MARGAM FLOOD CONSEQUENCE ASSESSMENT REPORT

NG Margam

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P03 – Incorporation of completed hydraulic modelling with site specific data & amended in accordance with recent TAN15 requirements.

P04 - Update to section 8.0 – Vulnerability to flooding, defining in further detail & context in regards to development vulnerability.

P05 - Update to reflect revised site boundary & amendments in accordance with National Grid / Stantec comments.

Flood Consequence Assessment

Proposed extension of the Margam Substation

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Basis of Report

This document has been prepared by SLR Consulting Limited (SLR) with reasonable skill, care and diligence, and taking account of the timescales and resources devoted to it by agreement with BakerHicks Limited (the 'Client') as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

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Acronyms and Abbreviations

AEP	Annual Exceedance Probability
aOD	Above Ordnance Datum
BGS	British Geological Survey
BSI	British Standards Institution
CIRIA	Construction Industry Research and Information Association
DTM	Digital Terrain Model
EAF	Electric Arc Furnace
FCA	Flood Consequence Assessment
FMC	Flood Map for Planning
FMfP	Flood Maps for Planning
GIS	Gas Insulated Switchgear
LPA	Local Planning Authority
NGR	National Grid Reference
NPTCBC	Neath Port Talbot County Borough Council
NRW	Natural Resources Wales
PPW	Planning Policy Wales
PU	Policy Unit
SAB	SuDS Approving Body
SINC	Site of Importance for Nature Conservation
SMP2	Shoreline Management Plan 2
SPZ	Source Protection Zone
SuDS	Sustainable Drainage Systems
TAN15	Technical Advice Note 15

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1.0 Introduction

SLR Consulting Limited (SLR) has been appointed by BakerHicks Ltd. (the 'Client') to complete a Flood Consequence Assessment (FCA) for the proposed extension of the Margam Distribution Substation (the 'Site'). Details of the proposed development are provided in 3.0. The extension will facilitate additional electrical supply and distribution capacity to TATA Steel's new Electric Arc Furnace (EAF) at the nearby TATA Steel Facility.

This FCA has been prepared by SLR Consulting Ltd (SLR) under the direction of an SLR Technical Director of Hydrology who specialises in flood risk and is familiar with Welsh planning policy in so far as it relates to flood risk and drainage matters.

1.1 Site Location

The Site is located directly adjacent to the existing Margam Distribution Substation to the west and is centred on National Grid Reference (NGR) SS 78575 86379. The proposed extension to the substation extends to an area of some 1.73ha.

The Site is located on the east periphery of the TATA Steel Facility approximately 800m to the south of Margam. The Site is accessible via a maintenance access road that leads to the existing substation from the A48 Margam Interchange located west of the M4 motorway.

A Site location plan is included in **Appendix A-1**.

1.2 Aims and Objectives

With reference to the Flood Maps for Planning[1], the Site lies within Flood Zone 3. An extract of the Flood Maps for Planning has been provided **Appendix A-2**

With reference to the Planning Policy Wales[2] (PPW) and its associated Technical Advice Note 15[3] (TAN15), any planning application submitted for the proposed development must be supported by an FCA.

The objective of this FCA is to:

- Identify sources of flood risk at the Site;
- Determine an appropriate design level for the mitigation measures required to ensure that the proposed and existing substation remain free from flooding up the 0.1% Annual Exceedance Probability (AEP) flood event including an allowance for climate change, and;
- To consider the impact of the proposed development on the flood risk elsewhere.

The FCA also considered how the proposed development complies with the requirements of TAN15 in terms of its siting, and the management of flood consequences including the effects of flood risk elsewhere.

1.3 Administrative Context

The Site lies within the Neath Port Talbot County Borough Council (NPTCBC) administrative area. NPTCBC are also the SuDS Approving Body (SAB).

1 Natural Resources Wales (2025) Flood map for planning (April 2025). Natural Resources Wales / Flood map for planning

2 Planning Policy Wales (Edition 12, February 2024)

3 Technical Advice Note 15: Development and Flood Risk to Planning Policy Wales (March 2025)

1.4 Best Practice

This report has been prepared in accordance with the advice and requirements prescribed in current best practice documents relating to the management of flood risk in development published by the Construction Industry Research and Information Association (CIRIA)[4], the British Standards Institution (BSI) BS8533[5] and TAN15[3].

4 CIRIA Report C624, Development and flood risk – guidance for the construction industry (October 2004)

5 BS8533:2017, Assessing and managing flood risk in development – Code of Practice (December 2017)

2.0 Site Details

2.1 Existing Site Description

The site of the substation extension lies within the Junction 38 Wetland Complex Site of Importance for Nature Conservation (SINC)[6], designated for its complex of wetland habitats and woodland, with the footprint of the proposed development being dominated by reedbed and willow/birch scrub[7]. Satellite imagery of the Site and surrounding area has been provided in **Appendix A-3**.

Adjacent to the west boundary of the proposed substation extension is the existing Margam Substation, which comprises of hardstanding raised to 4.15m above Ordinance Datum (aOD), a maintenance access road, ancillary buildings, and electrical infrastructure which includes distribution pylons. These pylons lie outside the Site's northern and southern boundaries.

165m to the east is a woodland area which is partially designated as a Restored Ancient Woodland[8]. It separates the Site and surrounding marsh from three industrial plant facilities: a renewable energy plant operated by Western Bio-Energy Limited, another renewable energy plant operated by Schroders Greencoat Limited, and an industrial gas plant operated by BOC Gas & Gear Limited.

Harbour Way (A4241) is situated 220m to the northeast of the Site, which links to the M4, 1km to the east. 75m to the west is a rail line that separates the existing substation from the TATA Steel Facility. The TATA Steel Facility consists of large open areas of hardstanding, roads, buildings, warehouses, and heavy industrial plant.

2.2 Topography

Regional 2m Digital Terrain Model (DTM) topographic data was downloaded from the National Resources Wales (NRW) LiDAR data viewer[9] and is reproduced in **Appendix A-4**. The data shows that the Site is located within an area of low-lying land on the fringes of the coastal flats.

Land in the vicinity of the proposed substation slopes generally from the southeast to the northwest. East of Margam the land rises steeply to an elevation of circa. 220m aOD. The TATA Steel Facility to the west is raised on levelled ground at an average elevation of circa.14.0m aOD. The rail line is raised on an embankment to circa. 5.35m aOD.

Based on a review of the LiDAR data, land within the Site appears to have relatively little topographic variation with an average elevation of circa. 3.37m aOD. The existing substation platform is raised to 4.15m aOD and has several shallow depressions around the platform that are understood to be associated with local drainage features.

6 Neath Port Talbot County Borough Council (2024) Margam and Tai-bach https://beta.npt.gov.uk/leisure-parks-and-culture/countryside-and-wildlife/npt-wildlife/whats-in-my-ward/margam-and-tai-bach/ (Accessed: 24 July 2024)

7 Stantec (December 2024) Preliminary Ecological Appraisal Report. Margam, National Grid. Prepared for National Grid.

8 NRW (2021) Ancient Woodland Inventory https://experience.arcgis.com/experience/dd852f0e12864928973e3e165a1b4631/page/English/?views=Layers (Accessed: 15 August 2024)

9 Natural Resources Wales (2024) Data Map Wales: LiDAR viewer https://datamap.gov.wales/maps/lidar-viewer/ (Accessed: 24 July 2024)

2.3 Hydrological Context

2.3.1 Hydrology

The Site is located 1.8km inland from the Swansea Bay coastline and lies within a catchment comprising the low-lying coastal strip between the coast and the land just to the east of the M4. The area is known locally as Margam Moors.

The higher ground to the east of the Site, the western flanks of Mynydd Margam, is drained by the Nant Cwm Philip, Nant Cwmcaetreharn and Nant Ffrwdwyllt.

Nant Ffrwdwyllt flows through Port Talbot to the Swansea Bay 2.5km to the north. The Nant Cwmcaetreharn is a tributary of the Nant Cwm Philip which drains south to Margam Duck Pond 1.77km east of the Site. The Nant Cwm Philip then continues to flow south through the pond where it confluences with the Afon Cynffig 3.85km to the south of the Site before finally discharging into the Swansea Bay 3.7km southwest.

The low-lying land in the vicinity of the proposed substation between the elevated railway line to the west and higher ground to the east is drained by a network of ditches to the central 'Upper Mother Ditch' 80m to the east of the substation extension. The ditch drains through a culvert beneath the railway line before passing through a large Sluice Structure 320m to the northwest (NGR: SS 78299 86666). The Structure is comprised of a series of flow controls before leading to a culvert beneath the TATA Steel Facility (the "TATA Upper Mother Outlet").

It is anticipated that the TATA Upper Mother Outlet discharges into Swansea Bay or is routed through a large reservoir on the western side of the facility, which then drains into the bay. The outfall to the sea is protected by a tide flap.

The Eglwys Nunydd Reservoir is located in the southern end of the low-laying land circa.1.0km south of the Site. It receives flow from the Nant Cwm Philip via a sluice-controlled brook and drains to the network of ditches.

2.3.2 Drainage Regime

The Site is undeveloped and is not serviced by a formal drainage network as shown by plans provided by NRW enclosed in **Appendix B**. The plans show that Harbour Way to the north drains to the Upper Mother Ditch via a series of balancing ponds and discharge west to the Sluice Structure.

2.4 Geological and Hydrogeological Context

2.4.1 Geology

The National Soils Resources Institute, Soilscapes website[10], identifies *'Loamy and clayey soils of coastal flats with naturally high groundwater'* across the entire Site and much of the wider area.

British Geological Survey (BGS) mapping[11] indicates that the area is underlain by superficial Tidal Flat Deposits consisting of clay, silt and sand. The solid bedrock geology underlying the Site and local area is indicated to be South Wales Middle Coal Measures Formation consisting of mudstone, siltstone and sandstone.

10 Soilscapes online soil map, Cranfield Soil and Agrifood Institute, http://www.landis.org.uk/soilscapes/ (Accessed: 24 July 2024)

11 BGS Geology of Britain Viewer, http://mapapps.bgs.ac.uk/geologyofbritain/home.html (Accessed: 24 July 2024)

Intrusive ground investigations were completed at the development Site and local area by Geotechnics Ltd[12] in September 2024. The scope included drilling of boreholes and excavation of trial pits. The plans and records have been provided in **Appendix C**.

The records broadly confirm that the Site is underlain by tidally deposited superficial geologies overlaid onto mudstone bedrock. A summary of BH108 bored to a depth of 14.66m below ground level (3.05m aOD) and located centrally at the development Site has been provided in Table 2-1.

Table 2-1: Summary of Geological Data Observed in BH108

Geological Description	Depth blg (m)
Top Soil	0.40
Blue CLAY	1.00
PEAT	4.30
Gravelly CLAY	5.50
Sandy GRAVEL	7.70
Gravelly brown CLAY	12.00
Sandy gravelly CLAY	12.90
Weak MUDSTONE	14.66
END OF RECORD	

2.4.2 Hydrogeology

The Tidal Flat Deposits has been designated as a '*Secondary Undifferentiated'* Aquifer[13], defined as "*lower permeability layers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value*".

The South Wales Middle Coal Measures Formation has been designated as a *Secondary A* Aquifer, defined as "*permeable layers capable of supporting local water supplies and, in some cases, forming an important source of base flow to rivers*."

The simplified groundwater vulnerability of underlying aquifers at the Site is classified as having *medium to high* vulnerability and is not located within a Source Protection Zone (SPZ).

Groundwater was encountered in BH108 at a depth of 5.80m bgl, corresponding to -2.75m aOD, within sandy gravel strata. The groundwater level subsequently rose by 5.40m, stabilising at approximately 2.65m aOD. This suggests the groundwater table is confined beneath the overlying clayey strata and the peat layer.

Other records contained within **Appendix C** indicate the presence of water within the topsoil; however, this is likely attributable to recent rainfall and is not considered to represent the true groundwater table.

12 Geotechnics Ltd (2025) Ground Investigation Phase 1 [101677 Margam TATA Steel Connection]. REP003 Rev 11.2. Project No.: PC248745. [Accessed 08/07/2025].

13 Natural Resources Wales (2024) Interactive Map Viewer Interactive Map Viewer (arcgis.com) (Accessed: 24 July 2024)

3.0 Development Proposals

3.1 Project Description

This FCA has been prepared to support the Full planning application for the extension of the Margam 275kV substation including the erection of a gas insulated switchgear hall (GIS hall) and the demolition of the existing control and amenities buildings to enable the erection of a new amenities building. Works to include earthworks, surface water management and drainage infrastructure, lighting, CCTV, boundary treatment, car parking, ecological improvements including a wildlife tower and gabion baskets, improved internal access roads, diesel generator and storage buildings, water storage tank, flood defence wall including flood gates, access road and appropriate landscaping and other associated engineering operations.

A detailed overview of the proposed works to the existing Margam 275kV substation compound is provided below:

- Construction of a GIS hall to house 275 kV electrical switchgear and ancillary equipment;
- The GIS hall to include 12 bays with the provision of 3 spare bays;
- Mechanically Switched Capacitor with Damping Network;
- Realignment of the existing downleads and Super Grid Transformer circuits to new bays within the GIS hall;
- New amenities building to include welfare facilities, meeting room and ancillary office space;
- Hardstanding for the freestanding diesel generator to be used in a backup situation only;
- Security fencing;
- Surface water management and drainage infrastructure including internal drainage systems;
- Flood defence wall (1150mm high and depth 1000mm) and flood gates at existing access points into the existing substation;
- Water storage tank (6m high and 6.1m diameter);
- CCTV;
- Lighting to include 6m medium duty, tilt down tubular steel constructure (exact location to be agreed), 27no. ‘label C’, 18no. ‘label E’ and 13no. ‘label EX1), dark sky approved.
- Creation of new designated car parking area (four standard bays and two accessible bays).
- Landscaping to incorporate native planting / wildflowers.
- Ecological mitigation to include a wildlife tower and gabion baskets.

The development layout is provided Drawing No. MARPT-BHK-01-ZZ-DG-A-130023 / 13_LOR_0066 enclosed at **Appendix D.**

3.2 Anticipated Lifetime of Development

The proposed development has a 40-year lifetime. However, a conservative approach has been taken in this assessment and a 50-year design lifetime has been assumed. The

development is due to commence operation in 2027 and therefore the flood risk has been considered up to 2077.

3.3 Planning Context

3.3.1 TAN15

PPW[2] sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales.

TAN15[3] provides technical guidance relating to development planning and flood risk in Wales.

A review of the proposed development's compliance with TAN15 is provided in Sections 9.0 and 10.0.

3.3.2 Neath Port Talbot County Borough Council, Local Development Plan

The Local Development Plan (2016–2026)[14] (LDP) was adopted in January 2016 and is the development plan for Neath Port Talbot that provides the basis for decisions on land use planning in the County Borough up to 2026.

Policies that are relevant to flood risk and drainage matters are summarised below.

Overarching Polices

Policy SP1, Climate Change

'In relation to the consequences of climate change:

Likely increased flood risk will be taken into account and addressed by ensuring that there is greater resilience by avoiding development on land that is at risk from flooding in the first instance in accordance with the sequential approach set out in national guidance or in locations that could increase the risk of flooding elsewhere.'

Paragraph 3.0.5

'New developments will be expected to avoid unnecessary flood risk and to meet the requirements of TAN 15: Development and Flood Risk. No highly vulnerable development will be permitted within Development Advice Map (DAM) Zone C2(8) and development will only be considered in areas at risk of flooding where it can be demonstrated that the site can comply with the justification and assessment requirements set out in the TAN'.

Topic Based Policies

Policy BE1 Design

'Proposals will only be permitted where all of the following criteria, where relevant, are satisfied:

9. Its drainage systems are designed to limit surface water run-of and flood risk and prevent pollution'.

Paragraph 5.5.13

14 Neath Port Talbot County Borough Council Local Development Plan (2011-2026) Adopted January 2016 (Accessed: 04 August 2024)

> Drainage systems should be designed to ensure that developments have no detrimental effects on the water environment or on flood risk. Normally this will involve the use of Sustainable Drainage Systems (SuDS) techniques.

This assessment will demonstrate how the development complies the with the LDP in so far as it relates to flood risk and drainage matters.

4.0 Potential Sources of Flooding

4.1 Screening Study

There are a number of potential sources of flooding, and these include:

- Flooding from rivers or fluvial flooding;
- Flooding from the sea or tidal flooding;
- Flooding from surface water or pluvial flooding;
- Flooding from groundwater;
- Flooding from sewers;
- Flooding from reservoirs, canals, and other artificial sources, and;
- Flooding from infrastructure failure.

4.1.1 Flooding from Rivers or Fluvial Flooding

With reference to the Flood Maps for Planning[1], the detailed map for flooding from Rivers, (reproduced as **Appendix A-2**), shows the proposed extension to the substation to lie wholly within Flood Zone 3. The existing substation lies within Flood Zone 2.

Flooding from this source has therefore been considered in further detail in Section 6.0.

4.1.2 Flooding from the Sea or Tidal Flooding

The Flood Map for Planning indicates that Site is not at risk of tidal flooding. However, given the proximity to Swansea Bay, flooding from this source has been considered in further detail in Section 6.0.

4.1.3 Flooding from Surface Water and Small Watercourses

With reference to the Flood Map for Planning, the detailed map for flooding from Surface Water or Pluvial Flooding and Small Watercourses shows the Site to be at risk of flooding from Surface Water and Small Watercourses.

Flooding from this source has therefore been considered in further detail in Section 6.0

4.1.4 Flooding from Groundwater

Groundwater flooding can occur when a Site is underlain by permeable strata. After a prolonged period of rainfall and groundwater recharge, a rise in groundwater levels above the ground surface can result in flooding. Due to the slow response of groundwater systems, groundwater flooding can persist for an extended period.

High groundwater levels are typically observed close to the coast, where superficial geologies are saturated by the ingress of brackish seawaters and catchment runoff. As the proposed substation is low lying at an elevation of circa. 3.37m aOD, there is a risk of groundwater emergence.

Flooding from this source has therefore been considered in further detail in Section 6.0.

4.1.5 Flooding from Sewers

Data provided by NPT enclosed at **Appendix B** shows that there are no sewers located within the Site boundary. It is understood that the existing Margam Substation and TATA Steel Facility to the west are service by foul and surface water drainage networks. Should

either system surcharge, floodwaters are highly unlikely to propagate to the east and inundate the Site.

Flooding from the source has not been considered further.

4.1.6 Flooding from Reservoirs, Canals and Other Artificial Sources

The Flood Maps for Planning show that the Site is at risk of flooding from the Eglwys Nunydd reservoir located circa.1.0km to the south.

However, reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the regulation authority for the Reservoirs Act 1975 in Wales, NRW ensure that reservoirs are inspected regularly, and essential safety work is carried out.

There are no canals or other artificial sources of within the vicinity of the Site that could give rise to a flood risk

Therefore, the likelihood of flooding from these sources is low and has not been considered further.

4.1.7 Flooding from Infrastructure Failure

During an extreme tidal flood event, overtopping of the flood defences could result in flooding of the land to their rear. Overtopping can significantly increase the potential for scour and erosion of the landward side of a flood defence resulting in the development of a breach through which significant volumes of floodwater would propagate across the coastal flats.

As discussed above, the Flood Map for Planning from the Sea indicates that the Site is not at risk of flooding from the sea, nor does it fall within a TAN15 Defended Zone. However, this is not consistent with the extract of the policy map from the SMP2 enclosed at **Appendix E**. This figure shows a significant extent of flood risk from a 0.1% AEP event originating from the sea, impacting a large portion of the TATA Steel Facility.

In addition, the Upper Mother Ditch drains via the Sluice Structure that discharges catchment runoff to the Swansea Bay via the TATA Upper Mother Outlet under the facility. Should the Structure become blocked, water upstream of the Upper Mother Ditch could back up onto the Site.

Flooding from this source has therefore been considered in further detail in Section 6.0.

4.2 Flood Risk Summary

A summary of the potential sources of flooding and the flood risk arising from them is presented in Table 4-1.

Table 4-1: Potential Sources of Flooding

Potential Source of flooding	Significant Flood Risk at the Site (Y/N)
Rivers or Fluvial Flooding	Y
Sea or Tidal Flooding	Y
Surface Water or Pluvial Flooding	Y
Groundwater	Y
Sewers	N
Reservoirs, Canals and other Artificial Sources	N
Infrastructure Failure	Y

The flood screening assessment has shown that Site is potentially at flood risk from multiple sources, and these are considered in detail in Section 6.0.

5.0 Climate Change

In September 2021, Welsh Government published Flood Consequences Assessments: Climate change[15]. This guidance advises that peak rainfall intensity, sea level, peak river flow, and extreme wave heights are all expected to increase in the future as a result of climate change.

The guidance acknowledges that there is considerable uncertainty with respect to the absolute level of change that is likely to occur. As such, in these instances, the guidance provides estimates of possible changes that reflect a range of different emission scenarios. Uplifts have only been applied where datasets are derived from non-site-specific datasets or where local hydraulic modelling has not included climate change allowances.

The impact of climate change on offshore wind speed and wave height are only of relevance when considering locations in direct proximity to the open coast or other large open bodies of water.

The climate change allowances applicable to the Site relate to peak river flow, peak rainfall intensity, and sea level rise.

5.1 Peak River Flow Allowance

The Site lies within the Western Wales River Basin District.

An extract of Flood Consequences Assessments: Climate change allowances, *Table 1: peak river flow allowances by river basin district* for the Western Wales River Basin District is reproduced in Table 5-1.

NRW recommends that the central allowance for the 2080s is used to assess the potential impact of climate change in FCA reporting and to inform design levels.

Table 5-1: Peak River Flow Allowances by River Basin District (Using 1961 to 1990 Baseline[16])

River basin district (using 1961 to 1990 baseline	Change Factors	Total potential change anticipated by the 2020s (2009 – 2019)	Total potential change anticipated by the 2050s (2021 – 2049)	Total potential change anticipated by the 2080s (2050 – 2079)
Western Wales	Upper end estimate	25%	40%	75%
	Central estimate	15%	25%	30%
	Lower end estimate	5%	10%	15%

5.1.1 Design Flood Event

Based on NRW guidance[13] and assuming a development lifetime of 50 years, uplifts in peak fluvial flows of 30% have been adopted to inform the design flood level for the development.

15 Welsh Government, (2021). Flood Consequences Assessments: Climate Change allowance

16 UK Climate Projections (2009) published June 2009 by the UK Government Department for Environment, Food and Rural Affairs.

5.1.2 Impact of Development on Flood Risk to Third Parties

NRW recommends[13] that FCAs should apply the upper-end climate change allowance when assessing the potential increase in flood risk to third parties arising from development. However, the guidance also states:

"The upper end estimate may not be applicable to every site but will need to be considered depending upon the scale and nature of the site in question."

Section 10.1 of the hydraulic modelling report enclosed at **Appendix G** confirms that the displacement of floodwaters by the proposed development would result in a minor increase in the flood extent within adjacent industrial premises.

Table 4 of TAN15 considers such sites as *less vulnerable*, i.e. the impacts of flooding are unlikely to present a significant risk to lives or livelihoods.

It is therefore considered appropriate to adopt the central estimate evaluating the potential impact of the development on third parties.

5.2 Peak Rainfall Intensity Allowances

An extract of Flood Consequences Assessments: Climate change allowances *Table 2: Change to extreme rainfall intensity* is reproduced in Table 5-2.

Both the central and upper estimates should be assessed to estimate the range of impacts. The central estimate should be used to inform design levels; however, where the assessment indicates a significant residual flood risk for the upper end estimate, the FCA should include appropriate mitigation measures.

Table 5-2: Change to Extreme Rainfall Intensity (Compared to 1961-90 baseline)

Allowance Category	Total potential change anticipated for 2020s (2015-2039)	Total potential change anticipated for 2050s (2040-2069)	Total potential change anticipated for 2080s (2070-2115)
Upper End	10%	20%	40%
Central	5%	10%	20%

With reference to Table 5-2 the FCA has considered increases in rainfall intensity of 40% over the lifetime of the development.

5.3 Sea Level Rise Allowances

An extract of Flood Consequences Assessments: Climate change allowances *Table 3: Estimated mean sea level rise (in metres) for relevant local authority areas by 2100 and 2120. Allowances are based on RCP8.5 70th and 95th percentiles* is reproduced as Table 5-3.

Development proposals should be assessed against the relevant regional 70th percentile (Higher Central allowance) presented in Table 3 to inform design levels. The 95th percentile (Upper End allowance) should also be assessed to inform any mitigation measures that may be required, access and egress routes and emergency evacuation plans.

Table 5-3: Table 3: Estimated mean sea level rise (in metres) for relevant local authority areas by 2100 and 2120. Allowances are based on RCP8.5 70th and 95th percentiles

Local Authority Area	Allowance Percentile	Mean Sea Level Rise (metres) by 2100 *(UKCP18 baseline 1981-2000)	Mean Sea Level Rise (metres) by 2120 *(UKCP18 baseline 1981-2000)
Neath Port Talbot	70th (Higher Central)	0.84	1.00
	95th (Upper End)	1.11	1.32

The review of the tidal flood risk to the Site will therefore consider the 0.84m uplift associated with the 70th percentile up until 2100. However, this is for a considerably greater lifetime than that of the development of 50 years.

To consider the impact of climate change on sea levels over a shorter lifespan, it is appropriate to refer to the Sea Level Allowances published by the Environment Agency[17] for the 'South West', which are presented in Table 5-4. This table shows the estimated annual uplifts to mean sea level over a number of epochs. These uplifts apply to coastal areas in the Bristol Channel, including Swansea Bay.

Table 5-4 Sea level allowances by river basin district for each epoch in mm for each year (based on a 1981 to 2000 baseline)

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (meters)
South West	Higher Central	5.8 (203)	8.8 (264)	11.7 (351)	13.1 (393)	1.21
	Upper End	7.0 (245)	11.4 (342)	16.0 (480)	18.4 (546)	1.62

Clearly, there is some discrepancy in the cumulative rise to 2120 between the Welsh Government and Environment Agency guidance, however, by adopting the Environment Agency guidance provides a conservative estimate for the shorter lifetime of development.

A higher allowance for the increase in sea levels of 0.51m to 2077 was therefore estimated. Calculations are provided in **Appendix G.**

17 https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#sea-level-allowances

6.0 Assessment of Flood Risk

6.1 Potential Sources of Flood Risk

The flood screening assessment reporting in Section 4.0 and summarised in 4.2 indicates that Site may be at risk of flooding from the following sources:

- Rivers or Fluvial Flooding
- Sea or Tidal Flooding
- Surface Water or Pluvial Flooding
- Groundwater Flooding
- Infrastructure Failure

The risk of flooding from these sources is considered in detail below.

6.2 Data Sources

6.2.1 Introduction

In considering the flood risk to the Site, the following data sources have been reviewed:

- Flood Map for Planning
- Hydraulic models
- Flood Risk Management Plan[18]
- Strategic Flood Consequence Assessment[19]
- Shoreline Management Plan 2

Hydraulic modelling output data was sampled and analysed using the baseline run used for NRW Flood Maps for Planning in Section 6.0. Datasets were mapped onto the Site using Geographic Information System software for accurate determination of flood levels, depths and velocities.

6.2.2 Flood Map for Planning

The Flood Map for Planning published on the NRW[1] website indicates that:

- Rivers – the Site is in Flood Zone 3. Areas with more than 1% (1 in 100) chance of flooding from rivers in a given year, including the effects of climate change.
- Sea – the Site is in Flood Zone 1. Areas with less than 0.1% (1 in 1.000) chance of flooding from the sea in a given year, including the effects of climate change.
- Surface Water and Small Watercourses – the Site is in Flood Zones 2 and 3. Areas with 0.1% to 1% (1 in 1000 to 1 in 100) and more than 1% (1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change respectively.
- TAN15 Defended Zone – the Site does not benefit from river or tidal flood defences.

18 Neath and Port Talbot (2015) Flood Risk Management Plan 2015 (Accessed 12 August 2024)

19 Neath and Port Talbot (2014) Strategic Flood Consequences Assessment Stage 1 & 2 (September 2014) (Accessed: 12 August 2024).

6.2.3 Hydraulic Models

In response to a formal data request, NRW provided outputs from a hydraulic model developed to consider the flood risk arising from the Margam Duck Pond.

The Margam_FMC_5_V1.0 2023 Model was completed to support a formal Flood Map Challenge (FMC) to the flood mapping previously published by NRW. The FMC was accepted by NRW and integrated into the updated Flood Map for Planning, for Rivers and Sea.

It should be noted that the FMC Model did not consider breaches of the existing tidal defences.

The Port_Talbot_5_V3.1_2021 hydraulic model, which covers the wider coastal catchment to the north of the Site was also reviewed alongside the FMC Model. It was concluded that the Port Talbot model had no significant impact on flood risk to the Site and was thus excluded from further analysis.

The FMC Model run 093 represents the baseline scenario where the initial water level in the Margam Duck Pond (referred to as 'Ty Du'), located 1.77km east of the Site, is set at 44.12m aOD with the sluice gate closed to reflect the 'default' conditions without pre-storm 'interventions'. By comparison, FMC Model run 094 incorporates a sensitivity test with the sluice gate open and the initial water level lowered to 43.0m aOD to simulate pre-storm drawdown to mitigate potential flooding.

It was clear from a review of the FMC model outputs that the representation of high probability fluvial flood events did not correlate well with observed local flood risk history. Data provided by The NPTCBC Highways Authority and the Welsh Government indicated that the FMC model was significantly overstating the flood risk to the M4 Motorway.

The FMC model report provided by NRW included a number of suggested recommendations for improvement of the model and so, given the clear issue with higher probability flood events, it was licensed from NRW and updated to inform this FCA.

Principal improvements to the FMC model carried out by SLR were:

- Review of hydrology
- Detailed topographic survey of the Margam Duck Pond and downstream culvert
- Inclusion of major culvert beneath Harbour Way
- Inclusion of culvert beneath TATA Steel that drains the Mother Ditch
- Contribution of the catchment between the Margam Duck Pond and the Site

A copy of the hydraulic modelling report for the updated model upon which this FCA has been based is enclosed at **Appendix H** and the results summarised in Section 6.4.

6.2.4 Flood Risk Management Plan

NPTCBC is a Lead Local Flood Authority (LLFA) and prepared its Local Flood Risk Management Plan to comply with the European Floods Directive in June 2013.

This strategy provides a high-level overview of the flood risk to the borough rather than a detailed assessment on a site-by-site basis; however, it does provide a chronology of flood events which suggests that there was a major tidal flood event in 1910, however, it is not clear if this affected the Site.

6.2.5 Strategic Flood Consequence Assessment

A Strategic Flood Consequence Assessment was completed for NPTCBC in 2014. This document is largely focused on the key urban centres and does not include specific reference to the Site other than confirming the Site's location within Zone C2, as defined by the previous version of TAN15[20].

6.2.6 Shoreline Management Plan

The Shoreline Management Plan outlines strategies for managing the coastline and defences over the next 100 years. It provides information on coastal defence policies, condition of defences and considers future sea level rise.

6.3 Tidal Flood Risk

6.3.1 Overview

The Site falls within the Shoreline Management Plan (SMP2) Policy Development Zone 8 (Sker Point to Swansea Docks)[21]. Although the data is considered outdated, the SMP2 policy map 8 shows that the Site is at risk of flooding for the 0.1% AEP undefended scenario.

A copy of the policy map is enclosed in **Appendix E** and indicates that the formal defences along Swansea Bay to the west of the TATA Steel Facility (Policy Unit 8.2) are 'outflanked' by floodwater via the Afon Cynffig and flowing north towards the Site along the line of the railway from the Afon Cynffig estuary, some 3.0km to the South.

6.3.2 Flood Defences

The Site benefits from coastal defences to the west of the TATA Steel Facility as shown in **Appendix A-5** which shows the variation in crest level along the line of the existing defences based on NRW LiDAR[9] and SMP2 data[22]. These defences consist of raised revetments which protect the TATA Steel Facility and wider coastal flats.

The short to long policy for Policy Unit 8.2 that covers these raised revetments is to '*Hold the Line*' by: "*maintaining and upgrading existing defences (privately funded) in response to future climate change/ sea level rise as required*".

National Coastal Erosion Risk Management (NCERM) data[23] indicates that by 2077 (Long Term Epoch) revetment crest levels will be raised by 3.4 - 6.6m to provide a minimum crest level of 12.4m aOD within the Policy Unit.

Clearly, these policies currently rely on private funding in the future that cannot be guaranteed; however, they afford protection to substantial industrial assets, principally the TATA Steel Facility.

20 Welsh Government (2004) Technical Advice Note 15: DEVELOPMENT AND FLOOD RISK

21 Swansea and Carmarthen Bay Engineering Group (2012) Laverock Point to St. Ann's Head Shoreline Management Plan SMP2 Main Document [Accessed 30 July 2024].

22 Swansea and Carmarthen Bay Engineering Group (2012) Lavernock Point to St Ann's Head SMP2 Appendix C: Baseline Process Understanding Annex C: Defence Assessment p1-50. [Accessed 01 August 2024]

23 Natural Resources Wales (2023) National Coastal Erosion Risk Management (NCERM), DataMapWales National Coastal Erosion Risk Management (NCERM) | DataMapWales (gov.wales) [Accessed 01 August 2024]

6.3.3 Sea Levels

Coastal Design Extreme Sea Level data published by the Environment Agency[17] indicates that current day still-water tidal flood levels for the 0.5% AEP event are 6.38m aOD and 6.71m aOD for the 0.1% AEP event.

When considering the impact of climate change up to 2122, the 0.1% AEP still water tidal flood level is predicted to increase by 1.32m to 8.03m aOD. As discussed in Section 5.3, assuming a 50-year development lifetime to 2077, the sea level is predicted to rise by 0.51m to 7.22m aOD.

6.3.4 Evaluation of Tidal Flood Risk

It is clear that the existing flood defences to the west of the TATA Steel Facility are unlikely to be overtopped; however, as discussed in Section 6.3.1, they are at risk of being outflanked.

This was explicitly considered by the FMC Model. When tidal flood levels exceed the level of the higher ground between Margam Moors and Afon Cynffig estuary to the south of the Site, floodwaters spill into the low-lying Moors as illustrated by **Appendix A-6**. However, the modelling indicates that the floodwater would not propagate as far as the Site.

