free Cyanide	SFAPI	0.5	mg/kg^	UM		<0.6
Phenol Index	SFAPI	0.05	mg/l	U	<0.05	
Phenol Index	SFAPI	0.5	mg/kg^	U		<0.6
Sulphide as S	SFAPI	0.02	mg/l	U	<0.02	
Sulphide as S	SFAPI	0.5	mg/kg^	N		<0.6
Total Cyanide	SFAPI	0.02	mg/l	U	<0.02	
Total Cyanide	SFAPI	0.5	mg/kg^	UM		<0.6
COD (Filtered)	WSLM11	5	mg/l	N	5	
Soil Organic Matter	WSLM59	0.04	% m/m^	U		>43.0* E



Analysis Results

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Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002		003		004	005
					Customer ID	TP01-4-ES-0.70		TP01-10-ES-1.90		TT04-2-ES-0.50		TT04-3-ES-0.90	BH2A-1-ES-0.30
					Sample Type	SOLID		LPL	SOLID	LPL	SOLID	SOLID	SOLID
					Sampling Date	19/01/2022		19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
BOD (Leached 5 Day)	WSLM20	1	mg O2/l	N		3.1				7.9			
Antimony as Sb	ICPMSS	0.1	mg/kg^	U		3.7		2.0		1.6		3.2	3.2
Arsenic as As	ICPMSS	0.3	mg/kg^	UM		57.6		64.1		35.9		44.3	32.1
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM		0.5		0.5		1.1		1.4	1.5
Copper as Cu	ICPMSS	1.6	mg/kg^	UM		180.2		307.3		140.7		157.5	352.3
Lead as Pb	ICPMSS	0.7	mg/kg^	UM		178.7		117.4		175.4		300.6	182.2
Manganese as Mn	ICPMSS	1	mg/kg^	UM		798.8		479.6		646.7		855.4	1025
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM		<0.5		<0.5		<0.5		<0.5	<0.5
Molybdenum as Mo	ICPMSS	0.5	mg/kg^	UM		5.8		4.5		2.0		2.4	7.5
Nickel as Ni	ICPMSS	2	mg/kg^	UM		38.0		30.8		21.6		27.1	69.6
Selenium as Se	ICPMSS	0.5	mg/kg^	UM		0.5		<0.5		<0.5		<0.5	0.6
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM		9.9		9.9		16.8		50.0	28.9
Vanadium as V	ICPMSS	0.6	mg/kg^	N		26.0		23.4		25.4		33.3	39.7
Zinc as Zn	ICPMSS	16	mg/kg^	UM		306.1		236.6		476.2		670.1	472.3
Aluminium as Al	ICPSOIL	10	mg/kg^	U		8710		8160		11200		9230	13600
Barium as Ba	ICPSOIL	0.5	mg/kg^	UM		486		358		263		232	679
Beryllium as Be	ICPSOIL	0.1	mg/kg^	U		1.14		0.81		0.69		0.45	1.62
Iron as Fe	ICPSOIL	36	mg/kg^	UM		90700		39400		24700		33700	88300
Magnesium as Mg	ICPSOIL	10	mg/kg^	U		3370		3610		5640		3430	6450



Analysis Results

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					Sample ID	006	
					Customer ID	BH2A-3-ES-1.10	
					Sample Type	LPL	SOLID
					Sampling Date	19/01/2022	19/01/2022
					Analysis	Method Code	MDL
BOD (Leached 5 Day)	WSLM20	1	mg O2/l	N	6.8		
Antimony as Sb	ICPMSS	0.1	mg/kg^	U		2.5	
Arsenic as As	ICPMSS	0.3	mg/kg^	UM		51.2	
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM		0.7	
Copper as Cu	ICPMSS	1.6	mg/kg^	UM		216.7	
Lead as Pb	ICPMSS	0.7	mg/kg^	UM		163.6	
Manganese as Mn	ICPMSS	1	mg/kg^	UM		670.9	
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM		<0.5	
Molybdenum as Mo	ICPMSS	0.5	mg/kg^	UM		4.9	
Nickel as Ni	ICPMSS	2	mg/kg^	UM		45.4	
Selenium as Se	ICPMSS	0.5	mg/kg^	UM		<0.5	
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM		13.7	
Vanadium as V	ICPMSS	0.6	mg/kg^	N		30.3	
Zinc as Zn	ICPMSS	16	mg/kg^	UM		240.3	
Aluminium as Al	ICPSOIL	10	mg/kg^	U		14000	
Barium as Ba	ICPSOIL	0.5	mg/kg^	UM		1200	
Beryllium as Be	ICPSOIL	0.1	mg/kg^	U		1.51	
Iron as Fe	ICPSOIL	36	mg/kg^	UM		66700	
Magnesium as Mg	ICPSOIL	10	mg/kg^	U		5490	



Analysis Results

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Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002		003		004	005
					Customer ID	TP01-4-ES-0.70		TP01-10-ES-1.90		TT04-2-ES-0.50		TT04-3-ES-0.90	BH2A-1-ES-0.30
					Sample Type	SOLID		LPL	SOLID	LPL	SOLID	SOLID	SOLID
					Sampling Date	19/01/2022		19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Boron as B	ICPBOR	0.5	mg/kg^	UM		<0.5		<0.5		0.5		<0.5	0.8
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM		478		348		168		80	538
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM		1380		2980		905		671	1740
Antimony as Sb	ICPMSW (Dissolved)	0.001	mg/l	U				0.002		0.003			
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U				0.018		0.029			
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U				<0.00002		<0.00002			
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U				0.005		0.003			
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U				0.032		0.017			
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U				<0.001		<0.001			
Manganese as Mn	ICPMSW (Dissolved)	0.002	mg/l	U				<0.002		<0.002			
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U				0.00003		0.00013			
Molybdenum as Mo	ICPMSW (Dissolved)	0.001	mg/l	U				0.155		0.044			
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U				<0.001		0.001			
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U				0.015		0.003			
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U				0.016		0.011			
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U				<0.002		<0.002			
Aluminium as Al	ICPWATVAR (Dissolved)	0.01	mg/l	U				0.45		0.06			
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U				0.12		0.07			
Beryllium as Be	ICPWATVAR (Dissolved)	0.01	mg/l	N				<0.01		<0.01			



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					Sample ID	
					006	
					Customer ID	
					BH2A-3-ES-1.10	
					Sample Type	
					LPL	SOLID
					19/01/2022	19/01/2022
					Sampling Date	
Analysis	Method Code	MDL	Units	Accred.		
Boron as B	ICPBOR	0.5	mg/kg^	UM		0.6
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM		298
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM		1980
Antimony as Sb	ICPMSW (Dissolved)	0.001	mg/l	U	0.002	
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U	0.012	
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U	<0.00002	
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U	0.003	
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U	0.008	
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001	
Manganese as Mn	ICPMSW (Dissolved)	0.002	mg/l	U	<0.002	
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U	<0.00003	
Molybdenum as Mo	ICPMSW (Dissolved)	0.001	mg/l	U	0.091	
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U	0.001	
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U	0.006	
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U	0.009	
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U	<0.002	
Aluminium as Al	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.09	
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.10	
Beryllium as Be	ICPWATVAR (Dissolved)	0.01	mg/l	N	<0.01	

					Sample ID	001	002		003		004	005
					Customer ID	TP01-4-ES-0.70	TP01-10-ES-1.90		TT04-2-ES-0.50		TT04-3-ES-0.90	BH2A-1-ES-0.30
					Sample Type	SOLID	LPL	SOLID	LPL	SOLID	SOLID	SOLID
					Sampling Date	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analysis	Method Code	MDL	Units	Accred.								
Boron as B	ICPWATVAR (Dissolved)	0.01	mg/l	U			0.05		0.04			
Iron as Fe	ICPWATVAR (Dissolved)	0.01	mg/l	U			<0.01		<0.01			
Magnesium as Mg	ICPWATVAR (Dissolved)	1	mg/l	U			<1		1			
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U			267		78			
MTBE	BTEXHSA	10	µg/l	N			<10		<10			
MTBE	BTEXHSA	20	µg/kg^	U		<26		<26		<23	<24	<24
Benzene HS_1D_AR	BTEXHSA	5	µg/l	N			<5		<5			
Ethylbenzene HS_1D_AR	BTEXHSA	5	µg/l	N			<5		<5			
m/p-Xylene HS_1D_AR	BTEXHSA	10	µg/l	N			<10		<10			
o-Xylene HS_1D_AR	BTEXHSA	5	µg/l	N			<5		<5			
Toluene HS_1D_AR	BTEXHSA	5	µg/l	N			<5		<5			
Benzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM		<13		<13		<12	<12	<12
Ethylbenzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM		<13		<13		<12	<12	<12
m/p-Xylene HS_1D_AR	BTEXHSA	20	µg/kg^	UM		<26		<26		<23	<24	<24
o-Xylene HS_1D_AR	BTEXHSA	10	µg/kg^	UM		<13		<13		<12	<12	<12
Toluene HS_1D_AR	BTEXHSA	10	µg/kg^	UM		<13		<13		<12	<12	<12
Acenaphthene	PAHMSW	0.01	µg/l	U			<0.01		<0.01			
Acenaphthylene	PAHMSW	0.01	µg/l	U			<0.01		<0.01			
Anthracene	PAHMSW	0.01	µg/l	U			<0.01* B		<0.01* B			



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					Sample ID	
					006	
					Customer ID	
					BH2A-3-ES-1.10	
					Sample Type	
					LPL	SOLID
					19/01/2022	19/01/2022
					Sampling Date	
Analysis	Method Code	MDL	Units	Accred.		
Boron as B	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.04	
Iron as Fe	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.01	
Magnesium as Mg	ICPWATVAR (Dissolved)	1	mg/l	U	2	
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U	163	
MTBE	BTEXHSA	10	µg/l	N	<10	
MTBE	BTEXHSA	20	µg/kg^	U		<26
Benzene HS_1D_AR	BTEXHSA	5	µg/l	N	<5	
Ethylbenzene HS_1D_AR	BTEXHSA	5	µg/l	N	<5	
m/p-Xylene HS_1D_AR	BTEXHSA	10	µg/l	N	<10	
o-Xylene HS_1D_AR	BTEXHSA	5	µg/l	N	<5	
Toluene HS_1D_AR	BTEXHSA	5	µg/l	N	<5	
Benzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM		<13
Ethylbenzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM		<13
m/p-Xylene HS_1D_AR	BTEXHSA	20	µg/kg^	UM		<26
o-Xylene HS_1D_AR	BTEXHSA	10	µg/kg^	UM		<13
Toluene HS_1D_AR	BTEXHSA	10	µg/kg^	UM		<13
Acenaphthene	PAHMSW	0.01	µg/l	U	0.02	
Acenaphthylene	PAHMSW	0.01	µg/l	U	<0.01	
Anthracene	PAHMSW	0.01	µg/l	U	<0.01* B	

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002		003		004	005
					Customer ID	TP01-4-ES-0.70		TP01-10-ES-1.90		TT04-2-ES-0.50		TT04-3-ES-0.90	BH2A-1-ES-0.30
					Sample Type	SOLID		LPL	SOLID	LPL	SOLID	SOLID	SOLID
					Sampling Date	19/01/2022		19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Benzo[a]anthracene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Benzo[a]pyrene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Benzo[b]fluoranthene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Benzo[g,h,i]perylene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Benzo[k]fluoranthene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Chrysene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Coronene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Dibenzo[a,h]anthracene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Fluoranthene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Fluorene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Naphthalene	PAHMSW	0.01	µg/l	U			0.02			0.01			
Phenanthrene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Pyrene	PAHMSW	0.01	µg/l	U			<0.01			<0.01			
Total PAH 16	PAHMSW	0.16	µg/l	U			0.17			0.16			
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM		0.16			0.11		1.28	0.84	<0.10
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U		0.17			<0.10		0.64	0.58	0.10
Anthracene	PAHMSUS	0.08	mg/kg^	U		0.36			0.37		3.77	2.57	0.19
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM		1.06			0.79		21.0	12.2	0.59

					Sample ID	006	
					Customer ID	BH2A-3-ES-1.10	
					Sample Type	LPL	SOLID
					Sampling Date	19/01/2022	19/01/2022
Analysis	Method Code	MDL	Units	Accred.			
Benzo[a]anthracene	PAHMSW	0.01	µg/l	U	<0.01		
Benzo[a]pyrene	PAHMSW	0.01	µg/l	U	<0.01		
Benzo[b]fluoranthene	PAHMSW	0.01	µg/l	U	<0.01		
Benzo[g,h,i]perylene	PAHMSW	0.01	µg/l	U	<0.01		
Benzo[k]fluoranthene	PAHMSW	0.01	µg/l	U	<0.01		
Chrysene	PAHMSW	0.01	µg/l	U	<0.01		
Coronene	PAHMSW	0.01	µg/l	U	<0.01		
Dibenzo[a,h]anthracene	PAHMSW	0.01	µg/l	U	<0.01		
Fluoranthene	PAHMSW	0.01	µg/l	U	<0.01		
Fluorene	PAHMSW	0.01	µg/l	U	<0.01		
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	µg/l	U	<0.01		
Naphthalene	PAHMSW	0.01	µg/l	U	0.04		
Phenanthrene	PAHMSW	0.01	µg/l	U	<0.01		
Pyrene	PAHMSW	0.01	µg/l	U	<0.01		
Total PAH 16	PAHMSW	0.16	µg/l	U	0.20		
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM			0.11
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U			0.19
Anthracene	PAHMSUS	0.08	mg/kg^	U			0.36
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM			0.77

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002		003		004	005
					Customer ID	TP01-4-ES-0.70		TP01-10-ES-1.90		TT04-2-ES-0.50		TT04-3-ES-0.90	BH2A-1-ES-0.30
					Sample Type	SOLID		LPL	SOLID	LPL	SOLID	SOLID	SOLID
					Sampling Date	19/01/2022		19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM		0.92			0.69		17.1	10.3	0.59
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM		2.03			1.49		30.9	18.7	1.01
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM		0.60			0.48		9.90	6.30	0.47
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM		0.64			0.59		10.4	6.49	0.36
Chrysene	PAHMSUS	0.08	mg/kg^	UM		1.88			1.31		23.8	14.1	0.77
Coronene	PAHMSUS	0.08	mg/kg^	N		0.18			0.16		2.01	1.48	0.15
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM		0.31			0.28		4.72	2.90	0.14
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM		2.08			1.63		30.2	18.1	1.14
Fluorene	PAHMSUS	0.08	mg/kg^	UM		0.22			0.15		0.92	0.68	<0.10
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM		0.85			0.68		14.4	8.99	0.52
Naphthalene	PAHMSUS	0.08	mg/kg^	UM		1.88			1.21		5.58	5.21	0.29
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM		3.41			2.29		14.4	11.0	0.66
Pyrene	PAHMSUS	0.08	mg/kg^	UM		1.43			1.13		20.9	13.1	0.98
Total PAH 16	PAHMSUS	1.28	mg/kg^	U		18.0			13.3		210	132	8.00
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U				<0.01		<0.01			
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U				<0.01		<0.01			
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U				<0.01		<0.01			
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U				<0.01		<0.01			
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U				0.01		<0.01			



Analysis Results

Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT FAS
 Project No: 22011389
 Date Issued: 09/02/2022



					Sample ID	
					006	
					Customer ID	
					BH2A-3-ES-1.10	
					Sample Type	
					LPL	SOLID
					19/01/2022	19/01/2022
					Sampling Date	
Analysis	Method Code	MDL	Units	Accred.		
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM		0.66
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM		1.37
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM		0.41
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM		0.47
Chrysene	PAHMSUS	0.08	mg/kg^	UM		1.19
Coronene	PAHMSUS	0.08	mg/kg^	N		0.12
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM		0.20
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM		1.56
Fluorene	PAHMSUS	0.08	mg/kg^	UM		0.15
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM		0.57
Naphthalene	PAHMSUS	0.08	mg/kg^	UM		1.42
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM		2.17
Pyrene	PAHMSUS	0.08	mg/kg^	UM		1.08
Total PAH 16	PAHMSUS	1.28	mg/kg^	U		12.7
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01	
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01	
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01	
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01	
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01	



Analysis Results

Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT FAS
Project No: 22011389
Date Issued: 09/02/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001	002	003	004	005
					Customer ID	TP01-4-ES-0.70	TP01-10-ES-1.90	TT04-2-ES-0.50	TT04-3-ES-0.90	BH2A-1-ES-0.30
					Sample Type	SOLID	LPL	SOLID	LPL	SOLID
					Sampling Date	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<5.12	<5.13	<4.59	<4.88	<4.80
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<5.12	<5.13	<4.59	<4.88	6.45
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<5.12	<5.13	17.1	<4.88	16.3
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	10	mg/kg^	U		<12.8	<12.8	104	<12.2	150
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	20	mg/kg^	U		<25.6	<25.6	135	<24.4	196
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U			<0.01	<0.01		
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U			<0.01	<0.01		
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U			<0.01* _B	<0.01* _B		
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U			0.01	<0.01		
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U			0.02	0.01		
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		<5.12	<5.13	6.55	7.76	<4.80
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		<5.12	<5.13	22.1	22.8	5.81
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		6.48	6.86	94.0	92.7	17.1
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	10	mg/kg^	U		<12.8	<12.8	317	279	244
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	20	mg/kg^	U		<25.6	<25.6	450	413	287
Total Moisture at 35°C	CLANDPREP	0.1	%	N		21.8	22.0	12.9	18.1	16.7
Description of Solid Material	CLANDPREP		-	N		SILT	SILT	SILT	SILT	SILT
Equivalent Weight of Dry Material (kg)	Leachate Prep CEN 2:1		kg	N			0.400	0.400		
Fraction above 4 mm (%)	Leachate Prep CEN 2:1		%	N			100	100		



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT FAS
 Project No: 22011389
 Date Issued: 09/02/2022



					Sample ID	
					006	
					Customer ID	
					BH2A-3-ES-1.10	
					Sample Type	
					LPL	SOLID
					19/01/2022	19/01/2022
					Sampling Date	
Analysis	Method Code	MDL	Units	Accred.		
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<5.12
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<5.12
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<5.12
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	10	mg/kg^	U		<12.8
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	20	mg/kg^	U		<25.6
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.01	
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.01	
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.01* B	
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.01	
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	0.01	
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		<5.12
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		13.4
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		20.9
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	10	mg/kg^	U		31.1
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	20	mg/kg^	U		71.3
Total Moisture at 35°C	CLANDPREP	0.1	%	N		21.8
Description of Solid Material	CLANDPREP		-	N		SILT
Equivalent Weight of Dry Material (kg)	Leachate Prep CEN 2:1		kg	N		0.400
Fraction above 4 mm (%)	Leachate Prep CEN 2:1		%	N		100



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT FAS
 Project No: 22011389
 Date Issued: 09/02/2022



					Sample ID	001	002		003		004	005
					Customer ID	TP01-4-ES-0.70	TP01-10-ES-1.90		TT04-2-ES-0.50		TT04-3-ES-0.90	BH2A-1-ES-0.30
					Sample Type	SOLID	LPL	SOLID	LPL	SOLID	SOLID	SOLID
					Sampling Date	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analysis	Method Code	MDL	Units	Accred.								
Fraction of non-crushable material (%)	Leachate Prep CEN 2:1		%	N			0		0			
Volume of Water for 2:1 Leach (ltr)	Leachate Prep CEN 2:1		l	N			0.703		0.722			
Weight of Sample Leached (kg)	Leachate Prep CEN 2:1		kg	N			0.497		0.478			
Asbestos Identification	SUB020		-	N	NAIIS		NAIIS		NAIIS		NAIIS	NAIIS



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT FAS
 Project No: 22011389
 Date Issued: 09/02/2022



					Sample ID	006
					Customer ID	BH2A-3-ES-1.10
					Sample Type	LPL SOLID
					Sampling Date	19/01/2022 19/01/2022
Analysis	Method Code	MDL	Units	Accred.		
Fraction of non-crushable material (%)	Leachate Prep CEN 2:1		%	N		0
Volume of Water for 2:1 Leach (ltr)	Leachate Prep CEN 2:1		l	N		0.678
Weight of Sample Leached (kg)	Leachate Prep CEN 2:1		kg	N		0.522
Asbestos Identification	SUB020		-	N		NAIIS

CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: SOCOTEC UK Ltd
Environmental Chemistry
PO Box 100
Burton upon Trent
Staffordshire
DE15 0XD

CONTRACT NO: S23221-1

DATE OF ISSUE: 02.02.22

DATE SAMPLES RECEIVED: 26.01.22

DATE ANALYSIS COMPLETED: 01.02.22

DESCRIPTION: Six soil/loose aggregate samples each weighing approximately 0.8-1.1kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of soil/loose aggregate samples for mass determination of asbestos.