It is therefore concluded that the proposed substation extension is not at significant risk of tidal flooding.

6.4 Fluvial Flood Risk

6.4.1 Overview

With reference to NRW TAN15 Defended Zones data, the Site does not formally benefit from fluvial defences and is shown by the Flood Map for Planning, Rivers, to be at a greater than 1% AEP risk of fluvial flooding when considering the impact of climate change. This is shown in **Appendix A-7**.

As discussed above, the Flood Map for Planning has been informed by the FMC Model that has been revised to inform this FCA. The FMC Model indicated that the primary source of flood risk to the Site is from overtopping from Margam Duck Pond.

6.4.2 Flood Mechanism

Whilst the improvements to the FMC model indicate the frequency of flooding along the M4 from the overtopping of the Margam Duck Pond is significantly reduced, the flood flow path for lower probability flood events is broadly similar.

Floodwater overtopping the Margam Duck Pond that cannot be accommodated in the culvert spills over the west bank of the spillway. Here, it travels downstream of the Pond across Margam Park and onto the surface of the M4. It then continues to spill on to the land to the north of Harbour Way before flowing beneath Harbour Way via existing culverts and accumulating in the lower lying vicinity of the Site. This is shown broadly by **Appendix A-8**.

The TATA Upper Mother Outlet has a limited discharge capacity when compared to flood flows arising from the Margam Duck Pond. This results in a gradual increase in flood level at the Site as the floodwaters continue to progress onto the Site.

As shown by **Appendix A-8**, the updated FMC Model indicates that assuming the central estimate of the impact on climate change, the existing substation platform would be inundated in addition to the area that will accommodate the proposed extension.



6.4.3 Fluvial Flood Levels

Modelled flood levels at the location of the proposed substation extension are summarised in Table 6-1.

Table 6-1: Summary of Modelled Levels

Fluvial Event Scenario	Flood Level (m aOD)
3.3 % AEP	3.82
1.0% AEP	4.13
1.0% AEP + 30% Climate Change	4.35
1.0% AEP + 75% Climate Change	4.68
0.1% AEP	4.59
0.1% AEP + 30% Climate Change	4.96
0.1% AEP + 75% Climate Change	5.46

When considering the impact over the 50-year lifetime of the development, the maximum flood level in the vicinity of the proposed substation extension will be 4.96m aOD for the 2077 0.1% AEP fluvial flood event when accounting for the central climate change allowance.

6.4.4 Design Flood Level

The original hydraulic modelling report highlighted that the flood risk from the Margam Duck Pond, which affects the Site, was a major uncertainty that was ultimately included in NRW's Flood Maps for Planning from Rivers. The update to the FMC model aimed to reduce the uncertainty with respect to the estimated flood levels in the vicinity of the Site and provides an up to date representation of the likely flood mechanisms and return period.

However, there remains a degree of uncertainty with respect to the capacity of the TATA Upper Mother Culvert that provides the only 'outlet' for floodwaters accumulating in the vicinity of the Site.

The proposed substation will not be a permanently manned facility. Therefore, the level of risk the operator is willing to accept regarding the impacts of climate change over the lifetime of the development is ultimately a matter of their professional judgment.

Therefore, as discussed in Section 5.1.1, the design of the flood mitigation measures to protect the existing and proposed substation extension has been based on the central estimate of 30%.Surface Water and Small Watercourses

Due to the locally low-lying topography, surface water runoff naturally drains towards the Site which is at the lowest point in the catchment as shown in **Appendix A-9**.

In the absence of site specific modelling data for the flood risk from Surface Water and Small Watercourses, an estimate of the flood level for the 0.1% AEP flood event was made by comparing the flood outline to the local topography. The outermost extent of Flood Zone 2, shown by **Appendix A-9**, was sampled from the local LiDAR data to derive an estimation of the peak flood level. Statistical analysis was used to filter any anomalous values to improve the accuracy of the estimate.

The maximum flood level for the 0.1% AEP event including an allowance for climate change (implicit in Flood Zone 2) in the vicinity of the proposed substation extension using this method was estimated as 3.565m aOD.

6.5 Groundwater Flood Risk

As discussed at Section 2.4.1, the Site is underlain by superficial deposits of Tidal Flat Deposits consisting of clay, silt and sand. The solid geology underlying the Site confirmed to be South Wales Middle Coal Measures Formation consisting of mudstone, siltstone and sandstone.

Drilling was completed in September 2024. The Tidal Flat Deposits encountered are likely to be of low permeability, but drilling identified a high-permeability gravel aquifer located at a depth of 5.80m bgl. This aquifer is confined by layers of low-permeability peat and clay, which restrict groundwater movement.

The Site is low-lying and could be susceptible to groundwater flooding, particularly during periods of high groundwater levels due to its coastal proximity and topography. However, the well-developed drainage system, including the network draining Margam Moor to the south of the TATA Steel facility, is expected to help regulate and attenuate shallow groundwater flooding.

Groundwater emergence flow rates are expected to be relatively slow, and flood levels would likely be moderated by the extensive local drainage network.

Therefore, whilst there is a risk from groundwater flooding, in terms of flood levels, it is not considered significant compared to the fluvial flood risk discussed above.

6.6 Infrastructure Failure

6.6.1 Breach of the Tidal Defences

The Site is well protected by the existing tidal flood defences to the west of the TATA Steel Facility designated Policy Unit 8/2 by the SMP2. The short to long term policy is '*Hold the Line*'. With reference to the SMP policy statement for Sker Point to Swansea Docks:

> *"The policy is to (…) maintain and upgrade existing defences (privately funded) in response to future climate change/ sea level rise as required. This will continue to manage the risk of coastal erosion and flooding to the industrial area and minimise the risk of potentially contaminated material from being released into the coastal zone."*

No breach modelling has been completed for these defences; however, given the important industrial assets they protect and the ongoing monitoring and maintenance, they are considered unlikely to fail.

In the unlikely event that the defences were to be breached or outflanked at locations vulnerable to scour and erosion, a simple estimate of the impact is to project the peak tide levels across the coastal flats to assess the flood level. This in effect creates an undefended tidal flood scenario where water fills the floodplain and rises up to the peak water level. When accounting for climate change up to 2077, the flood level for the 0.1% AEP event could reach a theoretical maximum of 7.37m aOD. **Appendix E** approximates the extent of flooding under such an undefended scenario.

In practice, the volume of water that can propagate inland following a breach is limited by the width of the breach and the duration of the peak of the tidal cycle. Therefore, the simple projection based on the complete absence of defences, as detailed in **Appendix E**, is a significant overestimate of the extent of the flooding.

Additionally, such a simplistic analysis ignores the topographic variation between the defences and the Site, which includes the raised development platform within the TATA Steel Facility and the protection afforded by the railway embankment.

In summary, the risk of a breach of the defences is considered very low and even if it were to occur, it is unlikely that resulting flood levels would reach the proposed crest level of the flood defence wall for the substation discussed in Section 6.7.

6.6.2 Upper Mother Ditch Sluice Blockage

A blockage of the Sluice Structure controlling the outfall of the Upper Mother Ditch is a potential risk to the Site. In a scenario where water is unable to drain, water would back up onto the Site and overtop the banks of the Upper Mother Ditch. Given the importance to the local drainage regime as the primary outlet, it is considered that the structure is likely to be regularly maintained, and as such the risk of a blockage is considered low.. It is also noted that the capacity of the culvert is influenced by the tide locking of the outfall to the Severn Estuary,

Residual risk is considered to be analogous to the mechanism described by the updated FMC Model in Section 6.4.2. The Site would slowly fill before the sluice can be repaired or water overtops the railway at 5.35m aOD and floods west.

6.7 Design Flood Level

The analysis set out above concludes that based on the best available data, the Site is predominantly at risk of fluvial flooding and to a lesser extent flooding from Surface Water and Small Watercourses.

The tidal, groundwater and infrastructure flood risks have been discounted.

National Grid's design criteria for the development (BP 213) requires that it remains free from flooding during a 0.1% AEP flood event, considering the central estimate for climate change over the development's 50-year lifetime up to 2077. As shown by Table 6-1, the updated FMC Model predicts a flood level of 4.96m aOD for this event.

The crest level of flood defences to exclude flood waters from the existing substation and proposed extension has been designed to include 300mm freeboard resulting in a crest level of **5.3m aOD**.

Given the design flood event adopted and the freeboard provided, the residual risk of flooding to the proposed development from fluvial sources and from Surface Water and Small Watercourses with the proposed flood defences in place is considered very low.

6.8 Impact on the Flood Risk Elsewhere

The updated FMC Model predicts that exclusion of floodwaters from the area protected by the proposed flood defences will increase the depth of flooding locally for the 0.1% AEP flood allowing for the central estimate of climate change.

This is discussed in more detail in Section 10.0.

7.0 TAN15 Flood Zone

The description of the flood Zones defined by Figure 1 of TAN15 are reproduced in Table 7-1.

Table 7-1: TAN15 Flood Zones

Zone	Flooding from river	Flooding from the sea	Flooding from surface water and small watercourses
1	Less than 1 in 1000 (0.1%) (plus climate change) chance of flooding in a given year		
2	Less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.	Less than 1 in 200 (0.5%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.	Less than 1 in 100 (0.5%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.
3	A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change.	A greater than 1 in 200 (1%) chance of flooding in a given year, including climate change.	A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change.
TAN 15 Defended Zones	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from rivers of 1:100 (plus climate change and freeboard).	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from the sea of 1:200 (plus climate change and freeboard).	Not applicable.

Based on the review set out in Section 6.0, it is clear that the proposed substation extension lies within **Flood Zone 3.**

8.0 Vulnerability to Flooding

With the proposed defences in place, in the unlikely event occur that Margam Substation were to flood to an extent to which it went offline, the operational impact would likely be limited in scale and manageable. There is no current indication that such an event would result in a widespread blackout or pose a significant risk to Tata Steel's operations. Furthermore, the connection offer for the new EAF, accepted by TATA, is based on this single substation connection. TATA accept this risk and will mitigate appropriately.

The electric arc furnace is not as sensitive to cessation as the blast furnace operation was, the furnace can easily be restarted with little effect on production in the event of a loss of power. The worst case scenario is that the refractories would need to be removed and this is completed on a two week cycle under normal operations.

BP 213 (Substation Flood Risk Assessment and Flood Risk Monitoring) is the appropriate National Grid procedural reference which sets out the technical and procedural requirements for flood resilience and has been followed in the design of the flood mitigation measures for the substation and proposed extension.

National Grid Electricity transmission substations do not directly feed any residential properties – this includes Margam. Margam 275kV substation currently feeds Grange substation which provides a feed to Tata Steel. The proposed extension to Margam substation provides a supply to the new Port Talbot substation which then feeds the EAF at Tata Steel in addition to Grange

The guidance under TAN15 defines "*highly vulnerable*" development as that which, if flooded, would pose a risk to life, the environment, or critical services. In contrast, "*less vulnerable*" development is where the consequences of flooding are more manageable and do not pose such risks.

In conclusion:

- There is no evidence of a direct risk to life or the environment from a flood at Margam.
- Tata Steel appears to have sufficient backup arrangements in place.
- The substation's role in the grid does not suggest it would trigger a regional blackout if temporarily offline.

Therefore, from an operational standpoint, the Margam Substation can reasonably be considered '***less vulnerable***' in the context of TAN15.

9.0 Flooding and the Plan-led System

9.1 Substation Extension

As discussed in Sections 7.0 and 8.0 the proposed substation extension lies within **Flood Zone 3** and is considered a ***"Less Vulnerable"*** development.

For planning applications in Flood Zone 3, TAN15 Paragraph 10.23 states:

"*Other proposals will only be appropriate if they are essential to the Development Plan Strategy to regenerate an existing settlement or achieve key economic or environmental objectives. Any redevelopment proposal must be consistent with the acceptability considerations in section 11. In addition, proposals which include residential development must ensure that such uses do not occur at ground floor level. Proposals that address national security or energy security needs, mitigate the impacts of climate change, that are necessary to protect and promote public health may also, by exception, be appropriate provided that their locational need is clear and the potential consequences from flooding have been considered and found to be acceptable*."

9.2 Justification

National Grid has undertaken a Siting Study conducting a thorough back check to ensure that no other reasonable alternative sites were overlooked. This process is essential to validate the decision and confirm that the current proposal remains the most appropriate choice. National Grid's '*Our Approach to Options Appraisal'* reflects its statutory duties by underpinning a set of overarching principles which assist in decision making and help to achieve an appropriate balance between competing interests that must be considered in options appraisal. Options are considered to have an advantage if they can use or adapt existing infrastructure, or where National Grid can negotiate different commercial arrangements with its customers to achieve a need, rather than building new infrastructure. Options are also considered to have an advantage if they are shorter, compared with longer routes.

The topics and subtopics considered are presented below:

Table 9-1: topics and subtopics considered for Site location

Topic	Subtopic
Environmental	Landscape and Visual Amenity; Ecology; Historic Environment; Local Air Quality; Noise and Vibration; Soils and Geology; Water.
Socio-economic	Local Economic Activity; Traffic and Transport.
Cost	Technical Feasibility; Approximate capital cost of connecting from the new substation back to the existing Main Interconnected System, including considerations of existing infrastructure and length.

The Siting Study undertakes a comprehensive assessment of sites within the Siting Study Area, identifying potential sites and going on to assess these against defined criteria to a shortlist of sites. The shortlisted sites are then assessed in detail to identify the optimum site.

Following a detailed Siting Study the proposed Site was considered the preferred Site for the below reasons:

- The Site is located directly adjacent to the existing Margam Substation, allowing for easier integration with current electrical systems.
- This proximity reduces the need for extensive new construction and minimises environmental impacts associated with longer cable routes.
- The ability to leverage existing infrastructure means lower overall construction costs compared to options that require building entirely new facilities in greenfield locations.
- The existing infrastructure allows for quicker development timelines, enabling the project to address energy demands more rapidly.
- Being close to the proposed Port Talbot Substation enhances operational reliability and efficiency. Shorter cable connections improve the overall reliability of the electrical supply.
- The Site is already within an industrial area, which means it is less likely to disrupt natural habitats. The established industrial character of the region helps mitigate potential noise impacts.
- The established industrial landscape surrounding helps to minimise visual impacts, making it less intrusive compared to other options that may be more visible from surrounding areas.
- Being located in an already industrialised area may lead to greater community acceptance, as residents are more accustomed to industrial activities compared to options situated in more rural or residential settings.
- Access can be achieved via existing roads, minimizing the need for new access routes that could disrupt local traffic and communities. This is particularly important during the construction phase, where increased traffic could affect nearby residential and commercial properties.
- The distance from significant heritage sites and the natural landform provide adequate screening, ensuring that there will be minimal impact on historical and cultural assets in the area.

10.0 Acceptability Criteria

10.1 Summary of Requirements

TAN15 Section 11 summarises the acceptability critical for flooding consequences. For this development, these criteria are as follows:

- No increase in flooding elsewhere
- Occupiers aware of flood risk
- Escape/evacuation routes present
- Flood emergency plans and procedures agreed and in place
- Flood resistant and resilient design
- Acceptable consequences for type of use

For 'Less Vulnerable' development the FCA must ideally demonstrate that:

- The scheme will be flood free for the 1 in 100 annual probability flood event with an appropriate allowance for climate change; and
- That in extreme flood conditions the depth of flooding will not exceed 600mm and the velocity of flood water will not exceed 0.3m/s.

10.2 Proposed Substation Extension

To evaluate the potential impact of the proposed flood mitigation, the Updated Model provided by SLR was used to assess the change to flood risk elsewhere. Assessment of acceptability criteria has been based on the outputs of the 0.1% AEP plus 30% for climate change. These are addressed below:

- *No Increase in flooding elsewhere*

  Defending the existing substation and proposed extension will displace floodwaters during an extreme flood event.

  To assess the potential impact of the displacement of floodwaters, The Updated Model (Model 113) was modified to exclude floodwater from the footprint of the existing substation and proposed extension to represent the construction of the flood defence wall (DEV). The model was then rerun to assess the impact of the displacement of floodwaters for a range of return periods which included climate change scenarios.

  The results of the analysis for the 1% and 0.1% flood event including the central estimate of climate change are enclosed in **Appendix A-10** and **A-11** respectively. These show that very minor increases in flood extent arise from excluding floodwaters from the existing substation and proposed extension.

  As shown by **Appendix A-10** and **A-11,** changes in flood extent that would impact third parties are largely confined to the internal access roads within the adjacent BOC Gas Facility, approximately 400m to the south.

  As the increase in flood extent would not impact any buildings within the BOC Gas Facility, it is considered that the minor increase in flooding to third parties would be acceptable when set in the context of the importance of the development discussed at Section 9.2.

  The increase in flood level in the vicinity of the proposed development arising from the exclusion of floodwaters is provided in Table 10-1.

Table 10-1: Post Development Change in Flood Levels at the Site

Event Return Period	Change in Flood Level (m)
1.0% AEP + 30%	0.019
0.1% AEP + 30%	0.023

At the time the model was run, details of the short section of new access road to serve the substation were not fully resolved and therefore it was not explicitly including in the modelling. The construction of the access road will exclude circa 875m^3 of floodwater during the 1% AEP + 30% and 0.1% AEP + 30% flood events. Over the area of the flood envelope in the vicinity of the substation (to the south of Harbour Way) of some 376,000m^2, the displaced floodwaters from the construction of the access road would increase flood levels shown in Table 10-1 by a further circa 0.002m.

- *Occupiers aware of flood risk*

The proposed extension to the substation will feature an ancillary office. The room is to provide welfare facilities to people working in the substation. It is a separate building so that PPE does not need to be worn inside it and people working outside the main secure control rooms housing sensitive equipment can also use the room.

The office will be used during scheduled maintenance activities which take place as a minimum twice monthly, with further additional works on top of that as part of other routine maintenance/replacements/inspections.

The owner and operatives attending the substation are aware of the risk of flooding. Flood risk information will be communicated through internal training, site induction materials risk assessments that includes the formal Emergency Flood Response Plan discussed below

Maintenance visits will be planned with reference to NRW's flood warnings and weather alerts, and access to the Site will be avoided during periods of elevated flood risk.

- *Escape/evacuation routes present*

As shown by **Appendix A-12**, the access road to the Site from Harbour Way to the north remains largely free from flooding.

The hazard associated with traversing flood waters is evaluated at 'Table 4 - Hazard to People Classification using Hazard Rating (HR= d x (v + 0.5) + DF) for Source Table 13.1 of FD2320/TR2 - Extended version'[24].

With reference to Table 2 of the supplementary note and **Appendix A-12**, the Hazard Rating for the existing access road is ≤0.73. The Hazard to People Classification would be 'Very Low' Caution - "Flood zone with shallow flowing water or deep standing water".

Where the access road crosses the Upper Mother Ditch, 200m north of the proposed substation extension, the results of the modelling for the 1% AEP plus climate change flood event show the peak water level as being 0.5m lower than the surrounding road level, with a peak velocity at the road crossing of 1.2m/s.

[24] Supplementary note on flood hazard ratings and thresholds for development planning and control purpose – Clarification of the Table 13.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1, Suresh Surendran and Geoff Gibbs (Environment Agency), Steven Wade and Helen Udale-Clarke (HR Wallingford) May 2008

Whilst the existing crossing structure has not been explicitly modelled, based on the peak velocity at the crossing and a conservative assumption regarding head losses through the structure it is unlikely that the existing structure would cause water levels upstream to increase by as much as 0.5m. It is therefore unlikely that floodwater during the 1% AEP plus climate change event would overtop the road. On this basis, it is reasonable to assume that the Hazard Rating at the crossing will be equivalent to the road surface either side, i.e. ≤0.73.

It is understood that the existing access road will be extended to tie in with the proposed entrance to the new substation compound and that this new section of road will be constructed at the same elevation as the existing access road (Shown in **Appendix D**). It is therefore reasonable to assume that the degree of flood hazard will remain as 'Very Low'.

If operatives have to access the Site in an emergency during a flood event, based on the modelled maximum flood depth and velocities of floodwaters during the design flood event, the access road would be passable with care in a 4x4 vehicle.

In addition, the substation and proposed extension will provide a safe place of refuge should it not be safe to evacuate the Site.

- *Flood emergency plans and procedures agreed and in place*

The Site falls within the 'Rivers Afan and Kenfig' Flood Alert area that provides an early notification that flooding may be possible. There is currently no 'Flood Warning' available for the Site.

There is also a tidal 'Flood Alert' available for the 'Swansea Bay and the Gower coast' however, the alert area does not extend to the Site reflecting the low tidal flood risk.

The Site will be registered with NRW to receive live flood warnings during the construction phase. This will extent to the operational phase to ensure operatives completing planned inspection and maintenance tasks are alerted to any potential flood risk.

A formal Emergency Flood Response Plan will be prepared by the operator to ensure that checks are carried out regarding whether there are any Flood Alerts in place before accessing the Site.

It is recommended that the provision of an Emergency Flood Response Plan is secured by condition.

- *Flood resistant and resilient design*
- The flood defences will adopt a crest level of 5.3m aOD to exclude flood waters for the 0.1% AEP (1 in 1000 annual probability) flood event with an allowance of 30% for climate change. The flood defence wall will be designed and constructed to resist the loads imposed by extreme flood events to the structure and the ground. The substation is not a permanently manned facility and therefore the flood gates to allow access through the flood defence wall will be kept locked shut. They will only be opened to allow access for planned inspection and maintenance activities. The cost of the proposed flood defence wall will be borne by the developer along with future inspection and maintenance works.

This approach exceeds the flood event threshold where development must be flood-free as set out at Figure 5 of TAN15.

The alignment of the proposed flood defence wall and flood gates is shown by Drawing No. MARPT-BHK-01-ZZ-DG-C- 181009 / 18_LOR_0206 enclosed at

Appendix D. The reinforced concrete wall will vary in height between 1m and 3m supported by sheet piles varying in depth between 6m and 9m.

The flood risk during construction is addressed as part of the construction phasing plan.

- *Acceptable consequences for type of use (see detailed guidance below)*
  - *The scheme will be flood free for the 1 in 100 annual probability flood event with an appropriate allowance for climate change; and*
  - *That in extreme flood condition the depth of flooding will not exceed 600mm or the velocity of flood water 0.3m/s*

Therefore, with the proposed flood defences in place, there is no significant risk of flooding to the existing substation, or the proposed extension.

11.0 Residual Risk

There is a residual risk that the flood defences along Swansea Bay to the west of the TATA Steel Facility would be breached, however, given the importance of these defences to protecting significant industrial assets it is considered that this is unlikely.

If a breach were to occur, the inland propagation of floodwaters towards the Site would be moderated by the high ground within the TATA Steel Facility.

Flood events of a greater magnitude than those considered by this assessment have a very low probability of occurrence.

The FMC Model originally did not include an outlet structure for fluvial flooding at the Site, as highlighted in Section 6.4.4. **Appendix H** discusses that the fluvial flood risk at the Site is highly sensitive to inflows and outflows. It also notes that the sluice structure (referred to as the 'outfall structure') is currently unconfirmed, and it is likely that the anticipated design flood level has an inherent degree of inaccuracy

Managing the residual risk to operatives would be via the Emergency Flood Response Plan.



12.0 Sustainable Drainage Measures

12.1 Introduction

Sustainable drainage systems (SuDS) are required to manage both the rate and volume of runoff and importantly surface water quality.

Surface water drainage provision for new development is subject both to the planning process and, following implementation of Schedule 3 to the Flood and Water Management Act 2010, approval by the SuDS Approval Body (SAB).

12.2 SAB Approval

Section 15 of TAN15 advises that simultaneous applications are the best approach but recognises that this is not always feasible, as the level of detail required by a full SAB application (in effect, construction drawings) is rarely available at the point an application is made.

TAN15 therefore recommends that a Drainage Statement is submitted to provide the planning authority with confidence that the scheme incorporates SuDS appropriately and is subsequently likely to obtain SAB approval. The scope of such a Statement is set out in the six Statutory National Standards[25]:

- Standard S1 - Surface water runoff destination
- Standard S2 - Surface water runoff hydraulic control
- Standard S3 – Water Quality
- Standard S4 – Amenity
- Standard S5 – Biodiversity
- Standard S6 – Design of drainage for Construction and Maintenance and Structural Integrity

12.3 Preliminary Drainage Strategy

A drainage strategy for the proposed development has been prepared by the Client in support of the application that demonstrates how the six standards are met. It is anticipated that the submission of a detailed drainage strategy for formal approval will be made the subject of a condition to the planning permission.

25 Welsh Government (2018) Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems. Available from: statutory-national-standards-for-sustainable-drainage-systems.pdf [Accessed: 13 May 2025].

13.0 Summary

SLR Consulting Limited (SLR) has been appointed by BakerHicks Ltd (the 'Client') to produce a Flood Consequence Assessment (FCA) for a proposed extension of the Margam Distribution Substation (the 'Site')

The aim of the assessment was to determine an appropriate design level for a flood defence wall to protect the existing substation and proposed extension from a 0.1% AEP flood event when considering the central estimate of the impact of climate change over the lifetime of the development. The operational lifetime of the development has been taken as 50 years to 2077.

The Site is undeveloped marshland adjacent to the existing Margam Distribution Substation and is located approximately 1.7km inland from the Swansea Bay coastline.

An initial flood screening indicated that the Site is potentially at risk from multiple sources. These were considered in detail and it is concluded that whilst there is a risk of flooding from Surface Water and Small Watercourses, it is the flood risk from fluvial sources that dominate. Despite the proximity to the coast, the risk of tidal flooding is considered low due to existing tidal flood defences along the coastline to the west of the TATA Steel Facility.

The FCA has been informed by the results of a detailed hydraulic model built on the existing FMC Model (provided by NRW). The model confirmed that that the proposed development is primarily at risk from fluvial flooding from the Nant Cwm Philip and the Margam Duck Pond, 1.77km to the east. The tidal flood risk to the proposed development is not considered significant. The modelling confirms that proposed development lies within Flood Zone 3 defined by TAN15, Figure 1.

A design crest level of 5.3m aOD is proposed for the flood defences to protect the existing substation and proposed extension based on the updated FMC model outputs which includes a 300mm freeboard allowance.

The proposed development would be considered a *'Less Vulnerable Developments*' and is considered appropriate in Flood Zone 3 as the proposals seek to support key economic objectives, energy security need and the decarbonisation of TATA steel.

The proposed development meets all the TAN15 acceptability with the exception of the potential impact on the flood risk elsewhere. However, excluding floodwater from the existing substation and proposed extension will have only a very minor impact on third party land.

A drainage strategy based on an attenuated discharge to the local drainage network has been developed to demonstrate the feasibility of the proposed SuDS solution. SAB approval of the drainage scheme will be sought in parallel to the planning application for the proposed extension of Margam Substation.

It is recommended that to ensure the proposed development is safe for operatives, the requirement to develop a Emergency Flood Response Plan is secured by a planning condition. Similarly, a planning condition is recommended to require a detailed sustainable drainage strategy to be submitted for approval.

Appendix A Supporting Figures

Flood Consequence Assessment

Proposed extension of the Margam Substation

BakerHicks Limited

SLR Project No.: 402.065363.00001

26 August 2025

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278500
279000
279500
187000
186500
186000

BRYNHYFRYD ROAD
CEFN GWRGAN ROAD
ABBOTT'S CLOSE
MARGAM / MARGAM ROAD
GRANGE ROAD
CENTRAL ROAD
GRANGE ROAD
A4241
A48
M4
39
Upper Mother Ditch
Tyn y Caeau
Longland House
HEOLCAE'R-BONT
Lower Mother

0 100 200 300 400 m

N

APPENDIX A-1

Legend

- Application Boundary
- Substation and Access Road

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MARGAM SUBSTATION FLOOD CONSEQUENCE ASSESSMENT

FIGURE 001

SITE LOCATION PLAN

Scale	1:6000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500

187000 186500 186000

BRYNHYFRYD ROAD
ABBOTT'S CLOSE
CEFN FFYNON
MARGAM / MARGAM ROAD
TY-R-GROES
GRANGE ROAD
CENTRAL ROAD
GRANGE ROAD
A424
A48
M4
39
Upper Mother Ditch
Tyn y Caeau
Longland House
HEOL CAE'R-BONT
Lower Mother

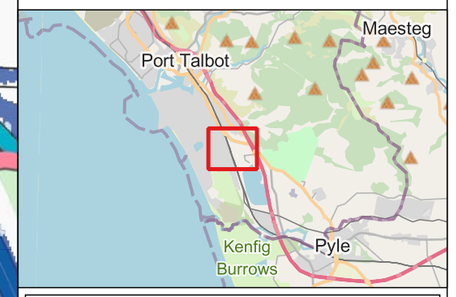
0 100 200 300 400 m

N

APPENDIX A-2

Legend

- Application Boundary
- Substation and Access Road
- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



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MARGAM SUBSTATION FLOOD CONSEQUENCE ASSESSMENT

FIGURE 002

NATURAL RESOURCES WALES FLOOD MAPS FOR PLANNING FOR RIVERS AND SEAS

Scale	1:6000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500

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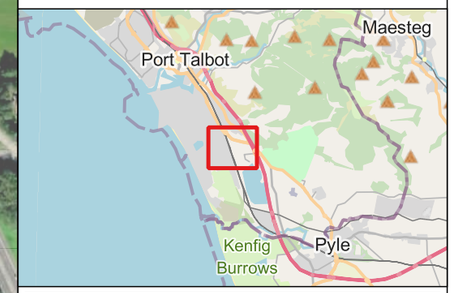
N

0 100 200 300 400 m

APPENDIX A-3

Legend

- Application Boundary
- Substation and Access Road



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MARGAM SUBSTATION FLOOD CONSEQUENCE ASSESSMENT

FIGURE 003

ESRI SATELLITE IMAGERY OF THE SITE

Scale	Date
1:6000 @ A3	AUGUST 2025

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278000
278500
279000
187000
186500
186000
N
0
100
200
300
400 m

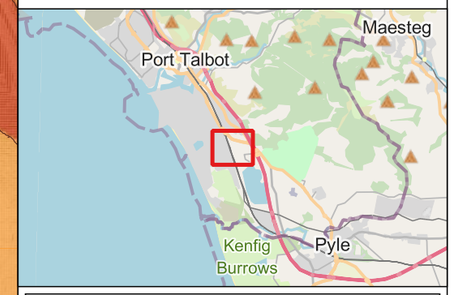
APPENDIX A-4

Legend

- Application Boundary
- Substation and Access Road

Elevation (m AOD)

- <= 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- > 16



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MARGAM SUBSTATION FLOOD CONSEQUENCE ASSESSMENT

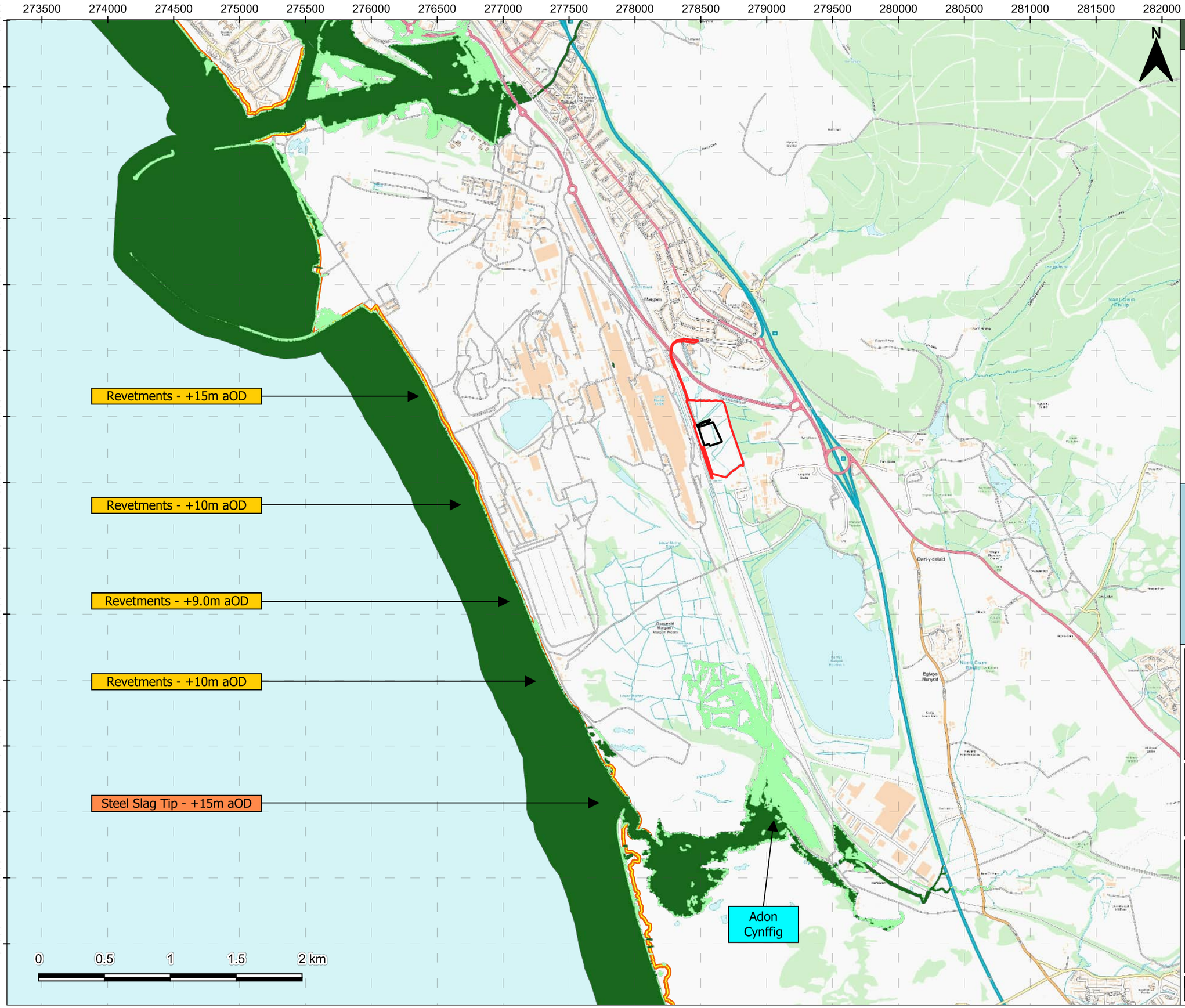
FIGURE 004

2M REGIONAL DIGITAL TERRAIN MODEL AT THE SITE

Scale	1:5000 @ A3	Date	AUGUST 2025

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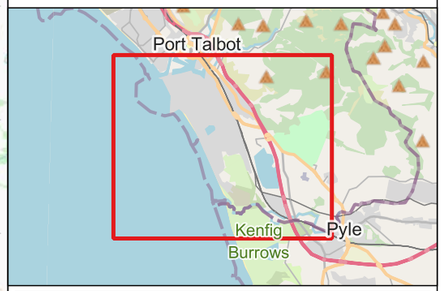
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APPENDIX A-5

Legend

- Application Boundary
- Substation and Access Road
- Coastal Defences
- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



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MARGAM SUBSTATION FLOOD CONSEQUENCE ASSESSMENT

FIGURE 005

EXTRACT OF NRW FLOOD RISK FROM THE SEA WITH COASTAL DEFENCES

Scale	Date
1:27000 @ A3	AUGUST 2025

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277000 277500 278000 278500 279000 279500 280000

187000 186500 186000 185500 185000 184500

N

Upper Mother Ditch

Lower Mother Ditch

Tyn y Caeau

Longland House

Crugwyllt-Fawr

Ropeyard Plantation

Cwrt-y-

Eglw Nuny

BRYNHYFRYD ROAD

ABBOTS CLOSE

CENTRAL ROAD

GRANGE ROAD

HEOL CAE RIBONT

A4241

A48

M4

0 100 200 300 400 m

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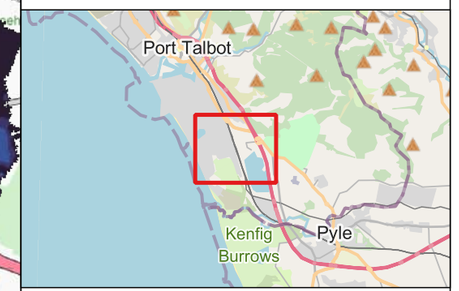
APPENDIX A-6

Legend

- Application Boundary
- Substation and Access Road

0.1% AEP Tidal Flood Risk Depth (m)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- > 1.75



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MARGAM SUBSTATION FLOOD CONSEQUENCE ASSESSMENT

FIGURE 006

FMC MODEL FUTURE (2122) 0.1% AEP FLOOD RISK FROM SEA

Scale	1:10000 @ A3	Date	AUGUST 2025

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277500 278000 278500 279000 279500

187000 186500 186000 185500

N

0 100 200 300 400 m

Upper Mother Ditch

Lower Mother Ditch

Tyn y Caeau

Longland House

Ropeyard Plantation

Ten Acre Wood

Facility

KNOX STREET

BYASS STREET

MORFA ROAD

ALTOUN STREET

TOLLGATE ROAD

HEOL-Y-GWRGAN

BEECHWOOD ROAD

A48

COLLEGE GREEN DR

TY'R GROES

CEFN FFYNON

HEOL MARGAM / MARGAM ROAD

BRYNHYFRYD ROAD

ABBOTTS CLOSE

EAST ROAD

GRANGE ROAD

CENTRAL ROAD

A48

M4

39

38

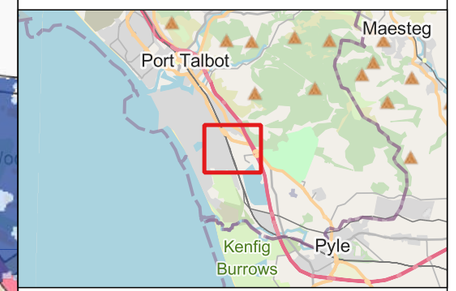
HEOL CAE'R-BONT

PW

APPENDIX A-7

Legend

- Application Boundary
- Substation and Access Road
- Flow Direction
- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



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MARGAM SUBSTATION FLOOD CONSEQUENCE ASSESSMENT

FIGURE 007

NATURAL RESOURCES WALES FLOOD MAPS FOR PLANNING FOR RIVERS

Scale	Date
1:7000 @ A3	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

Margam

Harbour Way

Margam Duck Pond

Nant Cwm Philip

Upper Mother Ditch

Lower Mother Ditch

Tyn y Caeau

Longland House

Park House

Cwrt-y-defaid

Crugwyllt-Fawr

Cwm Bach

Education Facility

Museum

Ten Acre Wood

Ropeyard Plantation

Enginehouse Plantation

BEECHWOOD ROAD

TOLLGATE ROAD

COLLEGE GREEN

HEOL MARGAM / MARGAM ROAD

BRYNHYFRYD ROAD

ABBOTTS CLOSE

MAXIMIN ROAD

SALTOUN STREET

BYASS STREET

MORFA ROAD

HEOL-Y-GWRGAN

CEFN FFYNON

TY RHOSYN DOR

GRANGE ROAD

EASTROAD

KNOX STREET

HEOL DAFAD BOSWR

MAPPERS STREET

A48

M4

39

PW

0 100 200 300 400 m

N

APPENDIX A-8

Legend

- Application Boundary
- Substation and Access Road
- Flow Direction
- Flood Extent

Port Talbot

Maesteg

Kenfig Burrows

Pyle

BakerHicks.

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MARGAM SUBSTATION FLOOD CONSEQUENCE ASSESSMENT

FIGURE 008

UPDATED FMC MODEL 0.1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE FLOOD RISK EXTENT

Scale	1:8200 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500

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A4241

A4

BRYNHYFRYD ROAD

GEEN GWRGAN ROAD

ABBOTT'S CLOSE

GRANGE ROAD

CENTRAL ROAD

GRANGE ROAD

Upper Mother Ditch

Lower Mother

Tyn y Caeau

Ten Acre Wo

Longland House

HEOL CAER-BONT

Ropeyard Plantation

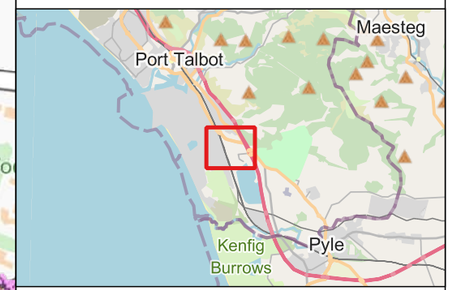
PW

0 100 200 300 400 m

APPENDIX A-9

Legend

- Application Boundary
- Substation and Access Road
- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



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MARGAM SUBSTATION FLOOD CONSEQUENCE ASSESSMENT

FIGURE 009

NATURAL RESOURCES WALES FLOOD MAPS FOR PLANNING FOR SURFACE WATER AND SMALL WATERCOURSES

Scale	Date
1:6000 @ A3	AUGUST 2025

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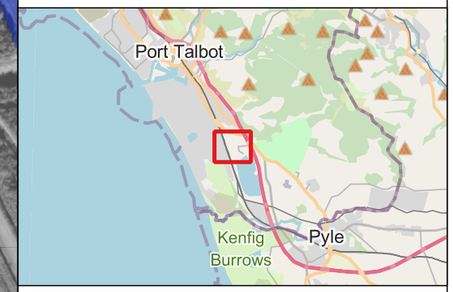
N

0 100 200 300 400 m

APPENDIX A-10

Legend

- Application Boundary
- Substation and Access Road
- Decrease in Post Development Flood Extent
- Post Development Flood Extent
- Increase in Post Development Flood Extent



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MARGAM SUBSTATION FLOOD CONSEQUENCE ASSESSMENT

FIGURE 010

1% AEP PLUS CENTRAL ALLOWANCE FOR CLIMATE CHANGE PEAK FLOOD EXTENT CHANGES

Scale	Date
1:4500 @ A3	AUGUST 2025

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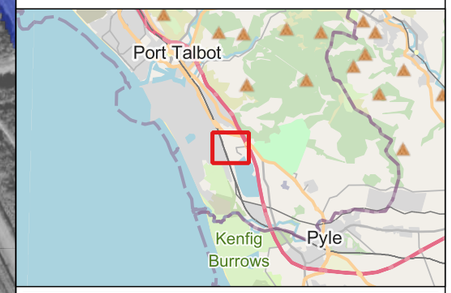
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278500
279000
279500
186500
186000
185500
0
100
200
300
400 m
N

APPENDIX A-11

Legend

- Application Boundary
- Substation and Access Road
- Decrease in Post Development Flood Extent
- Post Development Flood Extent
- Increase in Post Development Flood Extent



BakerHicks.

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MARGAM SUBSTATION FLOOD CONSEQUENCE ASSESSMENT

FIGURE 011

0.1% AEP PLUS CENTRAL ALLOWANCE FOR CLIMATE CHANGE PEAK FLOOD EXTENT CHANGES

Scale	Date
1:4500 @ A3	AUGUST 2025

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278000
278500
279000
186500
186000
N
Upper Mother Ditch
A4241
GRANGE ROAD
HEOLCAER-BONT
0
100
200
300
400 m

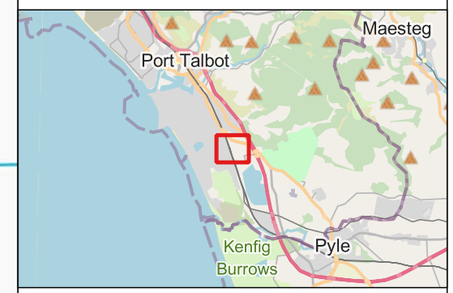
APPENDIX A-12

Legend

- Application Boundary
- Substation and Access Road

Environment Agency Hazard Index 'Hazard to People' Classification

- ≤ 0.73
- 0.73 - 1.25
- 1.25 - 2
- ≥ 2



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MARGAM SUBSTATION FLOOD CONSEQUENCE ASSESSMENT

FIGURE 012

1% AEP PLUS CENTRAL ALLOWANCE FOR CLIMATE CHANGE PEAK FLOOD HAZARD MAPPING OUTPUT

Scale	Date
1:4000 @ A3	AUGUST 2025

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Appendix B NPT Drainage Assets

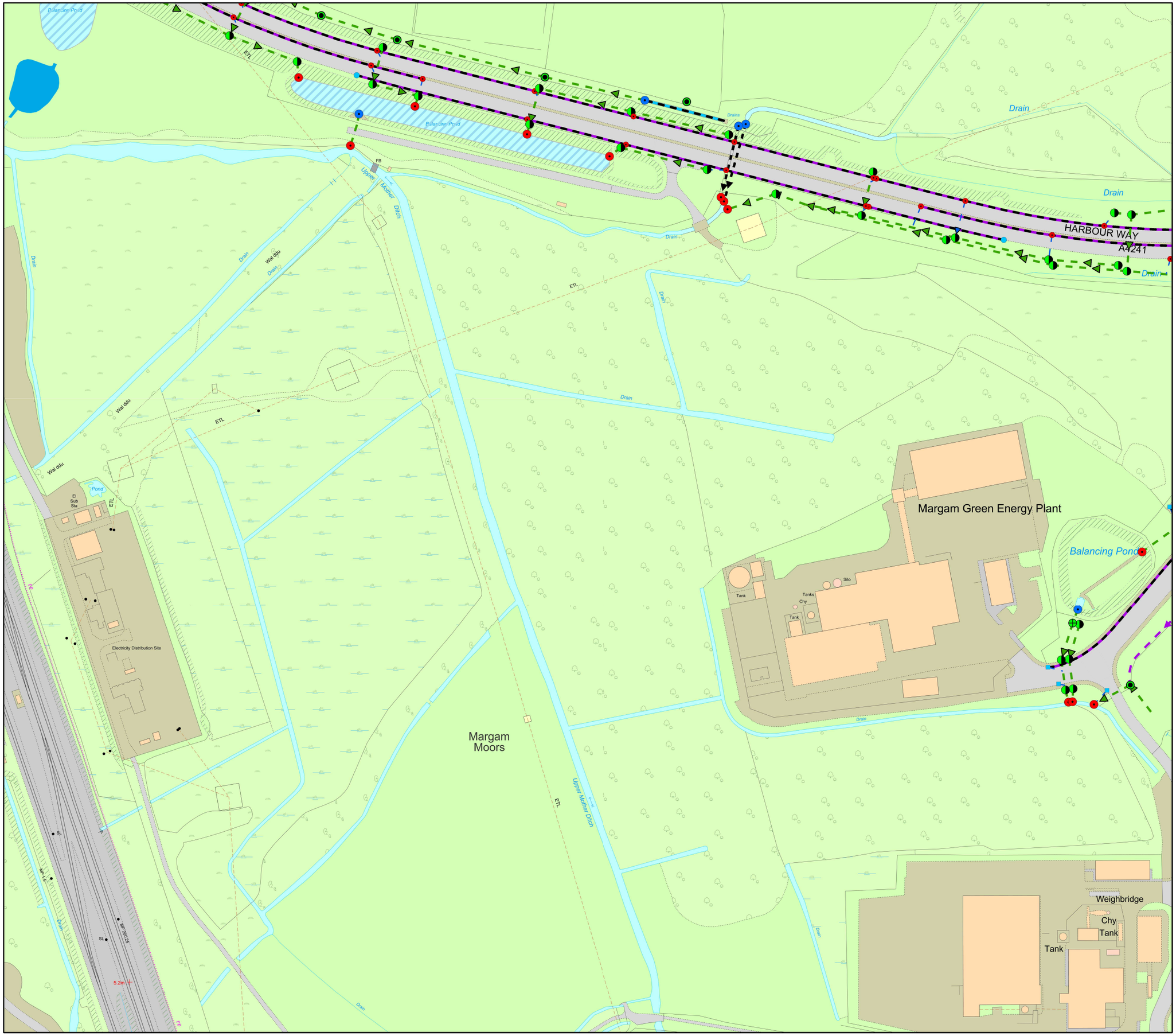
Flood Consequence Assessment

Proposed extension of the Margam Substation

BakerHicks Limited

SLR Project No.: 402.065363.00001

26 August 2025



- MasterGully
- Beany Kerb Outfall
- Inlet
- Outlet
- Beany Kerb Access Cover
- Surface Water Chamber
- Catchpit Chamber
- Hydrobrake Chamber
- Beany Kerb
- Culvert
- Gully Line
- Land Drain
- Storm Overflow
- Surface Water Channel
- Surface Water Lines
- Balancing Pond
- Pond

NETWORK MANAGEMENT

Neath Port Talbot County Borough Council
Cyngor Bwrddeistref Sirol Castell-nedd Port Talbot
Nicola Pearce
Director of Environment
The Quays, Brunel Way, Baglan Energy Park,
Neath, SA112GG

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N
W E
S

Neath Port Talbot County Borough • Bwrdeistref Sirol Castell-nedd Port Talbot •

ArcGIS Pro

22/07/2024

FOI REQUEST
-
P966270

A3	Sheet 1
1:2,000	C.Evans

Appendix C Geotechnics Ltd Ground Investigation Records

Flood Consequence Assessment

Proposed extension of the Margam Substation

BakerHicks Limited

SLR Project No.: 402.065363.00001

26 August 2025

APPENDIX 4

Borehole Records

DATA SHEET - Symbols and Abbreviations used on Records

Sample Types

B	Bulk disturbed sample
BLK	Block sample
C	Core sample
D	Small disturbed sample (tub/jar)
E	Environmental test sample
ES	Environmental soil sample
EW	Environmental water sample
G	Gas sample
L	Liner sample
LB	Large bulk disturbed sample
P	Piston sample (PF - failed P sample)
TW	Thin walled push in sample
U	Open Tube - 102mm diameter with blows to take sample. (UF - failed U sample)
UT	Thin wall open drive tube sampler - 102mm diameter with blows to take sample. (UTF - failed UT sample)
V	Vial sample
W	Water sample
#	Sample Not Recovered

Insitu Testing / Properties

CBRP	CBR using TRL probe
CHP	Constant Head Permeability Test
COND	Electrical conductivity
TC	Thermal Conductivity
TR	Thermal Resistivity
HV	Strength from Hand Vane
ICBR	CBR Test
IDEN	Density Test
IRES	Resistivity Test
MEX	CBR using Mexecone Probe Test
PKR	Packer Permeability Test
PLT	Plate Load Test
PP	Strength from Pocket Penetrometer
Temp	Temperature
VHP	Variable Head Permeability Test
VN	Strength from Insitu Vane
w%	Water content

(All other strengths from undrained triaxial testing)

S	Standard Penetration Test (SPT)
C	SPT with cone
N	SPT Result
-/-	Blows/penetration (mm) after seating drive
-*/- (mm)	Total blows/penetration
( )	Extrapolated value

Groundwater

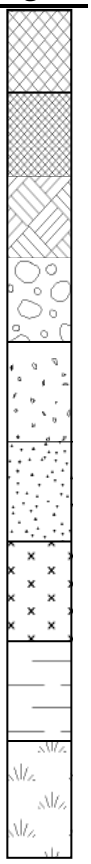
Water Strike

Depth Water Rose To

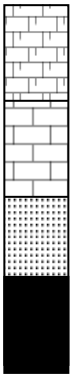
Instrumentation



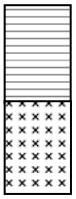
Strata



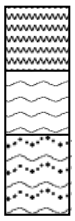
Note: Composite soil types shown by combined symbols



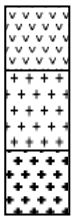
Strata, Continued



Metamorphic Rock



Igneous Rock



Backfill Materials



Rotary Core

RQD	Rock Quality Designation (% of intact core >100mm)
FRACTURE INDEX	Fractures/metre
NI	Non-intact core
NR	No core recovery
AZCL	Assumed zone of core loss

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378492.7 E 186568.4 N	**Borehole**	BH101
				Ground Level	3.36 m OD

Scale 1:50

Sampling			Properties		Strata			
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
0.10 - 0.30	B				TOPSOIL: Grass over soft dark brown slightly sandy clay with occasional rootlets and roots up to 8mm in diameter.			
0.20	D					0.30		3.06
0.25	ES				Soft grey mottled brown slightly sandy CLAY with occasional roots up to 10mm in diameter.			
0.25			PID: <0.1 ppm					
0.25	HV		30/32/31 kPa		Below 0.50m, roots absent.			
0.40 - 0.80	B							
0.50	D		w: 24 %					
0.50	ES					1.20		2.16
0.50			PID: <0.1 ppm		Very soft grey slightly sandy CLAY with occasional pockets (up to 10mm in size) of organic material.			
0.60	HV		39/40/38 kPa					
1.00	D							
1.00	ES							
1.00			PID: <0.1 ppm					
1.20 - 1.65		1.20 (0.80)		S0*/ 450mm				
1.20 - 1.65	D							
1.20 - 2.20	B							
1.80	D		w: 77 %					
2.20 - 2.65	UT	2.20	6 blows					
2.20 - 2.65		(DRY)	cu: 16 kPa					
2.50 - 3.20	B							
2.65 - 2.80	D							
3.00	D		w: 80 %					
3.20 - 3.65		3.20 (DRY)		S1				
3.20 - 3.65	D					3.80		-0.44
3.80 - 4.20	B				Very dense dark brown sandy GRAVEL with a low cobble content of subrounded sandstone. Gravel is subangular to subrounded fine to coarse sandstone and quartzite.			
4.00	D							
4.20 - 4.34		4.20 (1.20)		C50/ 70mm				
4.20 - 5.20	B							
5.00	D							
5.20 - 5.65		5.20 (-0.14)		C38	At 5.20m, dense.			
5.20 - 6.00	B							
6.10	D							
6.30 - 6.64		6.20 (0.00)		C50/ 190mm				
6.30 - 7.00	B							
6.80	D							
7.10 - 7.44		7.00 (0.00)		C50/ 190mm				
7.10 - 8.00	B							
7.50	D							
8.00 - 8.37		8.00 (0.00)		C50/ 220mm				
8.00 - 8.80	B							
8.60	D							
9.10 - 9.55		9.10 (0.00)		C39	At 9.10m, dense.			
9.10 - 10.00	B							
9.80	D							
10.00 - 10.45		10.00 (0.00)		C42				

Boring

Depth	Hole Dia.	Technique	Crew
1.20	0.30	Inspection Pit	MR/SS
14.70	0.20	Cable Percussion	MR/SS
15.00	0.12	Rotary Open Hole	CJ/IJ
25.00	0.12	Rotary Core	CJ/IJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			12/08/24	08:00
7.00	7.00	0.00	12/08/24	18:00
7.00	7.00	0.00	13/08/24	08:00
14.85	14.70	11.10	13/08/24	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
1.00		0.80	20		Artesian
4.00	4.00	1.20	20		
5.20	5.20	-0.14	30		
18.00	15.00	1.40	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
Chiselling: 6.50-6.70m for 30 minutes & 8.50-8.80m for 40 minutes.
Artesian water noted at 5.20mbgl.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
At 14.50m, water level rose to 0.49m in 10mins. Rotary casing installed. Flush:Air/Mist

Logged by SI

Figure Sheet 1 of 4
05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378492.7 E 186568.4 N	**Borehole**	BH101
				Ground Level	3.36 m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Results	SPT N	Strata Description	Depth	Legend	Level (m OD)
10.20 - 11.50	B				Very stiff dark brown and dark grey slightly sandy slightly gravelly CLAY with a low cobble content of subangular sandstone. Gravel is angular to subangular fine to coarse sandstone.	10.20		-6.84
11.00	D		w: 16 %					
11.50 - 11.95		11.50 (10.40)		S41				
11.50 - 11.95	D							
12.10 - 13.50	B				Extremely weak brownish grey MUDSTONE, possibly interbedded and extremely weak SANDSTONE,	12.10		-8.74
13.00	D							
13.50 - 13.84		12.00 (11.20)		S50/ 190mm	Extremely weak grey MUDSTONE, recovered as clayey gravel.	13.60		-10.24
13.50 - 13.84	D							
13.60 - 14.50	B							
14.00	D							
14.60	D				Extremely weak black COAL.	14.50		-11.14
14.70 - 14.85		12.00 (11.10)		S50/ 75mm	***Borehole continued using alternative techniques - see next page***			
14.70 - 14.85	D							

Boring

Depth	Hole Dia.	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
14.85	14.70	-0.70	27/08/24	08:00
22.50	15.00	1.10	27/08/24	17:00
22.50	15.00	0.00	28/08/24	08:00
25.00	15.00		28/08/24	16:40

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378492.7 E 186568.4 N	**Borehole**	BH101
				Ground Level	3.36 m OD

Scale 1:50

Sampling/Testing		Drilling					Strata				
Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Legend	Level (m OD)
							Borehole continued using rotary drilling techniques - see below				
							Extremely weak black COAL.		14.85		-11.49
		15.00 - 16.50	15.00	80 33	10	AZCL NI 2 NI 9 NI NI NI	Very weak and weak light grey MUDSTONE with occasional plant fossils up to 5mm diameter. Discontinuities are subhorizontal (0-10 degrees), very closely and closely spaced, stepped, rough and clean.	Between 15.00m - 15.30m. assumed zone of core loss. Between 15.30m - 15.50m, non-intact, recovered as angular to subangular fine to coarse gravel of very strong light grey sandstone, quartzite and coal. Between 15.50m - 15.70m, with numerous plant fossils. Between 15.70m - 15.92m, 16.15m - 16.28m and 16.35m - 16.50m, non-intact, recovered as angular and subangular fine to coarse gravel.			
16.28 - 16.40	C										
		16.50 - 18.00	15.00	100 93	13	9	Medium strong grey SILTSTONE with occasional very strong sandstone layers. Discontinuities are subhorizontal (0-15 degrees), very closely and closely spaced, stepped, rough and clean.	Between 16.90m - 17.00m. very strong sandstone layer.	16.90		-13.54
16.90 - 16.99	C										
		18.00 - 19.50	15.00	97 60	47	NI	Strong to very strong dark grey SILTSTONE with gypsum veins up to (2mm thick). Discontinuities are generally inclined at (15 degrees), very closely and closely spaced, plannar, stepped, smooth and clean	Between 17.90m - 18.22m. very strong sandstone with occasional gypsum and pyrite veins up to (1mm thick) with discontinuities subhorizontal, stepped and rough. Between 18.22m - 18.36m. non-intact recovered as angular to subangular fine to coarse gravel.	18.36		-15.00
18.81 - 18.91	C					8		Between 19.62m - 19.72m, non-intact, recovered as angular to subangular fine to coarse gravel. Between 19.76m - 19.90m. very strong sandstone layer.			
		19.50 - 21.00	15.00	99 87	60	NI					

Boring

Depth	Hole Dia.	Technique	Crew
1.20	0.30	Inspection Pit	MR/SS
14.70	0.20	Cable Percussion	MR/SS
15.00	0.12	Rotary Open Hole	CJ/IJ
25.00	0.12	Rotary Core	CJ/IJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			12/08/24	08:00
7.00	7.00	0.00	12/08/24	18:00
7.00	7.00	0.00	13/08/24	08:00
14.85	14.70	11.10	13/08/24	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
1.00		0.80	20		Artesian
4.00	4.00	1.20	20		
5.20	5.20	-0.14	30		
18.00	15.00	1.40	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
Chiselling: 6.50-6.70m for 30 minutes & 8.50-8.80m for 40 minutes.
Artesian water noted at 5.20mbgl.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
At 14.50m, water level rose to 0.49m in 10mins. Rotary casing installed. Flush:Air/Mist

Logged by SI

Figure Sheet 3 of 4

05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378492.7 E 186568.4 N	**Borehole**	BH101
				Ground Level	3.36 m OD

Sampling/Testing | Drilling | Strata — Scale 1:50

Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Legend	Level (m OD)
20.10 - 20.32	C	19.50 - 21.00	15.00	99 87	60	7					
		21.00 - 22.50	15.00	53 47	9	AZCL		Between 21.00m - 21.70m, assumed zone of core loss.			
						NI		Between 21.70m - 21.80m, non-intact, recovered as angular to subangular fine to coarse gravel.			
						11					
22.68 - 22.76	C	22.50 - 24.00	15.00	53 30	0	AZCL		Between 22.50m - 23.20m, assumed zone of core loss.			
						NI		Between 23.20m - 23.55m, very weak dark grey mudstone, recovered as angular to subangular fine to coarse gravel.			
						11					
		24.00 - 25.00	15.00	60 15	15	AZCL		Between 24.00m - 24.40m. assumed zone of core loss.			
						NI		Between 24.40m - 24.85m. non-intact, recovered as angular to subangular fine to coarse gravel of siltstone and sandstone.			
						7		Between 24.85m - 25.00m, very strong sandstone with occasional gypsum veins (1mm thick) with discontinuities subhorizontal stepped and rough.	25.00		-21.64
								End of Borehole			

Boring

Depth	Hole Dia.	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
14.85	14.70	-0.70	27/08/24	08:00
22.50	15.00	1.10	27/08/24	17:00
22.50	15.00	0.00	28/08/24	08:00
25.00	15.00		28/08/24	16:40

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378526.6 E 186599.0 N	**Borehole**	BH102
				Ground Level	2.95 m OD

Sampling			Properties		Strata			Scale 1:50
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
0.10 - 0.30	B				TOPSOIL: Grass over very soft dark brown slightly sandy organic clay with occasional rootlets and roots (up to 8mm in diameter).			
0.20	HV		15/18/17 kPa			0.30		2.65
0.25	D				Soft grey mottled brown slightly sandy CLAY with occasional rootlets and roots (up to 10mm in diameter).			
0.25	ES							
0.25			PID: <0.1 ppm					
0.30 - 0.80	B				Spongy dark brown mottled black slightly clayey fibrous PEAT.	0.80		2.15
0.50	D							
0.50	ES							
0.50			PID: <0.1 ppm					
0.50	HV		32/30/34 kPa					
0.80 - 1.20	B				Very soft dark brown and grey slightly sandy organic CLAY with occasional pockets (up to 10mm in size) of organic material.	1.60		1.35
1.00	D		w: 448 %					
1.00	ES							
1.00			PID: 5 ppm					
1.20 - 1.65		1.20 (0.70)		S0*/ 450mm				
1.20 - 1.65	D							
1.60 - 2.20	B							
2.00	D		w: 36 %					
2.20 - 2.65	UT	2.20 (1.70)	2 blows		At 3.00m, grading to clayey sand.			
2.20 - 3.20	B					3.30		-0.35
2.65 - 2.80	D				Firm grey mottled brown slightly gravelly sandy CLAY. Gravel is angular to subangular fine to coarse sandstone.			
3.00	D							
3.20 - 3.65		3.20 (2.90)		S9				
3.20 - 3.65	D					4.00		-1.05
3.30 - 4.00	B				Dense dark brown sandy GRAVEL with a low cobble content of subrounded sandstone. Gravel is subangular to subrounded fine to coarse sandstone and quartzite.			
3.80	D		w: 17 %					
4.20 - 4.65		4.20 (4.10)		C41	Between 4.00-8.30m, driller notes boulders.			
4.20 - 5.20	B							
5.00	D							
5.20 - 5.52		5.20 (5.00)		C50/ 175mm	At 5.20m, very dense.			
5.20 - 6.20	B							
6.00	D							
6.20 - 6.65		6.20 (0.00)		C36				
6.20 - 7.20	B							
7.00	D							
7.20 - 7.40		7.20 (0.00)		C50/ 90mm	At 7.20m, very dense.			
7.20 - 8.00	B							
7.50	D							
8.00 - 8.45		8.00 (0.60)		C18				
8.30 - 9.50	B					8.30		-5.35
9.00	D		w: 5 %		Stiff dark brown and dark grey slightly sandy slightly gravelly CLAY with a low cobble content of subangular sandstone. Gravel is angular to subangular fine to coarse sandstone.			
9.50 - 9.50		9.00 (8.60)		S50/ 0mm				
10.00 - 11.20	B							

Boring

Depth	Hole Dia.	Technique	Crew
1.20		Inspection Pit	MR/SS
13.18	0.20	Cable Percussion	MR/SS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			14/08/24	08:00
11.65	9.00	8.20	14/08/24	18:00
11.65	9.00	-0.20	15/08/24	08:00
13.18	9.00	6.10	15/08/24	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
1.20		0.70	20		For the -0.41m water strike only : Water level above ground level
6.20	6.20	-0.41	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
Chiselling: 6.60-6.90m for 60 minutes, 9.50-10.00m for 60 minutes & 12.80-13.00m for 30 minutes.
Artesian water noted at 6.20mbgl. Driller notes water rising around casing.
Borehole terminated at 13.18m, on Clients instruction following 30 minutes chiselling and SPT N value >50.
Borehole backfilled with bentonite on completion.

Logged by SI

Figure Sheet 1 of 2

05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD **-** *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
				Borehole	BH102
Client	National Grid	**National Grid Coordinates**	378526.6 E 186599.0 N	**Ground Level**	2.95 m OD

Sampling | Properties | Strata — Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
10.80	D							
11.20 - 11.65		9.00 (8.20)		S30				
11.20 - 11.65	D							
11.80	D				Extremely weak grey MUDSTONE. Probably interbedded with extremely weak grey SANDSTONE, recovered as clayey gravel.	11.70		-8.75
12.00 - 12.30		9.00 (6.60)		S50/ 150mm				
12.00 - 12.30	D							
12.00 - 13.00	B							
12.80	D							
13.00 - 13.18		9.00 (6.10)		S50/ 85mm				
13.00 - 13.18	D				End of Borehole	13.18		-10.23

Boring				Progress					Groundwater					
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378529.0 E 186531.9 N	**Borehole**	BH103
				Ground Level	3.20 m OD

Sampling			Properties		Strata			Scale 1:50	
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend		Level (m OD)
0.10 - 0.30	B				TOPSOIL: Grass over very soft dark brown slightly sandy clay with occasional rootlets and roots (up to 15mm in diameter).				
0.20	HV		10/13/15 kPa			0.30			2.90
0.25	D				Soft dark brown occasionally mottled grey slightly sandy CLAY.				
0.25	ES								
0.25			PID: <0.1 ppm						
0.30 - 1.00	B								
0.50	D		w: 45 %						
0.50	ES								
0.50			PID: <0.1 ppm						
0.50	HV		25/28/24 kPa		Very soft greyish brown and brown slightly sandy organic CLAY with occasional pockets (up to 10mm in size) of organic material.	1.30			1.90
1.00	D								
1.00	ES								
1.00			PID: <0.1 ppm						
1.20 - 1.65		1.20 (0.40)		S0*/ 450mm					
1.20 - 1.65	D								
1.30 - 2.20	B								
1.80	D		w: 54 %						
2.20 - 2.65	UT	1.90 (1.60)	6 blows						
2.20 - 3.20	B								
2.80	D		w: 49 %		Very soft dark brown slightly sandy organic CLAY with many pockets (upto 80mm in size) of fibrous peat.	3.20			0.00
3.20 - 3.65		3.20 (2.10)		S2					
3.20 - 3.65	D								
3.20 - 3.80	B		w: 146 %		Stiff greyish brown slightly gravelly sandy CLAY. Gravel is angular to subangular fine to coarse sandstone.	3.80			-0.60
3.80 - 4.40	B								
4.00	D		w: 24 %						
4.40 - 4.85		4.40 (0.00)		S33	Dense dark brown slightly sandy GRAVEL. Gravel is subangular to subrounded fine to coarse sandstone and quartzite.	4.40			-1.20
4.40 - 4.85	D								
4.40 - 5.30	B								
5.00	D								
5.30 - 5.75		5.30 (0.00)		C30					
5.30 - 6.30	B								
6.00	D								
6.30 - 6.72		6.30 (0.00)		C50/ 275mm	At 6.30m, very dense.				
6.30 - 7.20	B								
7.00	D								
7.20 - 7.65		7.20 (-0.10)		C35					
7.20 - 7.70	B								
7.50	D								
7.70 - 8.10	B				Very stiff dark brown slightly sandy gravelly CLAY with a low cobble content of subrounded sandstone. Gravel is angular to subrounded fine to coarse sandstone.	7.70			-4.50
8.00	D		w: 15 %						
8.10 - 8.55		8.00 (2.20)		S39					
8.10 - 8.55	D								
8.50 - 9.50	B								
9.00	D								
9.50 - 9.95	UT	9.50 (5.40)	56 blows cu: 144 kPa						
9.50 - 9.95									
10.00 - 11.20	B								

Boring

Depth	Hole Dia.	Technique	Crew
1.20		Inspection Pit	MR/TS
14.27	0.20	Cable Percussion	MR/TS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			20/08/24	08:00
14.27	9.50	5.50	20/08/24	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.75		0.40	20		Water level above ground level.
4.40	4.40	-0.41	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
Borehole backfilled with bentonite completion.