METHODS:

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

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies *et al*, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in any of the soil samples by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.





CONTRACT NO: S23221-1
DATE OF ISSUE: 02.02.22

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 22011389

IOM sample number	SOCOTEC Sample ID	Client Sample ID	ACM type detected	PLM result
S87623	22011389-001-15	TP01-4-ES-0.70	-	No Asbestos Detected
S87624	22011389-002-28	TP01-10-ES-1.90	-	No Asbestos Detected
S87625	22011389-003-28	TT04-2-ES-0.50	-	No Asbestos Detected
S87626	22011389-004-15	TT04-3-ES-0.90	-	No Asbestos Detected
S87627	22011389-005-15	BH2A-1-ES-0.30	-	No Asbestos Detected
S87628	22011389-006-28	BH2A-3-ES-1.10	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.

AUTHORISED BY:

J Simpson
Senior Laboratory Analyst



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT FAS
 Project No: 22011389
 Date Issued: 09/02/2022

Deviating Sample Report

Sample Reference	Text ID	Reported Name	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time
TP01-4-ES-0.70	22011389-001	GROHSA/BTEXHSA						✓
TP01-4-ES-0.70	22011389-001	BTEXHSA						✓
TP01-10-ES-1.90	22011389-002	GROHSA/BTEXHSA						✓
TP01-10-ES-1.90	22011389-002	BTEXHSA						✓
TT04-2-ES-0.50	22011389-003	GROHSA/BTEXHSA						✓
TT04-2-ES-0.50	22011389-003	BTEXHSA						✓
TT04-3-ES-0.90	22011389-004	GROHSA/BTEXHSA						✓
TT04-3-ES-0.90	22011389-004	BTEXHSA						✓
BH2A-1-ES-0.30	22011389-005	GROHSA/BTEXHSA						✓
BH2A-1-ES-0.30	22011389-005	BTEXHSA						✓
BH2A-3-ES-1.10	22011389-006	GROHSA/BTEXHSA						✓
BH2A-3-ES-1.10	22011389-006	BTEXHSA						✓



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT FAS
 Project No: 22011389
 Date Issued: 09/02/2022

Analysis Method

<u>Analysis</u>	<u>Analysis Type</u>	<u>Analysis Method</u>
AMMAR	INORGANIC	As Received
BTEXHSA	ORGANIC	Unfiltered
CLANDPREP	PHYS	As Received
GROHSA/BTEXHSA	ORGANIC	Filtered
ICPACIDS	METALS	Air Dried & Ground
ICPBOR	METALS	Air Dried & Ground
ICPMSS	METALS	Air Dried & Ground
ICPMSW (Dissolved)	METALS	Filtered
ICPSOIL	METALS	Air Dried & Ground
ICPWATVAR (Dissolved)	METALS	Filtered
ICPWSS	METALS	Air Dried & Ground
KONENO3	INORGANIC	Air Dried & Ground
KONENS	INORGANIC	Air Dried & Ground
Leachate Prep CEN 2:1	PHYS	As Received
PAHMSUS	ORGANIC	As Received
PAHMSW	ORGANIC	Filtered
PHCONDW	INORGANIC	Filtered
PHSOIL	INORGANIC	As Received
SFAPI	INORGANIC	As Received
SUB020	SUBCON	
TPHFID (Aliphatic)	ORGANIC	Filtered
TPHFID (Aromatic)	ORGANIC	Filtered
TPHFIDUS (Aliphatic)	ORGANIC	As Received
TPHFIDUS (Aromatic)	ORGANIC	As Received
WSLM11	INORGANIC	Filtered
WSLM20	INORGANIC	Filtered
WSLM59	INORGANIC	Air Dried & Ground



Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT FAS
Project No: 22011389
Date Issued: 09/02/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes.
The report notes are as follows:

<u>Letter</u>	<u>Note</u>
A	Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
B	The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
C	Due to matrix interference the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
D	A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
E	Due to recoveries beyond our calibration range and following the maximum size of dilution allowed, the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
F	Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
G	The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u>	<u>Description</u>
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e everything extracted by the solvent(s)
CU	Clean up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
+	Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT FAS
Project No: 22011389
Date Issued: 09/02/2022

Additional Information

This report refers to samples as received, and SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

In the accreditation column of analysis report the codes are as follows:

U = UKAS accredited analysis
M = MCERT accredited analysis
N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35° c.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full and with approval from the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis
NA = Sample is not amenable for the required analysis
ND = Results cannot be determined

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the Subcontracted lab for information regarding any deviancies for this analysis.

End of Certificate of Analysis



Environmental
Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22011523

Quote: BEC220124006 V1.1

Project Ref: H1069-21

Site: H1069-21 NPT

Contact: Ruth Blair

Address: Unit 15, Crosby Yard
Wildmill
Bridgend
Mid Glamorgan
CF31 1JZ

E-Mail: Ruth.Blair@socotec.com

Phone: 07483 097285

No. Samples Received: 2

Date Received: 26/01/2022

Analysis Date: 10/02/2022

Date Issued: 11/02/2022

Report Type: Final Version 01

This report supercedes any versions previously issued by the laboratory

Account Manager
Martin Elliott-Palmer
01283 554137

Authorised by the Operations Manager
Becky Batham



Client: SOCOTEC Geotechnical
Project Name: H1069-21
Project No: 22011523
Date Issued: 11/02/2022

Samples Analysed

<u>Sample Reference</u>	<u>Text ID</u>	<u>Sample Date</u>	<u>Sample Type</u>
TT01-2-ES-0.80	22011523-001	20/01/2022 00:00:00	SOLID
TT01-3-ES-1.20	22011523-002	20/01/2022 00:00:00	SOLID



Analysis Results

Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT
Project No: 22011523
Date Issued: 11/02/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002
					Customer ID	TT01-2-ES-0.80		TT01-3-ES-1.20
					Sample Type	LPL	SOLID	SOLID
					Sampling Date	20/01/2022	20/01/2022	20/01/2022
Ammoniacal Nitrogen as N	KONENS	0.01	mg/l	U		0.60		
Ammoniacal Nitrogen (Exchangeable) as N	AMMAR	0.5	mg/kg^	UM			<0.50*	<0.54*
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N		<0.200 _D		
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N		<0.200 _D		
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N		<0.005		
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N		<0.200 _D		
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.02	mg/l	N		<0.020		
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N		<0.200 _D		
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N		<0.005		
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.1	mg/l	U		<0.200 _D		
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM			<0.200* _B	<0.217* _B
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM			<0.200*	<0.217*
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM			<0.010*	<0.011*
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM			<0.200*	<0.217*
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.04	mg/kg^	UM			<0.040*	<0.044*
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM			<0.200*	<0.217*
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM			<0.010*	<0.011*
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.2	mg/kg^	UM			<0.200*	<0.217*
pH	PHCONDW	1	pH units	U		7.5		

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001	002
					Customer ID	TT01-2-ES-0.80	TT01-3-ES-1.20
					Sample Type	LPL	SOLID
					Sampling Date	20/01/2022	20/01/2022
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM		8.7*	8.4*
Chromium (VI) as Cr	KONENS	0.003	mg/l	U	<0.003		
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N		<0.1	<0.1
Nitrite as N	KONENS	0.01	mg/l	U	0.02		
Nitrate as N	KONENS	0.2	mg/l	U	3.82		
Nitrite as N	KONENS	0.02	mg/kg^	N		0.67	0.08
Nitrate as N	KONENO3	0.4	mg/kg^	N		9.7	7.8
Complex Cyanide	SFAPI	0.02	mg/l	U	<0.03		
Complex Cyanide	SFAPI	0.5	mg/kg^	UM		<0.5*	<0.5*
Free Cyanide	SFAPI	0.02	mg/l	U	0.04		
Free Cyanide	SFAPI	0.5	mg/kg^	UM		<0.5*	<0.5*
Phenol Index	SFAPI	0.05	mg/l	U	<0.05		
Phenol Index	SFAPI	0.5	mg/kg^	U		<0.5*	Pending
Sulphide as S	SFAPI	0.02	mg/l	U	<0.02		
Sulphide as S	SFAPI	0.5	mg/kg^	N		<0.5	4.3
Total Cyanide	SFAPI	0.02	mg/l	U	0.03		
Total Cyanide	SFAPI	0.5	mg/kg^	UM		<0.5*	<0.5*
COD (Filtered)	WSLM11	5	mg/l	N	32		
Soil Organic Matter	WSLM59	0.04	% m/m^	U		1.59*	6.41*

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002
					Customer ID	TT01-2-ES-0.80		TT01-3-ES-1.20
					Sample Type	LPL	SOLID	SOLID
					Sampling Date	20/01/2022	20/01/2022	20/01/2022
BOD (Leached 5 Day)	WSLM20	1	mg O2/l	N		>11.2 F		
Antimony as Sb	ICPMSS	0.1	mg/kg^	U			30.1*	123.5*
Arsenic as As	ICPMSS	0.3	mg/kg^	UM			10.4*	459.8*
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM			11.2*	32.3*
Copper as Cu	ICPMSS	1.6	mg/kg^	UM			45.3*	1311*
Lead as Pb	ICPMSS	0.7	mg/kg^	UM			142.3*	3837*
Manganese as Mn	ICPMSS	1	mg/kg^	UM			138.6*	767.9*
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM			<0.5*	2.7*
Molybdenum as Mo	ICPMSS	0.5	mg/kg^	UM			1.8*	6.9*
Nickel as Ni	ICPMSS	2	mg/kg^	UM			5.9*	75.5*
Selenium as Se	ICPMSS	0.5	mg/kg^	UM			<0.5*	3.1*
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM			8.4*	24.9*
Vanadium as V	ICPMSS	0.6	mg/kg^	N			6.3	42.8
Zinc as Zn	ICPMSS	16	mg/kg^	UM			679.4*	4938*
Aluminium as Al	ICPSOIL	10	mg/kg^	U			1730*	8720*
Barium as Ba	ICPSOIL	0.5	mg/kg^	UM			253*	404*
Beryllium as Be	ICPSOIL	0.1	mg/kg^	U			<0.10*	0.91*
Iron as Fe	ICPSOIL	36	mg/kg^	UM			1860*	67100*
Magnesium as Mg	ICPSOIL	10	mg/kg^	U			2280*	2490*

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002
					Customer ID	TT01-2-ES-0.80		TT01-3-ES-1.20
					Sample Type	LPL	SOLID	SOLID
					Sampling Date	20/01/2022	20/01/2022	20/01/2022
Boron as B	ICPBOR	0.5	mg/kg^	UM			1.5*	1.0*
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM			2450*	787*
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM			6590*	3250*
Antimony as Sb	ICPMSW (Dissolved)	0.001	mg/l	U	0.097			
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U	0.011			
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U	0.00017			
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U	0.005			
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U	0.017			
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001			
Manganese as Mn	ICPMSW (Dissolved)	0.002	mg/l	U	0.009			
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U	<0.00003			
Molybdenum as Mo	ICPMSW (Dissolved)	0.001	mg/l	U	0.040			
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U	0.001			
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U	0.004			
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U	0.002			
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U	<0.002			
Aluminium as Al	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.09			
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.06			
Beryllium as Be	ICPWATVAR (Dissolved)	0.01	mg/l	N	<0.01			



Analysis Results

Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT
 Project No: 22011523
 Date Issued: 11/02/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002
					Customer ID	TT01-2-ES-0.80		TT01-3-ES-1.20
					Sample Type	LPL	SOLID	SOLID
					Sampling Date	20/01/2022	20/01/2022	20/01/2022
Boron as B	ICPWATVAR (Dissolved)	0.01	mg/l	U		0.08		
Iron as Fe	ICPWATVAR (Dissolved)	0.01	mg/l	U		1.28		
Magnesium as Mg	ICPWATVAR (Dissolved)	1	mg/l	U		5		
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U		205		
MTBE	BTEXHSA	10	µg/l	N		<10		
MTBE	BTEXHSA	20	µg/kg^	U			<20*	<22*
Benzene HS_1D_AR	BTEXHSA	5	µg/l	N		<5		
Ethylbenzene HS_1D_AR	BTEXHSA	5	µg/l	N		<5		
m/p-Xylene HS_1D_AR	BTEXHSA	10	µg/l	N		<10		
o-Xylene HS_1D_AR	BTEXHSA	5	µg/l	N		<5		
Toluene HS_1D_AR	BTEXHSA	5	µg/l	N		<5		
Benzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<10*	<11*
Ethylbenzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<10*	<11*
m/p-Xylene HS_1D_AR	BTEXHSA	20	µg/kg^	UM			<20*	<22*
o-Xylene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<10*	<11*
Toluene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<10*	<11*
Acenaphthene	PAHMSW	0.01	µg/l	U		0.14		
Acenaphthylene	PAHMSW	0.01	µg/l	U		0.04		
Anthracene	PAHMSW	0.01	µg/l	U		<0.01* B		

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002
					Customer ID	TT01-2-ES-0.80		TT01-3-ES-1.20
					Sample Type	LPL	SOLID	SOLID
					Sampling Date	20/01/2022	20/01/2022	20/01/2022
Benzo[a]anthracene	PAHMSW	0.01	µg/l	U		<0.01		
Benzo[a]pyrene	PAHMSW	0.01	µg/l	U		<0.01		
Benzo[b]fluoranthene	PAHMSW	0.01	µg/l	U		<0.01		
Benzo[g,h,i]perylene	PAHMSW	0.01	µg/l	U		<0.01		
Benzo[k]fluoranthene	PAHMSW	0.01	µg/l	U		<0.01		
Chrysene	PAHMSW	0.01	µg/l	U		<0.01		
Coronene	PAHMSW	0.01	µg/l	U		<0.01		
Dibenzo[a,h]anthracene	PAHMSW	0.01	µg/l	U		<0.01		
Fluoranthene	PAHMSW	0.01	µg/l	U		<0.01		
Fluorene	PAHMSW	0.01	µg/l	U		0.07		
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	µg/l	U		<0.01		
Naphthalene	PAHMSW	0.01	µg/l	U		0.17		
Phenanthrene	PAHMSW	0.01	µg/l	U		0.04		
Pyrene	PAHMSW	0.01	µg/l	U		<0.01		
Total PAH 16	PAHMSW	0.16	µg/l	U		0.57		
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM			0.16*	<0.09*
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U			<0.08*	0.22*
Anthracene	PAHMSUS	0.08	mg/kg^	U			0.52*	0.57*
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM			0.64*	1.91*

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002
					Customer ID	TT01-2-ES-0.80		TT01-3-ES-1.20
					Sample Type	LPL	SOLID	SOLID
					Sampling Date	20/01/2022	20/01/2022	20/01/2022
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM			0.50*	1.68*
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM			0.63*	2.26*
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM			0.26*	0.84*
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM			0.27*	0.84*
Chrysene	PAHMSUS	0.08	mg/kg^	UM			0.74*	2.23*
Coronene	PAHMSUS	0.08	mg/kg^	N			<0.08	0.18
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM			<0.08*	0.29*
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM			1.46*	3.41*
Fluorene	PAHMSUS	0.08	mg/kg^	UM			0.22*	0.16*
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM			0.32*	1.13*
Naphthalene	PAHMSUS	0.08	mg/kg^	UM			0.12*	0.22*
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM			1.27*	1.60*
Pyrene	PAHMSUS	0.08	mg/kg^	UM			1.05*	2.55*
Total PAH 16	PAHMSUS	1.28	mg/kg^	U			8.34*	20.0*
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		<0.01		
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		<0.01		
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		<0.01		
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		<0.01		
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		0.02		



Analysis Results

Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT
Project No: 22011523
Date Issued: 11/02/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001		002
					Customer ID	TT01-2-ES-0.80		TT01-3-ES-1.20
					Sample Type	LPL	SOLID	SOLID
					Sampling Date	20/01/2022	20/01/2022	20/01/2022
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<4.00*		<4.34*
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<4.00*		<4.34*
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<4.00*		<4.34*
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	10	mg/kg^	U		10.3*		12.9*
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	20	mg/kg^	U		<20.0*		23.0*
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		<0.01		
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		<0.01		
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		<0.01* _B		
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		<0.01		
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		0.02		
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		<4.00*		<4.34*
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		<4.00*		<4.34*
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		<4.00*		14.6*
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	10	mg/kg^	U		11.1*		35.0*
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	20	mg/kg^	U		<20.0*		56.6*
Total Moisture at 35°C	CLANDPREP	0.1	%	N		<0.1		7.9
Description of Solid Material	CLANDPREP		-	N		GRAVEL		GRAVEL
Equivalent Weight of Dry Material (kg)	Leachate Prep CEN 2:1		kg	N		0.400		
Fraction above 4 mm (%)	Leachate Prep CEN 2:1		%	N		100		



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT
 Project No: 22011523
 Date Issued: 11/02/2022



					Sample ID		001	002
					Customer ID		TT01-2-ES-0.80	
					Sample Type		LPL	SOLID
					Sampling Date		20/01/2022	20/01/2022
Analysis	Method Code	MDL	Units	Accred.				
Fraction of non-crushable material (%)	Leachate Prep CEN 2:1		%	N			0	
Volume of Water for 2:1 Leach (ltr)	Leachate Prep CEN 2:1		l	N			0.790	
Weight of Sample Leached (kg)	Leachate Prep CEN 2:1		kg	N			0.410	
Asbestos Identification	SUB020		-	N			NAIIS	NAIIS

CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: SOCOTEC UK Ltd
Environmental Chemistry
PO Box 100
Burton upon Trent
Staffordshire
DE15 0XD

CONTRACT NO: S23265-3

DATE OF ISSUE: 03.02.22

DATE SAMPLES RECEIVED: 27.01.22

DATE ANALYSIS COMPLETED: 02.02.22

DESCRIPTION: Two soil/loose aggregate samples each weighing approximately 0.5-0.9kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of soil/loose aggregate samples for mass determination of asbestos.

METHODS:

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

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies *et al*, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in either of the soil samples by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.





CONTRACT NO: S23265-3
DATE OF ISSUE: 03.02.22

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 22011523

IOM sample number	SOCOTEC Sample ID	Client Sample ID	ACM type detected	PLM result
S87697	22011523-001-28	TT01-2-ES-0.80	-	No Asbestos Detected
S87698	22011523-002-15	TT01-3-ES-1.20	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.

AUTHORISED BY:

J Simpson
Senior Laboratory Analyst



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT
 Project No: 22011523
 Date Issued: 11/02/2022

[Deviating Sample Report](#)

Sample Reference	Text ID	Reported Name	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time
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[Analysis Method](#)

<u>Analysis</u>	<u>Analysis Type</u>	<u>Analysis Method</u>
AMMAR	INORGANIC	As Received
BTEXHSA	ORGANIC	As Received
CLANDPREP	PHYS	As Received
GROHSA/BTEXHSA	ORGANIC	Filtered
ICPACIDS	METALS	Air Dried & Ground
ICPBOR	METALS	Air Dried & Ground
ICPMSS	METALS	Air Dried & Ground
ICPMSW (Dissolved)	METALS	Filtered
ICPSOIL	METALS	Air Dried & Ground
ICPWATVAR (Dissolved)	METALS	Filtered
ICPWSS	METALS	Air Dried & Ground
KONENO3	INORGANIC	Air Dried & Ground
KONENS	INORGANIC	Air Dried & Ground
Leachate Prep CEN 2:1	PHYS	As Received
PAHMSUS	ORGANIC	As Received
PAHMSW	ORGANIC	Filtered
PHCONDW	INORGANIC	Filtered
PHSOIL	INORGANIC	As Received
SFAPI	INORGANIC	As Received
SUB020	SUBCON	
TPHFID (Aliphatic)	ORGANIC	Filtered
TPHFID (Aromatic)	ORGANIC	Filtered
TPHFIDUS (Aliphatic)	ORGANIC	As Received
TPHFIDUS (Aromatic)	ORGANIC	As Received
WSLM11	INORGANIC	Filtered
WSLM20	INORGANIC	Filtered
WSLM59	INORGANIC	Air Dried & Ground



Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT
Project No: 22011523
Date Issued: 11/02/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes.
The report notes are as follows:

<u>Letter</u>	<u>Note</u>
A	Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
B	The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
C	Due to matrix interference the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
D	A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
E	Due to recoveries beyond our calibration range and following the maximum size of dilution allowed, the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
F	Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
G	The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u>	<u>Description</u>
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e everything extracted by the solvent(s)
CU	Clean up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
+	Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT
Project No: 22011523
Date Issued: 11/02/2022

Additional Information

This report refers to samples as received, and SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

In the accreditation column of analysis report the codes are as follows:

U = UKAS accredited analysis
M = MCERT accredited analysis
N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35° c.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full and with approval from the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis
NA = Sample is not amenable for the required analysis
ND = Results cannot be determined

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the Subcontracted lab for information regarding any deviancies for this analysis.