Logged by SI

Figure Sheet 1 of 2

05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD **-** *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
				Borehole	BH103
Client	National Grid	**National Grid Coordinates**	378529.0 E 186531.9 N	**Ground Level**	3.20 m OD

Scale 1:50

Sampling			Properties	Strata			
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
10.80	D							
11.20 - 11.54		9.50 (5.50)		S50/ 190mm				
11.20 - 11.54	D							
11.20 - 12.50	B							
12.00	D		w: 15 %					
12.70	D				Extremely weak dark grey MUDSTONE with occasional coal fragments (up to 6mm in size), recovered as clayey gravel.	12.60		-9.40
12.80 - 13.12		9.50 (5.40)		S50/ 190mm				
12.80 - 13.12	D							
13.00 - 14.00	B							
13.50	D							
14.00 - 14.27		9.50 (5.50)		S50/ 150mm				
14.00 - 14.27	D				End of Borehole	14.27		-11.07

Boring				Progress					Groundwater					
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure Sheet 2 of 2

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378634.4 E 186469.8 N	**Borehole**	BH104

Sampling			Properties		Strata			Scale 1:50
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
0.10 - 0.30	B				TOPSOIL: Grass over very soft slightly sandy organic clay with many rootlets and occasional roots (up to 15mm diameter).			
0.20	HV		15/17/16 kPa			0.30		
0.25	D				Very soft grey and dark brown slightly sandy CLAY with occasional pockets (up to 10mm in size) of organic material and occasional roots (up to 20mm diameter).			
0.25	ES							
0.25			PID: 0.1 ppm					
0.30 - 1.00	B							
0.50	D				Below 1.00m, roots absent.			
0.50	ES							
0.50			PID: <0.1 ppm					
0.50	HV		20/19/20 kPa					
1.00	D							
1.00	ES							
1.00			PID: 5 ppm					
1.20 - 1.65	UTF	1.20 (0.00)	1 blows		Spongy brown fibrous PEAT with many pockets (up to 80mm in size) of brownish grey organic clay and occasional wood fragments (up to 40mm in size).	2.00		
1.20 - 2.00	D		w: 53 %					
2.00 - 2.45		2.00 (0.00)		S1				
2.00 - 2.45	D							
2.00 - 3.20	B							
2.80	D		w: 162 %					
3.20 - 3.65	UT	3.00 (0.80)	8 blows			3.40		
3.40 - 4.50	B				Stiff dark brown and dark grey slightly gravelly sandy CLAY with a low cobble content of subangular sandstone. Gravel is subangular to subrounded fine to coarse sandstone.			
4.00	D		w: 17 %					
4.50 - 4.95		4.50 (2.10)		S19				
4.50 - 4.95	D							
5.10 - 6.00	B				Medium dense dark brown sandy GRAVEL with a low cobble content of subrounded sandstone. Gravel is subangular to subrounded fine to coarse sandstone and quartzite.	5.10		
5.50	D							
6.00 - 6.45		6.00 (4.10)		C20				
6.20 - 7.00	B				Stiff dark grey slightly gravelly sandy CLAY. Gravel is angular to subangular fine to coarse sandstone and quartzite.	6.20		
6.50	D		w: 15 %					
7.00 - 7.45		7.00 (DRY)		S23				
7.00 - 7.45	D							
7.00 - 8.20	B							
7.80	D							
7.80	W							
8.20 - 8.65		7.50 (DRY)		S33				
8.20 - 8.65	D							
8.20 - 9.00	B							
9.30	D							
9.50 - 9.95	UT	7.50 (DRY)	36 blows cu: 304 kPa					
9.50 - 9.95								
9.95 - 10.10	D							
10.00 - 11.00	B							

Boring

Depth	Hole Dia.	Technique	Crew
1.20		Inspection Pit	MR/SS
11.80	0.20	Cable Percussion	MR/SS
13.90	0.15	Cable Percussion	MR/SS
25.50	0.12	Rotary Core	CJ/IJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			15/08/24	08:00
6.45	6.00	4.10	15/08/24	18:00
6.45	6.00	DRY	16/08/24	08:00
11.80	7.50	7.80	16/08/24	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.20		0.00	20		
11.80	7.50	7.80	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
Flush : Air/Mist

Logged by SI

Figure Sheet 1 of 4

05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378634.4 E 186469.8 N	**Borehole**	BH104

Sampling | Properties | Strata | Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
10.80	D		w: 13 %					
11.00 - 11.45		7.50 (10.60)		S35				
11.00 - 11.45	D							
11.80 - 12.20	B							
					Dense grey slightly sandy GRAVEL. Gravel is angular to subangular fine to coarse sandstone.	11.80		
12.20 - 12.65		12.20 (1.20)		C37				
12.20	D					12.40		
12.40 - 13.20	B				Extremely weak dark grey MUDSTONE, recovered as angular to subangular fine to coarse gravel.			
12.80	D							
13.20 - 13.48		13.20 (1.00)		S50/ 150mm				
13.20 - 13.48	D							
13.20 - 13.90	B							
13.50	D							
13.90 - 14.00		13.90 (0.00)		S50/ 50mm	***Borehole continued using alternative techniques - see next page***	13.90		
13.90 - 14.00	D							

Boring

Depth	Hole Dia.	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
11.80	7.50	-0.10	19/08/24	08:00
13.90	13.90	0.00	19/08/24	18:00
13.90	14.50	-0.30	29/08/24	08:00
25.50	14.50	0.00	29/08/24	17:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378634.4 E 186469.8 N	**Borehole**	BH104

Sampling/Testing | Drilling | Strata | Scale 1:50

Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Legend	Level (m OD)
							Borehole continued using rotary drilling techniques - see below				
		13.90 - 15.00	13.90	100 64	0	NI 16	Weak to medium strong dark grey SILTSTONE. Discontinuities are subhorizontal (0-15 degrees), very closely and closely spaced, stepped, rough and clean.	Between 13.90m-14.30m, non-intact, recovered as angular to subangular fine to coarse gravel.			
15.47 - 15.55	C	15.00 - 16.50	13.90	93 33	0	AZCL 17 NI 1	Very weak black COAL, recovered as angular and subangular fine to coarse gravel.	Between 15.00m-15.10m, assumed zone of core loss.	15.70		
		16.50 - 18.00	13.90	90 60	8	AZCL NI 11	Strong grey SILTSTONE with occasional very strong ironstone nodules up to 20mm in size. Discontinuities are (Set i) subhorizontal (0-15 degrees) closely and medium spaced, stepped, rough with occasional pyrite mineralisation (1mm thick). (Set ii) (75-90 degrees) open/closed, subhorizontal undulating stepped, rough with occasional pyrite crystals.	Between 16.50m-16.65m. assumed zone of core loss. Between 17.10m-17.50m. subhorizontal discontinuities (75-90 degrees) undulating, partially open, stepped, rough with occasional pyrite mineralisation (1mm thick). Between 18.00m-18.50m. subhorizontal discontinuity, partially open and clean, stepped, rough with pryite mineralisation up to (10mm thick). Between 18.60m-18.75m. discontinuity inclined at (70 degrees) stepped and rough. Between 19.40m and 19.50m. discontinuity inclined between (60-70 degrees), stepped rough and clean. Between 19.50m and 19.75m. discontinuity subhorozontal, undulating and closed.	17.10		
18.00 - 18.33	C	18.00 - 19.50	13.90	100 95	54	4					
20.00 - 20.10	C	19.50 - 21.00	13.90	100 100	94						

Boring

Depth	Hole Dia.	Technique	Crew
1.20		Inspection Pit	MR/SS
11.80	0.20	Cable Percussion	MR/SS
13.90	0.15	Cable Percussion	MR/SS
25.50	0.12	Rotary Core	CJ/IJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			15/08/24	08:00
6.45	6.00	4.10	15/08/24	18:00
6.45	6.00	DRY	16/08/24	08:00
11.80	7.50	7.80	16/08/24	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.20		0.00	20		
11.80	7.50	7.80	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
Flush : Air/Mist

Logged by SI

Figure Sheet 3 of 4
05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378634.4 E 186469.8 N	**Borehole**	BH104

Sampling/Testing | Drilling | Strata | Scale 1:50

Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Legend	Level (m OD)
		19.50 - 21.00	13.90	100 100	94		Very strong grey dark grey SILSTONE. Discontinuities are (Set i) subhorizontal (0-15 degrees) medium and closely spaced, stepped, rough and clean. (Set ii) subvertical (75-90 degrees), partly open, undulating, stepped, rough with pyrite crystals.		20.10		
		21.00 - 22.50	13.90	100 97	94						
21.45 - 21.89	C					NI		Between 21.38m and 21.46m. non-intact, recovered as angular to subangular fine to coarse gravel.			
						1					
		22.50 - 24.00	13.90	100 97	74						
							Strong grey SILSTONE. Discontinuities are (Set i) subhorizontal (0-15 degrees) closely and medium spaced, stepped, rough and clean. (Set ii) discontinuities inclined between (60-70 degrees) undulating and stepped, rough and clean.	At 22.95m. Ironstone nodule.	23.00		
23.55 - 23.75	C							Between 23.10m and 23.40m. discontinuity subhorozontal (80-90 degrees), stepped, rough and clean.			
						4		Between 23.80m and 24.00m. fracture inclined at (70 degrees), closed.			
		24.00 - 25.50	13.90	100 87	57			Between 24.10m and 24.40m. discontinuity inclined between (60 and 70 degrees) stepped, rough and clean.			
24.95 - 25.35	C					NI		Between 24.80m and 25.00m, weak and dark grey, non-intact, recovered as angular to subangular fine to coarse gravel.			
						4		Below 25.00m. becoming very strong.	25.50		
								End of Borehole			

Boring

Depth	Hole Dia.	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
11.80	7.50	-0.10	19/08/24	08:00
13.90	13.90	0.00	19/08/24	18:00
13.90	14.50	-0.30	29/08/24	08:00
25.50	14.50	0.00	29/08/24	17:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378542.2 E 186424.2 N	**Borehole**	BH105
				Ground Level	3.04 m OD

Sampling			Properties		Strata			Scale 1:50
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
0.10 - 0.30	B				TOPSOIL: Grass over very soft dark brown slightly sandy organic clay with occasional rootlets up to 20mm in diameter.			
0.25	D					0.30		2.74
0.25	ES				Soft blueish grey slightly sandy CLAY with occasional roots up to 10mm in diameter.			
0.25			PID: <0.1 ppm					
0.25	HV		15/18/17 kPa					
0.50	D		w: 34 %					
0.50	ES							
0.50 - 1.00	B					1.20		1.84
0.50			PID: <0.1 ppm		Very soft bluish grey slightly sandy organic CLAY with large pockets (up to 100mm in size) of peat.			
0.50	HV		40/38/39 kPa					
1.00	D							
1.00	ES							
1.00			PID: 0.10 ppm					
1.20 - 1.65		1.20 (0.20)		S1				
1.20 - 1.65	D		w: 38 %					
1.20 - 2.20	B							
2.00	D							
2.20 - 2.65	UT	2.20 (DRY)	2 blows					
2.20 - 3.20	B							
2.65 - 2.80	D							
2.80	D							
3.00	D				Below 3.50m, driller noted presence of peat bands.			
3.20 - 3.65		3.20 (3.20)		S0*/ 450mm				
3.20 - 3.65	D							
3.20 - 4.40	B							
4.00	D							
4.40 - 4.85	UT	4.40 (DRY)	4 blows					
4.80 - 5.20	B					4.80		-1.76
5.00	D				Medium dense dark brown slightly sandy GRAVEL with a low cobble content of subrounded sandstone and quartzite. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite.			
5.20 - 5.65		5.20 (0.80)		S25				
5.20 - 6.50	B							
6.00	D							
6.50 - 6.57		6.50 (1.00)		C50/ 10mm	At 6.50m, very dense.			
6.50 - 7.30	B							
7.00	D							
7.30						7.30		-4.26
7.40	D		w: 11 %		Stiff dark brown slightly sandy slightly gravelly CLAY with a low cobble content of subrounded quartzite and sandstone. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite.			
7.50 - 7.95		7.50 (7.50)		S26				
7.50 - 7.95	D							
7.50 - 8.50	B							
8.00	D							
8.50 - 8.95	UT	8.50 (7.60)	47 blows					
8.50 - 9.50	B							
8.95 - 9.10	D							
8.95 - 9.10	UT		20 blows					
9.40	D							
9.50 - 9.95		9.00 (7.60)		S35	Below 9.50m, becoming very stiff.			
9.50 - 9.95	D							
10.00 - 11.00	B							

Boring

Depth	Hole Dia.	Technique	Crew
1.20	0.30	Inspection Pit	MR/TS
3.20	0.20	Cable Percussion	MR/TS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			27/08/24	13:00
3.20	3.20	3.20	27/08/24	18:00
3.20	3.20	DRY	28/08/24	08:00
15.00	9.00	11.60	28/08/24	14:41

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.20	1.20	0.20	20		
5.00	5.00	0.80	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub. Chiselling 6.50 - 6.70m 30mins and 14.50 - 14.70m 30 mins. At 11.00m, UT catcher and shoe broken during sampling.

Logged by SI

Figure

Sheet 1 of 2

05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378542.2 E 186424.2 N	**Borehole**	BH105
				Ground Level	3.04 m OD

Scale 1:50

Sampling			Properties		Strata			
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
10.50	D							
11.00	UT	9.00 (10.20)	61 blows					
11.00 - 12.10	B							
11.45 - 11.60	D		w: 12 %					
11.80	D							
12.10 - 12.41		9.00 (10.10)		S50/ 156mm				
12.10 - 12.41	D							
12.70 - 13.40	B				Extremely weak greyish brown MUDSTONE, recovered as gravelly clay.	12.70		-9.66
13.00	D							
13.50	D				Extremely weak grey MUDSTONE, recovered as angular to subangular fine to coarse gravel.	13.40		-10.36
13.60 - 13.98		9.00 (12.10)		S50/ 225mm				
13.60 - 13.98	D							
13.60 - 14.70	B							
14.50	D							
14.70 - 14.99		9.00 (11.60)		S50/ 145mm				
14.70 - 14.98	D				End of Borehole	15.00		-11.96

Boring				Progress					Groundwater					
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378571.7 E 186406.9 N	**Borehole**	BH106
				Ground Level	3.15 m OD

Sampling			Properties		Strata			Scale 1:50
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
0.10 - 0.40	B				TOPSOIL: Very soft dark brown slightly sandy organic clay with occasional rootlets and roots up to 20mm in diameter.			
0.25	D							
0.25	ES					0.40		2.75
0.25			PID: <0.1 ppm		Very soft bluish grey slightly sandy CLAY.			
0.25	HV		12/11/15 kPa					
0.50	D							
0.50	ES							
0.50 - 1.00	B		w: 53 %					
0.50			PID: <0.1 ppm					
0.50	HV		18/20/19 kPa					
1.00	D							
1.00	ES				Below 1.60m: with occasional large pockets (up to 80mm in size) of peat.			
1.00			PID: <0.1 ppm					
1.20 - 1.65		1.20 (0.00)		S0*/ 450mm				
1.20 - 1.65	D							
1.60 - 2.50	B							
2.00	D							
2.50 - 2.95		2.50		S0*/				
2.50 - 2.95	D	(DRY)		450mm				
2.50 - 3.50	B							
3.00	D							
3.50 - 3.95		3.50		S0*/				
3.50 - 3.95	D	(DRY)		450mm		3.60		-0.45
3.50 - 4.50	B				Spongy dark brown fiberous PEAT.			
4.00	D							
4.50 - 4.95		4.50 (2.70)		S26				
4.50 - 4.95	D					4.70		-1.55
4.70 - 5.50	B				Medium dense dark brown slightly sandy GRAVEL with a low subangular cobble content of sandstone and quartzite. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite.			
5.00	D							
5.50 - 5.95		5.50 (1.10)		C33	At 5.50m, dense.			
5.50 - 6.50	B							
6.00	D							
6.50 - 6.90		6.50 (0.00)		C50/ 250mm	Below 6.50m: with a medium subrounded cobble content of sandstone and quartzite.			
6.50 - 7.50	B				At 6.50m, very dense.			
7.00	D							
7.50 - 7.95		7.50 (0.00)		C19				
7.80 - 8.50	B					7.80		-4.65
8.00	D		w: 12 %		Very stiff brownish grey slightly sandy gravelly CLAY. Gravel is angular to subanhgular fine to coarse of sandstone.			
8.50	UT	8.50 (7.10)	26 blows cu: 140 kPa		At 8.50m: becoming sandy clay.			
8.95 - 9.10	D							
9.00 - 10.00	B							
9.50	D							
10.00 - 10.45		9.00 (9.00)		S47				

Boring

Depth	Hole Dia.	Technique	Crew
1.20	0.30	Inspection Pit	MR/SS
14.14	0.20	Cable Percussion	MR/SS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			12/09/24	08:00
14.14	9.00	12.10	12/09/24	17:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.00	0.00	0.00	20		
4.70	4.70	2.10	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
Chiseling 7.10-7.30m 30mins.
Artesian water noted at a depth of 6.00m.

Logged by SI

Figure

Sheet 1 of 2

05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD **-** *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
				Borehole	BH106
Client	National Grid	**National Grid Coordinates**	378571.7 E 186406.9 N	**Ground Level**	3.15 m OD

Scale 1:50

Sampling			Properties		Strata			
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
10.00 - 10.45	D							
10.50 - 11.50	B							
11.00	D		w: 13 %		Very stiff grey slightly gravelly sandy CLAY. Gravel is angular to subangular fine to coarse of sandstone.	11.00		-7.85
11.50 - 11.95		9.00 (10.30)		S31				
11.50 - 11.95	D							
12.20 - 13.00	B				Extremely weak grey MUDSTONE, recovered as angular to subangular fine to coarse gravel.	12.20		-9.05
12.50	D							
13.10 - 13.50		9.00 (11.60)		S50/ 245mm				
13.10 - 13.50	D							
13.40	D							
13.80 - 14.14		9.00 (12.10)		S50/ 195mm				
13.80 - 14.14	D				End of Borehole	14.14		-10.99

Boring				Progress					Groundwater					
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378601.9 E 186379.5 N	**Borehole**	BH107
				Ground Level	2.95 m OD

Sampling | Properties | Strata — Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
0.10 - 0.20	B				TOPSOIL: Grass over very soft dark brown slightly sandy organic clay with occasional rootlets and roots up to 20mm in diameter.			
0.10	HV		5/8/6 kPa			0.20		2.75
					Spongy dark brown to black fiberous PEAT.			
0.50	D							
0.50	ES							
0.50			PID: 0.10 ppm					
1.20 - 1.65		1.20 (0.20)		S0*/ 450mm				
1.20 - 2.50	D		w: 271 %					
2.50 - 2.95		2.50 (0.30)		S0*/ 450mm				
2.50 - 3.50	D							
3.50 - 3.95		3.50 (0.60)		S0*/ 450mm				
3.50 - 4.50	B							
4.00	D		w: 53 %		Below 4.00m, becoming slightly clayey fiberous peat.			
4.50	UTF	4.50 (1.00)	10 blows		Soft dark brown slightly gravelly sandy CLAY. Gravel is subangular and subrounded fine to coarse of sandstone and quartzite.	4.50		-1.55
4.50 - 5.40	B		w: 22 %					
5.20	D							
5.40 - 5.85		5.40 (1.80)		S23	Medium dense greyish brown sandy GRAVEL with a low subangular cobble content of sandstone and quartzite. Gravel is subangular and subrounded fine to coarse of sandstone and quartzite.	5.40		-2.45
5.40 - 5.85	D							
5.50 - 6.50	B							
6.00	D							
6.50 - 6.95		6.50 (0.00)		S33	At 6.50m, dense.			
6.50 - 7.50	B							
7.00	D							
7.50 - 7.95		7.50 (1.80)		S18				
7.70 - 8.70	B				Stiff to very stiff dark brown slightly sandy gravelly CLAY. Gravel is angular and subangular fine to coarse of sandstone and quartzite.	7.70		-4.75
8.20	D		w: 14 %					
8.70 - 9.15	UT	8.70 (DRY)	57 blows					
8.70 - 9.15			cu: 64 kPa					
9.15 - 9.30	D							
9.30 - 10.00	B							
9.50	D							
10.00 - 10.45		9.00 (DRY)		S31				
10.00 - 10.45	D							

Boring

Depth	Hole Dia.	Technique	Crew
1.20	0.30	Inspection Pit	MR/TS
14.70	0.20	Cable Percussion	MR/TS
49.50	0.12	Rotary Core	CJ/IJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			09/09/24	08:00
14.50	9.00	8.80	09/09/24	17:00
14.50	14.50	1.20	11/09/24	08:00
25.50	14.50	2.90	11/09/24	17:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
5.40	5.40	-0.46	20		
21.00	14.50	14.30	20		

Remarks

AGS

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub. Not possible to take ES samples at 0.25 and 1.00m due to excessive water and little recovery.
Artesian water noted at 5.40m, water level to 0.46m above ground level.
Flush:Air/Mist.

Logged by SI

Figure

Sheet 1 of 7

05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD **-** *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
				Borehole	BH107
Client	National Grid	**National Grid Coordinates**	378601.9 E 186379.5 N	**Ground Level**	2.95 m OD

Sampling | Properties | Strata — Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
					Below 10.00m, becoming very stiff.			
10.50 - 11.50	B							
11.00	D		w: 17 %					
11.50 - 11.95		9.00		S38				
11.50 - 11.95	D	(DRY)						
12.00 - 13.00	B							
12.50	D							
13.20 - 13.52		9.00 (8.80)		S50/ 165mm	Extremely weak dark grey MUDSTONE, recovered as angular and tabular fine to coarse gravel.	13.10		-10.15
13.20 - 13.52	D							
13.50 - 14.50	B							
14.00	D							
14.50 - 14.70		9.00 (8.80)		S50/ 115mm	Between 14.50m - 16.80m, no recovery.	14.70		-11.75
14.50	D				***Borehole continued using alternative techniques - see next page***			

Boring

Depth	Hole Dia.	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
25.50	14.50	-0.30	12/09/24	08:00
39.00	14.50	12.00	12/09/24	17:00
39.00	14.50	-0.65	13/09/24	08:00
49.50	14.50		13/09/24	17:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378601.9 E 186379.5 N	**Borehole**	BH107
				Ground Level	2.95 m OD

Scale 1:50

Sampling/Testing		Drilling					Strata				
Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Legend	Level (m OD)
							Borehole continued using rotary drilling techniques - see below				
		14.50 - 16.00	14.50	0 NA	NA	NR	Soft MUDSTONE to gravelly clay. (drillers description)				
		16.00 - 16.50	14.50	0 NA	NA		Soft MUDSTONE. (drillers description)		16.00		-13.05
		16.50 - 18.00	14.50	14 7	0	NI	Extremely weak black carbonaceous MUDSTONE. Generally non-intact, recovered as angular to subangular fine to coarse gravel.		16.50		-13.55
		18.00 - 19.50	14.50	54 47	7	AZCL		Between 18.00m - 18.70m. assumed zone of core loss.			
18.95 - 19.05	C					11	Weak dark grey slightly sandy MUDSTONE with occasional black plant remains up to 5mm diameter on discontinuity surface. Discontinuities are generally subhorizontal (0-15 degrees) very closely and closely spaced, stepped, rough.		18.80		-15.85
		19.50 - 21.00	14.50	73 60	23	AZCL		Between 19.50m - 19.90m. assumed zone of core loss.			

Boring

Depth	Hole Dia.	Technique	Crew
1.20	0.30	Inspection Pit	MR/TS
14.70	0.20	Cable Percussion	MR/TS
49.50	0.12	Rotary Core	CJ/IJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			09/09/24	08:00
14.50	9.00	8.80	09/09/24	17:00
14.50	14.50	1.20	11/09/24	08:00
25.50	14.50	2.90	11/09/24	17:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
5.40	5.40	-0.46	20		
21.00	14.50	14.30	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub. Not possible to take ES samples at 0.25 and 1.00m due to excessive water and little recovery.
Artesian water noted at 5.40m, water level to 0.46m above ground level.
Flush:Air/Mist.

Logged by SI

Figure

05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378601.9 E 186379.5 N	**Borehole**	BH107
				Ground Level	2.95 m OD

Sampling/Testing | Drilling | Strata — Scale 1:50

Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Legend	Level (m OD)
		19.50 - 21.00	14.50	73 60	23	12		Between 20.00m - 20.40m. with occasional coal fragments up to 5mm diameter.			
							Very strong grey SILTSTONE with rare gypsum veins up to 1mm thick. Discontinuities are (Set i) subhorizontal (0-15 degrees) very closely and medium spaced, stepped, rough and clean. (Set ii) subvertical (80-90degrees) varying to between (60-70 degrees), stepped, rough with rare gypsum veins (up to 1mm thick) on discontinuity surfaces.	Between 20.60 - 20.80m, 20.80 - 21.20m, 21.40 - 21.52m, 21.52 -21.73 and 21.90 - 22.50m discontinuities vertical inclined between (70-90 degrees) stepped, rough with rare gypsum veins (up to 1mm thick)	20.60		-17.65
		21.00 - 22.50	14.50	99 73	43	8					
21.35 - 21.52	C										
		22.50 - 24.00	14.50	100 80	7	NI	Medium strong dark grey SILTSTONE. discontinuities are predominantly subhorizontal (15 degrees) plannar, smooth and clean.	Between 22.50 - 22.60m. non-intact recovered as angular to subangular fine to coarse gravel fragments.	22.50		-19.55
23.15 - 23.28	C					13					
						NI		Between 23.65 - 23.90m. non-intact recovered as angular and subangular fine to coarse gravel.	23.90		-20.95
						20					
		24.00 - 25.50	14.50	87 47	0	AZCL	Weak to medium strong dark grey slightly sandy MUDSTONE with rare very strong siltstone bands up to 50mm thick. Discontinuities are subhorizontal (0-15 degrees) very closely and closely spaced plannar, rough and clean.				
						NI		Between 24.10m - 24.25m, non-intact, recovered as angular to subangular fine to coarse gravel.			
						7					
						NI		Between 24.68m - 24.80m, non-intact recovered as angular to subangular fine to coarse gravel.			
						19		Between 25.00m - 25.80m. assumed zone of core loss.			
		25.50 - 27.00	14.50	80 47	0	AZCL					
						+25		At 26.10m. layer of very strong siltstone. Between 26.10m - 26.15m, 26.55m - 26.60m, 26.70m - 26.78m and 26.87m - 26.95m, non-intact recovered as angular to subangular fine to coarse gravel, possibly extremely closely fractured.	27.00		-24.05
		27.00 - 28.50	14.50	87 54	11	AZCL	Very strong grey SILTSTONE with many discontinuities subhorizontal black carbonaceous lenses (up to 1mm thick). Discontinuities are (Set i) subhorizontal (0-15 degrees) very closely and closely spaced, stepped, rough and clean. (Set ii) subhorizontal (75-90 degrees) inclined, stepped, rough with occasional pyrite crystals and gypsum veins (up to 1mm thick).				
27.40 - 27.50	C					12		Between 27.00m - 27.20m. assumed zone of core loss.			
						NI		Between 27.80m - 27.88m, non-intact, recovered as angular to subangular fine to coarse gravel.			
28.15 - 28.33	C					7					
						NI		Between 28.30m - 28.50m. non-intact, recovered as angular to subangular fine to coarse gravel.			
		28.50 - 30.00	14.50	63 47	0	AZCL		Between 28.50m - 29.05m. assumed zone of core loss.			
						12		Between 29.20m - 29.30m, 29.38m - 29.48m, 29.50m - 29.58m and 29.60m - 29.80m, discontinuities inclined between (70-80 degrees), stepped rough, with occasional sand infill (up to 2mm thick).			

Boring

Depth	Hole Dia.	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
25.50	14.50	-0.30	12/09/24	08:00
39.00	14.50	12.00	12/09/24	17:00
39.00	14.50	-0.65	13/09/24	08:00
49.50	14.50		13/09/24	17:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378601.9 E 186379.5 N	**Borehole**	BH107
				Ground Level	2.95 m OD

Scale 1:50

Sampling/Testing		Drilling					Strata			
Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Level (m OD)
		30.00 - 31.00	14.50	90 48	36	AZCL NI 4 NI		Between 30.00m - 30.10m. assumed zone of core loss. Between 30.10m - 30.33m. non-intact recovered as angular to subangular fine to coarse gravel. At 30.30m. Discontinuities inclined (60-70 degrees), stepped, rough and clean.		
		31.00 - 32.30	14.50	85 54	10	AZCL NI 13 NI		Between 31.00m - 31.20m, assumed zone of core loss. Between 31.20m - 31.46m, non-intact, recovered as angular to subvangular fine to coarse gravel. Between 31.46m - 31.63m and 31.90m - 32.00m, discontinuities vertical (90 degrees), stepped, rough and clean.		
		32.30 - 33.60	14.50	100 88	54	9 NI		Between 32.00m - 32.50m, non-intact, recovered as angular and subangular fine to coarse gravel and cobbles. Between 32.50m - 33.10m, vertical discontinuity (90 degrees), stepped, rough and clean.		
		33.60 - 35.00	14.50	71 43	11	AZCL NI 13 NI 14		Between 33.50m - 33.60m. non-intact, recovered as angular to subangular fine to coarse gravel.	34.00	-31.05
		35.00 - 36.00	14.50	100 90	45	+25 20	Strong to very strong dark grey thinly laminated SILTSTONE with rare gypsum veins up to 1mm thick. Discontinuities are (Set i) subhorizontal (0-15 degrees) very closely and closely spaced plannar, rough and clean. (Set ii) Vertical (80-90 degrees), stepped, rough with occasional gypsum veins (up to 1mm thick) on surface.	Between 34.00m - 34.10m and 34.26m - 34.34m, non-intact, recovered as angular and tabular fine to coarse gravel. At 34.60m., discontinuity inclined between (80-90 degrees), undulating, stepped, rough and clean.	34.90	-31.95
36.25 - 36.30	C	36.00 - 37.50	14.50	100 83	37	8	Very strong grey SILTSTONE. Discontinuities subhorizontal (0-15 degrees) closely and medium spaced, stepped, rough and clean. Black carbonaceous lenses (up to 1mm thick).	Between 35.00m - 35.30m, non-inact, recovered as angular to subangular fine to coarse gravel. 35.70m - 35.90m. discontinuity inclined at (70 degrees) stepped, rough and clean. Between 36.50m - 36.70m. vertical discontinuity inclined (85 degrees) stepped, rough and clean.		
37.10 - 37.24	C									
38.00 - 38.25	C	37.50 - 39.00	14.50	93 80	49	AZCL 8 NI 20		Between 37.50m - 37.60m. assumed zone of core loss.		
		39.00 - 40.50	14.50	100 90	51	10 +25	Very strong grey SILTSTONE. Discontinuities predominantly subhorizontal (0-15 degrees), closely and medium spaced, stepped, rough and clean.	Between 39.30m - 39.56m. discontinuities subhorizontal extremely closely spaced.	39.56	-36.61

Boring

Depth	Hole Dia.	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
49.50	14.50		16/09/24	08:00
49.50	14.50		16/09/24	17:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378601.9 E 186379.5 N	**Borehole**	BH107
				Ground Level	2.95 m OD

Sampling/Testing | Drilling | Strata — Scale 1:50

Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Legend	Level (m OD)
		39.00 - 40.50	14.50	100 90	51	5					
		40.50 - 42.00	14.50	100 98	73	NI		Between 40.78m - 40.82m. non-intact, recovered as angular and subangular fine to coarse gravel. Between 40.90m - 41.00m. discontinuity inclined (60 degrees), closely spaced, plannar, rough and clean.			
		42.00 - 43.50	14.50	100 93	47	6		Between 42.56m - 42.67m, 42.80m - 42.92m and 42.95m - 43.10m. discontinuities inclined (50-70 degrees), stepped, rough and clean.			
		43.50 - 45.00	14.50	100 87	27	NI 7		Between 43.50m - 43.62m. non-intact, recovered as angular to subangular fine to coarse gravel. Between 43.75m - 43.95m. discontinuities inclined at (70 degrees), stepped, rough and clean. Between 44.10m - 44.25m, 44.72m - 44.98m. discontinuities inclined (40-60 degrees), stepped, rough and clean.			
		45.00 - 46.50	14.50	87 67	33	AZCL 9 NI 10	Weak to medium strong dark grey SILTSTONE. Discontinuities are (Set i) subhorizontal very closely and closely spaced, stepped, rough and clean. (Set ii) inclined (40-70 degrees), stepped, rough and clean.	Between 45.00m - 45.20m. assumed zone of core loss. Between 45.30m - 45.38m, 45.40m - 45.48m, 45.51m - 45.59m, 45.90m - 45.98m and 46.32m - 46.42m. discontinuities inclined (40-70 degrees) stepped, rough and clean.	45.90		-42.95
		46.50 - 48.00	14.50	100 67	33	8 NI		Between 46.00m - 46.20m. non-intact, recovered as angular to subangular fine to coarse gravel. Between 46.60m - 46.70m, 46.90m - 47.10m and 47.50m - 47.55m, discontinuities inclined at (40-70 degrees) stepped, rough and clean.			
		48.00 - 49.50	14.50	93 73	24	AZCL 9		Between 48.00m - 48.10m, assumed zone of core loss. Between 48.40m - 48.46m, 48.70m - 48.90m and 48.90m - 49.10m, discontinuities inclined at (40-70 degrees) stepped, rough and clean.			
								End of Borehole	50.00		-47.05

Boring

Depth	Hole Dia.	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD **-** *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
				Borehole	BH107
Client	National Grid	**National Grid Coordinates**	378601.9 E 186379.5 N	**Ground Level**	2.95 m OD

Sampling/Testing		Drilling					Strata				Scale 1:50
Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Legend	Level (m OD)

Boring				Progress					Groundwater					
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378582.9 E 186364.4 N	**Borehole**	BH108
				Ground Level	3.05 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
0.25	D				TOPSOIL: Grass over very soft dark brown slightly sandy organic clay with occasional rootlets and roots up to 20mm in diameter.			
0.25	ES					0.40		2.65
0.25			PID: <0.1 ppm		Soft bluish grey slightly sandy CLAY.			
0.25	HV		10/12/11 kPa					
0.40 - 1.00	B							
0.50	D		w: 54 %			1.00		2.05
0.50	ES				Spongy dark brown fiberous PEAT.			
0.50			PID: <0.1 ppm					
0.50	HV		37/40/38 kPa					
1.00			PID: <0.1 ppm					
1.10	D							
1.10	ES							
1.20 - 1.65		1.20 (0.00)		S0*/ 450mm				
1.20 - 1.65	D							
1.20 - 2.50	B							
2.00	D							
2.50 - 2.95		2.50 (1.80)		S0*/ 450mm				
2.50 - 3.50	B							
3.00	D							
3.50 - 3.95		3.50 (2.10)		S0*/ 450mm				
3.50 - 3.95	D							
3.50 - 4.30	B							
4.00	D							
4.40	D		w: 25 %			4.30		-1.25
4.60	UT	4.50 (DRY)	31 blows w: 23 %		Stiff greyish brown slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone and quartzite.			
4.60 - 5.50	B							
5.05 - 5.20	D							
5.40	D							
5.50 - 5.95		5.50 (5.10)		S35		5.50		-2.45
5.50	D				Medium dense greyish brown slightly sandy GRAVEL. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite.			
5.50 - 6.50	B							
6.00	D							
6.50 - 6.95		6.50 (-0.12)		C33				
6.50 - 7.50	B							
7.00	D							
7.50 - 7.95		7.50 (2.10)		C14				
7.70 - 8.50	B					7.70		-4.65
8.00	D		w: 19 %		Stiff dark brown slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone and quartzite.			
8.50 - 8.95	UT	8.50 (7.70)	52 blows w: 21 %					
8.95 - 9.10	D							
9.00 - 10.00	B							
9.50	D							
10.00 - 10.45		9.00 (9.00)		S27				

Boring

Depth	Hole Dia.	Technique	Crew
1.20	0.30	Inspection Pit	MR/SS
14.66	0.20	Cable Percussion	MR/SS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			11/09/24	09:00
11.50	9.00	11.30	11/09/24	17:00
11.50	9.00	DRY	12/09/24	08:00
14.66	9.00	DRY	12/09/24	09:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
5.80	5.80	+0.45	20		Water level above ground level.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
In-situ permeability test carried out at 6.00m.