End of Certificate of Analysis



Environmental
Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22011525

Quote: BEC220124006 V1.1

Project Ref: H1069-21

Site: H1069-21 NPT

Contact: Ruth Blair

Address: Unit 15, Crosby Yard
Wildmill
Bridgend
Mid Glamorgan
CF31 1JZ

E-Mail: Ruth.Blair@socotec.com

Phone: 07483 097285

No. Samples Received: 1

Date Received: 26/01/2022

Analysis Date: 17/02/2022

Date Issued: 17/02/2022

Report Type: Final Version 01

This report supercedes any versions previously issued by the laboratory

Account Manager
Martin Elliott-Palmer
01283 554137

Authorised by the Operations Manager
Becky Batham



Client: SOCOTEC Geotechnical
Project Name: H1069-21
Project No: 22011525
Date Issued: 17/02/2022

Samples Analysed

<u>Sample Reference</u>	<u>Text ID</u>	<u>Sample Date</u>	<u>Sample Type</u>
BH3-2-ES-0.60	22011525-001	24/01/2022 12:00:00	SOLID

Analysis Results

					Sample ID	001
					Customer ID	BH3-2-ES-0.60
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
Ammoniacal Nitrogen as N	KONENS	0.01	mg/l	U	0.04	
Ammoniacal Nitrogen (Exchangeable) as N	AMMAR	0.5	mg/kg [^]	UM		<0.59
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.200 _D	
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.200 _D	
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N	<0.005	
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.200 _D	
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.02	mg/l	N	<0.020	
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.200 _D	
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N	<0.005	
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.1	mg/l	U	<0.200 _D	
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg [^]	UM		<0.236
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg [^]	UM		<0.236
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg [^]	UM		<0.012
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg [^]	UM		<0.236* _B
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.04	mg/kg [^]	UM		<0.048
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg [^]	UM		<0.236
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg [^]	UM		<0.012
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.2	mg/kg [^]	UM		<0.236
pH	PHCONDW	1	pH units	U	8.4	

Analysis Results

					Sample ID	001
					Customer ID	BH3-2-ES-0.60
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM		9.2
Chromium (VI) as Cr	KONENS	0.003	mg/l	U	<0.003	
Chromium (VI) as Cr	KONENS	0.1	mg/kg [^]	N		<0.1
Nitrite as N	KONENS	0.01	mg/l	U	0.04	
Nitrate as N	KONENS	0.2	mg/l	U	<0.20	
Nitrite as N	KONENS	0.02	mg/kg [^]	N		0.13
Nitrate as N	KONENO3	0.4	mg/kg [^]	N		<0.4
Complex Cyanide	SFAPI	0.02	mg/l	U	<0.34	
Complex Cyanide	SFAPI	0.5	mg/kg [^]	UM		<0.6
Free Cyanide	SFAPI	0.02	mg/l	U	<0.02	
Free Cyanide	SFAPI	0.5	mg/kg [^]	UM		<0.6
Phenol Index	SFAPI	0.05	mg/l	U	<0.05	
Phenol Index	SFAPI	0.5	mg/kg [^]	U		<0.6
Sulphide as S	SFAPI	0.02	mg/l	U	<0.02	
Sulphide as S	SFAPI	0.5	mg/kg [^]	N		<0.6
Total Cyanide	SFAPI	0.02	mg/l	U	0.34	
Total Cyanide	SFAPI	0.5	mg/kg [^]	UM		<0.6
COD (Filtered)	WSLM11	5	mg/l	N	38	
Soil Organic Matter	WSLM59	0.04	% m/m [^]	U		16.7

Analysis Results

					Sample ID	001
					Customer ID	BH3-2-ES-0.60
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
BOD (Leached 5 Day)	WSLM20	1	mg O2/l	N	10.9 g	
Antimony as Sb	ICPMSS	0.1	mg/kg^	U		5.3
Arsenic as As	ICPMSS	0.3	mg/kg^	UM		47.0
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM		4.6
Copper as Cu	ICPMSS	1.6	mg/kg^	UM		260.7
Lead as Pb	ICPMSS	0.7	mg/kg^	UM		535.3
Manganese as Mn	ICPMSS	1	mg/kg^	UM		2353
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM		<0.5
Molybdenum as Mo	ICPMSS	0.5	mg/kg^	UM		4.0
Nickel as Ni	ICPMSS	2	mg/kg^	UM		35.8
Selenium as Se	ICPMSS	0.5	mg/kg^	UM		0.9
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM		31.6
Vanadium as V	ICPMSS	0.6	mg/kg^	N		62.4
Zinc as Zn	ICPMSS	16	mg/kg^	UM		3275
Aluminium as Al	ICPSOIL	10	mg/kg^	U		14600
Barium as Ba	ICPSOIL	0.5	mg/kg^	UM		456
Beryllium as Be	ICPSOIL	0.1	mg/kg^	U		1.35
Iron as Fe	ICPSOIL	36	mg/kg^	UM		52900
Magnesium as Mg	ICPSOIL	10	mg/kg^	U		4290

Analysis Results

					Sample ID	001
					Customer ID	BH3-2-ES-0.60
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
Boron as B	ICPBOR	0.5	mg/kg^	UM		0.9
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM		574
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM		4600
Antimony as Sb	ICPMSW (Dissolved)	0.001	mg/l	U	0.012	
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U	0.023	
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U	0.00026	
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001	
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U	0.031	
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001	
Manganese as Mn	ICPMSW (Dissolved)	0.002	mg/l	U	0.075	
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U	<0.00003	
Molybdenum as Mo	ICPMSW (Dissolved)	0.001	mg/l	U	0.070	
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U	0.002	
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U	0.002	
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U	0.012	
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U	0.004	
Aluminium as Al	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.02	
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.12	
Beryllium as Be	ICPWATVAR (Dissolved)	0.01	mg/l	N	<0.01	

Analysis Results

					Sample ID	001	
					Customer ID	BH3-2-ES-0.60	
					Sample Type	LPL	SOLID
					Sampling Date	24/01/2022	24/01/2022
Analysis	Method Code	MDL	Units	Accred.			
Boron as B	ICPWATVAR (Dissolved)	0.01	mg/l	U		0.04	
Iron as Fe	ICPWATVAR (Dissolved)	0.01	mg/l	U		0.14	
Magnesium as Mg	ICPWATVAR (Dissolved)	1	mg/l	U		4	
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U		283	
MTBE	BTEXHSA	10	µg/l	N		<10	
MTBE	BTEXHSA	20	µg/kg^	U			<24
Benzene HS_1D_AR	BTEXHSA	5	µg/l	N		<5	
Ethylbenzene HS_1D_AR	BTEXHSA	5	µg/l	N		<5	
m/p-Xylene HS_1D_AR	BTEXHSA	10	µg/l	N		<10	
o-Xylene HS_1D_AR	BTEXHSA	5	µg/l	N		<5	
Toluene HS_1D_AR	BTEXHSA	5	µg/l	N		<5	
Benzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<12
Ethylbenzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<12
m/p-Xylene HS_1D_AR	BTEXHSA	20	µg/kg^	UM			<24
o-Xylene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<12
Toluene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<12
Acenaphthene	PAHMSW	0.01	µg/l	U		0.09	
Acenaphthylene	PAHMSW	0.01	µg/l	U		<0.01	
Anthracene	PAHMSW	0.01	µg/l	U		<0.01	

Analysis Results

					Sample ID	001
					Customer ID	BH3-2-ES-0.60
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
Benzo[a]anthracene	PAHMSW	0.01	µg/l	U	<0.01	
Benzo[a]pyrene	PAHMSW	0.01	µg/l	U	<0.01	
Benzo[b]fluoranthene	PAHMSW	0.01	µg/l	U	<0.01	
Benzo[g,h,i]perylene	PAHMSW	0.01	µg/l	U	<0.01	
Benzo[k]fluoranthene	PAHMSW	0.01	µg/l	U	<0.01	
Chrysene	PAHMSW	0.01	µg/l	U	<0.01	
Coronene	PAHMSW	0.01	µg/l	U	<0.01	
Dibenzo[a,h]anthracene	PAHMSW	0.01	µg/l	U	<0.01	
Fluoranthene	PAHMSW	0.01	µg/l	U	<0.01	
Fluorene	PAHMSW	0.01	µg/l	U	<0.01	
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	µg/l	U	<0.01	
Naphthalene	PAHMSW	0.01	µg/l	U	0.03	
Phenanthrene	PAHMSW	0.01	µg/l	U	0.02	
Pyrene	PAHMSW	0.01	µg/l	U	<0.01	
Total PAH 16	PAHMSW	0.16	µg/l	U	0.29	
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM		0.18
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U		0.10
Anthracene	PAHMSUS	0.08	mg/kg^	U		0.28
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM		0.79

Analysis Results

					Sample ID	001
					Customer ID	BH3-2-ES-0.60
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM		0.74
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM		1.36
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM		0.47
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM		0.50
Chrysene	PAHMSUS	0.08	mg/kg^	UM		1.09
Coronene	PAHMSUS	0.08	mg/kg^	N		0.12
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM		0.19
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM		1.56
Fluorene	PAHMSUS	0.08	mg/kg^	UM		0.18
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM		0.63
Naphthalene	PAHMSUS	0.08	mg/kg^	UM		0.18
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM		0.89
Pyrene	PAHMSUS	0.08	mg/kg^	UM		1.25
Total PAH 16	PAHMSUS	1.28	mg/kg^	U		10.4
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.02 D	
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.02 D	
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.02 D	
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.02 D	
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.02 D	

Analysis Results

					Sample ID	001
					Customer ID	BH3-2-ES-0.60
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		13.6
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		65.1
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		21.7
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	10	mg/kg^	U		52.5
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	20	mg/kg^	U		170
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.02* B,D	
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	0.02	
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.02* B,D	
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.02 D	
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	0.04	
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		9.28
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		15.3
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		52.7
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	10	mg/kg^	U		92.2
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	20	mg/kg^	U		191
Total Moisture at 35°C	CLANDPREP	0.1	%	N		15.1
Description of Solid Material	CLANDPREP		-	N		SILT
Equivalent Weight of Dry Material (kg)	Leachate Prep CEN 2:1		kg	N		0.400
Fraction above 4 mm (%)	Leachate Prep CEN 2:1		%	N		100



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT
 Project No: 22011525
 Date Issued: 17/02/2022

Analysis Results

					Sample ID	001
					Customer ID	BH3-2-ES-0.60
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
Fraction of non-crushable material (%)	Leachate Prep CEN 2:1		%	N		0
Volume of Water for 2:1 Leach (ltr)	Leachate Prep CEN 2:1		l	N		0.736
Weight of Sample Leached (kg)	Leachate Prep CEN 2:1		kg	N		0.464
Asbestos Identification	SUB020		-	N		NAIIS



CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: SOCOTEC UK Ltd
Environmental Chemistry
PO Box 100
Burton upon Trent
Staffordshire
DE15 0XD

CONTRACT NO: S23265-4

DATE OF ISSUE: 03.02.22

DATE SAMPLE RECEIVED: 27.01.22

DATE ANALYSIS COMPLETED: 02.02.22

DESCRIPTION: One soil/loose aggregate sample weighing approximately 1.1kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of a soil/loose aggregate sample for mass determination of asbestos.

METHODS:

Qualitative - The sample was analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies *et al*, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in the soil sample by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.





CONTRACT NO: S23265-4
DATE OF ISSUE: 03.02.22

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 22011525

IOM sample number	SOCOTEC Sample ID	Client Sample ID	ACM type detected	PLM result
S87699	22011525-001-28	BH3-2-ES-0.60	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.

AUTHORISED BY:

J Simpson
Senior Laboratory Analyst



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT
 Project No: 22011525
 Date Issued: 17/02/2022

Deviating Sample Report

Sample Reference	Text ID	Reported Name	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time
BH3-2-ES-0.60	22011525-001	PAHMSW						✓

Analysis Method

Analysis

AMMAR
 BTEXHSA
 CLANDPREP
 GROHSA/BTEXHSA
 ICPACIDS
 ICPBOR
 ICPMSS
 ICPMSW (Dissolved)
 ICPSOIL
 ICPWATVAR (Dissolved)
 ICPWSS
 KONENO3
 KONENS
 Leachate Prep CEN 2:1
 PAHMSUS
 PAHMSW
 PHCONDW
 PHSOIL
 SFAP
 SUB020
 TPHFID (Aliphatic)
 TPHFID (Aromatic)
 TPHFIDUS (Aliphatic)
 TPHFIDUS (Aromatic)
 WSLM11
 WSLM20
 WSLM59

Analysis Type

INORGANIC
 ORGANIC
 PHYS
 ORGANIC
 METALS
 METALS
 METALS
 METALS
 METALS
 METALS
 METALS
 INORGANIC
 INORGANIC
 PHYS
 ORGANIC
 ORGANIC
 INORGANIC
 INORGANIC
 INORGANIC
 SUBCON
 ORGANIC
 ORGANIC
 ORGANIC
 ORGANIC
 INORGANIC
 INORGANIC
 INORGANIC

Analysis Method

As Received
 Unfiltered
 As Received
 Filtered
 Air Dried & Ground
 Air Dried & Ground
 Air Dried & Ground
 Filtered
 Air Dried & Ground
 Filtered
 Air Dried & Ground
 Air Dried & Ground
 Air Dried & Ground
 As Received
 As Received
 Filtered
 Filtered
 As Received
 As Received
 Filtered
 Filtered
 Air Dried & Ground



Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT
Project No: 22011525
Date Issued: 17/02/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes.
The report notes are as follows:

<u>Letter</u>	<u>Note</u>
A	Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
B	The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
C	Due to matrix interference the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
D	A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
E	Due to recoveries beyond our calibration range and following the maximum size of dilution allowed, the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
F	Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
G	The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u>	<u>Description</u>
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e everything extracted by the solvent(s)
CU	Clean up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
+	Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT
Project No: 22011525
Date Issued: 17/02/2022

Additional Information

This report refers to samples as received, and SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

In the accreditation column of analysis report the codes are as follows:

U = UKAS accredited analysis
M = MCERT accredited analysis
N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35° c.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full and with approval from the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis
NA = Sample is not amenable for the required analysis
ND = Results cannot be determined

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the Subcontracted lab for information regarding any deviancies for this analysis.

End of Certificate of Analysis



Environmental
Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22011640

Quote: BEC220124006 V1.1

Project Ref: H1069-21

Site: H1069-21 NPT

Contact: Ruth Blair

Address: Unit 15, Crosby Yard
Wildmill
Bridgend
Mid Glamorgan
CF31 1JZ

E-Mail: Ruth.Blair@socotec.com

Phone: 07483 097285

No. Samples Received: 1

Date Received: 27/01/2022

Analysis Date: 17/02/2022

Date Issued: 17/02/2022

Report Type: Final Version 01

This report supercedes any versions previously issued by the laboratory

Account Manager
Martin Elliott-Palmer
01283 554137

Authorised by the Operations Manager
Becky Batham



Client: SOCOTEC Geotechnical
Project Name: H1069-21
Project No: 22011640
Date Issued: 17/02/2022

Samples Analysed

<u>Sample Reference</u>	<u>Text ID</u>	<u>Sample Date</u>	<u>Sample Type</u>
BH03-101-ES-2.50	22011640-001	24/01/2022 13:00:00	SOLID

Analysis Results

					Sample ID	001	
					Customer ID	BH03-101-ES-2.50	
					Sample Type	LPL	SOLID
					Sampling Date	24/01/2022	24/01/2022
Analysis	Method Code	MDL	Units	Accred.			
Ammoniacal Nitrogen as N	KONENS	0.01	mg/l	U	3.60		
Ammoniacal Nitrogen (Exchangeable) as N	AMMAR	0.5	mg/kg^	UM		69.8	
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.200		
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.200		
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N	<0.005		
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.200		
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.02	mg/l	N	<0.020		
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.200		
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	N	<0.005		
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.1	mg/l	U	0.204		
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.321	
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.321	
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM		<0.016	
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.321	
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.04	mg/kg^	UM		<0.064	
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.321	
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM		<0.016	
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.2	mg/kg^	UM		<0.321	
pH	PHCONDW	1	pH units	U	8.5		

Analysis Results

					Sample ID	001
					Customer ID	BH03-101-ES-2.50
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM		8.1
Chromium (VI) as Cr	KONENS	0.003	mg/l	U	<0.003	
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N		<0.1
Nitrite as N	KONENS	0.01	mg/l	U	<0.01	
Nitrate as N	KONENS	0.2	mg/l	U	<0.20	
Nitrite as N	KONENS	0.02	mg/kg^	N		0.03
Nitrate as N	KONENO3	0.4	mg/kg^	N		<0.4
Complex Cyanide	SFAPI	0.02	mg/l	U	<0.02	
Complex Cyanide	SFAPI	0.5	mg/kg^	UM		<0.8
Free Cyanide	SFAPI	0.02	mg/l	U	<0.02	
Free Cyanide	SFAPI	0.5	mg/kg^	UM		<0.8
Phenol Index	SFAPI	0.05	mg/l	U	<0.05	
Phenol Index	SFAPI	0.5	mg/kg^	U		1.0
Sulphide as S	SFAPI	0.02	mg/l	U	<0.02	
Sulphide as S	SFAPI	0.5	mg/kg^	N		<0.8
Total Cyanide	SFAPI	0.02	mg/l	U	<0.02	
Total Cyanide	SFAPI	0.5	mg/kg^	UM		<0.8
COD (Filtered)	WSLM11	5	mg/l	N	57	
Soil Organic Matter	WSLM59	0.04	% m/m^	U		3.77

Analysis Results

					Sample ID	001
					Customer ID	BH03-101-ES-2.50
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
BOD (Leached 5 Day)	WSLM20	1	mg O2/l	N	6.2	
Antimony as Sb	ICPMSS	0.1	mg/kg^	U		0.7
Arsenic as As	ICPMSS	0.3	mg/kg^	UM		6.9
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM		0.2
Copper as Cu	ICPMSS	1.6	mg/kg^	UM		16.7
Lead as Pb	ICPMSS	0.7	mg/kg^	UM		29.6
Manganese as Mn	ICPMSS	1	mg/kg^	UM		392.0
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM		<0.5
Molybdenum as Mo	ICPMSS	0.5	mg/kg^	UM		0.6
Nickel as Ni	ICPMSS	2	mg/kg^	UM		14.8
Selenium as Se	ICPMSS	0.5	mg/kg^	UM		<0.5
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM		19.8
Vanadium as V	ICPMSS	0.6	mg/kg^	N		22.0
Zinc as Zn	ICPMSS	16	mg/kg^	UM		44.0
Aluminium as Al	ICPSOIL	10	mg/kg^	U		9620
Barium as Ba	ICPSOIL	0.5	mg/kg^	UM		96.1
Beryllium as Be	ICPSOIL	0.1	mg/kg^	U		0.55
Iron as Fe	ICPSOIL	36	mg/kg^	UM		15200
Magnesium as Mg	ICPSOIL	10	mg/kg^	U		3630

Analysis Results

					Sample ID	001	
					Customer ID	BH03-101-ES-2.50	
					Sample Type	LPL	SOLID
					Sampling Date	24/01/2022	24/01/2022
Analysis	Method Code	MDL	Units	Accred.			
Boron as B	ICPBOR	0.5	mg/kg^	UM		8.6	
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM		626	
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM		1290	
Antimony as Sb	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001		
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U	0.007		
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U	<0.00002		
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001		
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001		
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001		
Manganese as Mn	ICPMSW (Dissolved)	0.002	mg/l	U	0.174		
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U	<0.00003		
Molybdenum as Mo	ICPMSW (Dissolved)	0.001	mg/l	U	0.248		
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U	0.002		
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001		
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U	0.003		
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U	<0.002		
Aluminium as Al	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.01		
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U	<0.01		
Beryllium as Be	ICPWATVAR (Dissolved)	0.01	mg/l	N	<0.01		

Analysis Results

					Sample ID	001	
					Customer ID	BH03-101-ES-2.50	
					Sample Type	LPL	SOLID
					Sampling Date	24/01/2022	24/01/2022
Analysis	Method Code	MDL	Units	Accred.			
Boron as B	ICPWATVAR (Dissolved)	0.01	mg/l	U		0.67	
Iron as Fe	ICPWATVAR (Dissolved)	0.01	mg/l	U		0.03	
Magnesium as Mg	ICPWATVAR (Dissolved)	1	mg/l	U		10	
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U		35	
MTBE	BTEXHSA	10	µg/l	N		<10	
MTBE	BTEXHSA	20	µg/kg^	U			<32
Benzene HS_1D_AR	BTEXHSA	5	µg/l	N		<5	
Ethylbenzene HS_1D_AR	BTEXHSA	5	µg/l	N		<5	
m/p-Xylene HS_1D_AR	BTEXHSA	10	µg/l	N		<10	
o-Xylene HS_1D_AR	BTEXHSA	5	µg/l	N		<5	
Toluene HS_1D_AR	BTEXHSA	5	µg/l	N		<5	
Benzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<16
Ethylbenzene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<16
m/p-Xylene HS_1D_AR	BTEXHSA	20	µg/kg^	UM			<32
o-Xylene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<16
Toluene HS_1D_AR	BTEXHSA	10	µg/kg^	UM			<16
Acenaphthene	PAHMSW	0.01	µg/l	U		0.05	
Acenaphthylene	PAHMSW	0.01	µg/l	U		<0.01	
Anthracene	PAHMSW	0.01	µg/l	U		<0.01	

Analysis Results

					Sample ID	001	
					Customer ID	BH03-101-ES-2.50	
					Sample Type	LPL	SOLID
					Sampling Date	24/01/2022	24/01/2022
Analysis	Method Code	MDL	Units	Accred.			
Benzo[a]anthracene	PAHMSW	0.01	µg/l	U	<0.01		
Benzo[a]pyrene	PAHMSW	0.01	µg/l	U	<0.01		
Benzo[b]fluoranthene	PAHMSW	0.01	µg/l	U	<0.01		
Benzo[g,h,i]perylene	PAHMSW	0.01	µg/l	U	<0.01		
Benzo[k]fluoranthene	PAHMSW	0.01	µg/l	U	<0.01		
Chrysene	PAHMSW	0.01	µg/l	U	<0.01		
Coronene	PAHMSW	0.01	µg/l	U	<0.01		
Dibenzo[a,h]anthracene	PAHMSW	0.01	µg/l	U	<0.01		
Fluoranthene	PAHMSW	0.01	µg/l	U	<0.01		
Fluorene	PAHMSW	0.01	µg/l	U	<0.01		
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	µg/l	U	<0.01		
Naphthalene	PAHMSW	0.01	µg/l	U	0.01		
Phenanthrene	PAHMSW	0.01	µg/l	U	<0.01		
Pyrene	PAHMSW	0.01	µg/l	U	<0.01		
Total PAH 16	PAHMSW	0.16	µg/l	U	0.23		
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM			<0.13
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U			<0.13
Anthracene	PAHMSUS	0.08	mg/kg^	U			<0.13
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM			<0.13

Analysis Results

					Sample ID	001
					Customer ID	BH03-101-ES-2.50
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg [^]	UM		<0.13
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg [^]	UM		<0.13
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg [^]	UM		<0.13
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg [^]	UM		<0.13
Chrysene	PAHMSUS	0.08	mg/kg [^]	UM		<0.13
Coronene	PAHMSUS	0.08	mg/kg [^]	N		<0.13
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg [^]	UM		<0.13
Fluoranthene	PAHMSUS	0.08	mg/kg [^]	UM		<0.13
Fluorene	PAHMSUS	0.08	mg/kg [^]	UM		<0.13
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg [^]	UM		<0.13
Naphthalene	PAHMSUS	0.08	mg/kg [^]	UM		<0.13
Phenanthrene	PAHMSUS	0.08	mg/kg [^]	UM		<0.13
Pyrene	PAHMSUS	0.08	mg/kg [^]	UM		<0.13
Total PAH 16	PAHMSUS	1.28	mg/kg [^]	U		<2.05
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.03 D	
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.03 D	
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.03 D	
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.03 D	
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.03 D	

Analysis Results

					Sample ID	001
					Customer ID	BH03-101-ES-2.50
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		7.35
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		9.44
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U		9.38
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	10	mg/kg^	U		<16.1
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	20	mg/kg^	U		37.1
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.03* B,D	
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.03 D	
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.03* B,D	
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.03 D	
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	0.06	
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		<6.42
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		11.3
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U		<6.42
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	10	mg/kg^	U		<16.1
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	20	mg/kg^	U		33.2
Total Moisture at 35°C	CLANDPREP	0.1	%	N		37.7
Description of Solid Material	CLANDPREP		-	N		CLAY
Equivalent Weight of Dry Material (kg)	Leachate Prep CEN 2:1		kg	N		0.400
Fraction above 4 mm (%)	Leachate Prep CEN 2:1		%	N		0



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT
 Project No: 22011640
 Date Issued: 17/02/2022

Analysis Results

					Sample ID	001
					Customer ID	BH03-101-ES-2.50
					Sample Type	LPL SOLID
					Sampling Date	24/01/2022 24/01/2022
Analysis	Method Code	MDL	Units	Accred.		
Fraction of non-crushable material (%)	Leachate Prep CEN 2:1		%	N		0
Volume of Water for 2:1 Leach (ltr)	Leachate Prep CEN 2:1		l	N		0.649
Weight of Sample Leached (kg)	Leachate Prep CEN 2:1		kg	N		0.551
Asbestos Identification	SUB020		-	N		NAIIS



CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: SOCOTEC UK Ltd
Environmental Chemistry
PO Box 100
Burton upon Trent
Staffordshire
DE15 0XD

CONTRACT NO: S23321-11

DATE OF ISSUE: 07.02.22

DATE SAMPLE RECEIVED: 31.01.22

DATE ANALYSIS COMPLETED: 07.02.22

DESCRIPTION: One soil/loose aggregate sample weighing approximately 0.9kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of a soil/loose aggregate sample for mass determination of asbestos.

METHODS:

Qualitative - The sample was analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies *et al*, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in the soil sample by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.





CONTRACT NO: S23321-11
DATE OF ISSUE: 07.02.22

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 22011640

IOM sample number	SOCOTEC Sample ID	Client Sample ID	ACM type detected	PLM result
S87798	22011640-001-28	BH03-101-ES-2.50	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.

AUTHORISED BY:

J Simpson

Senior Laboratory Analyst



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT
 Project No: 22011640
 Date Issued: 17/02/2022

Deviating Sample Report

Sample Reference	Text ID	Reported Name	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time
BH03-101-ES-2.50	22011640-001	WSLM20						✓
BH03-101-ES-2.50	22011640-001	PAHMSW						✓

Analysis Method

<u>Analysis</u>	<u>Analysis Type</u>	<u>Analysis Method</u>
AMMAR	INORGANIC	As Received
BTEXHSA	ORGANIC	Unfiltered
CLANDPREP	PHYS	As Received
GROHSA/BTEXHSA	ORGANIC	Filtered
ICPACIDS	METALS	Air Dried & Ground
ICPBOR	METALS	Air Dried & Ground
ICPMSS	METALS	Air Dried & Ground
ICPMSW (Dissolved)	METALS	Filtered
ICPSOIL	METALS	Air Dried & Ground
ICPWATVAR (Dissolved)	METALS	Filtered
ICPWSS	METALS	Air Dried & Ground
KONENO3	INORGANIC	Air Dried & Ground
KONENS	INORGANIC	Air Dried & Ground
Leachate Prep CEN 2:1	PHYS	As Received
PAHMSUS	ORGANIC	As Received
PAHMSW	ORGANIC	Filtered
PHCONDW	INORGANIC	Filtered
PHSOIL	INORGANIC	As Received
SFAPI	INORGANIC	As Received
SUB020	SUBCON	
TPHFID (Aliphatic)	ORGANIC	Filtered
TPHFID (Aromatic)	ORGANIC	Filtered
TPHFIDUS (Aliphatic)	ORGANIC	As Received
TPHFIDUS (Aromatic)	ORGANIC	As Received
WSLM11	INORGANIC	Filtered
WSLM20	INORGANIC	Filtered
WSLM59	INORGANIC	Air Dried & Ground



Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT
Project No: 22011640
Date Issued: 17/02/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes.
The report notes are as follows:

<u>Letter</u>	<u>Note</u>
A	Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
B	The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
C	Due to matrix interference the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
D	A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
E	Due to recoveries beyond our calibration range and following the maximum size of dilution allowed, the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
F	Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
G	The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u>	<u>Description</u>
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e everything extracted by the solvent(s)
CU	Clean up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
+	Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT
Project No: 22011640
Date Issued: 17/02/2022

Additional Information

This report refers to samples as received, and SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

In the accreditation column of analysis report the codes are as follows:

U = UKAS accredited analysis
M = MCERT accredited analysis
N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35° c.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full and with approval from the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis
NA = Sample is not amenable for the required analysis
ND = Results cannot be determined

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the Subcontracted lab for information regarding any deviancies for this analysis.

End of Certificate of Analysis



Environmental
Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22021918

Quote: BEC220124006 V1.1

Project Ref: H1069-21

Site: H1069-21 NPT

Contact: Ruth Blair

Address: Unit 15, Crosby Yard
Wildmill
Bridgend
Mid Glamorgan
CF31 1JZ

E-Mail: Ruth.Blair@socotec.com

Phone: 07483 097285

No. Samples Received: 3

Date Received: 23/02/2022

Analysis Date: 07/03/2022

Date Issued: 09/03/2022

Report Type: Final Version 01

This report supercedes any versions previously issued by the laboratory

Account Manager
Ayshea Dunsby
01283 554434

Authorised by the Operations Manager
Becky Batham



Client: SOCOTEC Geotechnical
Project Name: H1069-21
Project No: 22021918
Date Issued: 09/03/2022

Samples Analysed

<u>Sample Reference</u>	<u>Text ID</u>	<u>Sample Date</u>	<u>Sample Type</u>	<u>Sample Description</u>
BH01-210222-EW-4.00	22021918-001	21/02/2022 11:40:00	WATER	Ground Water
BH02A-210222-EW-4.50	22021918-002	21/02/2022 13:50:00	WATER	Ground Water
BH03-210222-EW-4.00	22021918-003	21/02/2022 13:00:00	WATER	Ground Water



Analysis Results

Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT
Project No: 22021918
Date Issued: 09/03/2022



Analysis	Method Code	MDL	Units	Accred.	Sample ID	001	002	003
					Customer ID	BH01-210222-EW-4.00	BH02A-210222-EW-4.50	BH03-210222-EW-4.00
					Sample Type	WATER	WATER	WATER
					Sampling Date	21/02/2022	21/02/2022	21/02/2022
Ammoniacal Nitrogen as N	KONENS	0.01	mg/l	U		<0.01	1.00	0.50
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N		<0.100	<0.100	<0.100
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N		<0.100	<0.100	<0.100
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	U		<0.005	<0.005	<0.005
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N		<0.100	<0.100	<0.100
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.02	mg/l	U		<0.020	<0.020	<0.020
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N		<0.100	<0.100	<0.100
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	U		<0.005	<0.005	<0.005
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.1	mg/l	U		<0.100	<0.100	<0.100
pH	PHCONDW	1	pH units	U		7.5	6.5	7.1
Chromium (VI) as Cr	KONENS	0.003	mg/l	U		0.004	<0.003	<0.003
Nitrite as N	KONENS	0.01	mg/l	U		<0.01	<0.01	<0.01
Nitrate as N	KONENS	0.2	mg/l	U		1.1	<0.2	<0.2
Total Oxidised Nitrogen	KONENS	0.2	mg/l	U		1.1	<0.2	<0.2
Complex Cyanide	SFAPI	0.02	mg/l	U		<0.02	<0.02	<0.02
Free Cyanide	SFAPI	0.02	mg/l	U		<0.02	<0.02	<0.02
Phenol Index	SFAPI	0.05	mg/l	U		<0.05	<0.05	<0.05
Sulphide as S	SFAPI	0.02	mg/l	U		<0.02	<0.02	<0.02
Total Cyanide	SFAPI	0.02	mg/l	U		<0.02	<0.02	<0.02

Analysis	Method Code	MDL	Units	Accred.	Sample ID	001	002	003
					Customer ID	BH01-210222-EW-4.00	BH02A-210222-EW-4.50	BH03-210222-EW-4.00
					Sample Type	WATER	WATER	WATER
					Sampling Date	21/02/2022	21/02/2022	21/02/2022
COD (Settled)	WSLM11	5	mg/l	U		17	8	19
BOD (5 day)	WSLM20	1	mg O2/l	U		<1.0	1.1	5.3* G
Antimony as Sb	ICPMSW (Dissolved)	0.001	mg/l	U		<0.001	<0.001	<0.001
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U		<0.001	0.003	0.003
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U		0.00008	0.00015	<0.00002
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U		<0.001	<0.001	<0.001
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U		0.002	<0.001	<0.001
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U		<0.001	<0.001	<0.001
Manganese as Mn	ICPMSW (Dissolved)	0.002	mg/l	U		0.109	0.684	0.751
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U		<0.00003	<0.00003	<0.00003
Molybdenum as Mo	ICPMSW (Dissolved)	0.001	mg/l	U		<0.001	<0.001	0.002
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U		0.002	0.008	<0.001
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U		0.002	<0.001	<0.001
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U		<0.001	<0.001	<0.001
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U		0.005	0.032	<0.002
Aluminium as Al	ICPWATVAR (Dissolved)	0.01	mg/l	U		0.01	<0.01	0.01
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U		0.04	0.03	0.01
Beryllium as Be	ICPWATVAR (Dissolved)	0.01	mg/l	N		<0.01	<0.01	<0.01
Boron as B	ICPWATVAR (Dissolved)	0.01	mg/l	U		0.05	0.06	0.17



Client: SOCOTEC Geotechnical
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Analysis	Method Code	MDL	Units	Accred.	Sample ID	001	002	003
					Customer ID	BH01-210222-EW-4.00	BH02A-210222-EW-4.50	BH03-210222-EW-4.00
					Sample Type	WATER	WATER	WATER
					Sampling Date	21/02/2022	21/02/2022	21/02/2022
Iron as Fe	ICPWATVAR (Dissolved)	0.01	mg/l	U		<0.01	10.3	0.06
Magnesium as Mg	ICPWATVAR (Dissolved)	1	mg/l	U		12	82	27
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U		60	1030	127
MTBE	BTEXHSA	10	µg/l	U		<10	<10	<10
Benzene HS_ID_AR	BTEXHSA	5	µg/l	U		<5	<5	<5
Ethylbenzene HS_ID_AR	BTEXHSA	5	µg/l	U		<5	<5	<5
m/p-Xylene HS_ID_AR	BTEXHSA	10	µg/l	U		<10	<10	<10
o-Xylene HS_ID_AR	BTEXHSA	5	µg/l	U		<5	<5	<5
Toluene HS_ID_AR	BTEXHSA	5	µg/l	U		<5	<5	<5
Acenaphthene	PAHMSW	0.01	µg/l	U		<0.01	<0.01	<0.01
Acenaphthylene	PAHMSW	0.01	µg/l	U		<0.01	<0.01	<0.01
Anthracene	PAHMSW	0.01	µg/l	U		<0.01	<0.01	<0.01
Benzo[a]anthracene	PAHMSW	0.01	µg/l	U		0.01	0.01	<0.01
Benzo[a]pyrene	PAHMSW	0.01	µg/l	U		0.01	0.01	<0.01
Benzo[b]fluoranthene	PAHMSW	0.01	µg/l	U		0.02	0.02	<0.01
Benzo[g,h,i]perylene	PAHMSW	0.01	µg/l	U		0.01	0.01	<0.01
Benzo[k]fluoranthene	PAHMSW	0.01	µg/l	U		<0.01	<0.01	<0.01
Chrysene	PAHMSW	0.01	µg/l	U		0.01	0.01	<0.01
Coronene	PAHMSW	0.01	µg/l	U		<0.01	<0.01	<0.01



Client: SOCOTEC Geotechnical
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Analysis	Method Code	MDL	Units	Accred.	Sample ID	001	002	003
					Customer ID	BH01-210222-EW-4.00	BH02A-210222-EW-4.50	BH03-210222-EW-4.00
					Sample Type	WATER	WATER	WATER
					Sampling Date	21/02/2022	21/02/2022	21/02/2022
Dibenzo[a,h]anthracene	PAHMSW	0.01	µg/l	U		<0.01	<0.01	<0.01
Fluoranthene	PAHMSW	0.01	µg/l	U		0.02	0.02	<0.01
Fluorene	PAHMSW	0.01	µg/l	U		<0.01	<0.01	<0.01
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	µg/l	U		0.01	0.01	<0.01
Naphthalene	PAHMSW	0.01	µg/l	U		<0.01	<0.01	<0.01
Phenanthrene	PAHMSW	0.01	µg/l	U		0.01	0.03	<0.01
Pyrene	PAHMSW	0.01	µg/l	U		0.02	0.02	<0.01
Total PAH 16	PAHMSW	0.16	µg/l	U		0.20	0.22	<0.16
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		<0.01	<0.01	<0.01
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		<0.01	<0.01	<0.01
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		<0.01	<0.01	<0.01
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		0.04	0.05	0.03
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U		0.06	0.07	0.06
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		<0.01	<0.01	<0.01
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		<0.01	<0.01	<0.01
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		<0.01* _B	<0.01* _B	<0.01* _B
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		<0.01	<0.01	<0.01
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U		<0.01	<0.01	<0.01



Client: SOCOTEC Geotechnical
 Project Name: H1069-21 NPT
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Deviating Sample Report

Sample Reference	Text ID	Reported Name	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time
BH01-210222-EW-4.00	22021918-001	SFAPI				✓		
BH01-210222-EW-4.00	22021918-001	SFAPI				✓		
BH01-210222-EW-4.00	22021918-001	SFAPI				✓		
BH01-210222-EW-4.00	22021918-001	SFAPI				✓		
BH01-210222-EW-4.00	22021918-001	SFAPI				✓		
BH02A-210222-EW-4.50	22021918-002	SFAPI				✓		
BH02A-210222-EW-4.50	22021918-002	SFAPI				✓		
BH02A-210222-EW-4.50	22021918-002	SFAPI				✓		
BH02A-210222-EW-4.50	22021918-002	SFAPI				✓		
BH02A-210222-EW-4.50	22021918-002	SFAPI				✓		
BH03-210222-EW-4.00	22021918-003	SFAPI				✓		
BH03-210222-EW-4.00	22021918-003	SFAPI				✓		
BH03-210222-EW-4.00	22021918-003	SFAPI				✓		
BH03-210222-EW-4.00	22021918-003	SFAPI				✓		
BH03-210222-EW-4.00	22021918-003	SFAPI				✓		

Analysis Method

Analysis

BTEXHSA
 GROHSA/BTEXHSA
 ICPMSW (Dissolved)
 ICPWATVAR (Dissolved)
 KONENS
 PAHMSW
 PHCONDW
 SFAPI
 TPHFID (Aliphatic)
 TPHFID (Aromatic)
 WSLM11
 WSLM20

Analysis Type

ORGANIC
 ORGANIC
 METALS
 METALS
 INORGANIC
 ORGANIC
 INORGANIC
 INORGANIC
 ORGANIC
 ORGANIC
 INORGANIC
 INORGANIC

Analysis Method

Unfiltered
 Unfiltered
 Filtered
 Filtered
 Filtered
 Unfiltered
 Unfiltered
 Unfiltered
 Unfiltered
 Unfiltered
 Unfiltered
 Unfiltered



Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT
Project No: 22021918
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Result Report Notes

Letters alongside results signify that the result has associated report notes.
The report notes are as follows:

<u>Letter</u>	<u>Note</u>
A	Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
B	The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
C	Due to matrix interference the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
D	A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
E	Due to recoveries beyond our calibration range and following the maximum size of dilution allowed, the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
F	Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
G	The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u>	<u>Description</u>
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e everything extracted by the solvent(s)
CU	Clean up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
+	Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Client: SOCOTEC Geotechnical
Project Name: H1069-21 NPT
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Date Issued: 09/03/2022

Additional Information

This report refers to samples as received, and SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

In the accreditation column of analysis report the codes are as follows:

U = UKAS accredited analysis
M = MCERT accredited analysis
N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 105° c.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full and with approval from the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis
NA = Sample is not amenable for the required analysis
ND = Results cannot be determined

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the Subcontracted lab for information regarding any deviancies for this analysis.