Logged by SI

Figure

05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD **-** *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
				Borehole	BH108
Client	National Grid	**National Grid Coordinates**	378582.9 E 186364.4 N	**Ground Level**	3.05 m OD

Scale 1:50

Sampling			Properties	Strata				
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
10.00 - 10.45	D							
10.50 - 11.50	B							
11.00	D							
11.50 - 11.95		9.00 (11.30)		S21				
11.50 - 11.95	D							
12.00 - 12.90	B				Stiff grey slightly sandy gravelly CLAY with many mudstone lithorelics up to 100mm in size. Gravel is subangular to angular fine to coarse of mudstone and sandstone.	12.00		-8.95
12.50	D							
13.20 - 13.46		9.00 (DRY)		S50/ 120mm	Extremely weak dark grey MUDSTONE with occasional coal fragments up to 15mm in diameter.	12.90		-9.85
13.20 - 13.46	D							
13.50 - 14.50	B							
14.00	D							
14.50 - 14.66		9.00 (DRY)		S50/ 85mm				
14.50 - 14.66	D				End of Borehole	14.66		-11.61

Boring				Progress					Groundwater					
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure Sheet 2 of 2

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378581.1 E 186340.3 N	**Borehole**	BH109
				Ground Level	3.04 m OD

Sampling			Properties		Strata			Scale 1:50
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
0.10 - 0.30	B				TOPSOIL: Grass over very soft dark brown slightly sandy organic clay with occasional rootlets and roots up to 20mm in diameter.			
0.25	D					0.30		2.74
0.25	ES				Very soft bluish grey slightly sandy CLAY with occasional roots up to 10mm in diameter.			
0.25			PID: <0.1 ppm					
0.25	HV		15/16/14 kPa					
0.40 - 1.10	B							
0.50	D		w: 60 %					
0.50	ES					1.10		1.94
0.50			PID: <0.1 ppm		Spongy dark brown fiberous PEAT with large pocket of clay (up to 100mm) in size.			
0.50	HV		18/19/16 kPa		Between 1.10m - 5.80m: bluish grey clay noted.			
1.00	D							
1.00	ES							
1.20 - 1.65		1.20 (0.00)		S0				
1.20 - 1.65	D							
1.20 - 2.50	B							
2.00	D		w: 84 %					
2.50 - 2.95	UT	2.50 (1.60)	2 blows					
2.50 - 3.50	B							
3.00	D							
3.50 - 3.95		3.20 (1.90)		S0				
3.50 - 3.95	D							
3.50 - 4.50	B							
4.00	D							
4.50 - 4.95	UT	2.60 (4.00)	4 blows					
4.50 - 5.50	D		w: 494 %					
5.50 - 5.95		5.50 (2.60)		S13				
5.50	D					5.80		-2.76
5.80 - 6.50	B				Dense dark brown sandy GRAVEL with a low cobble content of subrounded sandstone and quartzite. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite.			
6.00	D							
6.50 - 6.95		6.50 (-0.12)		S33				
6.50 - 7.50	B							
7.00	D							
7.50 - 7.95		7.50 (0.00)		S37				
7.50 - 8.50	B							
8.00	D							
8.50 - 8.95		8.50 (0.00)		S22				
8.60 - 9.50	B				Firm brownish grey slightly sandy slightly gravelly CLAY with occasional sand/gravel lenses up to 200mm thick. Gravel is subangular to subrounded fine to coarse of sandstone and rare coal.	8.60		-5.56
9.00	D		w: 19 %					
9.50 - 9.95	UT	9.50 (DRY)	51 blows					
9.95 - 10.10	D							
10.00 - 11.00	B							

Boring

Depth	Hole Dia.	Technique	Crew
1.20	0.30	Inspection Pit	MR/TS
14.30	0.20	Cable Percussion	MR/TS
49.50	0.12	Rotary Core	CJ/IJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			29/08/24	08:00
11.45	9.50	DRY	29/08/24	18:00
11.45	9.50	5.90	30/08/24	08:00
14.30	9.50	13.30	30/08/24	14:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.10	0.00	0.00	20		
6.00	6.00	-0.12	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
Chiselling 6.60m 6.80m 40mins and 14.20m - 14.30m 30mins. Flush:Air/Mist
Borehole backfilled on completion GL to 49.50 Bentonite pellets.

Logged by SI

Figure Sheet 1 of 6

05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378581.1 E 186340.3 N	**Borehole**	BH109
				Ground Level	3.04 m OD

Sampling			Properties		Strata			Scale 1:50
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
10.50	D							
11.00 - 11.45		9.50 (DRY)		S27				
11.00 - 11.45	D							
11.50 - 12.50	B				Below 11.50:m, becoming stiff.			
12.00	D		w: 13 %					
12.50 - 12.95	UT	9.50 (DRY)	58 blows					
12.50 - 13.30	B							
12.50 - 12.95			cu: 186 kPa					
12.95 - 13.10	D							
13.00	D							
13.30 - 14.00	B				Extremely weak grey and dark grey MUDSTONE.	13.30		-10.26
13.50	D							
14.00 - 14.21		9.50 (13.30)		S50/ 60mm				
14.00 - 14.21	D				***Borehole continued using alternative techniques - see next page***	14.30		-11.26
14.30 - 14.32		9.50 (13.30)		S50/ 10mm				
14.30 - 14.32	D							

Boring				Progress					Groundwater					
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
				14.30	14.30	0.00	03/09/24	08:00						
				21.00	14.30	1.60	03/09/24	17:00						
				21.00	14.30	-0.80	04/09/24	08:00						
				34.50	14.30	1.20	04/09/24	17:00						

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD **-** *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378581.1 E 186340.3 N	**Borehole**	BH109
				Ground Level	3.04 m OD

Sampling/Testing | Drilling | Strata — Scale 1:50

Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Legend	Level (m OD)
							Borehole continued using rotary drilling techniques - see below				
		14.30 - 15.00	14.30	43 0	0	AZCL	Strong grey SILTSTONE with many subhorizontal (0-15 degrees) black carbonaceous lenses (1mm thick). Below 18.30m discontinuities subhorizontal (0-15 degrees) very closely spaced, plannar, stepped, rough and clean.	Between 14.30m - 14.70m, assumed zone of core loss. Between 14.70m - 15.00m, non-intact, recovered as angular and subangular fine to coarse gravel.			
						NI					
		15.00 - 16.50	14.30	33 0	0	AZCL		Between 15.00m - 16.00m. assumed zone of core loss. Between 16.00m - 16.50m, non-intact, recovered as angular to subangular fine to coarse gravel with cobble.			
						NI					
		16.50 - 18.00	14.30	67 33	0	AZCL		Between 16.50m 17.00m. assumed zone of core loss. Between 17.00m - 18.30m, discontinuities subhorizontal, very closely spaced, planar, stepped, rough and clean.			
						>25					
18.20 - 18.25	C	18.00 - 18.50	14.30	100 80	0			Between 18.70m - 18.90m, non-intact, recovered as angular to subangular fine to coarse gravel.			
						18					
		18.50 - 18.80	14.30	100 40	0			Between 19.20m - 19.48m. discontinuity inclined (70-80 degrees) stepped, rough with occasional gypsum veins (<1mm thick).			
		18.80 - 19.50	14.30	79 50	14	NI					
						6					
		19.50 - 21.00	14.30	93 77	7	AZCL		Between 19.50m - 19.60m. assumed zone of core loss. Between 19.60m - 19.70m, non-intact, recovered as angular to subangular fine to coarse gravel.			
						NI					

Boring

Depth	Hole Dia.	Technique	Crew
1.20	0.30	Inspection Pit	MR/TS
14.30	0.20	Cable Percussion	MR/TS
49.50	0.12	Rotary Core	CJ/IJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			29/08/24	08:00
11.45	9.50	DRY	29/08/24	18:00
11.45	9.50	5.90	30/08/24	08:00
14.30	9.50	13.30	30/08/24	14:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.10	0.00	0.00	20		
6.00	6.00	-0.12	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
Chiselling 6.60m 6.80m 40mins and 14.20m - 14.30m 30mins. Flush:Air/Mist
Borehole backfilled on completion GL to 49.50 Bentonite pellets.

Logged by SI

Figure Sheet 3 of 6
05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378581.1 E 186340.3 N	**Borehole**	BH109
				Ground Level	3.04 m OD

Scale 1:50

Sampling/Testing		Drilling					Strata				
Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Legend	Level (m OD)
		19.50 - 21.00	14.30	93 77	7	13 NI >25 10		Between 20.30m - 20.41m. non-intact, recovered as angular to subangular fine to coarse gravel. Between 20.80m - 21.00m. discontinuity subvertical inclined stepped, rough with occasional gypsum veins up to (1mm thick) Between 21.00m - 21.30m. assumed zone of core loss.			
		21.00 - 22.50	14.30	80 67	0	AZCL >25 NI	Very strong dark grey SILTSTONE with many subhorizontal (15 degrees) black carbonaceous lenses up to (2mm thick). Discontinuities are subhorizontal (15 degrees) very closely and closely spaced, plannar, stepped, rough.	Between 21.30m - 21.70m. discontinuities very closely spaced.	21.70		-18.66
		22.50 - 24.00	14.30	100 90	27	10		Between 21.70m - 21.80m. non-intact, recovered as angular to subangular fine to coarse gravel. Between 22.40m - 22.50m, discontinuity subvertical (80 degrees) stepped, rough with occasional gypsum up to (1mm thick) on surface. Between 23.10m - 23.30m, discontinuity inclined (40-60 degrees) stepped, rough and clean.			
23.35 - 23.48	C										
		24.00 - 24.70	14.30	89 61	43	NI 7	Very strong grey SILTSTONE. Discontinuities are subhorizontal (0-15 degrees) closely spaced, stepped, rough and clean.	At 23.90m. discontinuity inclined (70 degrees) plannar, rough and clean. Between 24.00m - 24.27m, non-intact, recovered as angular to subangular fine to coarse gravel.	23.70		-20.66
		24.70 - 25.50	14.30	100 75	0	NI 10 NI 13		Between 24.50m - 24.70m. discontinuity closely spaced subvertical (80-90 degrees) undulating, rough with gypsum vein up to (2mm thick). Between 24.70m - 24.80m and 25.00m - 25.40m. non-intact, recovered as angular to subangular fine to coarse gravel. Between 25.55m - 25.65m, discontinuity inclined (45-60 degrees) plannar, rough and clean. Between 25.60m - 27.00m driller noted traces of coal. Between 25.65m - 25.75m, non-intact, recovered as angular to subangular fine to coarse gravel.			
		25.50 - 27.00	14.30	96 73	17	0 NI >25	Medium strong dark grey SILTSTONE with many subhorizontal black carbonaceous lenses up to (2mm thick). Discontinuities are predominantly subhorizontal (15 degrees) very closely spaced, plannar, rough and clean.	Between 25.84m - 25.93m, non-intact, recovered as angular to subangular fine to coarse gravel.	25.84		-22.80
26.40 - 26.50	C										
27.00 - 27.26	C	27.00 - 28.50	14.30	100 83	33	8 NI	Very strong dark grey SILTSTONE. Discontinuity is closely spaced, stepped, rough and clean.	Between 26.90m - 27.00m, discontinuity inclined (60 degrees) stepped, rough and clean. Between 27.65m - 28.00m. discontinuity inclined (70-80 degrees) stepped, rough and clean. Between 28.00m - 28.20m, discontinuities inclined (80-90 degrees), stepped, rough and clean. Between 28.24m - 28.30m, non-intact, recovered as angular to subangular fine to coarse gravel.	26.75		-23.72
		28.50 - 30.00	14.30	100 80	20	10 NI					

Boring

Depth	Hole Dia.	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
14.30	14.30	0.00	03/09/24	08:00
21.00	14.30	1.60	03/09/24	17:00
21.00	14.30	-0.80	04/09/24	08:00
34.50	14.30	1.20	04/09/24	17:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378581.1 E 186340.3 N	**Borehole**	BH109
				Ground Level	3.04 m OD

Scale 1:50

Sampling/Testing		Drilling					Strata				
Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Legend	Level (m OD)
		30.00 - 31.50	14.30	100 99	37			Between 28.40m - 28.50m, discontinuity inclined (70 degrees) stepped, rough and clean. Between 28.80m - 28.90m, non-intact, recovered as angular to subangular fine to coarse gravel. Between 29.10m - 29.20m and 29.52m - 29.60m. discontinuities inclined (45-60 degrees) plannar, rough and clean.			
30.40 - 30.57	C										
		31.50 - 33.00	14.30	100 99	30	8		At 31.60m, discontinuity inclined (45 degrees) stepped, rough. Between 31.75m - 31.80m, discontinuity inclined (60 degrees) stepped, rough and clean. Between 31.90m - 32.00m, discontinuity inclined (70 degrees) stepped, rough. Between 32.25m - 32.55m, discontinuity inclined (50-60 degrees) stepped, rough and clean.			
		33.00 - 34.50	14.30	100 90	22			At 32.35m, discontinuity inclined at (80 degrees) stepped, rough and clean. Between 32.56m - 32.65m, discontinuity inclined (60-70 degrees) stepped, rough and clean.			
						NI 12 NI					
34.03 - 34.22	C										
						7		At 32.65m and 33.20m discontinuity inclined (40-50 degrees) stepped, rough and clean.			
34.50 - 34.77	C	34.50 - 36.00	14.30	97 73	45		Weak to medium strong dark grey MUDSTONE. Discontinuities are subhorizontal (0-15 degrees) closely spaced, stepped, rough and clean.		34.50		-31.46
34.91 - 35.00	C					NI 8 NI		Between 33.35m - 33.42m, non-intact, recovered as angular to subangular fine to coarse gravel. Between 33.58m - 33.64m, 33.66m - 33.71m, non-intact, recovered as angular to subangular fine to coarse gravel. At 33.76m, discontinuity inclined (40-60 degrees) stepped, rough. Between 33.88m - 33.96m, discontinuities inclined (20 degrees) closely spaced, plannar, rough and clean.			
						6	Medium strong to strong grey SILTSTONE with occasional very strong ironstone nodules (up to 80mm in diameter) Discontinuities are subhorizontal, closely spaced rough and clean.		35.40		-32.36
		36.00 - 37.50	14.30	93 73	15	AZCL 7 NI 0 NI					
						8		Between 35.00m - 35.10m, non-intact, recovered as angular to subangular fine to coarse gravel. Between 35.22m - 35.32m, non-intact, recovered as angular to subangular fine to coarse gravel.			
		37.50 - 39.00	14.30	100 87	53			Between 36.00m - 36.10m, assumed zone core loss. Between 36.40m - 36.48m, non-intact, recovered as angular to subangular fine to coarse of gravel and ironstone cobble. At 36.40m and 36.55m, very strong ironstone nodules up to (80mm in diameter). Between 26.53m - 36.63m, non-intact, recovered as angular to subangular fine to coarse gravel. Between 36.58m - 36.65m. becoming very weak and dark			
38.00 - 38.25	C										
38.12 - 38.24	C					NI					
38.74 - 38.92	C					6					
		39.00 - 40.50	14.30	60 0	0	AZCL	Extremely weak dark grey MUDSTONE with rare very strong itonstone nodules. Recovered as angular to subangular fine to coarse gravel and cobbles.		39.00		-35.97

Boring

Depth	Hole Dia.	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
34.50	14.30	-0.65	05/09/24	08:00
43.50	14.30	1.20	05/09/24	10:04
43.50	14.30	-0.90	06/09/24	08:00
49.50	14.30		06/09/24	17:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion and Rotary*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378581.1 E 186340.3 N	**Borehole**	BH109
				Ground Level	3.04 m OD

Sampling/Testing | Drilling | Strata — Scale 1:50

Sample / SPT Depth	SPT N / Type	Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	TCR/ SCR (%)	RQD (%)	FI	General	Detail	Depth	Legend	Level (m OD)
		39.00 - 40.50	14.30	60 0	0	NI		grey. At 37.20m, very strong ironstone nodule. Between 38.10m - 38.22m, very strong ironstone. Between 38.22m - 32.33m, non-intact, recovered as angular to subangular fine to coarse gravel.			
		40.50 - 42.00	14.30	73 33	7	19 NI					
							Medium strong to strong black carbonaceous SILSTONE. Discontinuities are subhorizontal closely and medium spaced, plannar, smooth and clean.		41.18		-38.15
42.03 - 42.16	C	42.00 - 43.50	14.30	80 47	25	7		Between 39.00m - 39.60m, assumed zone of core loss. Between 39.60m - 40.40m, non-intact, recovered as angular to subangular fine to coarse gravel. Between 40.40m - 40.66m, siltstone layer.. Between 40.66m - 41.18m, non-intact, recovered as angular to subangular fine to coarse gravel.			
						NI	Weak black COAL. recovered as angular to subangular fine to coarse gravel with pyrite crystals		42.55		-39.52
							Weak to medium strong light grey MUDSTONE. Discontinuities are subhorizontal (0-15 degrees) closely and medium spaced, stepped.	Between 42.80m - 43.50m, non-intact, recovered as angular to subangular fine to coarse gravel.	42.80		-39.76
		43.50 - 45.00	14.30	100 90	73	3					
							Medium strong to strong grey SILTSTONE with rare very strong light grey ironstone nodules. Discontinuities are subhorizontal (0-15 degrees) closely and medium spaced stepped, rough and clean.		44.30		-41.26
		45.00 - 46.50	14.30	100 90	50	NI		Between 44.62m - 44.75m, non-intact, recovered as angular to subangular fine to coarse gravel. Between 44.75m - 44.90m and 45.00m - 45.10m, discontinuities inclined (40-60 degrees) stepped, rough and clean. Between 45.00m - 45.30m, discontinuities inclined (60-80 degrees) undulating, rough and clean.			
							Very weak to weak dark grey MUDSTONE with occasional very strong ironstone nodules. Discontinuities are closely spaced plannar, smooth and clean.		45.50		-42.46
		46.50 - 48.00	14.30	100 73	17	7					
		48.00 - 49.50	14.30	93 87	21	AZCL 12 NI 1 NI 2					
								End of Borehole	49.50		-46.46

Boring				Progress					Groundwater					
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378577.5 E 186301.0 N	**Borehole**	BH110
				Ground Level	3.07 m OD

Sampling			Properties		Strata			Scale 1:50
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
0.10 - 0.40	B				TOPSOIL: Grass over very soft dark brown slightly sandy organic clay with occasional rootlets and roots up to 20mm in diameter.			
0.25	D							
0.25	ES					0.40		2.67
0.25			PID: <0.1 ppm		Very soft blueish grey slightly sandy CLAY.			
0.25	HV		10/16/11 kPa					
0.50	D							
0.50	ES							
0.50 - 1.00	B							
0.50			PID: <0.1 ppm			1.30		1.77
0.50	HV		38/39/40 kPa		Spongy dark brown fiberous PEAT.			
1.00	D							
1.00	ES							
1.00			PID: 0.10 ppm					
1.20 - 1.65		1.20 (0.00)		S0*/ 450mm				
1.20 - 1.65	D							
1.30 - 2.50	B							
2.00	D							
2.50 - 2.95		2.50		S0*/				
2.50 - 2.95	D	(DRY)		450mm				
2.50 - 3.50	B							
3.00	D		w: 473 %					
3.50	UT	3.50 (DRY)	3 blows					
3.50 - 4.50	B		w: 611 %					
3.95 - 4.10	D							
4.30	D		w: 600 %		Below 4.30m: becoming slightly clayey fiberous peat.			
4.50 - 4.95		4.50		S0*/				
4.50 - 4.95	D	(DRY)		450mm				
5.10 - 5.60	B					5.10		-2.03
5.30	D		w: 10 %		Stiff to very stiff greyish brown slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone and quartzite.			
5.50 - 6.60	B							
5.60 - 6.60	B					5.60		-2.53
5.70 - 6.15		5.70		S31	Medium dense greyish brown slightly sandy GRAVEL. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite,			
6.00	D							
6.60 - 7.05		6.60 (1.90)		S26				
6.60 - 7.50	B							
7.00	D							
7.50 - 7.95		7.50 (2.10)		C15		7.60		-4.53
7.60 - 8.80	B				Stiff grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone and quartzite.			
8.50	D		w: 16 %					
8.80 - 9.25		8.80 (7.10)		S30				
8.80	D							
9.00 - 10.00	B							
9.50	D							
10.00 - 10.45	UT	8.80 (8.00)	54 blows w: 17 %					

Boring

Depth	Hole Dia.	Technique	Crew
1.20	0.30	Inspection Pit	MR/TS
12.22	0.20	Cable Percussion	MR/TS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			10/09/24	08:00
12.05	8.80	11.20	10/09/24	17:00
12.05	8.80	-0.46	11/09/24	08:00
12.22	8.80	-0.12	11/09/24	09:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.00		0.00	20		
6.00	6.00	1.90	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
Groundwater noted as artesian at 6.10m.
Chiselling 12.00 - 12.10m 30mins and 12.10 - 12.20m 30 mins.

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378577.5 E 186301.0 N	**Borehole**	BH110
				Ground Level	3.07 m OD

Sampling | Properties | Strata | Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
10.45 - 10.60	D							
11.00 - 12.00	B							
11.50 - 11.95		8.80 (10.30)		S32				
11.50	D							
11.50 - 11.95	D					11.90		-8.83
12.00 - 12.20	D				Weak dark grey fine grained SANDSTONE. Recovered as angular fine to coarse gravel.			
12.05 - 12.07		8.80 (11.20)		S50/ 10mm		12.20		-9.13
12.05 - 12.06	D				End of Borehole			

Boring

Depth	Hole Dia.	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

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Figure Sheet 2 of 2

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378625.1 E 186324.6 N	**Borehole**	BH111
				Ground Level	3.03 m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Results	SPT N	Strata Description	Depth	Legend	Level (m OD)
0.25	D				TOPSOIL: Grass over very soft dark brown slightly sandy organic clay with occasional rootlets and roots up to 20mm in diameter.			
0.25	ES					0.40		2.63
0.25			PID: <0.1 ppm		Very soft bluish grey slightly sandy CLAY with occasional pockets up to 15mm in size of peat.			
0.25	HV		12/10/13 kPa					
0.40 - 1.20	B							
0.50	D		w: 40 %					
0.50	ES							
0.50			PID: <0.1 ppm			1.30		1.73
0.50	HV		18/19/17 kPa		Spongy dark brown fiberous PEAT.			
1.00	D							
1.00	ES							
1.00			PID: <0.1 ppm					
1.20 - 1.65		1.20 (0.00)		S0*/ 450mm				
1.20	D							
1.30 - 2.50	B							
2.00	D							
2.50 - 2.95		2.50 (1.80)		S0*/ 450mm				
2.50 - 3.50	B							
3.00	D							
3.50 - 3.95		3.50 (2.10)		S0*/ 450mm		3.50		-0.47
3.50	D				Very soft bluish grey CLAY with large pockets up to 100mm in size of peat.			
3.50 - 4.50	B							
4.00	D							
4.50 - 4.95		4.50 (3.30)		S2				
4.50	D					4.80		-1.77
4.80 - 5.50	B				Stiff dark grey slightly gravelly sandy CLAY. Gravel is angular to subangular fine to coarse of sandstone.			
5.00	D		w: 22 %					
5.80 - 6.25		5.80 (4.90)		C21	Medium dense brownish grey slightly sandy GRAVEL. Gravel is subangular to subrounded fine to coarse of sandstone and quartzite.	5.80		-2.77
5.80 - 6.00	D					6.00		-2.97
5.80 - 6.50	D				Stiff to very stiff brownish grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse sandstone and quartzite.			
6.00 - 7.00	B							
6.60	D							
7.20 - 7.65		7.20 (DRY)		S35				
7.20	D							
7.20 - 8.50	B							
8.00	D		w: 17 %					
8.50	UT	7.30 (DRY`)	59 blows w: 11 %					
8.95 - 9.10	D							
9.00 - 10.00	B							
9.50	D							
10.00 - 10.45		7.30 (DRY)		S32				

Boring

Depth	Hole Dia.	Technique	Crew
1.20	0.30	Inspection Pit	MR/SS
14.29	0.20	Cable Percussion	MR/SS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			16/09/24	08:00
14.29	7.30	DRY	16/09/24	17:00
14.29	7.30	0.00	17/09/24	08:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.00		0.00	20		
5.80	5.80	4.90	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
Chiselling 13.80 -14.00m 30mins.
53mm standpipe installed GL to 1.00m plain pipe, 1.00m to 4.50m bgl slotted pipe, 4.50m to base bentonite backfill.

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Figure Sheet 1 of 2

05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378625.1 E 186324.6 N	**Borehole**	BH111
				Ground Level	3.03 m OD

Scale 1:50

Sampling			Properties		Strata			
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
10.00	D							
10.50 - 11.50	B							
11.00	D		w: 11 %					
11.50 - 11.95	UT	7.30 (DRY)	61 blows w: 11 %					
11.95 - 12.10	D							
12.30 - 13.00	B							
12.50	D				Extremely weak grey MUDSTONE, recovered as gravel.	12.30		-9.27
13.00 - 13.37		7.30 (DRY)		S50/ 220mm				
13.00 - 13.37	D							
13.00 - 14.00	B							
13.50	D							
14.00 - 14.29		7.30 (DRY)		S50/ 145mm				
14.00	D				End of Borehole	14.29		-11.26

Boring				Progress					Groundwater					
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

Figure

05/02/2025

GEOTECHNICS

BOREHOLE RECORD - *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
Client	National Grid	**National Grid Coordinates**	378640.5 E 186097.3 N	**Borehole**	BH112
				Ground Level	3.57 m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Results	SPT N	Strata Description	Depth	Legend	Level (m OD)
0.10 - 0.30	B				TOPSOIL: Grass over very soft dark brown slightly sandy clay with occasional rootlets and many roots (up to 15mm in diameter).			
0.25	D					0.30		3.27
0.25	ES				Soft brown mottled grey slightly sandy CLAY with occasional rootlets.			
0.25			PID: <0.1 ppm					
0.25	HV		18/15/16 kPa					
0.30 - 0.70	B				Soft to firm brownish grey slightly sandy CLAY with rare rootlets.	0.70		2.87
0.50	D							
0.50	ES							
0.50			PID: <0.1 ppm					
0.50	HV		39/40/39 kPa					
0.70 - 1.20	B				Very soft bluish grey and brown slightly sandy CLAY.	1.60		1.97
1.00	D		w: 39 %					
1.00	ES							
1.00			PID: <0.1 ppm					
1.20 - 1.65	UT	1.20 (0.80)	6 blows		Very soft grey slightly sandy organic CLAY with many pockets (up to 80mm in size) of peat.	2.30		1.27
1.60 - 2.30	B							
1.65 - 1.80	D							
2.00	D		w: 56 %					
2.30 - 2.75		2.30 (1.30)		S1				
2.30 - 2.75	D							
2.30 - 3.20	B							
3.00	D							
3.20 - 3.65		3.20 (3.20)		S0*/ 450mm				
3.20 - 3.65	D							
3.20 - 4.50	B							
4.00	D							
4.50	EW							
4.50 - 4.65	UT	4.50 (4.30)	7 blows					
4.50 - 5.50	B							
5.20	D		w: 230 %					
5.50 - 5.95		5.50 (5.30)		S6				
5.50 - 5.95	D							
5.80 - 6.10	D							
6.10 - 6.50	B				Very soft dark grey sandy organic CLAY.	6.10		-2.53
6.30	D							
6.50 - 6.95		6.50 (6.50)		S0*/ 450mm				
6.50 - 6.95	D							
6.50 - 7.30	B							
7.10	D		w: 31 %					
7.40	D				Dense brown sandy GRAVEL with a low cobble content of subangular sandstone and quartzite. Gravel is subangular to subrounded fine to coarse sandstone and quartzite.	7.30		-3.73
7.50 - 7.95		7.50 (1.00)		C43				
7.50 - 8.50	B							
8.00	D							
8.50 - 8.95		8.50 (0.10)		C17	At 8.50m, medium dense.			
8.50 - 9.20	B							
9.00	D							
9.30	D				Stiff dark grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse sandstone.	9.30		-5.73
9.40 - 9.85		9.40 (4.10)		S24				
9.40 - 9.85	D							
10.00 - 11.00	B							

Boring

Depth	Hole Dia.	Technique	Crew
1.20	0.30	Inspection Pit	MR/TS
14.46	0.20	Cable Percussion	MR/TS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
0.00			22/08/24	08:00
12.50	9.50	DRY	22/08/24	18:00
12.50	9.50	8.10	27/08/24	08:00
14.46	9.50	12.40	27/08/24	12:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.80		0.60	20		Fast inflow.
7.50	7.50	1.00	20		

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 60ml glass vial, 2 x 258ml amber glass jars and 1 x 1 litre plastic tub.
Chiselling 14.20m - 14.40m 30mins. 50mm standpipe - slotted 1.00m - 6.00m with raised cover.
Backfill: Bentonite 6.00m - 14.00m, gravel filter 1.00m - 6.00m, Bentonite seal 0.30m - 1.00m, concrete GL - 0.30m.