End of Certificate of Analysis

**APPENDIX F
PHOTOGRAPHS**

Trial Pit and Trial Trench Photographs

Sheets 1 to 29



TP01 - Face A



TP01 - Face B

Notes:

Project
Project No.
Carried out for

Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
H1069-21
Neath Port Talbot County Borough Council

Sheet



TP01 - Face C

Notes:	<table><tr><td>Project</td><td>Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes</td></tr><tr><td>Project No.</td><td>H1069-21</td></tr><tr><td>Carried out for</td><td>Neath Port Talbot County Borough Council</td></tr></table>	Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes	Project No.	H1069-21	Carried out for	Neath Port Talbot County Borough Council	<table><tr><td>Sheet</td><td>2</td></tr></table>	Sheet	2
Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes									
Project No.	H1069-21									
Carried out for	Neath Port Talbot County Borough Council									
Sheet	2									



TP01 – Face D

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



TP01 - Spoil

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace
Schemes
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



TT01 (North) - Face A



TT01 (North) - Face C

Notes:	<table><tr><td>Project</td><td>Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes</td></tr><tr><td>Project No.</td><td>H1069-21</td></tr><tr><td>Carried out for</td><td>Neath Port Talbot County Borough Council</td></tr></table>	Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes	Project No.	H1069-21	Carried out for	Neath Port Talbot County Borough Council	Sheet 5
Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes							
Project No.	H1069-21							
Carried out for	Neath Port Talbot County Borough Council							



TT01(North) - Face B

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



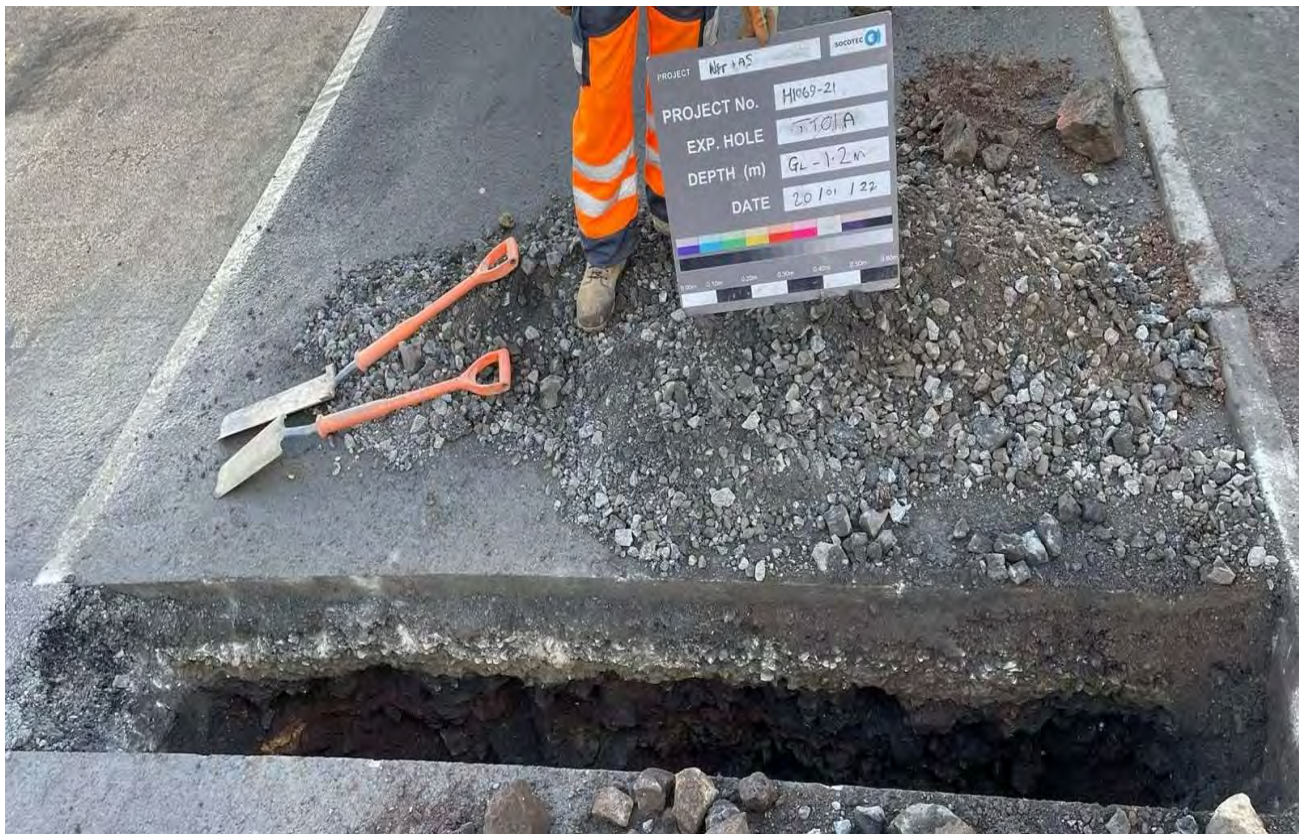
TT01 (North) - Face D

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet

Trial Trench Photographs



TT01 (South) - Face A



TT01 (South) - Face C

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Ceanant Terrace Schemes
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Sheet



TT01 (South) - Face B

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Ceanant Terrace Schemes
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Sheet



TT01 (South) - Face D

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Ceanant Terrace
Schemes
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



TT02 - Face B

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



TT02 - Face D

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



TT02 - Spoil

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



TT02A - Face A

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



TT02A - Face B

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
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Sheet



TT02A - Face C

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



TT02A - Face D

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



TT02B - Face D

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



TT02B - Spoil

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet

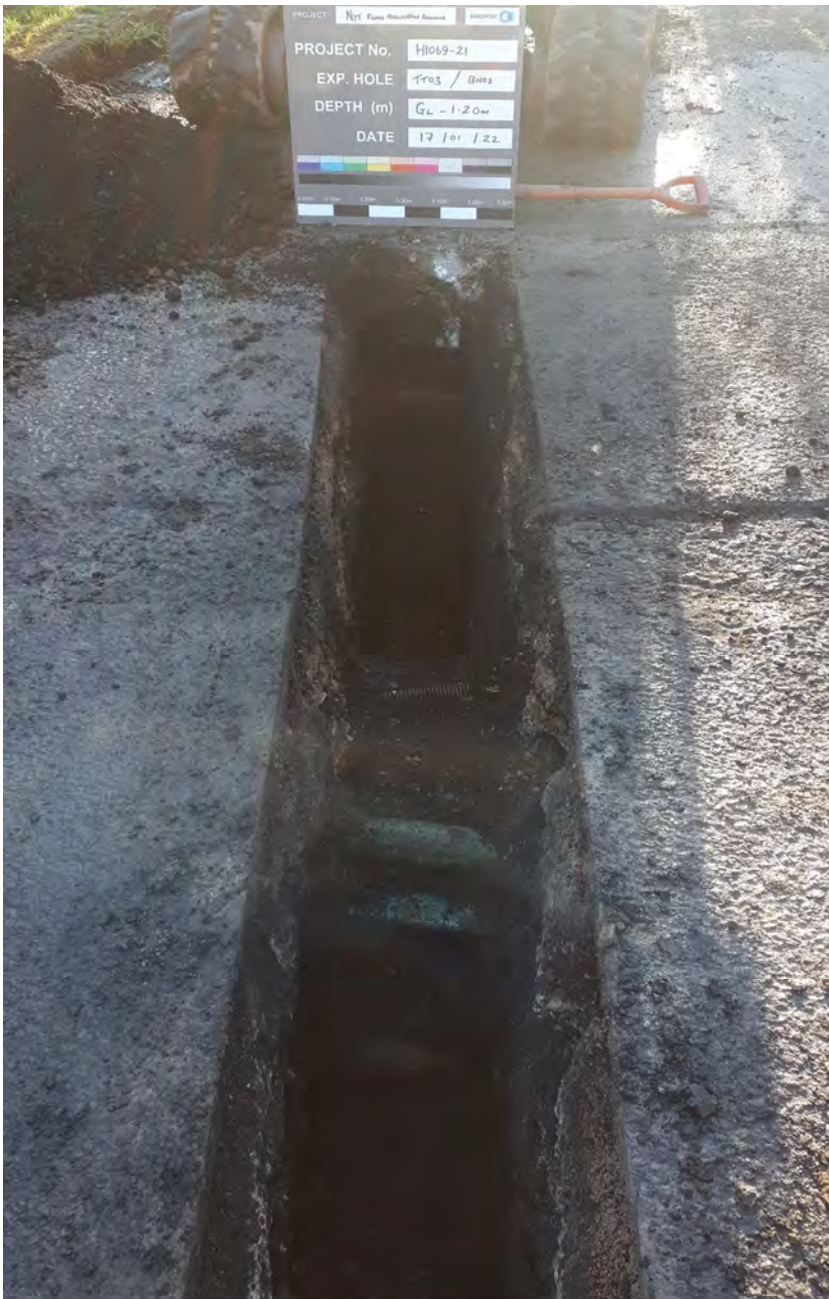


TT03 Face B

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Project No. H1069-21
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Sheet



TT03 Face D

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
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Carried out for Neath Port Talbot County Borough Council

Sheet



TT03 Spoil

Notes:	<table><tr><td>Project</td><td>Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes</td></tr><tr><td>Project No.</td><td>H1069-21</td></tr><tr><td>Carried out for</td><td>Neath Port Talbot County Borough Council</td></tr></table>	Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes	Project No.	H1069-21	Carried out for	Neath Port Talbot County Borough Council	<table><tr><td>Sheet</td><td>22</td></tr></table>	Sheet	22
Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes									
Project No.	H1069-21									
Carried out for	Neath Port Talbot County Borough Council									
Sheet	22									



TT04 - Face B

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



TT04 - Face C

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet



TT04 - Face D



TT04 - Spoil

Notes:	Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes Project No. H1069-21 Carried out for Neath Port Talbot County Borough Council	Sheet 26
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TT04A Face B

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes
Project No. H1069-21
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Sheet



TT04B - Face A



TT04B - Face C

Notes:	Project	Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace Schemes	Sheet 28
	Project No.	H1069-21	
	Carried out for	Neath Port Talbot County Borough Council	



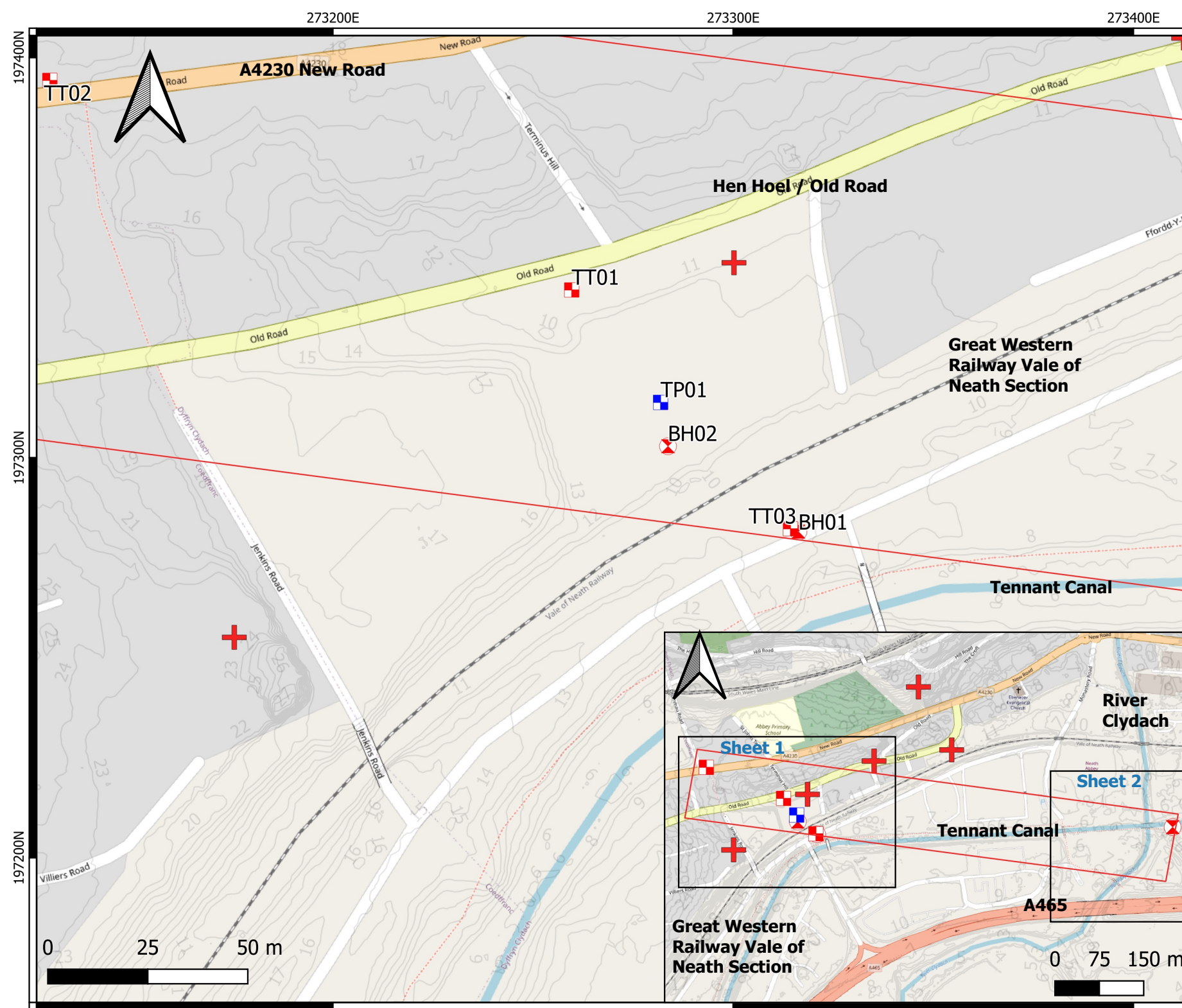
TT04B - Face B

Notes:

Project Neath Port Talbot Flood Alleviation Schemes: Caenant Terrace
Project No. H1069-21
Carried out for Neath Port Talbot County Borough Council

Sheet

Appendix E. Phase 2 GI Location Plan



- Legend**
- Phase 2 Site Location
 - Mine Entry
 - Proposed GI
 - Borehole
 - Machine Excavated Trial Pit
 - Machine Excavated Trial Trench

NOTES

- REFER TO SCHEDULE 2 FOR THE DETAILS OF THE EXPLORATORY HOLES
- ALL EXPLORATORY HOLE POSITIONS ARE PROVISIONAL AND ARE TO BE CONFIRMED ON SITE BY THE INVESTIGATION SUPERVISOR

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Neath Port Talbot Flood Alluviation Schemes:
Caenant Terrace

TITLE
Exploratory Hole Location Plan (For The Proposed Culverts)

OpenStreetMap standard mapping - <https://www.openstreetmap.org>

273800E

273900E

274000E

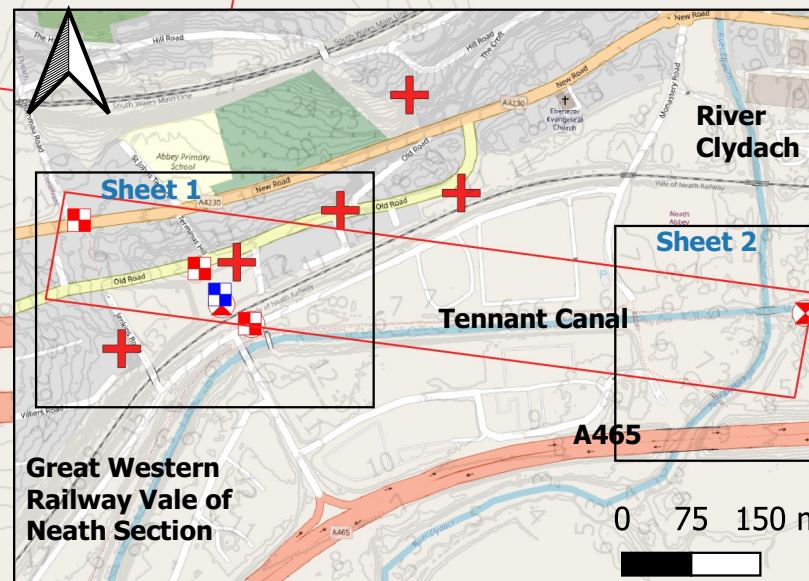


Tennant Canal

BH03

A465

0 25 50 m

Great Western
Railway Vale of
Neath SectionRiver
Clydach

Tennant Canal

A465

0 75 150 m



Legend

Phase 2 Site Location

Mine Entry

Proposed GI

Borehole

 Machine Excavated
Trial Pit

 Machine Excavated
Trial Trench

NOTES

1. REFER TO SCHEDULE 2 FOR THE DETAILS OF THE EXPLORATORY HOLES
2. ALL EXPLORATORY HOLE POSITIONS ARE PROVISIONAL AND ARE TO BE CONFIRMED ON SITE BY THE INVESTIGATION SUPERVISOR

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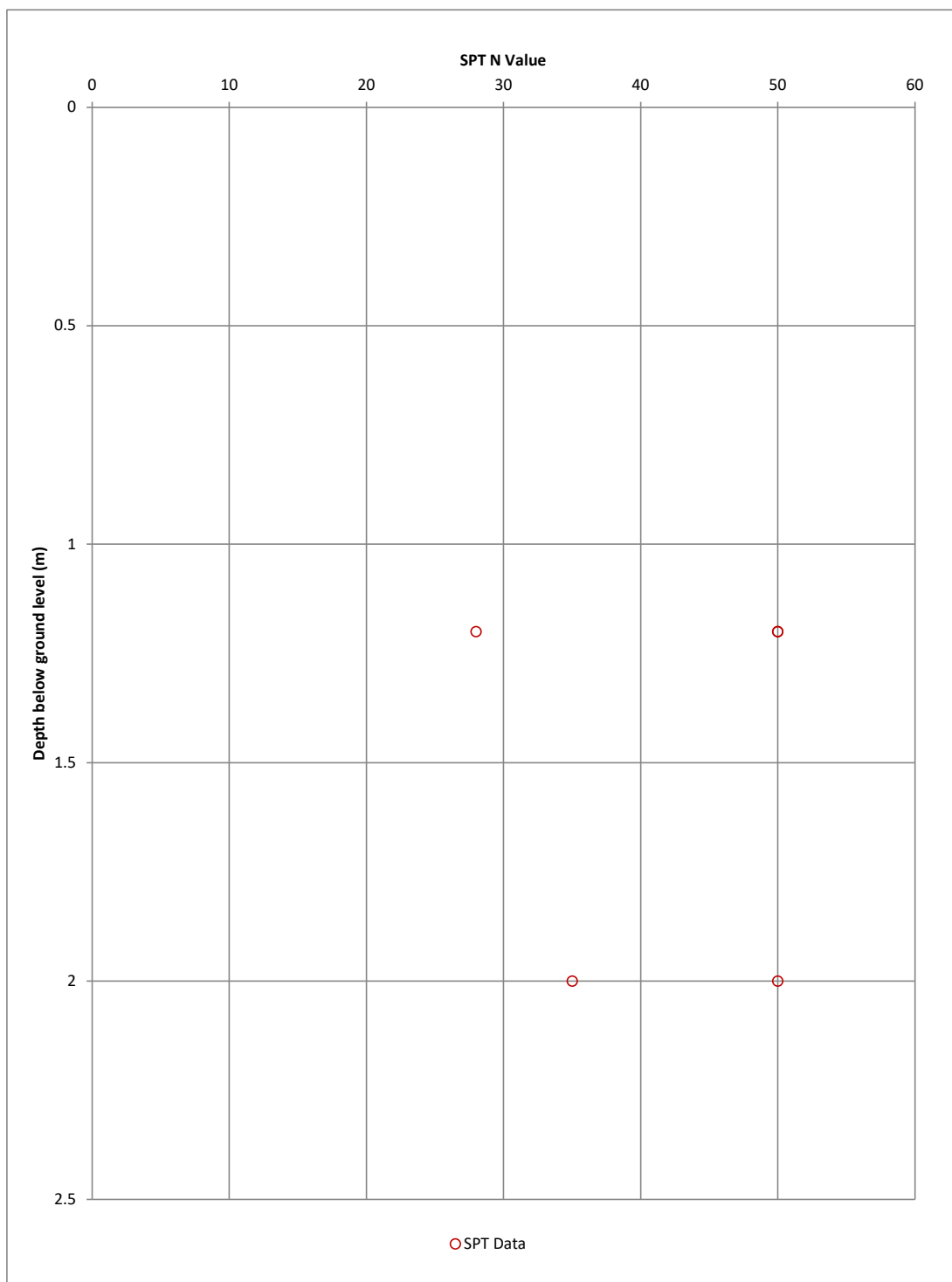
Neath Port Talbot Flood Alluviation Schemes:
Caenant Terrace