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Figure Sheet 1 of 2

05/02/2025

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

GEOTECHNICS

BOREHOLE RECORD **-** *Cable Percussion*

Project	National Grid - 101677 Margam TATA Steel Connection	**Engineer**	Baker Hicks	**Project No.**	PC248745 - Phase 1
				Borehole	BH112
Client	National Grid	**National Grid Coordinates**	378640.5 E 186097.3 N	**Ground Level**	3.57 m OD

Sampling			Properties		Strata			Scale 1:50
Depth	Sample Type	Depth Cased & (to Water)	Results	SPT N	Description	Depth	Legend	Level (m OD)
10.50	D							
11.00 - 11.45		9.50 (DRY)		S24				
11.00 - 11.45	D							
11.50 - 12.50	B							
12.00	D		w: 14 %					
12.50 - 12.95		9.50 (DRY)		S31				
12.50 - 12.95	D							
12.50 - 13.10	B							
12.80	D				Extremely weak grey MUDSTONE, recovered as angular to subangular fine to coarse gravel.	13.10		-9.53
13.10 - 14.00	B							
13.50	D							
14.00 - 14.17		9.50 (12.30)		S50/ 50mm				
14.00 - 14.17	D							
14.20	D				End of Borehole	14.46		-10.89
14.40 - 14.46		9.50 (12.40)		S50/ 20mm				
14.40 - 14.46	D							

Boring				Progress					Groundwater					
Depth	Hole Dia.	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbrevations are explained on the accompanying key sheets.
All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by SI

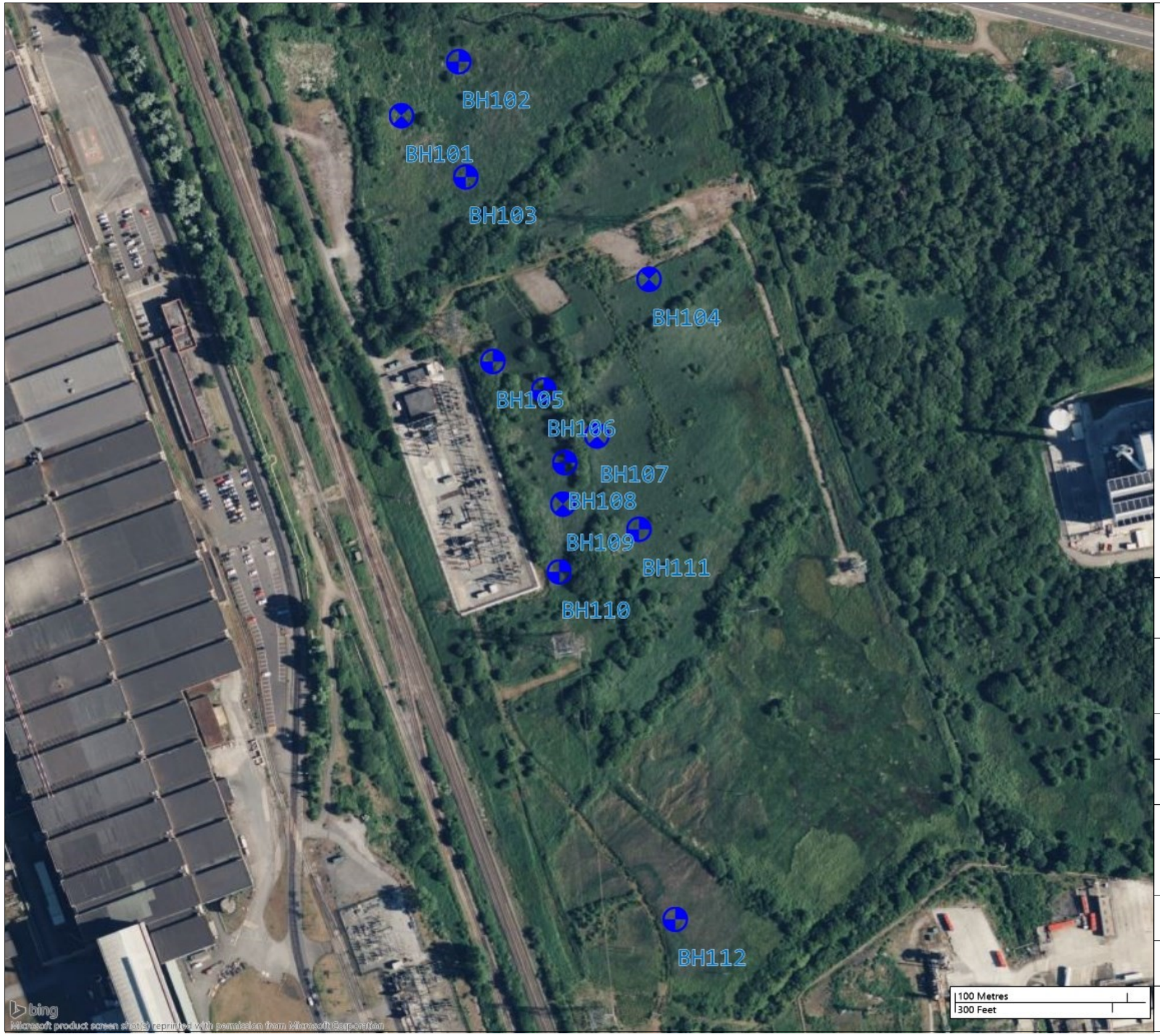
Figure

05/02/2025

GEOTECHNICS

APPENDIX 10

Exploratory Hole Location Plan



N

Legend

- Locations By Type - CP
- Locations By Type - CP+RC

GEOTECHNICS

203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP

Phone: 024 7669 4664
Email: mail@geotechnics.co.uk
www.geotechnics.co.uk

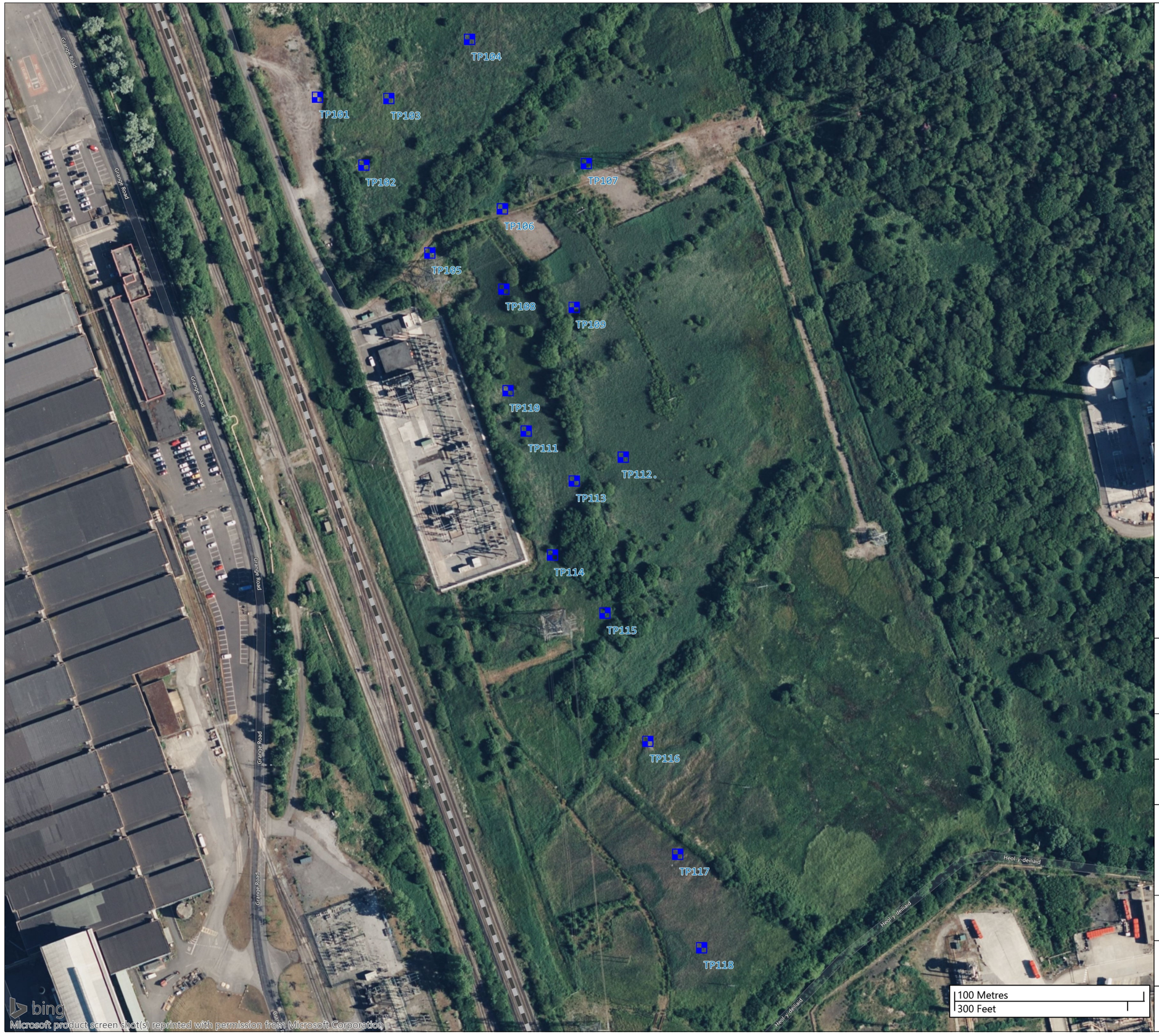
Engineer:
Baker Hicks

Client:
National Grid

Project:
National Grid - 101677 Margam TATA Steel Connection

Drawing Title:
Exploratory Hole Location Plan

Scale:	Date:
1:2200 at A3	**17/10/2024**
Project No.: **PC248745 - Phase 1**	**Exploratory Hole Location Plan**



N

Legend

Locations By Type - TP

GEOTECHNICS

203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP

Phone: 024 7669 4664
Email: mail@geotechnics.co.uk
www.geotechnics.co.uk

Engineer:
Baker Hicks

Client:
National Grid

Project:
National Grid - 101677 Margam TATA Steel Connection

Drawing Title:
Exploratory Hole Location Plan

Scale:	Date:
1:2000 at A3	**29/01/2025**

Project No.:	
PC248745 - Phase 1	**Exploratory Hole Location Plan**



N

Legend

Locations By Type - DCP

GEOTECHNICS

203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP

Phone: 024 7669 4664
Email: mail@geotechnics.co.uk
www.geotechnics.co.uk

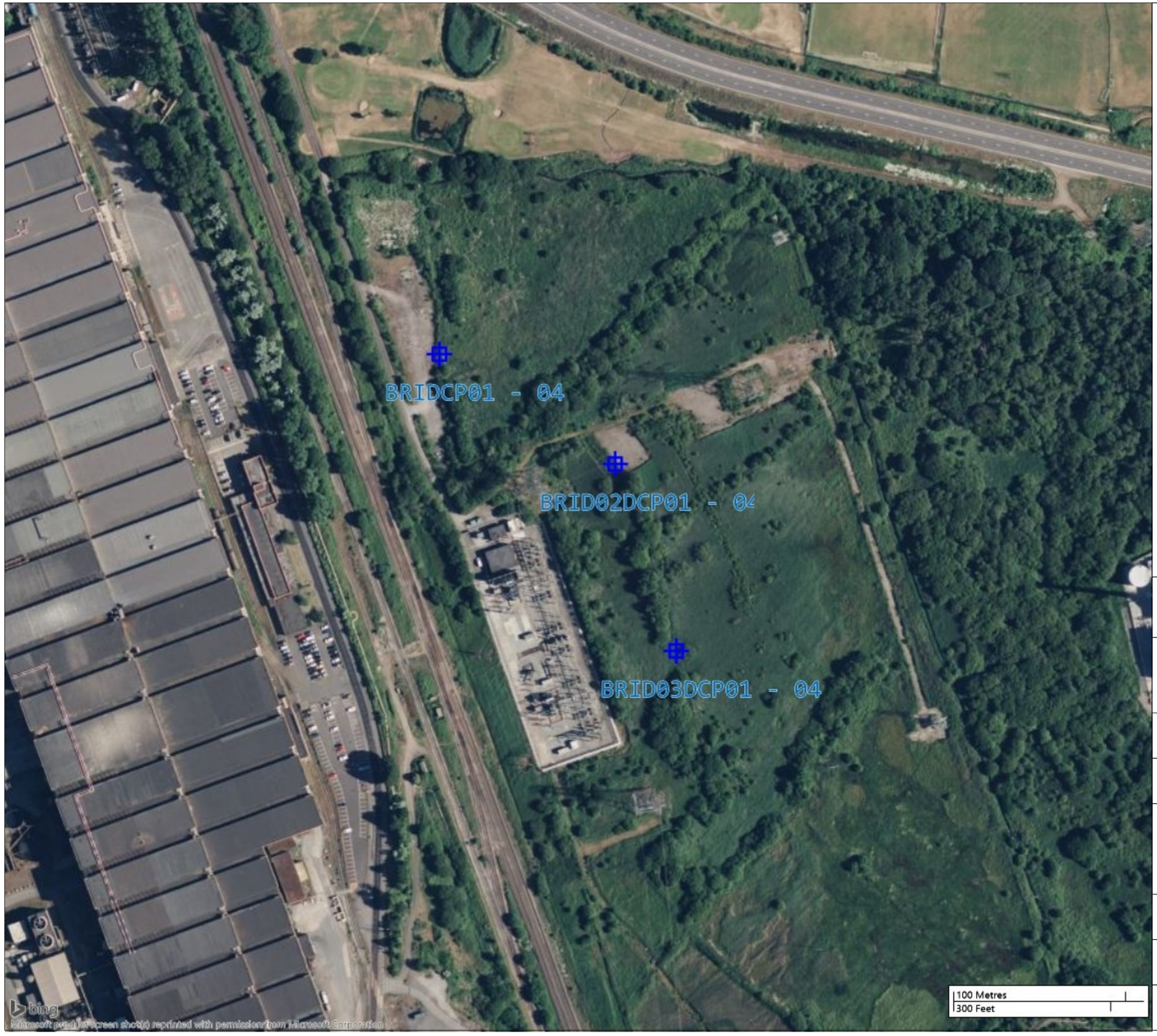
Engineer:
Baker Hicks

Client:
National Grid

Project:
National Grid - 101677 Margam TATA Steel Connection

Drawing Title:
Exploratory Hole Location Plan

Scale:	Date:
1:2000 at A3	**17/10/2024**
Project No.: **PC248745 - Phase 1**	**Exploratory Hole Location Plan**



N

Legend

Locations By Type - DCP

GEOTECHNICS

203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP

Phone: 024 7669 4664
Email: mail@geotechnics.co.uk
www.geotechnics.co.uk

Engineer:
Baker Hicks

Client:
National Grid

Project:
National Grid - 101677 Margam TATA Steel Connection

Drawing Title:
Exploratory Hole Location Plan

Scale:	Date:
1:2200 at A3	**17/10/2024**

Project No.:	
PC248745 - Phase 1	**Exploratory Hole Location Plan**

Appendix D General Site Arrangement Drawing

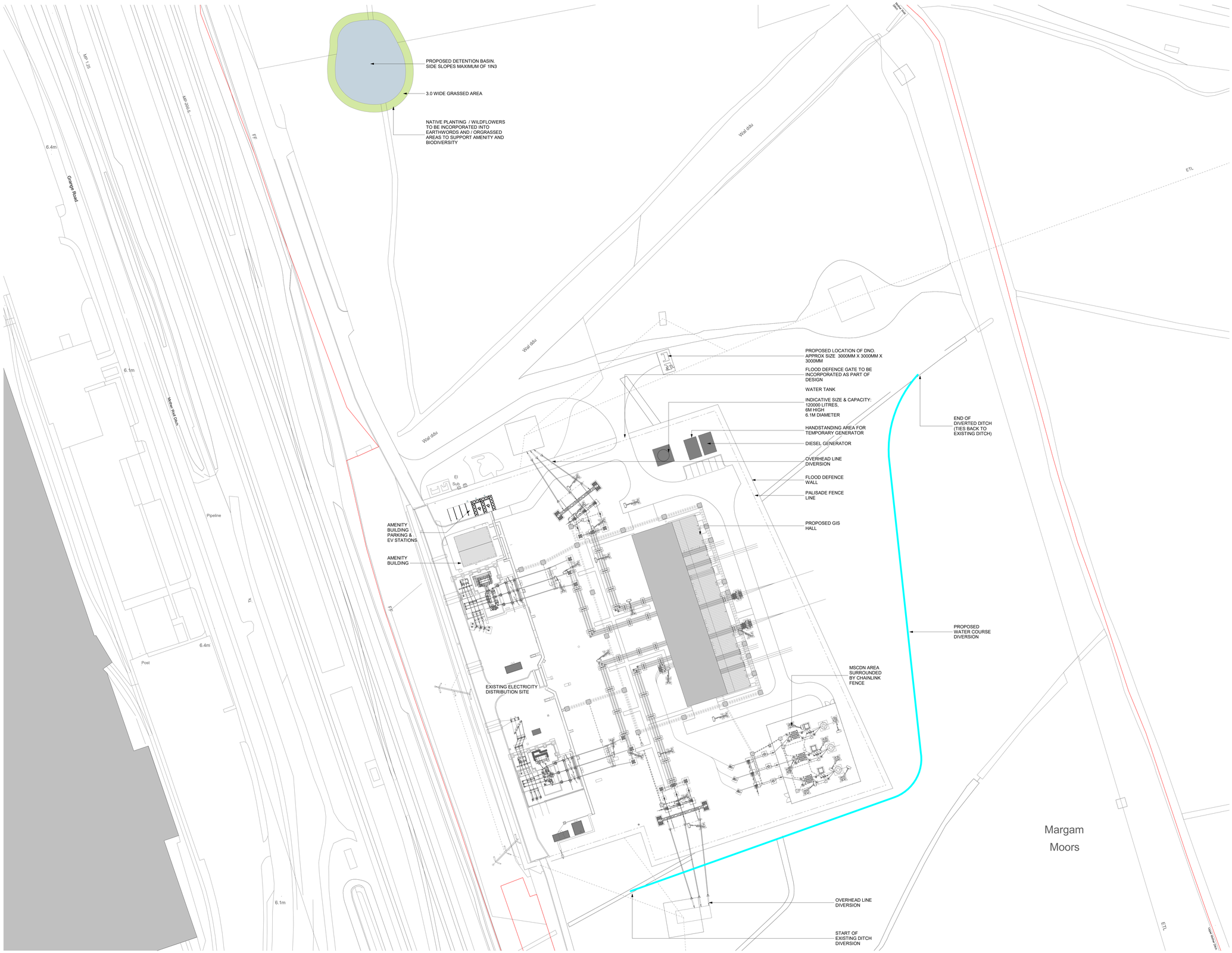
Flood Consequence Assessment

Proposed extension of the Margam Substation

BakerHicks Limited

SLR Project No.: 402.065363.00001

26 August 2025



1 Margam Site Plan - Proposed
Scale: 1 : 500

SCALE 1:500 (5 0 5 10 15 20 25 m)

For Planning

GENERAL NOTES

ALL BAKERHICKS DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE GENERAL NOTES DRAWINGS, THE RELEVANT BAKERHICKS SPECIFICATIONS AND ALL RELEVANT ARCHITECTS AND SERVICE ENGINEER'S DRAWINGS AND SPECIFICATION.

ALL LEVELS ARE IN METRES ABOVE ORDINANCE DATUM.

ALL DIMENSIONS ARE IN MILLIMETRES (U.N.O)

DO NOT SCALE ANY ENGINEERING DRAWINGS OR DIGITAL DATA. IF IN DOUBT ASK. WORK TO FIGURED DIMENSIONS ONLY. ANY DISCREPANCIES IN DIMENSIONS ARE TO BE REFERRED TO ENGINEER BEFORE WORK IS PUT TO HAND.

THE CONTRACTOR MUST ADVISE THE ARCHITECT AND ENGINEER OF ANY DISCREPANCIES BETWEEN THE CONTRACT DRAWINGS AND/OR SITE CONDITIONS / DIMENSIONS AT THE EARLIEST POSSIBLE OPPORTUNITY.

REVISION NOTES ARE FOR GUIDANCE ONLY. FOR SPECIFIC DETAILS, REFER TO CLOUDED AREA ON DRAWINGS FOR MOST RECENT AMENDMENTS.

ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE BY THE CONTRACTOR OR HIS SUBCONTRACTOR PRIOR TO PREPARING ANY WORKING DRAWINGS OR COMMENCING ON SITE.

ALL WORK HAS TO BE CARRIED OUT WITH THE REQUIREMENTS OF THE RELEVANT STATUTORY AUTHORITIES AND REGULATIONS.

ALL METHOD STATEMENTS SHOULD BE SUBMITTED TO THE ARCHITECT / CDM PRINCIPAL DESIGNER AND ENGINEER FOR REVIEW AT LEAST TWO WEEKS BEFORE CARRYING OUT THE SAID WORKS.

ALL PROPRIETARY PRODUCTS TO BE AS SPECIFIED OR EQUAL APPROVED.



KEYPLAN

SITE KEY

SITE BOUNDARY

SITE AREA: (154648.052 m2) (15.46 Hectares) (38.20 Acres)

BUILDINGS

PROPOSED WATERCOURSE DIVERSION

NOTE:

DRAWING TO BE PRINTED IN COLOUR

REFER TO PEAT MANAGEMENT STRATEGY FOR AREAS OF PEAT BURIAL LOCATIONS

P05	S3 For Review and Comment: Planning drawings updated following feedback with NPT on 24/07/25	MY	OTr / PC	29/07/25
P04	S3 - For Review & Comment. Updated Proposed Site Layout following Planning Consultant Feedback	OTr	OT/RC	30/06/25
P03	Issued for planning, comments incorporated following client feedback	GP	OTr / RC	24/04/25
P02	Issued For Planning	DSB	OTr / RW	10/02/25
P01	First Issue	DSB	RW / JK	03/02/25
Rev.	Description	Cre'd	Chk'd / Appr'd	Date

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
101677		MARGAM

Scheme Name: Margam Substation

Document Title: Margam GIS Hall - Proposed Site Plan

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
DSB	30/01/25	RW	30/01/25	JK	30/01/25

Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
	DWG	1 : 500	A0		P05

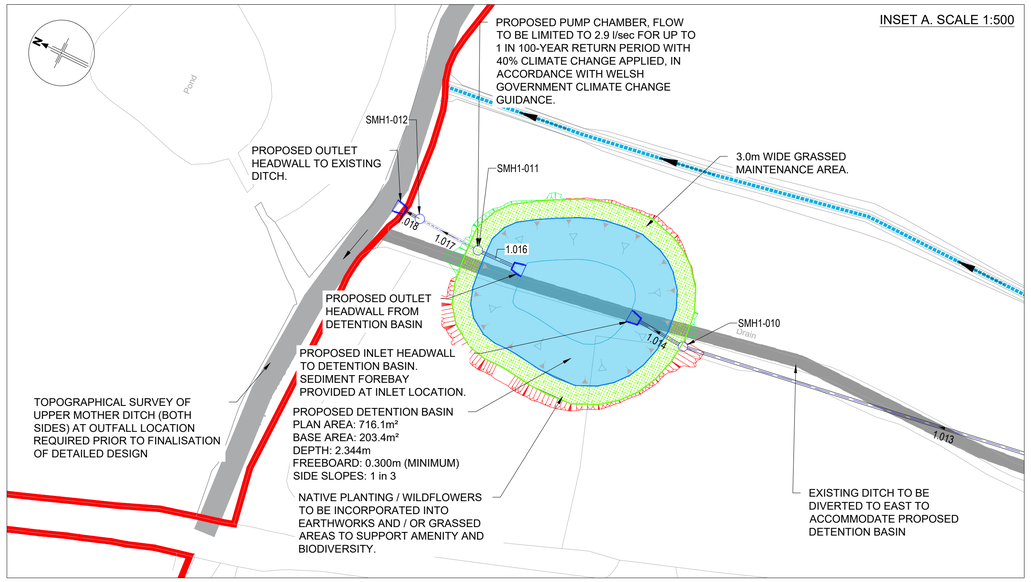
National Grid Document Number: 13_LOR_0066

MARPT-BHK-01-ZZ-DG-A-130023

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INSET A. SCALE 1:500



ASSOCIATED DRAWINGS:

MARPT-BHK-01-ZZ-SH-C-081010 - 08_LOR_0001 - MARGAM DRAINAGE SCHEDULE SHEET 01 OF 01
~~MARPT-BHK-01-ZZ-DG-C-181009 - 18_LOR_0206 - MARGAM DRAINAGE LAYOUT SHEET 01 OF 01~~
MARPT-BHK-01-ZZ-DG-C-181022 - 18_LOR_0207 - MARGAM DRAINAGE CONSTRUCTION DETAILS SHEET 01 OF 02
MARPT-BHK-01-ZZ-DG-C-181023 - 18_LOR_0208 - MARGAM DRAINAGE CONSTRUCTION DETAILS SHEET 02 OF 02
MARPT-BHK-01-ZZ-DG-C-181025 - 18_LOR_0210 - MARGAM DRAINAGE CESSPOOL DETAILS SHEET 01 OF 01
MARPT-BHK-01-ZZ-DG-C-181026 - 18_LOR_0211 - MARGAM DRAINAGE ATTENUATION DETAILS SHEET 01 OF 01

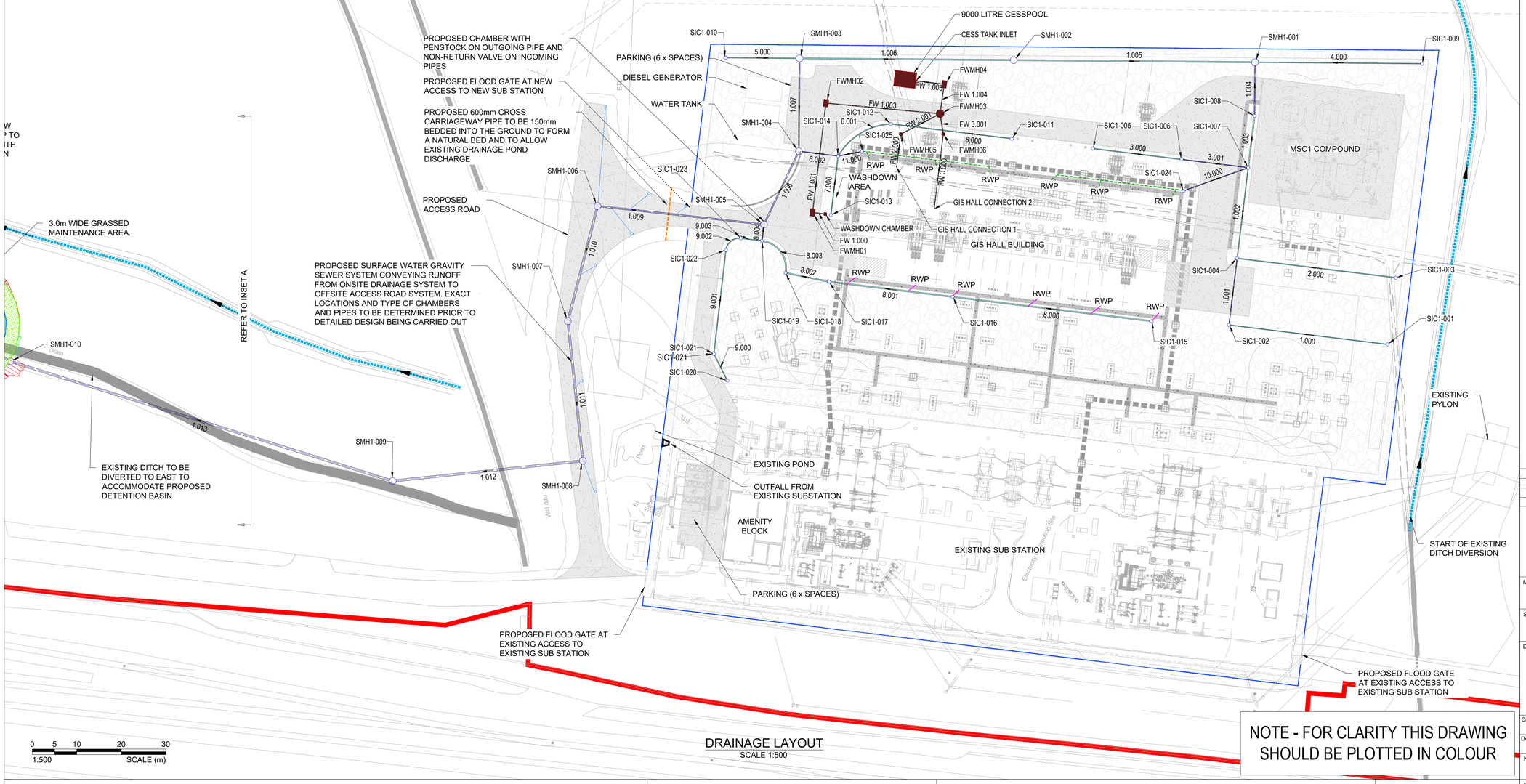
SPECIFICATIONS:

1. DRAINAGE WORKS TO BE IN ACCORDANCE WITH:-
   - NGTS 2.10.01 - OIL CONTAINMENT (ISSUE 2 - DECEMBER 2020)
   - NGTS 2.10.05 - COVERS, DUCTS & TRENCHES (ISSUE 1 - APRIL 2017)
   - NGTS 2.10.09 - DRAINAGE (ISSUE 1 - APRIL 2017)
   - NGTS 3.10.02 - MATERIALS (ISSUE 2 - APRIL 2017)
   - NGTS 3.10.03 - EXCAVATE, BACKFILL AND RESTORE (ISSUE 2 - APRIL 2017)
   - NGTS 3.10.05 - PIPELINES (ISSUE 2 - APRIL 2017)

LAING O'ROURKE

PRELIMINARY

WATERCOURSE DIVERSION INDICATIVE. FINAL LOCATION TO BE CONSIDERATE OF FUTURE WORKS TO AVOID ITS PROPOSED EXTENTS. FOR DETAILS REFER TO MARPT-BHK-01-ZZ-DG-C-181601.



0 5 10 20 30
1:500 SCALE (m)

DRAINAGE LAYOUT
SCALE 1:500

NOTE - FOR CLARITY THIS DRAWING SHOULD BE PLOTTED IN COLOUR

Health & Safety
CDM regulations 2015

Significant risks associated with this drawing are identified below and, where applicable, at specific locations on the drawing.
Refer to the CDM Regulation 9 Risk Register (30004595-BHK-XX-XX-RE-HS-0012) for full details.

1. DO NOT CONSTRUCT FROM THIS DRAWING - FOR PLANNING ONLY
2. WORKS WITHIN CLOSE PROXIMITY OF LIVE OHL, SUFFICIENT CLEARANCES TO BE PROVIDED AT ALL TIMES.
3. WORKS TO BE CONSIDERATE OF PRESENCE OF GROUND CONTAMINATION.
4. WORKS TO BE CONSIDERATE OF PEAT PRESENCE/POOR GROUND CONDITIONS.
5. WORKING IN PROXIMITY OF OPEN WATER BODIES, CARE BE TAKEN DURING PLANT MANOUVRES.
6. DEEP EXCAVATIONS REQUIRED FOR CESSPOOL & DETENTION BASI, EXCAVATIONS TO BE OPEN FOR MINIMUM TIME PRACTICABLE AND PROTECTED DURING WORKS.
7. HIGH GORUND WATER LEVELS ON SITE. SUITABLE DEWATERING TO BE IN PLACE DURING INSTALLATION OF SYSTEMS.

GENERAL NOTES:

1. DO NOT SCALE FROM THIS DRAWING.
2. UNLESS NOTED OTHERWISE, LEVELS (AOD) AND CO-ORDINATES (RELATIVE TO ORDINANCE DATUM) ARE IN METERS
3. DESIGN IN ACCORDANCE WITH:
   - 3.1. NATIONAL GRID TECHNICAL SPECIFICATION (NGTS) 2.10.09 SITE DRAINAGE (ISSUE 1).
   - 3.2. NATIONAL GRID TECHNICAL SPECIFICATION (NGTS) 2.10.01 OIL CONTAINMENT (ISSUE 2)
4. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DETAILS, DRAWINGS AND SPECIFICATIONS.
5. ALL WORK SHALL BE CARRIED OUT WITH THE REQUIREMENTS OF THE RELEVANT STATUTORY AUTHORITIES AND REGULATORS.
6. ALL PIPES SHALL BE LAID WITH SOFFITS LEVEL UNLESS NOTED OTHERWISE.

KEY:

- PROPOSED SURFACE WATER PIPE
- PROPOSED SURFACE WATER RISING MAIN
- PROPOSED FILTER DRAIN
- PROPOSED FOUL DRAINAGE PIPE
- PROPOSED FRENCH DRAIN (GRANULAR MATERIAL)
- PROPOSED RAINWATER PIPE CONNECTION
- PROPOSED CROSS CARRIAGEWAY PIPE
- PROPOSED GULLY AND CONNECTION
- PROPOSED SURFACE WATER CHAMBER/INSPECTION CHAMBER
- PROPOSED HEADWALL
- PROPOSED FOUL WATER CHAMBER
- PROPOSED CESSPOOL TANK
- EXISTING HEADWALL INLET / OUTLET
- EXISTING WATERCOURSE
- PROPOSED WATERCOURSE DIVERSION
- PROPOSED DETENTION BASIN
- PROPOSED 3M WIDE MAINTENANCE AREA TO DETENTION BASIN
- PROPOSED FLOOD DEFENCE WALL
- PROPOSED IMPERMEABLE ROAD AREA
- PROPOSED CONCRETE SLAB FOOTPATH AREA
- PROPOSED GRANULAR STONE PLATFORM
- PROPOSED CABLE TROUGH
- SITE BOUNDARY
- PROPOSED EARTHWORKS CUT SECTION
- PROPOSED EARTHWORKS FILL SECTION

Rev	Description	Cre'd	Chk'd / App'd	Date
P03	S3 - FOR REVIEW AND COMMENT	IL	CE/RC	21.08.25
P02	S3 - FOR REVIEW AND COMMENT	KA	CE/JD	17.06.25
P01	S3 - FOR REVIEW AND COMMENT	KA	CE/JD	30.05.25

nationalgrid

National Grid Electricity Transmission plc, Warwick Technology Park, Gallows Hill, Warwick. CV34 6DA

Master Scheme No:	Sub-Scheme No:	Site:
101677		MARGAM / PORT TALBOT

Scheme Name: MARGAM CONNECTION

Document Title:

MARGAM
DRAINAGE LAYOUT
SHEET 01 OF 01

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
KA	30.05.25	CE	30.05.25	JD	30.05.25
Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
	DWG	1:500	A1	01 OF 01	P03

National Grid Document Number: 18_LOR_0206

Document Number: MARPT-BHK-01-ZZ-DG-C- 181009

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Appendix E SMP2 Policy 8 Sker to Swanseadocks Map

Flood Consequence Assessment

Proposed extension of the Margam Substation

BakerHicks Limited

SLR Project No.: 402.065363.00001

26 August 2025

PU 8.3

PU 8.2

PU 8.1

This map provides a summary of the SMP2 policies which are likely to attract public funding. For further details, including recommendations with respect to private defences please refer to the SMP2 policy statement.

Swansea and Carmarthen Bay Coastal Engineering Group
Lavernock Point to St Ann's Head SMP Review
Preferred policies: Sker Point to Swansea Docks Map 1 of 2

0 0.25 0.5 1 1.5 2 Kilometres

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Job Number: DCSSMP
Drawn By: JSM

Legend

- Policy unit extents
- Policy units
- Policy scenario areas
- Scheduled Monuments
- International Nature Conservation Designations
- National Nature Conservation Designations
- Area currently at risk from flooding during the extreme flood event, 0.1% annual probability of occurrence (1 in 1000yr return period).

It is predicted that the probability and extent of flood risk will increase over time as a result of climate change. However, detailed assessments are outside the scope of the SMP.

Shoreline management policies

- No active intervention
- Managed realignment
- Hold the line
- Advance the line

Boxes showing cliff erosion estimates represent predicted erosion from the shoreline position in year 0. They are only shown where there is a policy of NAI and cliff erosion is the main risk.



Policy lines are not indicative of current shoreline position.

Lines represent the preferred shoreline management policy for each location (most landward line is the first epoch).

Up to 20 years
20 to 50 years
50 to 100 years

Halcrow

Cyngor Sir Gâr Carmarthenshire County Council

City and County of Swansea Dinas a Sir Abertawe

Neath Port Talbot Castell-nedd Port Talbot

Bridgend County Borough Council

Vale of Glamorgan Bro Morgannwg

Llywodraeth Cynulliad Cymru Welsh Assembly Government

Asiantaeth yr Amgylchedd Cymru Environment Agency Wales

Cyngor Cefn Gwlad Cymru Countryside Council for Wales

Appendix F NRW Correspondence

Flood Consequence Assessment

Proposed extension of the Margam Substation

BakerHicks Limited

SLR Project No.: 402.065363.00001

26 August 2025

Subject: RE: [EXTERNAL] RE: FCA Clarification
Sent: 29/05/2025, 09:15:40
From: Luke Jones<Luke.Jones@nationalgrid.com>
To: Elsby, Callum (BakerHicks); Sehat Tabatabaei, Ali; Jones, Robert; Collins, David; Hutchings, Elliot
Cc: Donnellan, John (BakerHicks); Cross, Robin (BakerHicks); Duong, Cindy (BakerHicks); Bainbridge, Paul (BakerHicks); Spaul, James (BakerHicks); Evriviades, Helen; Robinson, Michelle

---

Hi Callum.

Thank you for the response.

I have chased NPT again for a response and my understanding is they are trying to arrange a meeting with Welsh Government regarding the issue.

As soon as I hear anything further I will let you know.

We did contact NRW on the point as well and they noted the below:

Thank you for your query regarding the vulnerability category of the proposed Margam Substation extension, given the recent publication of the updated Technical Advice Note (TAN)15 Development, flooding and coastal erosion by the Welsh Government.

We advise that the guidance in paragraph 9.5 of the TAN15 states *"The list in Figure 4 is not exhaustive therefore decision makers should apply professional judgement when considering development categories not explicitly listed based on the risks posed to lives and livelihoods in the event of a flood. However, the list is the basis for the type of development captured by the Notification Direction."* We therefore advise there is no role for Natural Resources Wales (NRW) to advise on this in this instance. In addition, TAN15 also advises that justification (which arguably includes vulnerability classification) is a matter for the decision maker (please see paragraph 14.3 in TAN15).

In light of this, we advise you consult the opinion of the decision maker, which in this case is Neath Port Talbot Council. Should the decision maker have any queries, they should be directed to the Welsh Government.

If you need anything further please let me know.

Thanks

Luke Jones
Consents Officer
Strategic Infrastructure, Electricity Transmission
national**grid**

M +44 (0)7745645377
E luke.jones@nationalgrid.com

Advance notice of holiday:

From: Elsby, Callum (BakerHicks) <Callum.Elsby@bakerhicks.com>
Sent: 29 May 2025 07:44
To: Luke Jones <Luke.Jones@nationalgrid.com>; Sehat Tabatabaei, Ali <asehat@laingorourke.com>; Jones, Robert <R.Jones@laingorourke.com>; Collins, David <dacollins@laingorourke.com>; Hutchings, Elliot <elliothutchings@laingorourke.com>
Cc: Donnellan, John (BakerHicks) <John.Donnellan@bakerhicks.com>; Cross, Robin (BakerHicks) <Robin.Cross@bakerhicks.com>; Duong, Cindy (BakerHicks) <Cindy.Duong@bakerhicks.com>; Bainbridge, Paul (BakerHicks) <Paul.Bainbridge@bakerhicks.com>; Spaul, James (BakerHicks) <james.spaul@bakerhicks.com>
Subject: RE: [EXTERNAL] RE: FCA Clarification

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe. If you suspect this email is malicious, please use the 'Report Phish' button.

Good morning Luke,

SLR are happy to proceed on the basis identified within your email.
They are capturing your correspondence as an appendix in the report to aid in the justification in regards to site vulnerability classification.
I have also mentioned to them, further to your discussion with npt, it has been raised to Welsh government.

Ideally, it would be better to use NPT's response, but I assume we won't receive one anytime soon.

Kind regards,

Callum Elsby
Engineer - Civil & Structural

+44 7350 434 585
Callum.Elsby@bakerhicks.com
LinkedIn | Twitter | About Us

BakerHicks.

At BakerHicks, we value and encourage working flexibly. Whilst you may receive emails from colleagues outside of normal office hours, please read or respond at a time that works for you.

From: Luke Jones <Luke.Jones@nationalgrid.com>
Sent: 28 May 2025 18:35
To: Elsby, Callum (BakerHicks) <Callum.Elsby@bakerhicks.com>; Sehat Tabatabaei, Ali <asehat@laingorourke.com>; Jones, Robert <R.Jones@laingorourke.com>; Collins, David <dacollins@laingorourke.com>; Hutchings, Elliot <elliothutchings@laingorourke.com>
Cc: Donnellan, John (BakerHicks) <John.Donnellan@bakerhicks.com>; Cross, Robin (BakerHicks) <Robin.Cross@bakerhicks.com>; Duong, Cindy (BakerHicks) <Cindy.Duong@bakerhicks.com>; Bainbridge, Paul (BakerHicks) <Paul.Bainbridge@bakerhicks.com>; Spaul, James (BakerHicks) <james.spaul@bakerhicks.com>
Subject: RE: [EXTERNAL] RE: FCA Clarification

Hi Callum,

Could you confirm if the email I have shared is sufficient?

Thanks,

Luke Jones
Consents Officer
Strategic Infrastructure, Electricity Transmission
national**grid**

M +44 (0)7745645377
E luke.jones@nationalgrid.com

Advance notice of holiday:

From: Elsby, Callum (BakerHicks) <Callum.Elsby@bakerhicks.com>
Sent: 28 May 2025 17:16
To: Luke Jones <Luke.Jones@nationalgrid.com>; Sehat Tabatabaei, Ali <asehat@laingorourke.com>; Jones, Robert <R.Jones@laingorourke.com>; Collins, David <dacollins@laingorourke.com>; Hutchings, Elliot <elliothutchings@laingorourke.com>
Cc: Donnellan, John (BakerHicks) <John.Donnellan@bakerhicks.com>; Cross, Robin (BakerHicks) <Robin.Cross@bakerhicks.com>; Duong, Cindy (BakerHicks) <Cindy.Duong@bakerhicks.com>; Bainbridge, Paul (BakerHicks) <Paul.Bainbridge@bakerhicks.com>; Spaul, James (BakerHicks) <james.spaul@bakerhicks.com>
Subject: RE: [EXTERNAL] RE: FCA Clarification

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Hello Luke,

See attached from SLR to provide input into and review.
I have sent them your discussion with npt for information in which they are reviewing FCA in accordance with.

Kind regards,

Callum Elsby
Engineer - Civil & Structural

+44 (0)161 873 2500
Callum.Elsby@bakerhicks.com

From: Luke Jones <Luke.Jones@nationalgrid.com>
Sent: 28 May 2025 16:57
To: Elsby, Callum (BakerHicks) <Callum.Elsby@bakerhicks.com>; Sehat Tabatabaei, Ali <asehat@laingorourke.com>; Jones, Robert <R.Jones@laingorourke.com>; Collins, David <dacollins@laingorourke.com>; Hutchings, Elliot <elliothutchings@laingorourke.com>
Cc: Donnellan, John (BakerHicks) <John.Donnellan@bakerhicks.com>; Cross, Robin (BakerHicks) <Robin.Cross@bakerhicks.com>; Duong, Cindy (BakerHicks) <Cindy.Duong@bakerhicks.com>; Bainbridge, Paul (BakerHicks) <Paul.Bainbridge@bakerhicks.com>; Spaul, James (BakerHicks) <james.spaul@bakerhicks.com>
Subject: RE: [EXTERNAL] RE: FCA Clarification

Hi Callum,

As discussed if you could send over the relevant section of the TAN that needs to be addressed, I am happy to provide information on this.

I am also happy to have a call to discuss if that would be easier.

Thanks,

Luke Jones
Consents Officer
Strategic Infrastructure, Electricity Transmission
national**grid**

M +44 (0)7745645377
E luke.jones@nationalgrid.com

Advance notice of holiday:

From: Elsby, Callum (BakerHicks) <Callum.Elsby@bakerhicks.com>
Sent: 28 May 2025 11:29
To: Luke Jones <Luke.Jones@nationalgrid.com>; Sehat Tabatabaei, Ali <asehat@laingorourke.com>; Jones, Robert <R.Jones@laingorourke.com>; Collins, David <dacollins@laingorourke.com>; Hutchings, Elliot <elliothutchings@laingorourke.com>
Cc: Donnellan, John (BakerHicks) <John.Donnellan@bakerhicks.com>; Cross, Robin (BakerHicks) <Robin.Cross@bakerhicks.com>; Duong, Cindy (BakerHicks) <Cindy.Duong@bakerhicks.com>; Bainbridge, Paul (BakerHicks) <Paul.Bainbridge@bakerhicks.com>; Spaul, James (BakerHicks) <james.spaul@bakerhicks.com>
Subject: RE: [EXTERNAL] RE: FCA Clarification
Importance: High

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe. If you suspect this email is malicious, please use the 'Report Phish' button.

Good morning Luke,

A progress update and a few queries from FCA & hydrology report.

- Hydrology report, is with myself BHK to review today. I am hoping to be issuing this week to Asite with appropriate reference. This can also be shared alongside with Stantec in regards to the ecological assessments.

Appendix G Coastal Extreme Sea Level Calculations

Flood Consequence Assessment

Proposed extension of the Margam Substation

BakerHicks Limited

SLR Project No.: 402.065363.00001

26 August 2025

PROJECTED UPLIFT SUMMARY				
	mm to m conversion			1000
CC Allowance Type	Higher Central (m)	Upper End (m)		
	0.51	0.66		

Extreme Sea Level Calculations				
	PPG Table higher central uplift (mm)	Calculated Outcome (mm)	PPG Table upper end uplift (mm)	Calculated Outcome (mm)
2017	N/A	0	N/A	0
2018	5.8	5.8	7	7
2019	5.8	11.6	7	14
2020	5.8	17.4	7	21
2021	5.8	23.2	7	28
2022	5.8	29	7	35
2023	5.8	34.8	7	42
2024	5.8	40.6	7	49
2025	5.8	46.4	7	56
2026	5.8	52.2	7	63
2027	5.8	58	7	70
2028	5.8	63.8	7	77
2029	5.8	69.6	7	84
2030	5.8	75.4	7	91
2031	5.8	81.2	7	98
2032	5.8	87	7	105
2033	5.8	92.8	7	112
2034	5.8	98.6	7	119
2035	5.8	104.4	7	126
2036	8.8	113.2	11.4	137.4
2037	8.8	122	11.4	148.8
2038	8.8	130.8	11.4	160.2
2039	8.8	139.6	11.4	171.6
2040	8.8	148.4	11.4	183
2041	8.8	157.2	11.4	194.4
2042	8.8	166	11.4	205.8
2043	8.8	174.8	11.4	217.2
2044	8.8	183.6	11.4	228.6
2045	8.8	192.4	11.4	240
2046	8.8	201.2	11.4	251.4
2047	8.8	210	11.4	262.8
2048	8.8	218.8	11.4	274.2
2049	8.8	227.6	11.4	285.6
2050	8.8	236.4	11.4	297
2051	8.8	245.2	11.4	308.4
2052	8.8	254	11.4	319.8
2053	8.8	262.8	11.4	331.2
2054	8.8	271.6	11.4	342.6

2055	8.8	280.4	11.4	354
2056	8.8	289.2	11.4	365.4
2057	8.8	298	11.4	376.8
2058	8.8	306.8	11.4	388.2
2059	8.8	315.6	11.4	399.6
2060	8.8	324.4	11.4	411
2061	8.8	333.2	11.4	422.4
2062	8.8	342	11.4	433.8
2063	8.8	350.8	11.4	445.2
2064	8.8	359.6	11.4	456.6
2065	8.8	368.4	11.4	468
2066	11.6	380	15.8	483.8
2067	11.6	391.6	15.8	499.6
2068	11.6	403.2	15.8	515.4

Appendix H Hydraulic Modelling Report

Flood Consequence Assessment

Proposed extension of the Margam Substation

BakerHicks Limited

SLR Project No.: 402.065363.00001

26 August 2025

Hydraulic Modelling Report

Margam Moors – Substation Extension

BakerHicks Limited

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Basis of Report

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Appendices

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Appendix C **Base Case Model Results**
Appendix D **Proposed Case Results**
Appendix E **Sensitivity Results**

Acronyms and Abbreviations

AEP	Annual Exceedance Probability
AOD	Above Ordnance Datum
CC	Climate Change
DEM	Digital Elevation Model
EA	Environment Agency
EAF	Electric Arc Furnace
FEH	Flood Estimation Handbook
FEH22	FEH's latest UK-wide statistical model for rainfall depth-duration-frequency estimation
FMC	Flood Map Challenge
FMfP	Flood Map for Planning
HPC	Heavily Parallelised Compute
LiDAR	Light Detection and Ranging
NPTBC	Neath and Port Talbot Borough Council
NGR	National Grid Reference
NRW	Natural Resources Wales
RCP	Reinforced Concrete Pipe (Culvert)
ReFH2	Latest version of the Revitalised Flood Hydrograph model.
SGS	Sub-Grid Sampling
WEM	Water and Environmental Management

1.0 Introduction

1.1 Background

SLR Consulting (SLR) has been appointed by BakerHicks Limited to complete hydraulic modelling to inform the design of the proposed substation extension at Margam Moors. The Client seeks to appraise flood risk to land East of the Port Talbot TATA Steel manufactory (the "Site"), centred on National Grid Reference (NGR) SS 78575 86379.

It is proposed that an extension of the Margam Distribution Substation is constructed at the Site to facilitate additional electrical supply and distribution capacity to TATA Steel's new Electric Arc Furnace (EAF).

A Flood Consequence Assessment (FCA) was completed for the Site by SLR in January 2025. Analysis of the "*Margam_FMC_5_V1.0_2023.pdf*" completed by JBA was undertaken to obtain peak flood elevations at the Site for the design of flood mitigation.

The latest flood modelling undertaken for the Margam area was completed in 2023 by JBA Consulting. This modelling was commissioned by TATA Steel to update the Flood Map for Planning (FMfP) at Margam Moors. The modelled results were accepted by NRW and was integrated as part of the updated FMfP for Rivers and Sea. However, it was considered that the outputs of the model did not accurately represent flood risk at the Site and the M4 motorway 660m to the east.

The JBA modelling showed that the M4 flooded for the 1 in 2 Annual Exceedance Probability (50% AEP) from fluvial sources emanating from the Margam Duck Pond (previously known as Ty Du reservoir) and Nant Cwm Philip (previously called Ty Du watercourse), 1.6km east of the Site. After consultation with Neath and Port Talbot Borough Council (NPTBC) highways authority and the Welsh Government, it was verified that there are no records of flooding occurring on the M4 as represented by the model.

The JBA Flood Map Challenge (FMC) report acknowledged the persistent flooding from the Margam Duck Pond as a major uncertainty in the model. The report recommended that further amendments to the model should consider:

- The modelled storm duration of 6.5 hours for all inflow hydrographs, was identified as the recommended default ReFH2 duration for the downstream flow estimation point on at the Afon Cynffig;
- Revisions to the upstream extent of the Nant Cwm Philip upstream of the Duck Pond, and;
- Improvement of the 1D performance at the primary outflow for the Duck Pond.

1.2 Flood Map Challenge Objectives

NRW's FMfP show that the Site and much of the surrounding areas are within an area at risk of flooding with more than the 1% AEP from rivers in a given year, including the effects of climate change[1]. To best align the current understanding of flood risk in the local area, the objective of the hydraulic modelling seeks to:

1 Identify the most likely mechanism of fluvial flood risk to the Site occurring from the Nant Cwm Philip; and

[1] Natural Resources Wales (2024) Flood Map for Planning (Rivers) Available from: Natural Resources Wales / Flood map for planning / development advice map [Accessed: 03 February 2025].

2 Determine a design flood level at the Site for several AEP events with NRW's recommended allowances for climate change.

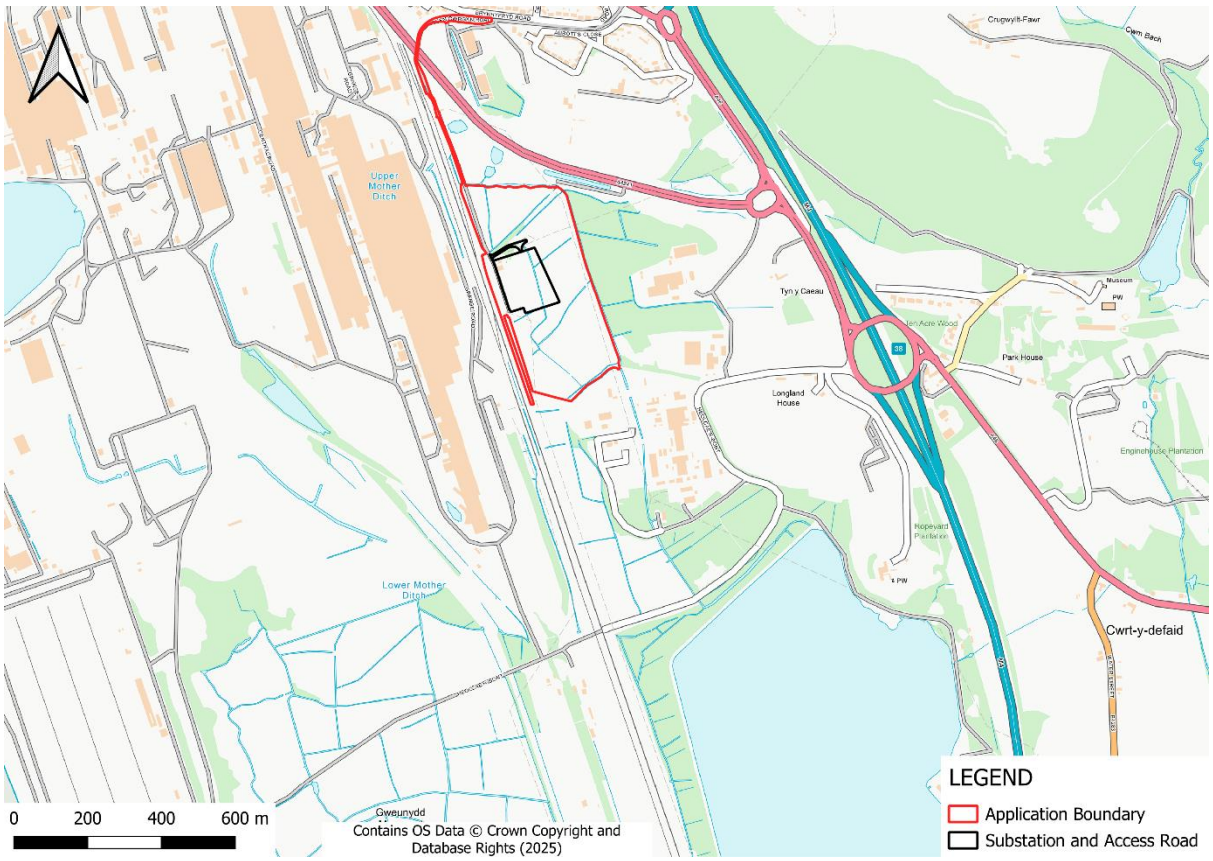
1.3 Site Location

The Site is located directly adjacent to the existing Margam Distribution Substation to the east and is centred on National Grid Reference (NGR) SS 78575 86379. The proposed extension to the substation extends to an area of 1.73ha.

The "Study Area" considered for the updated modelling comprises the area of land between the TATA Steel Facility and Margam Park 1.7km to the east of the Site.

The locality of the proposed extension is provided in Figure 1-1.

Figure 1-1: Site Location Plan



2.0 Hydrological Assessment

The hydraulic model update completed by JBA in 2023 reviewed the existing fluvial inflow hydrographs and updated them using the latest available software and the latest hydrometric data. The assessment was carried out for the catchments for the Nant Cwm Philip - headwaters to confluence with Kenfig and the Kenfig - headwaters to tidal[2]. The hydrological assessment was accepted by NRW.

However, NRW requested that the updated modelling investigate the inflow estimates upstream of the Margam Duck Pond (Nant Cwm Philip – headwaters) to verify if it has been over representing Q_{med} in the hydraulic model. Therefore, SLR undertook a revised hydrological assessment in accordance with the methods described in the latest NRW flood estimation guidance (GN008[3]).

The following hydrological assessment is a summary of the methodology and analysis provided in SLR's '*Margam Flood Estimation Report*'[4]. Input data, project files, and output data have been provided with the full flow estimation report.

2.1.1 Catchment Boundary Delineation

A distributed approach has been applied to the flow estimation for the Nant Cwm Philip and Afon Cynffig. This approach was selected in order to review the flood risk at specific catchment locations in further detail, such as Margam Duck Pond, as well as to maintain consistency with the previous JBA flow estimation for comparison purposes.

The Nant Cwm Philip and Afon Cynffig catchments have been split into five sub-catchments being defined based on local features. Two sub-catchments were delineated for the Nant Cwm Philip, and three sub-catchments were delineated for the Afon Cynffig.

A lumped catchment comprising each of the five sub-catchments was also delineated for use in determining the critical storm duration at the Site. The five sub-catchments and their outlet locations are shown in Figure 2-1, and the lumped catchment for critical duration testing is shown in Figure 2-2.

As part of the investigation of the Site, it was noted that a catchment size of approximately 3 km² contributing directing to the site was not accounted for in the fluvial assessment completed by JBA. As such, a direct rainfall area including the site itself was delineated for use in the updated model, and should be considered for all design (Figure 2-3).

Due to the location of the Site in the low-lying areas between the TATA Steel site and Margam Park, it is considered imperative that the 3 km² catchment be considered in calculating flood risk and design levels. This is due to low-lying areas typically being volume sensitive.

[2] Natural Resources Wales (2025) DataMapWales – Water Framework Directive (WFD) River Waterbody Catchments Cycle 3. Available from: New map | DataMapWales [Accessed: 19 February 2025].

[3] Natural Resources Wales (2024) Flood estimation – technical guidance GN 008. Available on request from NRW.

[4] SLR Consulting Ltd (2025) Margam Flood Estimation Report, '20250513_Margam_Flood_Estimation_Report.docx'

Figure 2-1 : Catchment Delineation

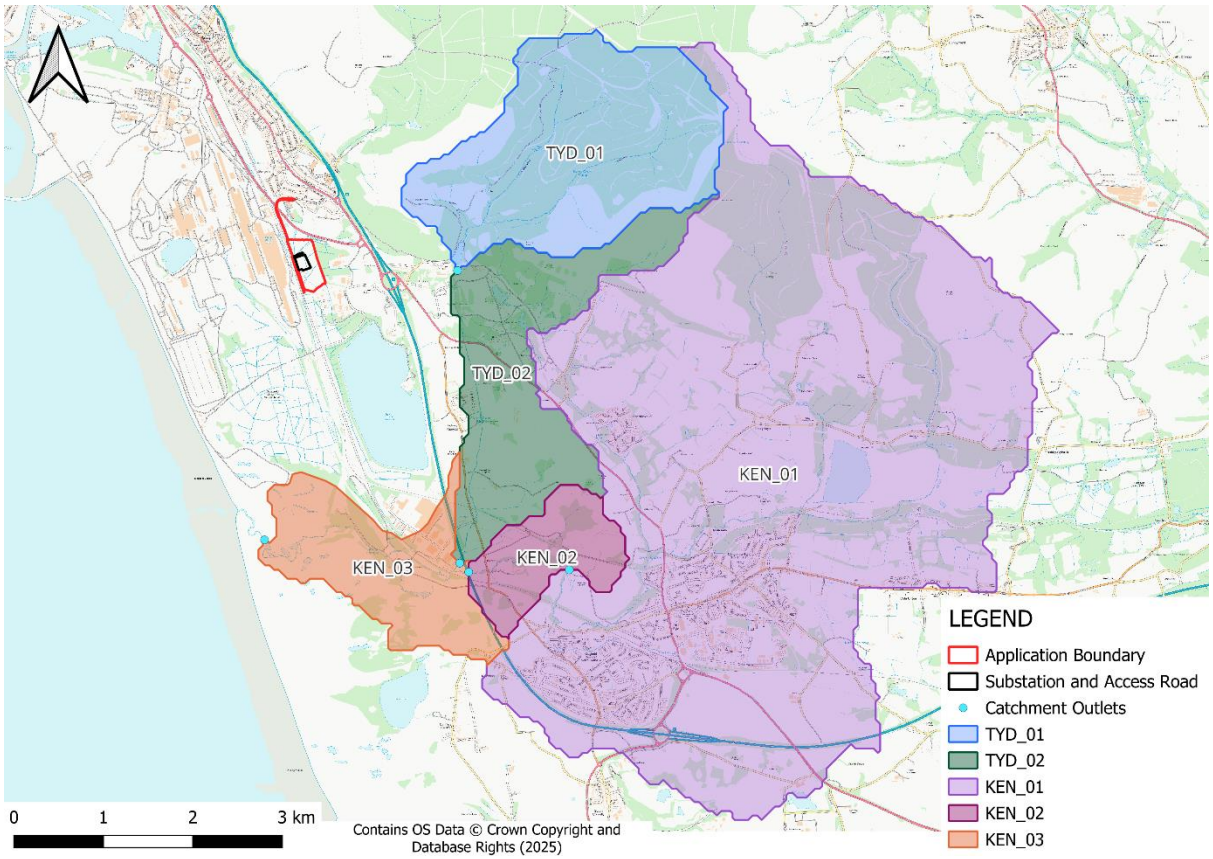


Figure 2-2 : Lumped Catchment for Critical Duration Testing

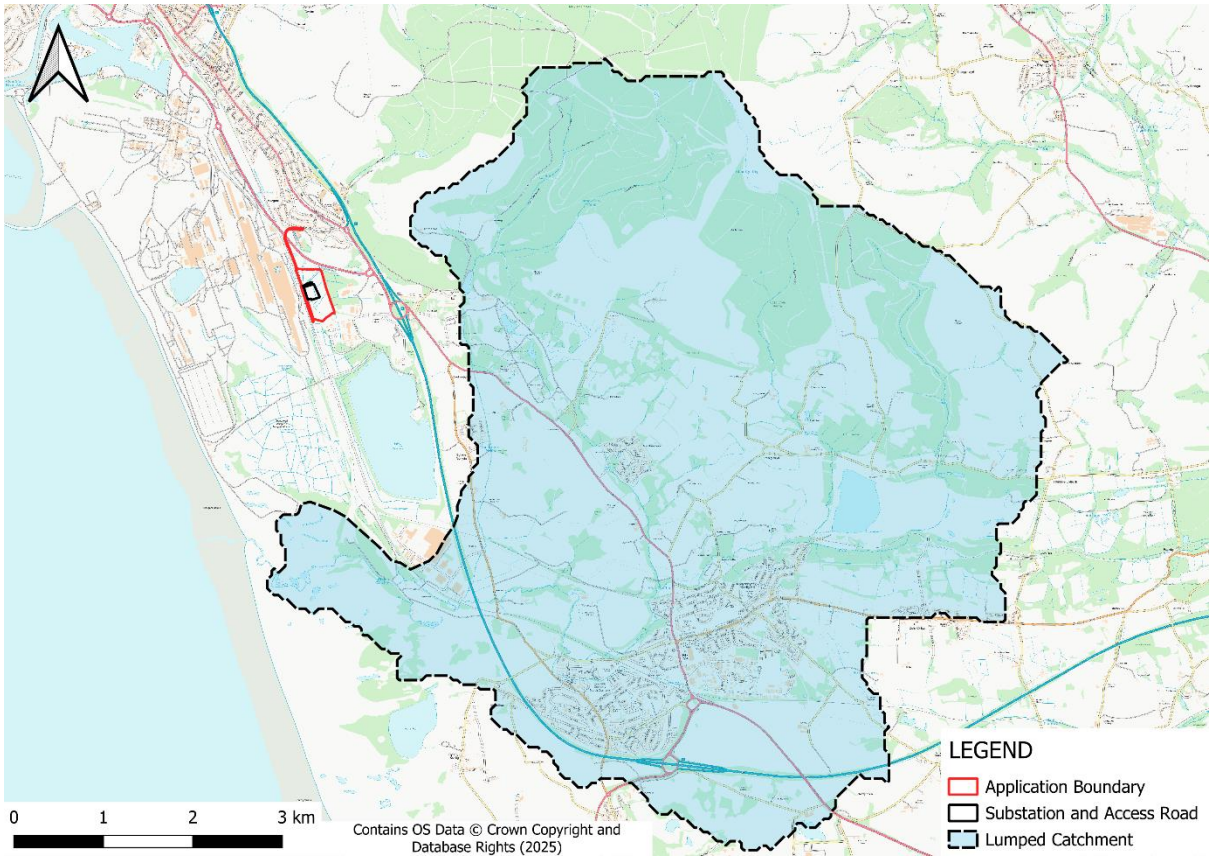
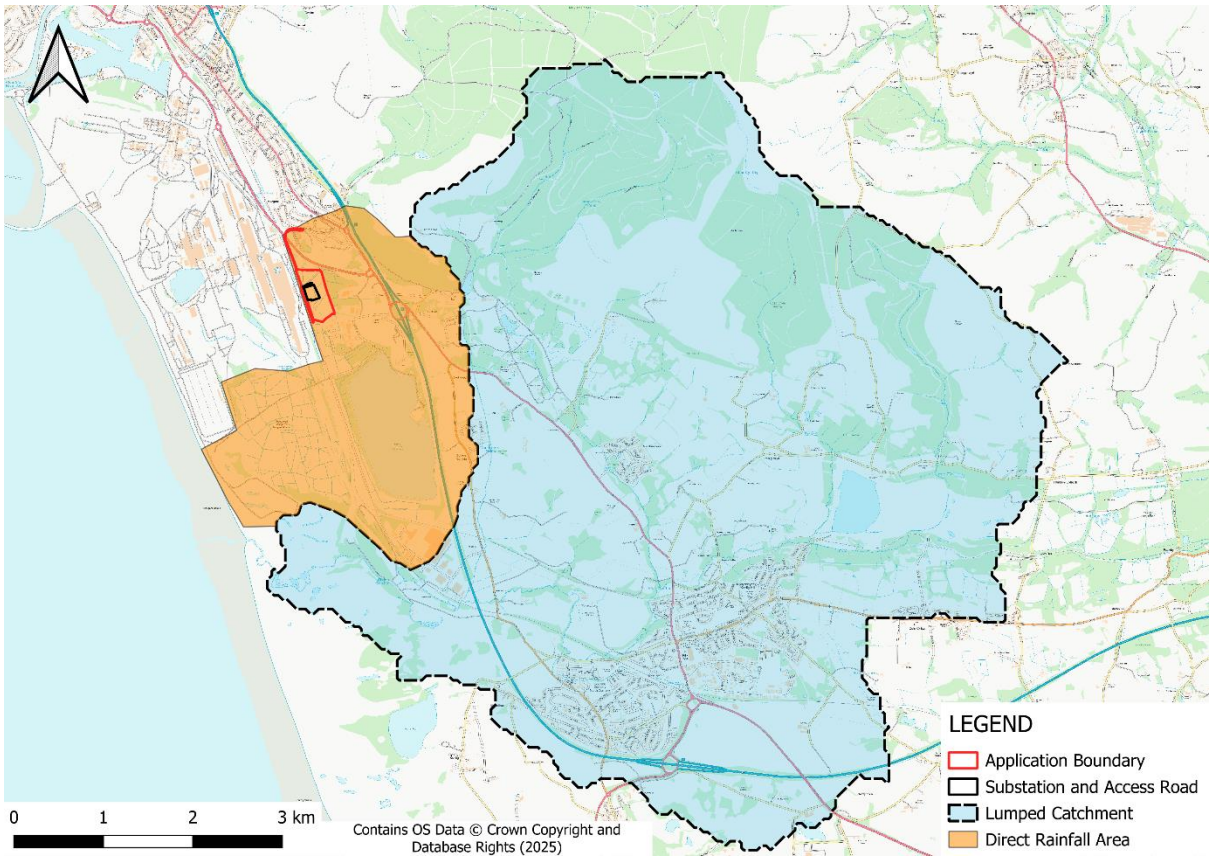


Figure 2-3 : Direct Rainfall Catchment for Sensitivity Testing



2.1.2 Catchment Descriptors

The details of the subject sites and the final catchment descriptors applied are outlined in Table 2-1 and Table 2-2 respectively. FARL, BFIHOST19, DPLBAR, DPSBAR, and URBEXT2000 values were amended where required and are marked in red where amended from the default FEH values. The reasoning and methodology for the changes are described in the Margam Flood Estimation Report.

Table 2-1 : Summary of Subject Sites

Site code	Type of estimate: lumped (L) or sub-catchment (S)	Water-course	Site name / description	Outlet Easting	Outlet Northing	AREA on FEH Web Service (km^2)	Revised AREA (if altered) (km^2)
TYD_01	S	Nant Cwm Philip	Nant Cwm Philip to Margam Duck Pond (downstream)	280300	186300	6.06	N/A
TYD_02	S	Nant Cwm Philip	Confluence with Afon Cynffig (excludes Margam	280350	183000	10.45	4.39

Site code	Type of estimate: lumped (L) or sub-catchment (S)	Water-course	Site name / description	Outlet Easting	Outlet Northing	AREA on FEH Web Service (km^2)	Revised AREA (if altered) (km^2)
			Duck Pond upstream)				
KEN_01	S	Afon Cynffig	Upstream model extent	281550	182900	29.14	N/A
KEN_02	S	Afon Cynffig	Confluence with Nant Cwm Philip	280450	182950	30.73	1.59
KEN_03	S	Afon Cynffig	Tidal reach downstream of confluence with Nant Cwm Philip	278150	183250	55.48	2.93
Lumped catchment*	L	Nant Cwm Philip and Afon Cynffig	Full Afon Cynffig and Nant Cwm Philip combined catchments	278150	183250	55.48	44.13

* for critical duration testing

Table 2-2 : Final Catchment Descriptors

Site code	FARL	PROPWET	BFIHOST19	DPLBAR (km)	DPSBAR (m/km)	SAAR (mm)	URBEXT 1990	URBEXT 2000	FPEXT
TYD_01	**0.949**	0.52	0.485	2.45	220.4	1548	0	**0.000325**	0.0014
TYD_02	**0.979**	0.52	0.585	**2.70**	**67.23**	1433	0	**0.0102**	0.0498
KEN_01	**0.970**	0.52	0.501	5.67	95.7	1342	0.0498	**0.0747**	0.0489
KEN_02	**1**	0.52	0.522	**1.3**	**4.85**	1333	0.0473	**0.00765**	0.0504
KEN_03	**0.952**	0.52	**0.854**	**1.77**	**4.75**	1295	0.0502	**0.0585**	0.145
Lumped catch*	**0.958**	0.52	0.617	**7.50**	**71.31**	1295	0.0502	**0.0546**	0.145

* for critical duration testing

2.1.3 FEH Methodology

Stationary statistical and rainfall-runoff methods were both tested for the sub-catchments. The final choice of method for the flow estimation was the rainfall-runoff method using ReFH2 software. This methodology is considered to be suitable, and the Flood Estimation Guidelines favour the use of a rainfall-runoff approach in catchments that are tidally influenced/flood locked, such as for the lumped catchment applied in this study, as well as for the estimation of higher return period floods, such as the 0.1% AEP event.