TITLE

Exploratory Hole Location Plan (For The
Proposed Culverts)OpenStreetMap standard mapping - <https://www.openstreetmap.org>

Appendix F. Geotechnical Parameter Plots

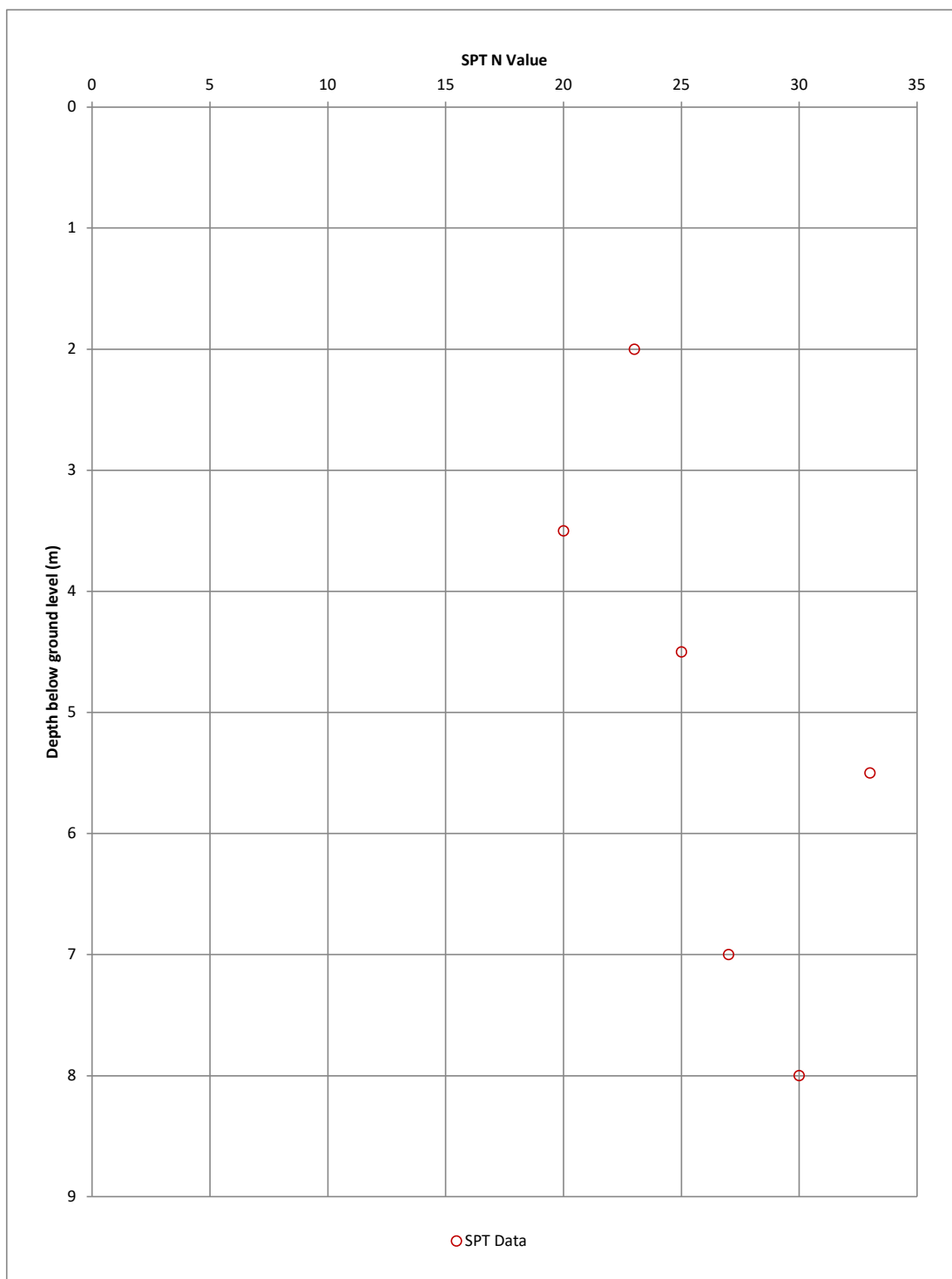
F.1. SPT 'N' Value vs. Depth: Made Ground



Maximum Extrapolated N Value	200
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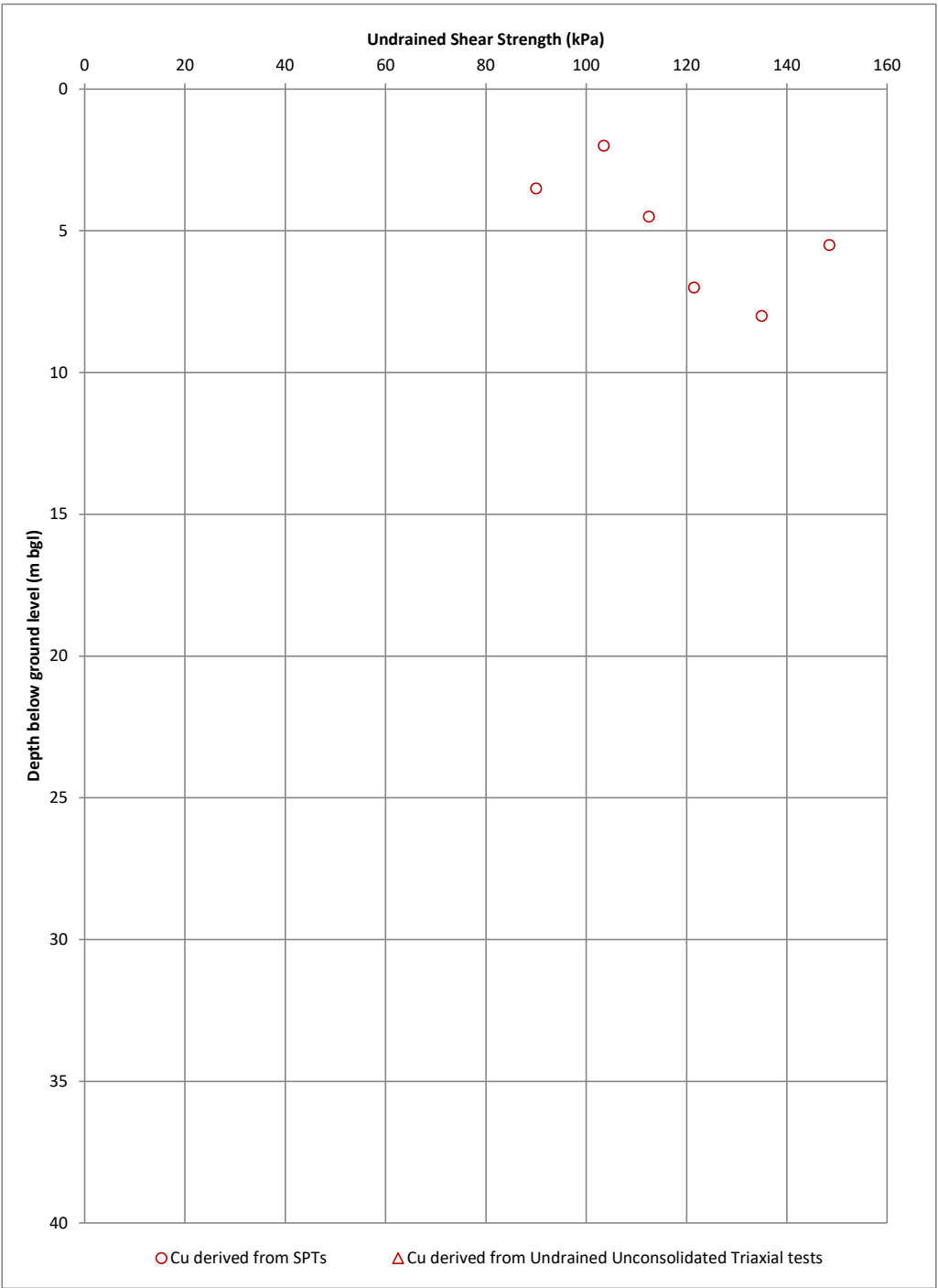
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	Neath Port Talbot Council		SPT N Value vs Depth for Made Ground			
	Project		Sheet size	Drawn: J Allison	Checked: J Batham	Reviewed: L McAra
			A4	Date: 07/06/22	Date: 17/06/22	Date: 22/06/22
Caenant Terrace		Status	Figure Number		Rev	
			F.1		01	

F.2. SPT 'N' Value vs. Depth: Glacial Till (Granular)



Maximum Extrapolated N Value	200
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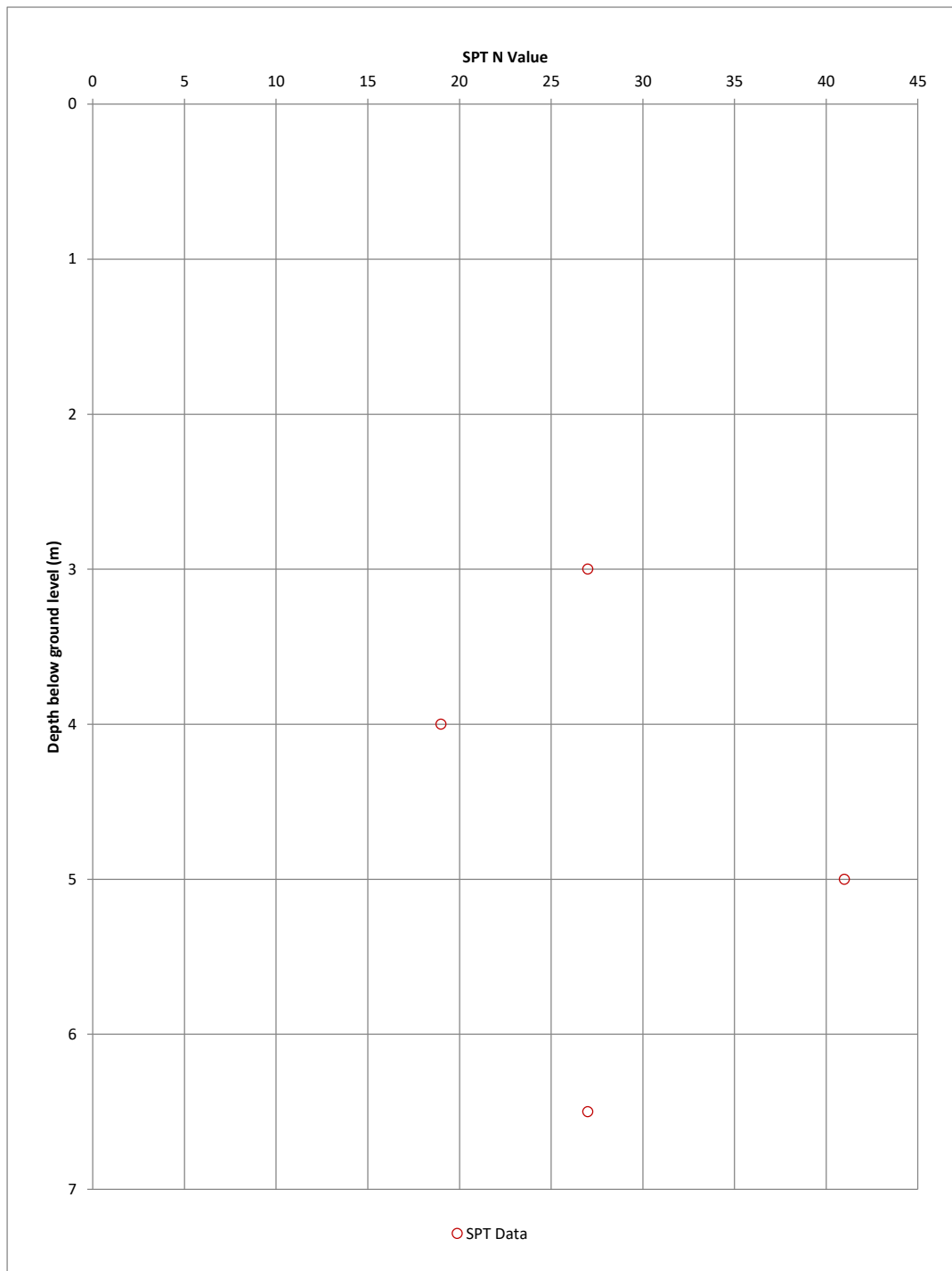
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	Neath Port Talbot Council		SPT N Value vs Depth for Glacial Till (Granular)			
	Project		Sheet size	Drawn: J Allison	Checked: J Batham	Reviewed: L McAra
Caenant Terrace			A4	Date: 07/06/22	Date: 17/06/22	Date: 22/06/22
		Status	Figure Number		Rev	
			F.2		01	



Maximum Extrapolated N Value	200
f, value (Cu = f ₁ N)	4.5

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	Neath Port Talbot Council		Undrained Shear Strength vs Depth for			
	Project		Sheet size	Drawn:	Checked:	Reviewed:
			A4	Date:	Date:	Date:
Caenant Terrace		Status	Figure Number		Rev	

F.3. SPT 'N' Value / Undrained Shear Strength, c_u vs. Depth: Glacial Till (Cohesive)



Maximum Extrapolated N Value	200
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SPT N Value vs Depth for Glacial Till (Cohesive)

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Date: 17/06/22

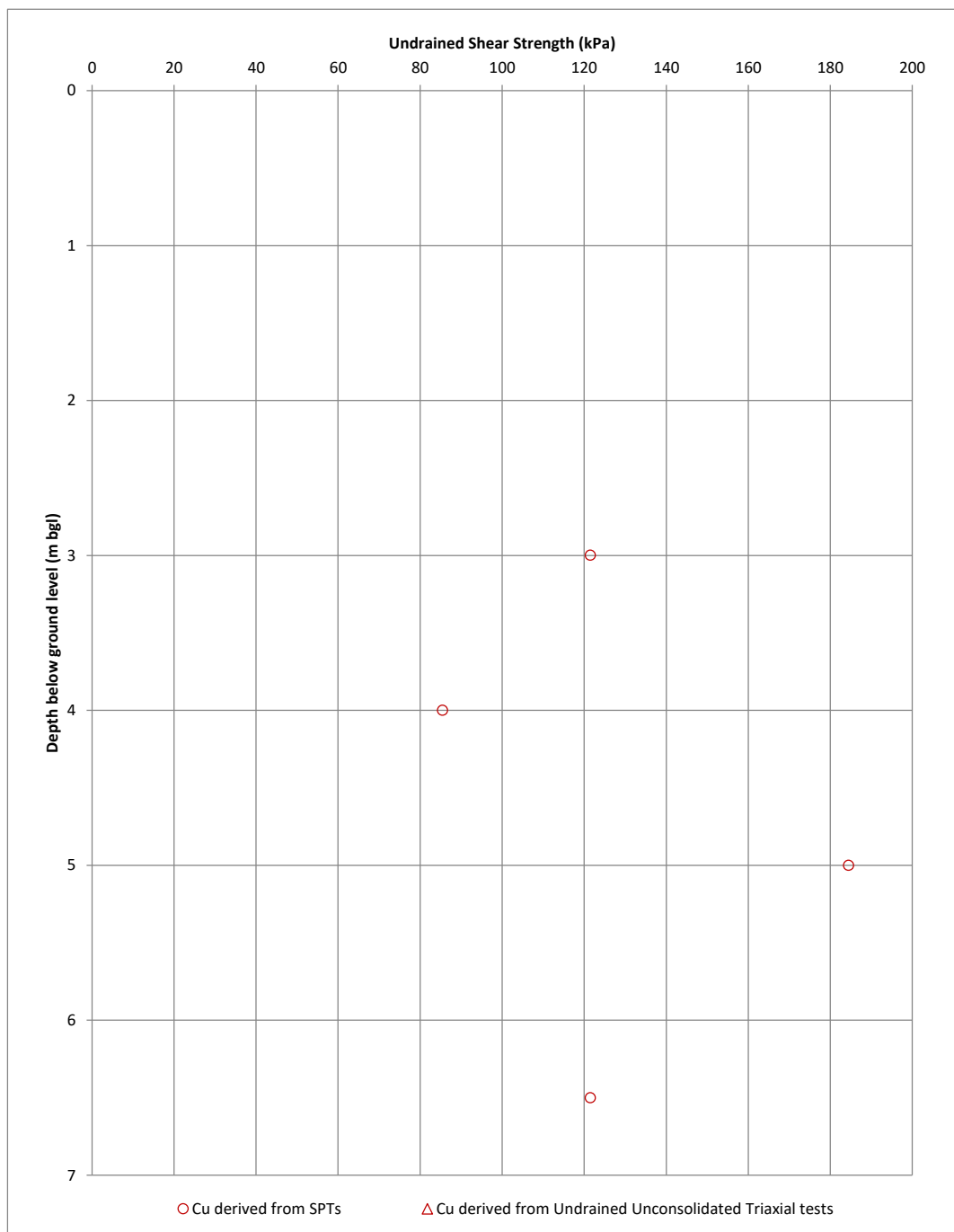
F.3

Reviewed: L McAra

Date: 22/06/22

Rev

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Maximum Extrapolated N Value	200
f ₁ value (Cu = f ₁ N)	4.5

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**Undrained Shear Strength vs Depth for Glacial Till
(Cohesive)**

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Date: 17/06/22

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Date: 22/06/22

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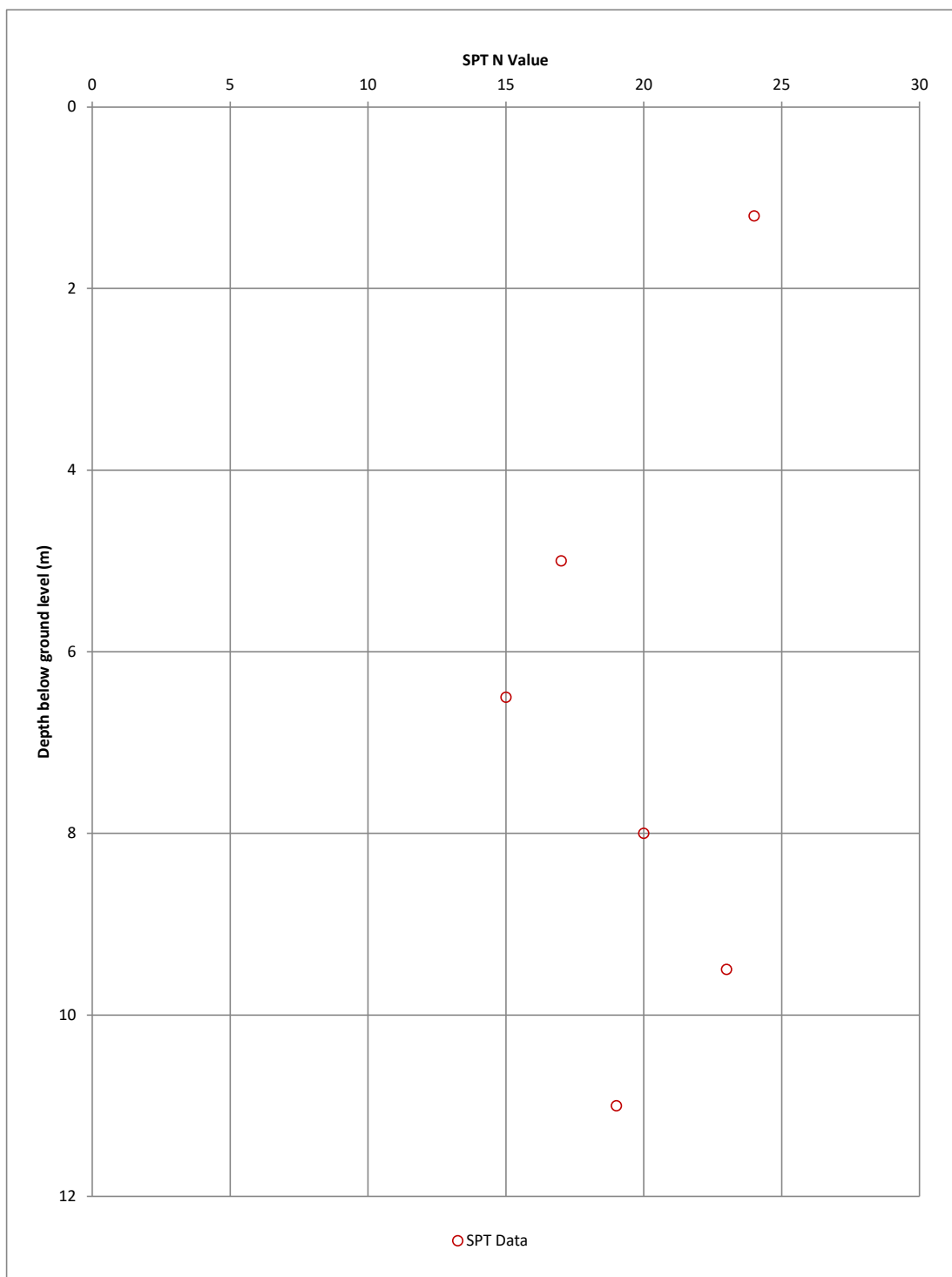
Figure Number

F.3

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01

F.4. SPT 'N' Value vs. Depth: Tidal Flat Deposits (Granular)



Maximum Extrapolated N Value	200
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Title

SPT N Value vs Depth for Tidal Flat Deposits (Granular)

Sheet size

A4

Drawn: J Allison

Date: 07/06/22

Checked: J Batham

Date: 17/06/22

Reviewed: L McAra

Date: 22/06/22

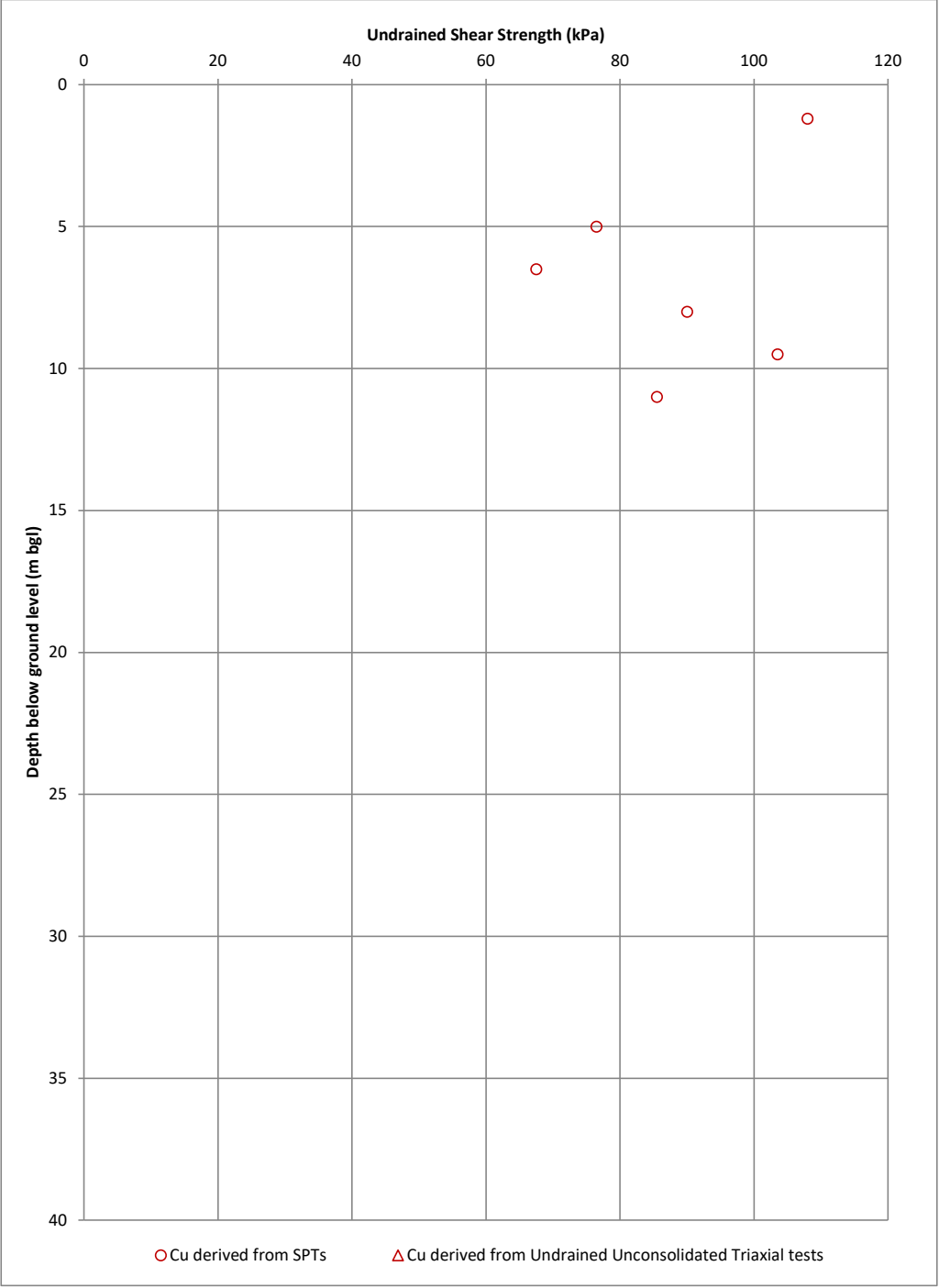
Status

Figure Number

F.4

Rev

01



Maximum Extrapolated N Value	200
f, value (Cu = f ₁ N)	4.5

ATKINS

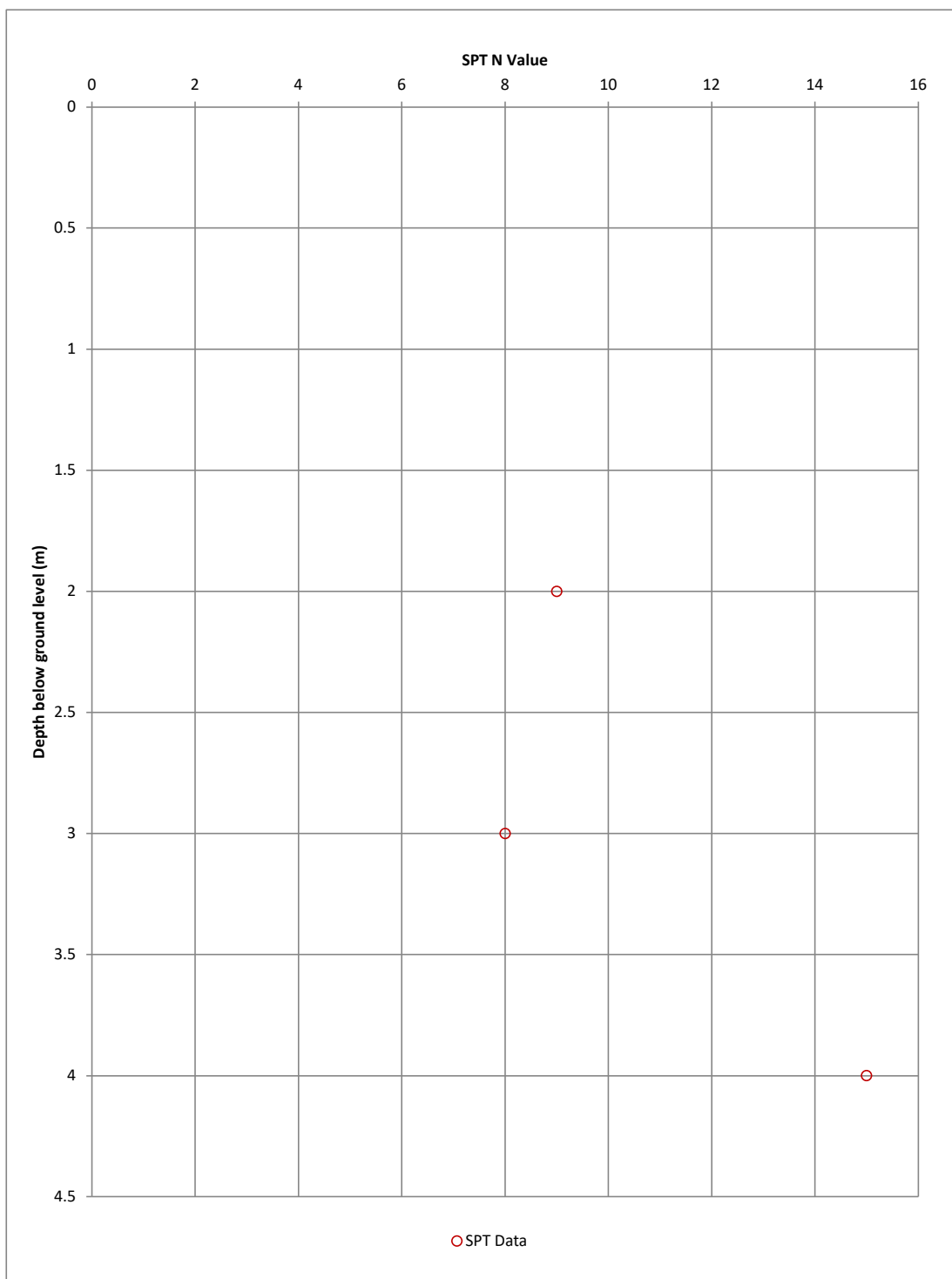
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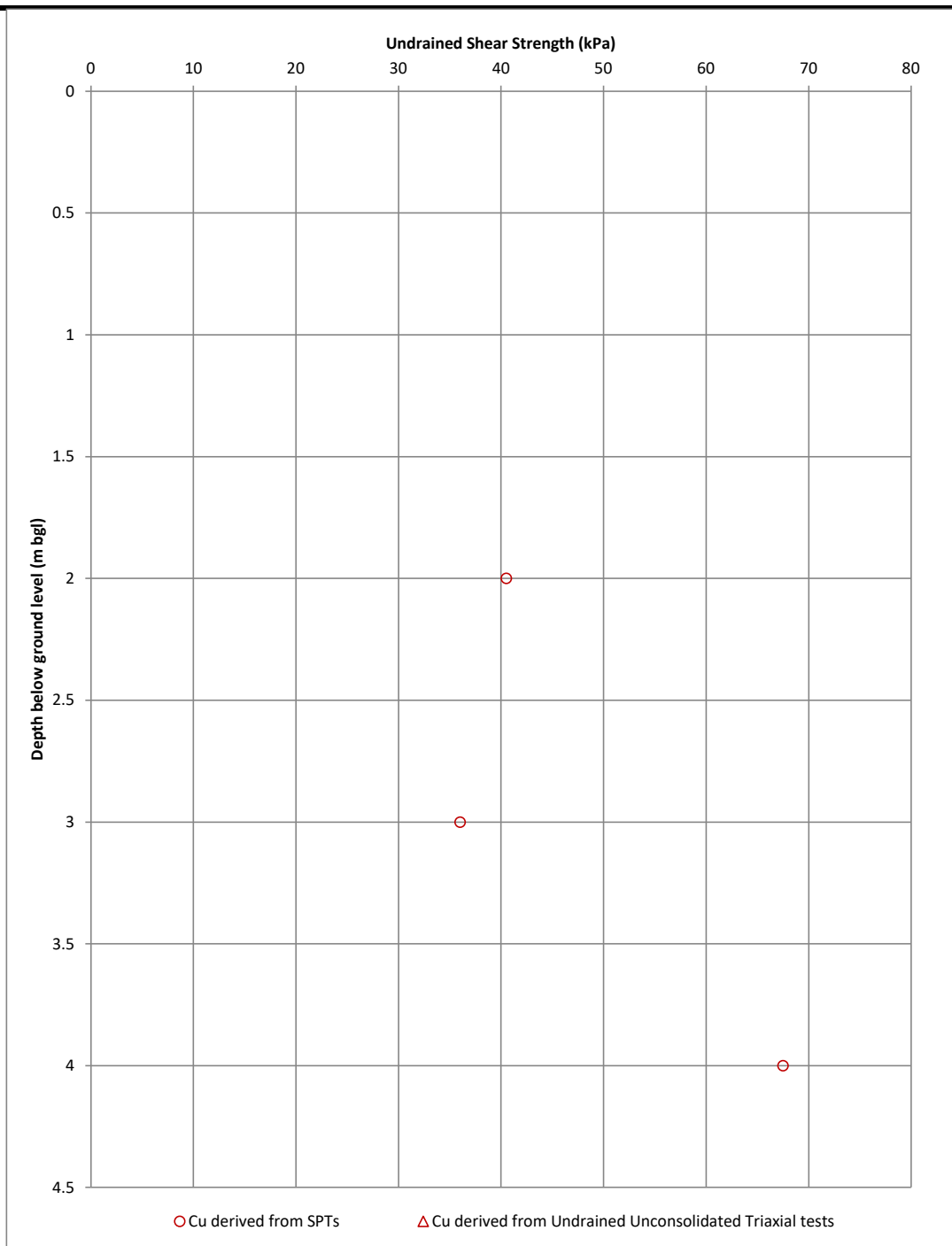
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Project	Caenant Terrace			Sheet size	Drawn:	Checked:
				A4	Date:	Date:
				Status	Figure Number	Reviewed:
						Date:
						Rev

F.5. SPT 'N' Value / Undrained Shear Strength, c_u vs. Depth: Tidal Flat Deposits (Cohesive)



Maximum Extrapolated N Value	200
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 Atkins Limited Woodcote Grove Ashley Road Epsom KT18 5BW Tel: (01372) 726140 Fax: (01372) 740055	Client		Title			
	Neath Port Talbot Council		SPT N Value vs Depth for Tidal Flat Deposits (Cohesive)			
	Project		Sheet size	Drawn: J Allison	Checked: J Batham	Reviewed: L McAra
	Caenant Terrace		A4	Date: 07/06/22	Date: 17/06/22	Date: 22/06/22
		Status	Figure Number	F.5		Rev
						01



Maximum Extrapolated N Value	200
f, value (Cu = f _i N)	4.5

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Title

Undrained Shear Strength vs Depth for Tidal Flat Deposits (Cohesive)

Sheet size

A4

Drawn: J Allison

Date: 07/06/22

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Date: 17/06/22

Reviewed: L McAra

Date: 22/06/22

Status

Figure Number

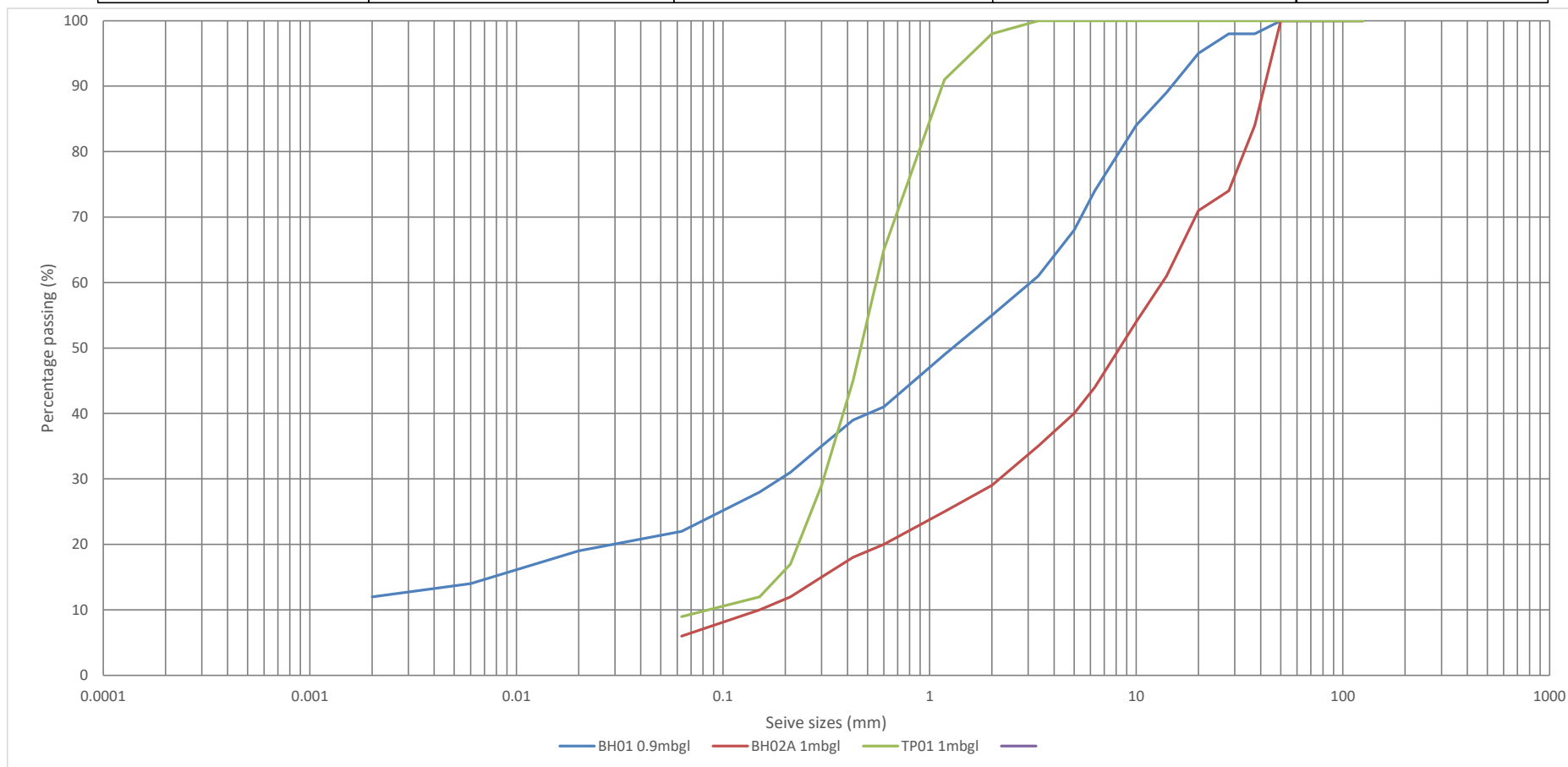
F.5

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F.6. PSD: Made Ground

CLAY	SILT	SAND	GRAVEL	COBBLES
------	------	------	--------	---------



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Particle Size Distribution for Made Ground

Sheet size

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Drawn

J Allison

Date

07/06/2022

Checked

J Batham

Date

17/06/2022

Authorised

L McAra

Date

22/06/2022

Status

Figure Number

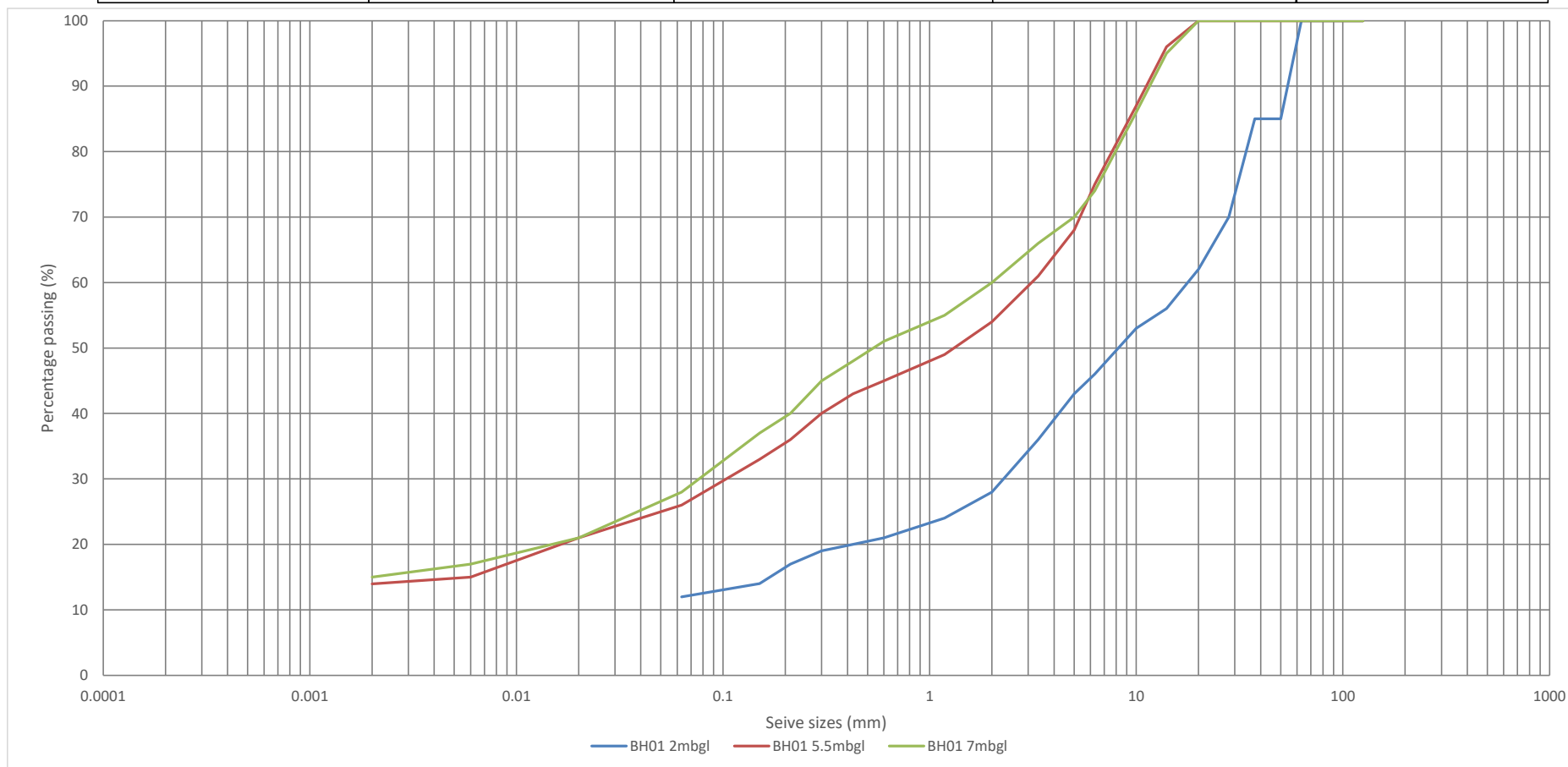
F.6

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F.7. PSD: Glacial Till (Granular)

CLAY	SILT	SAND	GRAVEL	COBBLES
------	------	------	--------	---------



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Title

Particle Size Distribution for Glacial Till (Granular)

Sheet size

A4

Drawn

J Allison

Date

07/06/2022

Checked

J Batham

Date

17/06/2022

Authorised

L McAra

Date

22/06/2022

Status

Figure Number

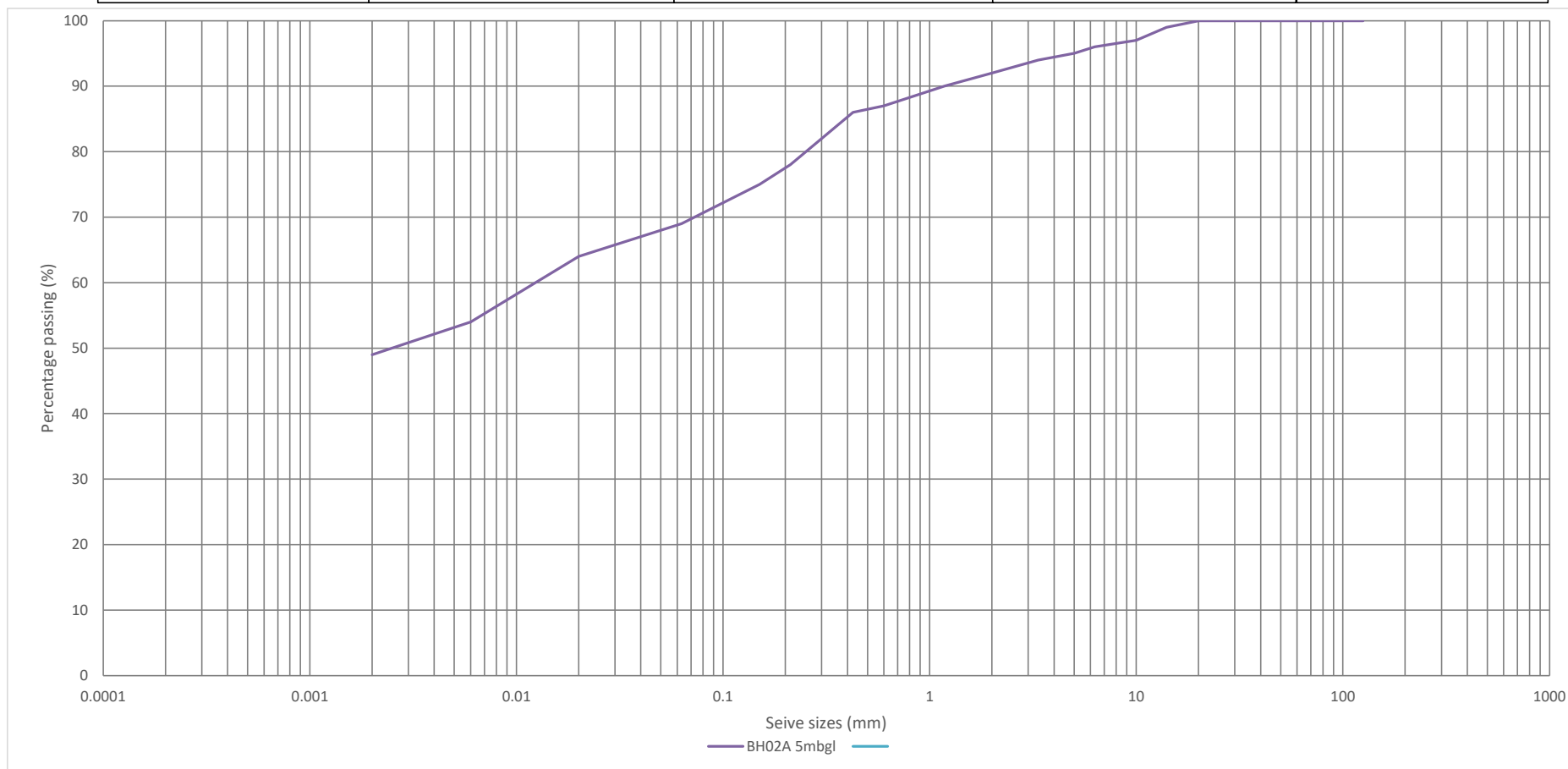
F.7

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F.8. PSD: Glacial Till (Cohesive)

CLAY	SILT	SAND	GRAVEL	COBBLES
------	------	------	--------	---------



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Title

Particle Size Distribution for Glacial Till (Cohesive)

Sheet size

A4

Drawn

J Allison

Date

07/06/2022

Checked

J Batham

Date

17/06/2022

Authorised

L McAra

Date

22/06/2022

Status

Figure Number

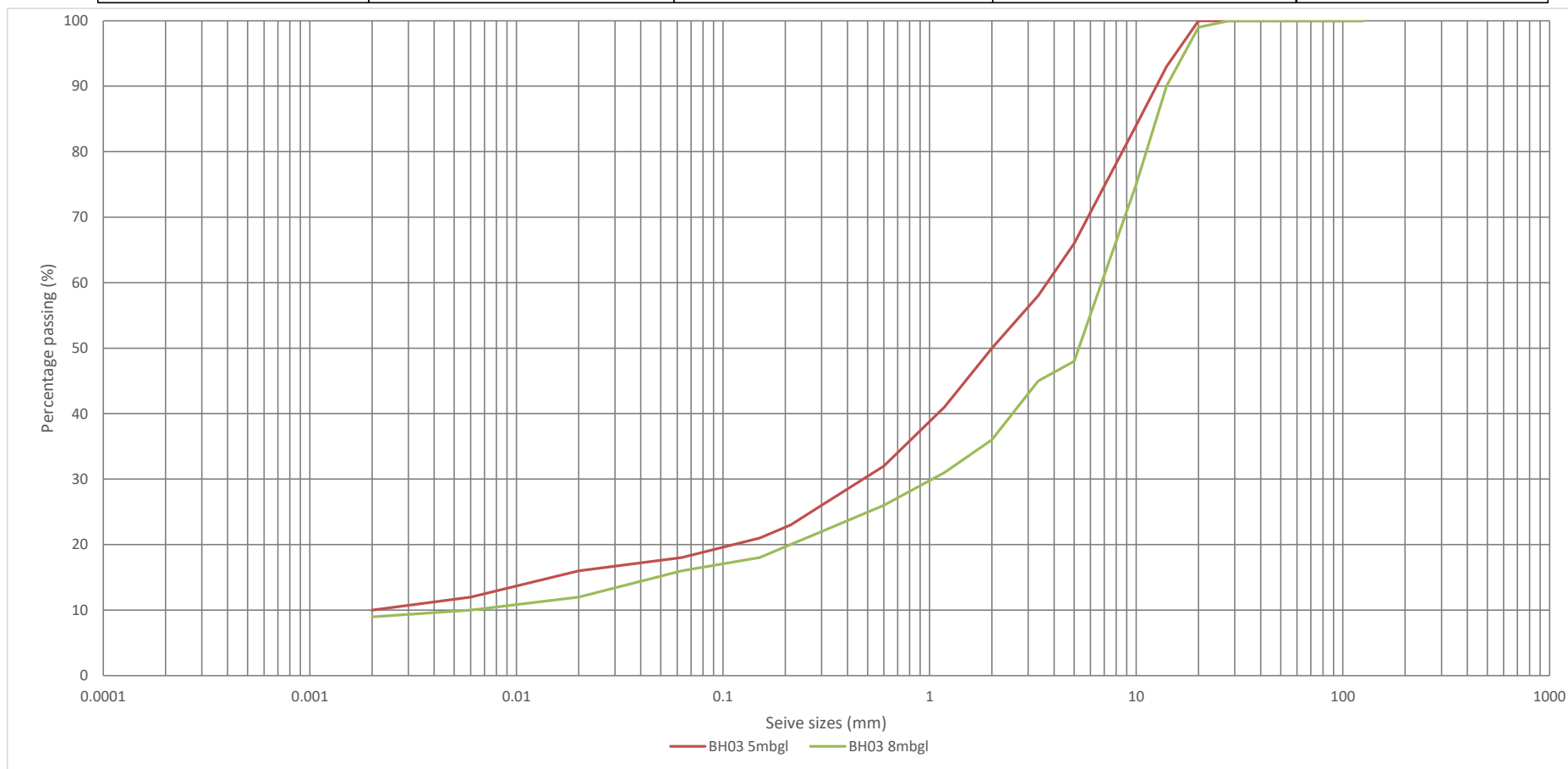
F.8

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F.9. PSD: Tidal Flat Deposits (Granular)

CLAY	SILT	SAND	GRAVEL	COBBLES
------	------	------	--------	---------



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Particle Size Distribution for Tidal Flat Deposits (Granular)

Sheet size

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Drawn

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Date

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17/06/2022

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L McAra

Date

22/06/2022

Status

Figure Number

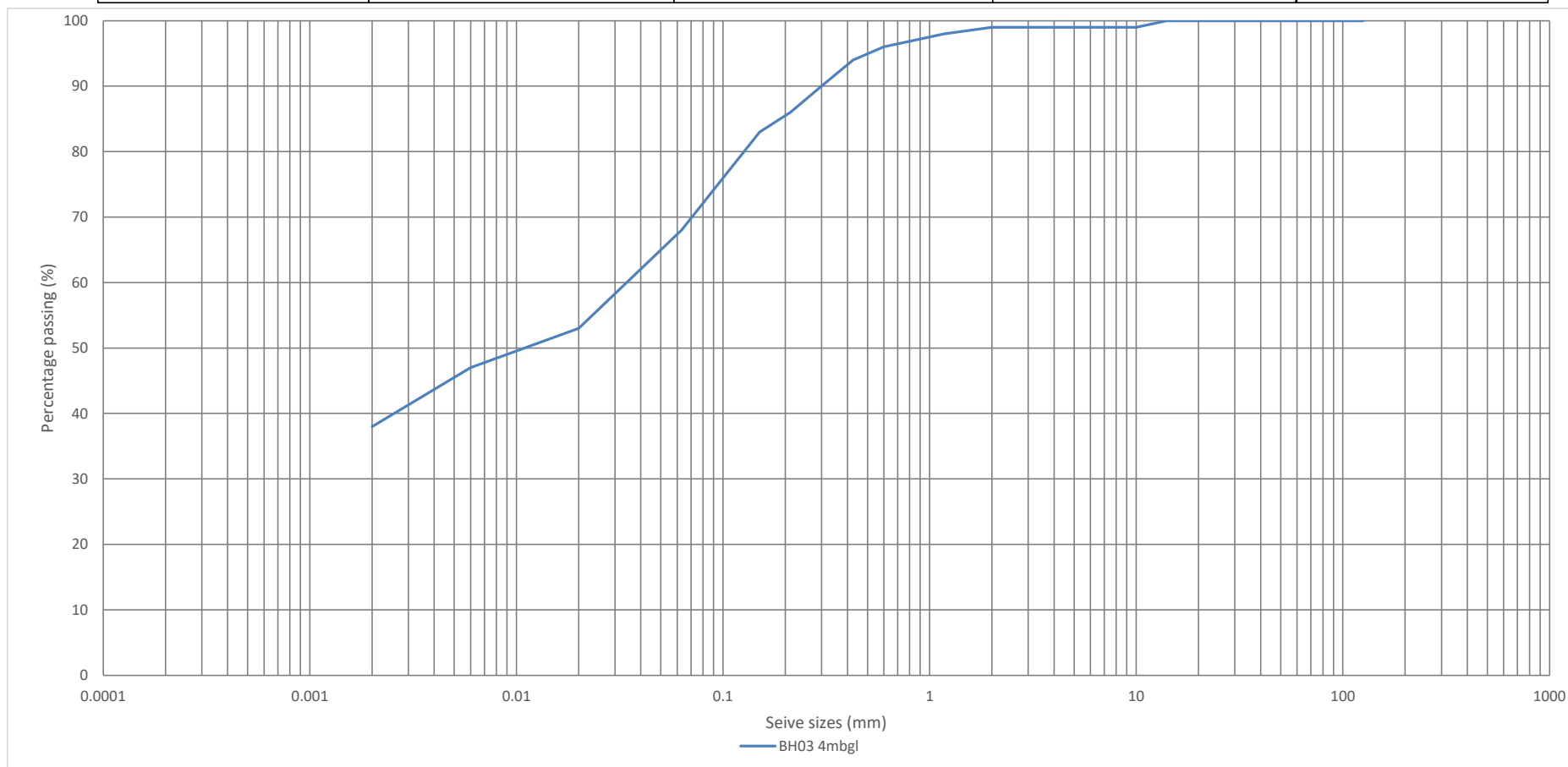
F.9

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F.10. PSD: Tidal Flat Deposits (Cohesive)

CLAY	SILT	SAND	GRAVEL	COBBLES
------	------	------	--------	---------



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Sheet size

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17/06/2022

Authorised

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Date

22/06/2022

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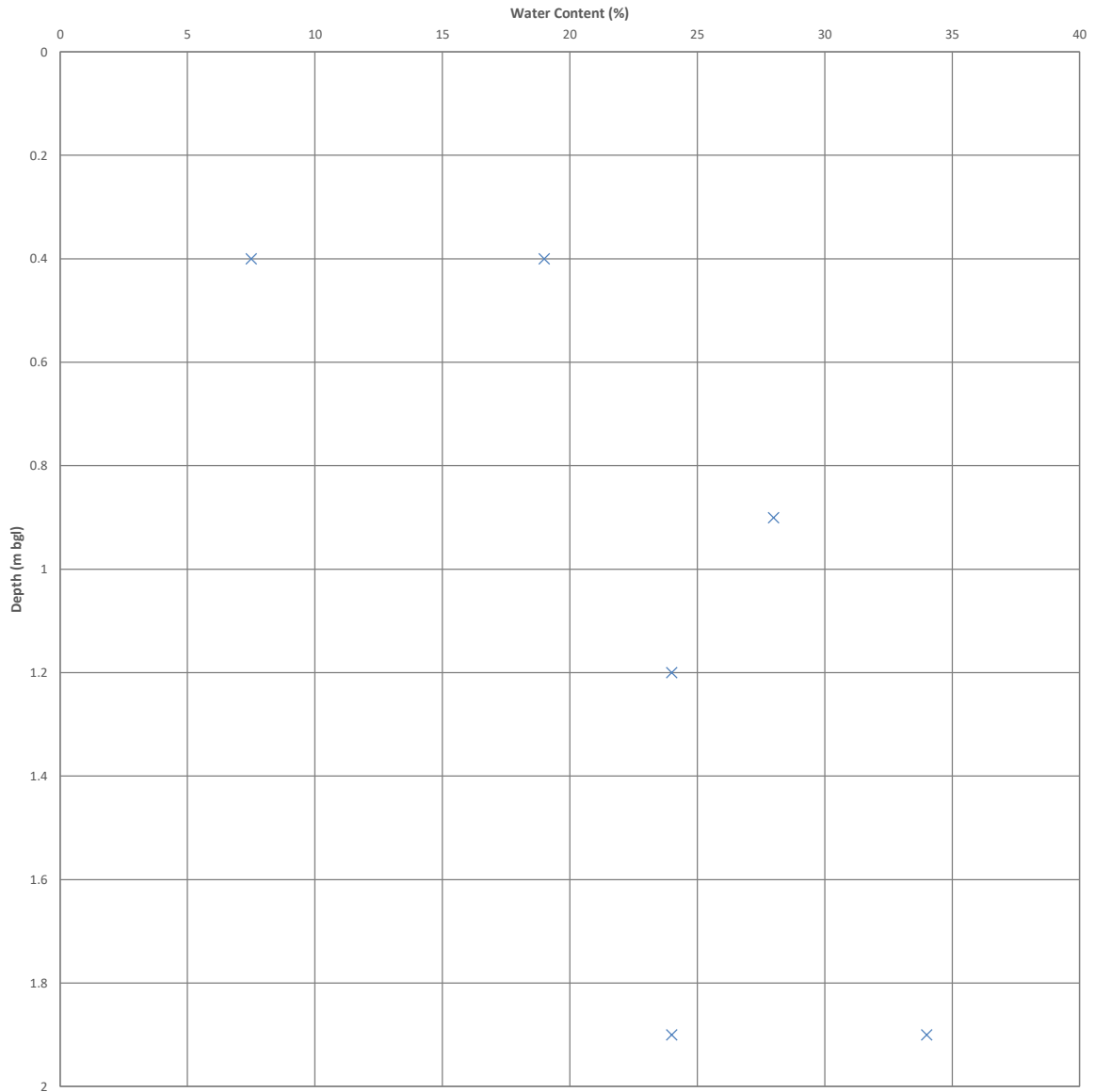
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F.11. Water Content: Made Ground



x Water Content (Classification Tests)



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Title

Water Content vs Depth for Made Ground

Sheet size

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Drawn

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Date

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Checked

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Date

17/06/2022

Reviewed

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Date

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Status

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F.11

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