There are no local gauges or other sources of information on either watercourse network which would aid calibration and verification of the hydrological modelling outputs.

The winter storm was selected for all sub-catchments due to the rural nature of the catchment of interest.

Critical duration testing was carried out in the hydraulic model using ReFH2 outputs for the TYD_01 sub-catchment, as well as for a lumped catchment including all five sub-catchments. The critical duration was identified to be 34 hours at the site itself, with a critical duration of 6 hours at Margam Duck Pond in catchment TYD_01. The 34-hour storm duration was therefore applied to the final peak flow estimation for all sub-catchments, with a sensitivity test carried out on the 6-hour storm duration for all sub-catchments.

Hyetographs for estimation of direct rainfall were estimated at the site of interest for the 50%, 3.3%, 1% AEP and 0.1% AEP events.

2.1.4 Climate Change

The West Wales 2080s central peak river flow allowance of 30% was applied in line with NRW guidance note GN008, as the catchment of interest and the majority of the sub-catchments in the study are above 5km^2 in area. Two of the sub-catchments are below 5km^2 in area, but are part of a wider fluvial catchment. For consistency, the peak river flow allowance was therefore applied to all sub-catchments.

Additionally, in line with NRW guidance, a test was also carried out applying the upper end peak river flow allowance of 75%.

The climate change allowances were applied as a direct multiplier to the peak flow estimates from ReFH2.

In accordance with the NRW guidance “Change to extreme rainfall intensity” for the central estimate and upper estimate have been applied as 20% and 40% respectively.

2.1.5 Peak Flow Results

The ReFH2 peak flow results are shown in Table 2-3. A comparison of the 1% AEP event and 0.1% AEP event peak flows derived from this study and the JBA study is provided in Table 2-4 for sub-catchment TYD_01.

Table 2-3 : ReFH2 Peak Flow Outputs

Site Code	AEP (%) – Peak Flow (m³/s)								
	3.3%	3.3% + 30% CC	3.3% + 75% CC	1%	1% + 30% CC	1% + 75% CC	0.1%	0.1% + 30% CC	0.1% + 75% CC
TYD_01	5.42	7.05	9.49	6.66	8.66	11.66	10.86	14.12	19.01
TYD_02	2.53	3.29	4.43	3.16	4.11	5.53	5.30	6.89	9.28
KEN_01	19.96	25.95	34.93	24.56	31.93	42.98	40.07	52.09	70.12
KEN_02	1.05	1.37	1.84	1.29	1.68	2.26	2.11	2.74	3.69
KEN_03	0.64	0.83	1.12	0.82	1.07	1.44	1.46	1.89	2.56

The peak flows derived for this study are lower than the ReFH2 and WINFAP peak flows estimated for the JBA study. The difference between the ReFH2 flows largely owe to the ReFH2 default duration of 6.5 hours being accepted for the JBA results, as well as to the inclusion of FEH22 rainfall data. The duration testing carried out for this study found the catchments (specifically located at the Site) to be volume-driven, and as such, scaling of the

WINFAP flows using ReFH2 outputs resulted in unrealistic flood volumes. It is considered that the ReFH2 outputs are more appropriate for flood estimation at the target site.

Table 2-4 : Comparison with JBA Peak Flow Results (TYD_01)

Source	1% AEP Event Peak Flow (m^3/s)	0.1% AEP Event Peak Flow (m^3/s)
SLR ReFH2	6.6	10.9
JBA ReFH2	10.3	18.1
JBA WINFAP	16.7	29.7

Peak flow results for sensitivity testing, as well as peak net rainfall results, are included in the Margam Flood Estimation Report.

2.1.6 Assumptions

The assumptions of this hydrological study include:

- There is a higher confidence in the peak flows estimated using the rainfall-runoff method than those estimated using the statistical method due to the tidally locked hydrological system and the requirement for analysis of long return period events;
- The rainfall-runoff method derived hydrograph shapes are representative of the runoff response of the catchment. There is no gauging data on the catchment itself to cross check these hydrographs;
- The proportion of baseflow in the catchments based on the FEH catchment descriptors is accurate;
- The lack of explicit representation of FARL in ReFH2 methodology will not result in overestimation of flows in the target catchments; and
- The area-weighting method of adjusting DPSBAR where applicable is appropriate for the scale of this study and does not have a major impact on flows.

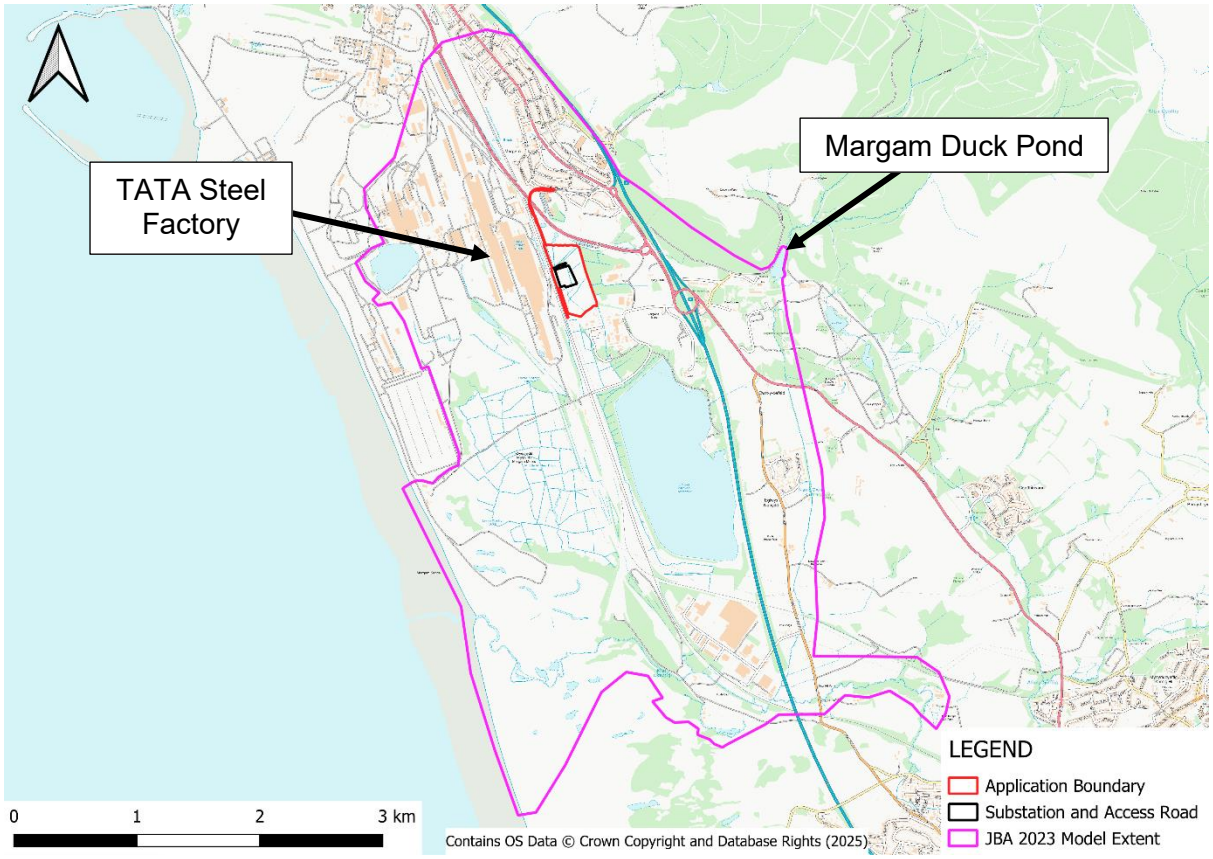
Limitations and uncertainties of the study are addressed in the Margam Flood Estimation Report.

3.0 Methodology

3.1 Model History

The existing flood model (JBA, 2023) for the Margam area was originally developed in 2015 by Capita URS for NRW under the Water and Environmental Management (WEM) framework. The model assessed fluvial flood risk from the Afon Cynffig and Nant Cwm Philip, along with tidal influences from the Bristol Channel. This was a 1D-2D linked ESTRY-TUFLOW model, based on river channel survey data collected in 2013. An extract of the modelling extent is provided in Figure 3-1.

Figure 3-1: Baseline JBA Model Extent



As part of the FMC completed by JBA, updates were made to improve the model's accuracy and align with regulatory requirements of NRW. Revisions since the 2015 study include:

- **Survey Updates**:
  - A new hydrological assessment was completed using extended hydrometric data and updated methods.
  - Additional culvert surveys were undertaken in 2022, particularly for the Margam Moors area, where multiple flow routes were identified between floodplain and railway lines.
  - The representation of the Margam Duck Pond spillway and control structures was refined based on site visits and analysis of survey data, addressing long-standing concerns regarding unrealistic flood frequency projections.
- **Model Enhancements**:
  - The latest TUFLOW executable (2020-10-AF-iDP) was used.

- Base LiDAR data was updated for improved terrain representation.
- Revised tidal boundary conditions were applied using updated Coastal Flood Boundary (CFB) data.
- Hydraulic structures were enhanced with more detailed schematisation, including the introduction of 'BB' bridge units to improve loss coefficient calculations.

3.2 NRW Model Update Requirements

SLR completed an initial review of the current model Product 7 data (JBA, 2023) and submitted a request to NRW's Flood Risk Assessment Team to establish the scoping requirements necessary to update the model as part of the design requirements of the substation extension. The requirements of the revised model have been summarised below:

- NRW required that the hydraulic structure at the inlet of the Margam Duck Pond is surveyed including cross sections for up to 150m upstream and cross sections downstream of the inlet structure;
- A detailed survey is to be completed for the hydraulic structures at the outlet of the Margam Duck Pond based on the Environment Agency National Standard Technical Specification for Surveying Services;
- Details as to the operation of the lake and how it is maintained to be incorporated into the model;
- Additional Cross Section data is captured along the confluence of the two spillways and the area upstream of a receiving culvert;
- NRW identified that there are two culverts missing under A4241 (Harbour Way) that lead to the Site and may be incorporated; and
- All simulation include a revised hydrological analysis of Q_{med}.

The product 7 data was purchased and licenced for the purposes of completing an FMC from NRW. Full correspondence was documented and provided in **Appendix A**.

3.3 Model Selection

Based on the objectives of this assessment, the existing 1-dimensional / 2-dimensional linked (1D/2D Linked) hydraulic model was deemed appropriate for updating in support of the FMC.

The principal source of flood risk identified at the Site in the Margam Substation FCA was fluvial flooding from the Margam Duck Pond and Nant Cwm Philip located approximately 1.6 km to the east. To more accurately represent these key features and update the model in line with current standards, refinements have been made in accordance with the Environment Agency's River Modelling Technical Standards and Assessment Guidance[5].

The latest version of TUFLOW (2025.0.2) was adopted for the model update, utilising the Sub-Grid Sampling (SGS) scheme to enhance the representation of small-scale terrain and flow pathways. SGS improves accuracy by incorporating finer terrain detail within coarser cell centres, allowing for improved resolution of topographic features without requiring uniformly small cell sizes across the entire domain. This is particularly beneficial in resolving complex flow paths, structures, and microtopography across floodplains and urban settings.

[5] Environment Agency River Modelling: Technical Standards and Assessment. Available via: https://www.gov.uk/government/publications/river-modelling-technical-standards-and-assessment

TUFLOW Heavily Parallelised Compute (HPC) remains the selected numerical solver for simulating fluvial and pluvial driven 2D flows, dynamically linked with the 1D ESTRY modelling engine. The HPC engine incorporated in TUFLOW 2025.0.2 continues to solve the full 2D shallow water equations, including inertia and turbulence, while also benefiting from enhanced numerical stability and performance improvements introduced in this version.

Adaptive time-stepping and SGS-compatible finer grid resolutions have been applied in the model updates to assist in areas of hydraulic complexity, allowing greater fidelity in the modelling of water levels, velocities and flood extents. The model configuration aligns with current best practice and remains consistent with EA and NRW benchmarked standards. TUFLOW, developed and maintained by BMT, continues to be widely adopted across the UK and internationally for flood risk modelling and appraisal.

3.4 Model Update Construction

The construction of the 1D/2D linked hydraulic model required several datasets and parameters. These are summarised below:

- A channel and topographic survey of Nant Cwm Philip (channel cross-section data). Details of which are included in **Appendix B**;
- Floodplain topography in the form of a Digital Elevation Model (DEM). This survey was captured in the extent of the site floodplain and captured 18 July 2024;
- Bathymetry survey of Margam Duck Pond topography in the form of a Digital Elevation Model (DEM). This survey was captured in the extent of the Margam Park area and captured 31 March 2025;
- Hydraulic boundaries;
- Roughness across the Study Area (Manning's n); and
- Appropriate model cell size, and adoption of sub-grid-sampling (SGS).

3.4.1 1D Channel Cross Sections

A total of 21 channel cross section surveys were carried out in March 2025 by Storm Geomatics Ltd and were incorporated into the model (**Appendix B**). These sections informed the 1D open channel network along the length of the Nant Cwm Philip through Margam Park.

The extent of the model was updated to incorporate the Nant Cwm Philip 150m upstream of the Margam Duck Pond inlet structure. The 1D representation of the channel was updated from the current JBA model up to 600m south of the Pond (the extent of the updated survey). The remaining lengths of the Nant Cwm Philip and Afon Cynffig was retained and reconnected to the updated version where appropriate.

Each updated length of the Nant Cwm Philip was digitised with 'XZ' type 1D cross sectional (1d_xs) lines linked to updated csv's as provided by Storm Geomatics. The surveyed channel was then connected to the existing 1D network and linked to the 2D domain via the means of HX boundary connections running parallel alongside each of the channel banks.

To provide maximum compatibility with the 2D element, the underlying DEM was sampled every 2m along the channel boundary and applied to the cells lining the edge of the channel by means of a topography modifier (2d_zsh).

3.4.2 Hydraulic Structures

All current and updated hydraulic structures used in the model domain were explicitly represented in the 1D domain. Structures downstream of the surveyed extent of the Nant



Cwm Philip have been retained. In total, 12 structures were added or amended into the model.

As identified by NRW, there are two culverts to the north and northwest of the Site below Harbour Way. These structures hydraulically link areas to the north of Harbour Way (A4241) to the Site. These structures were incorporated based on local planning data for Harbour Way (Application P2010/1100 for Harbour Way) and a site walkover completed by SLR on 10 March 2025.

Furthermore, it was identified in the initial supporting FCA that a leading cause of the significant flood depths occurring at the Site was the absence of an outlet (under the TATA Steel site) for attenuated water at the Site.

A review of flood risk information and local drainage around the Site indicates that the receiving Upper Mother Ditch drains low-lying areas below the adjacent railway to the west and conveys flows to a receiving structure comprising control gates and sluices. This structure is assumed to discharge to Swansea Bay, approximately 1.7 km west of the Site. Details of ownership and operation are currently unknown. Assumptions based on site inspections completed by BakerHicks were adopted for the modelling and discussed further in **Section 3.4.2.6**.

3.4.2.1 Nant Cym Philip Bridges

The approved NRW model utilised 'BB' ESTRY bridge unit type to represent flow hydraulics through all bridges for automatic calculations of form loss coefficients based on approach and departure velocities, with accompanying weir ('W') type structures to represent overtopping of the bridge deck. This was amended to 'BBW' along the surveyed extent of the Nant Cwm Philip, represented as 1d_nwke channels, to consolidate and represent flows overtopping the structure. Elements of the structure from the deck depth to rail height and blockage were represented by populating optional attribute descriptions with Storm Geomatics Survey data.

Each bridge was populated with cross sectional data surveyed at upstream and downstream ends. Height vs width (HW) tables were applied directly to bridge layers to permit flows through the structure.

A summary of the structures along the Nant Cwm Philip and locations are provided within Table 3-1.

Table 3-1: Nant Cwm Philip Structures

Bridge ID	Name	Type	Added or Updated
PHI01_00013_B1	Access Bridge_01	BBW	Added
PHI01_00195_B1	Rail Bridge	BBW	Added
PHI01_00265_B1a	Foot Bridge_01	BBW	Added
PHI01_00332_B1	Access Bridge_02	I	Added
PHI01_00587_B1	Margam Culvert	I	Updated
PhI01_00599_B1	Arch	BArch	Updated
PHI01_00630_B1	Foot Bridge_02	BW	Added
PHI01_00653_B1	Margam Duck Pond Outfall	W	Updated
Gate 104	Emergency Overflow	SGO	Updated

3.4.2.2 Margam Duck Pond Inlet

The inlet structure of Margam Duck Pond comprises of a weir with a bridge crossing over top with a clearance of 1.97m to the sofit. Downstream of the weir is a single stepped spillway that leads into the Pond. The incoming Nant Cwm Philip is represented in the 1D domain and is linked to the upstream side of the structure as a 1d_nwke layer with an irregular (I) type structure to represent the conveyance of the flow.

A bathymetric survey was completed for the receiving Duck Pond (see **Section 3.4.4.1**) which provides accurate ground levels for the spillway and downstream of the weir. The invert level of the structure was set to 46.13m AOD and linked to the 2D domain using SX boundary conditions. This arrangement permits water to outfall into the Duck Pond according to the dimensions of the structure and flow through the spillway in the 2D domain.

It was found that the flood level upstream of the structure does not overtop the structure deck even in extreme conditions, and as such representation of the bridge deck as a weir was retained in the 2D domain.

Figure 3-2 below shows the inlet structure to the duck pond.

Figure 3-2: Margam Duck Pond Inlet Downstream Face



3.4.2.3 Margam Duck Pond Outfall

The existing model represented the outfall structure from Margam Duck Pond as a bridge structure with Height Width (HW) tables to permit flow below the sofit of the bridge. As demonstrated in Figure 3-3, the complex arrangement of the outlet also includes an orifice with a diameter of 238mm.

There is also an unused outlet located just downstream of the main spillway that was surveyed and found to have insignificant flow. It is assumed that the unused outlet was sealed off in the past and any remaining discharge is seepage flow from the reservoir. This structure has therefore not been represented.

The model represents the spillway arrangement by implementing a 1.4m width weir linked in parallel to a single orifice, connected directly to the 2D domain within the duck pond. The arrangement was then reconnected to the surveyed extent of the Nant Cwm Philip in the downstream spillway path.

Following initial test runs, it was found that the water level when exceeding the outlet did not rise above the crest of the bridge structure. It was decided that the bridge deck did not provide significant hydraulic control and was removed in favour of simplicity and stability of flow through the outfall.

Figure 3-3 Downstream Face of Margam Duck Pond Outlet at Foot Bridge_03



3.4.2.4 Emergency Overflow (Sluice '*Gate 104*')

A discussion with the supervising Reservoir Panel Engineer of Margam Duck Pond took place on 12 March 2025. During the meeting, the operational details of the sluice gate were provided which indicate that the sluice gate is opened to maintain a 50mm head above the main outfall. The standard procedure is for a Margam Park attendant to manually open the sluice gate to maintain the 50mm head.

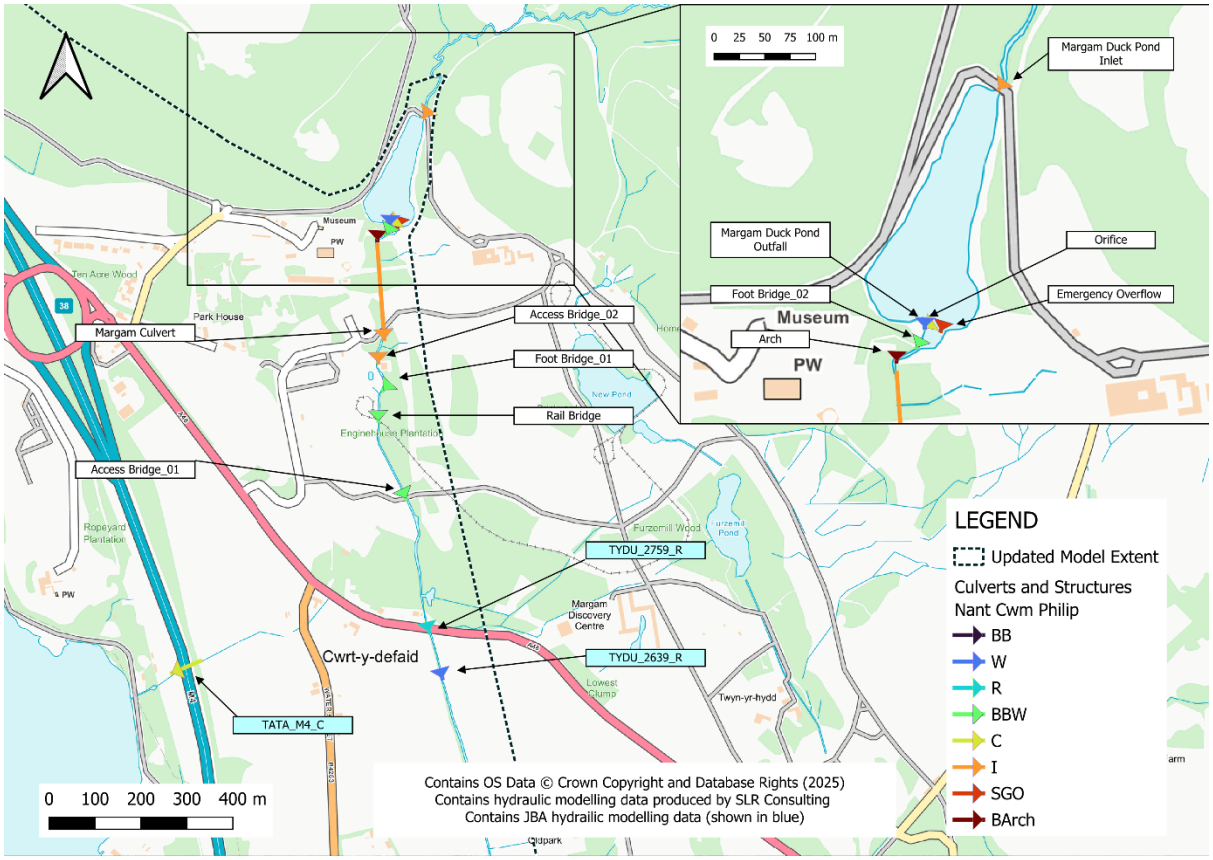
'Gate_104' was defined as an operational sluice gate (SGO) type 1d_nwke shape and modelled using a defined operational control rule (.toc). The gate was surveyed and has an invert level of 43.15m AOD, a width of 1.26m, and is operated as a vertically moving gate

with a maximum opening height of 0.8m above the gate seat. The fully open crest elevation is set at 44.0m AOD, and the gate moves at a speed of 0.1m/s to simulate manual operation.

Control of the sluice is based on an upstream water level trigger at coordinates 280260.05, 186365.61. The operational rule specifies the gate opens only when water levels reach or exceed 43.85m AOD (50mm above the crest level of the outfall weir). This operational logic aligns with instructions from the Margam Park Reservoir Engineer and simulates an operational gate scenario for flood risk assessment purposes.

Similar to the main spillway, it was found that the water level when exceeding the outlet did not rise above the deck of the bridge structure up to and including the extreme events (0.1% AEP) and therefore was not included in the final model.

Figure 3-4: Updated and Existing Hydraulic Structures Along Extent of Nant Cwm Philip



3.4.2.5 Culverts

A summary of the culvert structures added to the model, specifically siting the TATA Steel Facility and Harbour Way culverts, is summarised in Table 3-2.

Table 3-2: Culvert Structures

Culvert ID	Description	Type	Dimensions (m)
PHI01_00933_B1	Margam Duck Pond Inlet	I	Irregular dimensions
PHI01_00332_B1	Access Bridge_02	I	Irregular dimensions
HW_001	Harbour Way Underpass	C	3.0
HW_002	Harbour Way Culvert	C	0.9

Culvert ID	Description	Type	Dimensions (m)
TATA_In_109	TATA Culvert Inlet	RU	1 x 2
TATA_Out_109	TATA Upper Mother Outlet	RU	1 x 2

It was advised by NRW that the culvert structures below Harbour Way are included to better appraise fluvial flood risk at the Site. Data derived from NPTBC planning portal (Application P2010/1100 for Harbour Way) and data collected by SLR was incorporated into the model by representing culvert structures as 1d_nwk culverts.

Harbour Way Culvert & Underpass

The approved NRW model did not include structures which could permit flow through Harbour Way. Instead, water flowing from Margam Duck Pond is attenuated behind the embankment of Harbour Way before overtopping and flooding the Site. Due to accessibility constraints of the two structures, a review of the planning application P2010/1100 was completed in lieu of surveyed information. The parameters of Harbour Way are document in Table 3-2.

TATA Steel Inlet

As seen in Figure 3-5, the culvert permits utilities below the railway and links the Site to the TATA Upper Mother Outlet. The Client provided a drawing of the dimensions of the culvert for representation in the model. To account for restriction of flows through the culvert, the equivalent void area was applied to a rectangular, unidirectional (RU type) 1d_nwk culvert.

Figure 3-5: Upstream Face of TATA Steel Inlet



3.4.2.6 TATA Upper Mother Outlet

The approved NRW model outputs show that significant flooding occurs at the Site due to fluvial flows from the Margam Duck Pond overtopping Harbour Way. Harbour Way and the railway line west of the Site are raised on significant embankments which permit flood waters to attenuate and reach significant depths.

As reported in the accompanying FCA completed by SLR ("*250516_402_065363_00001_Margam Substation FCA_BakerHicks_Rev_08.pdf*")[6], the existing drainage regime at the Site comprises of a series of drainage ditches that connect to the Upper Mother Ditch that leads north. Here, water is conveyed below the railway line through a culvert and to a large control structure located at NGR: SS 78302 86668. It is understood that the local catchment comprising runoff from the east portion of Harbour Way, the Upper Mother Ditch and land north of Harbour Way[7] which ultimately leads to the outlet structure.

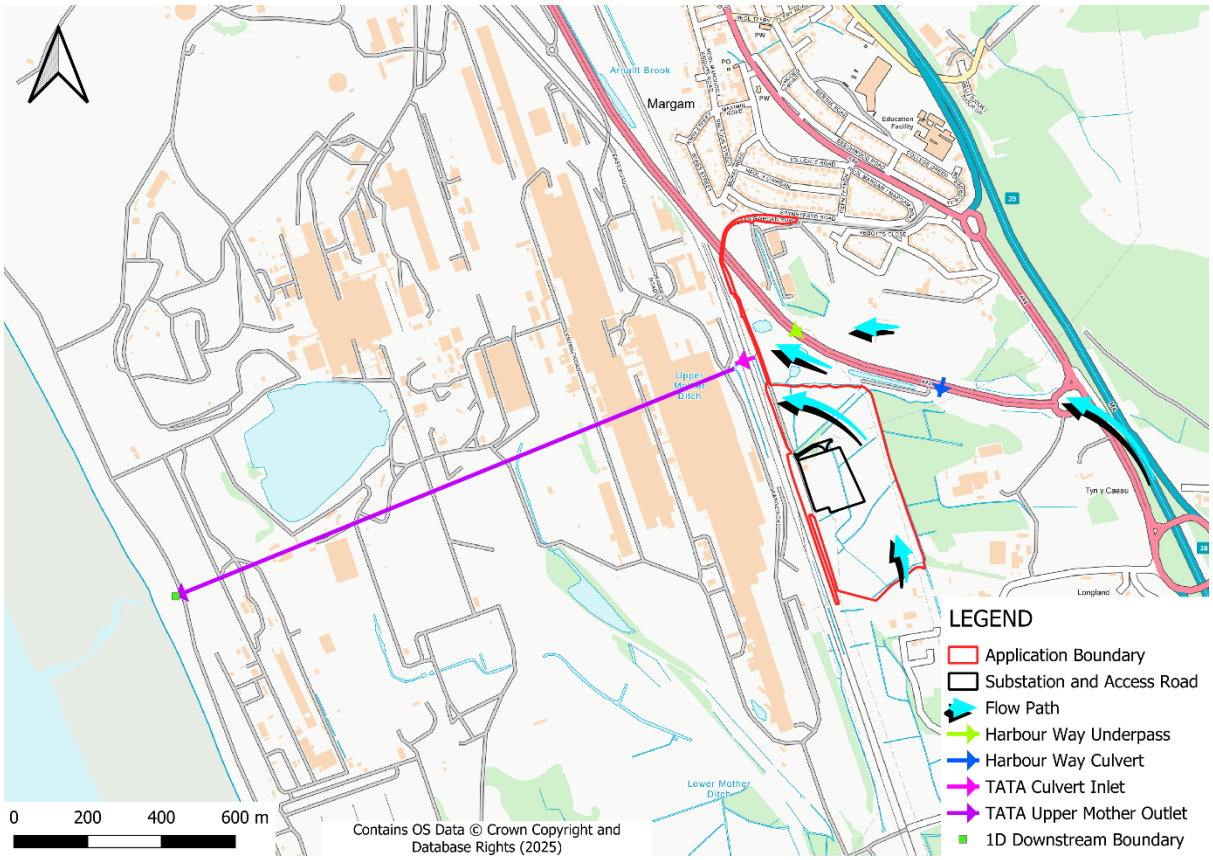
The TATA Upper Mother Outlet structure was implemented utilising the "RU" type culvert to represent unidirectional flows. An information request issued to TATA Steel suggested that they did not hold operational details of dimensions for the receiving inlet structure.

The structure has therefore been assumed to discharge directly to the Swansea Bay along a length of 1.63km through the TATA Steel Facility. The inlet was represented by 2m x 1m RU inlet and linked to the 2D domain with a simple SX boundary condition. In the absence of definitive data, the downstream connection of the structure was directly connected to the model's downstream boundary Mean High Water Springs (MHWS) tidal curve.

6 SLR Consulting (2025) Flood Consequence Assessment Proposed extension of the Margam Substation Rev.: 08.

7 Halcrow Group Limited (2007) Neath Port Talbot County Borough Council Port Talbot Peripheral Distributor Road Stage 2 Flood Consequences Assessment Supplementary Modelling Report Issue 1 (0). Available from: P2010/1100 | Construction of the Port Talbot Peripheral Distributor Road Stage 2.amendment to application P2007/292 approved 28th August 2007. | Land between the Port Talbot Docks Area and the A48 near Junction 38 Port Talbot [Accessed: 25 April 2025].

Figure 3-6: Culvert Structures at the Development Site



3.4.3 Hydraulic Boundaries

The objective of this assessment was to focus on the flood risk to the Site. The arrangement of the fluvial upstream boundary condition for the Afon Cynffig was retained with updated hydrological inputs as described in **Section 2.0**. All tidal boundary conditions were retained from the approved NRW model (JBA Consulting, 2023) and provided below for completeness.

It is expected in any event that the Margam Moors catchment would experience rainfall in both the fluvial investigated and pluvial investigated catchments. To assess the flood risk at the Site the direct rainfall contributing catchment was considered and applied to the model.

3.4.3.1 Upstream Boundaries

Hydraulic input for the upstream fluvial boundary condition for the Nant Cwm Philip upstream of the Margam Duck Pond was derived from updated flow vs time hydrographs acquired from the hydrological assessment (**Section 2.0**). This was applied within the 1D domain by means of a 1D boundary condition (1d_bc layer) positioned at the uppermost surveyed extent of the Nant Cwm Philip.

Duration testing was conducted using the 1% AEP plus 30% Climate Change to determine the critical duration on which to apply to the upstream boundary condition. As noted in **Section 2.0**, the 34-hour duration was selected, attributed heavily to the volume driven nature of the system and specifically areas of the Site. A summary of the flood peak statistics across each AEP event at the inflow location to the Nant Cym Philip is provided in Table 3-3.

Table 3-3: Nant Cym Philip Fluvial Model Inflows for the Critical Duration (34 hour)

Event Scenario (AEP)	Peak Flow (m^3/s)
50%	3.29
3.3%	5.55
1%	6.83
1% + 30% CC*	8.88
1% + 75% CC*	11.96
0.1%	11.15
0.1% + 30% CC*	14.50
0.1% + 75% CC*	19.52

* Climate Change

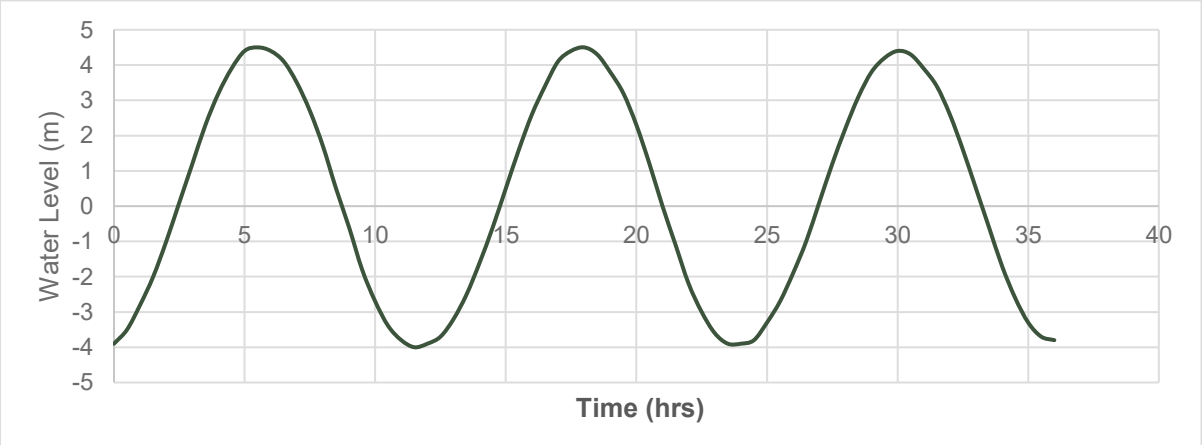
A range of uplifts has been applied to the 1% AEP and 0.1% AEP events to account for the change allowances in line with NRW guidance for West Wales. These uplifts have been directly multiplied to the respective 1% AEP or 0.1% AEP hydrographs for all fluvial boundary conditions.

3.4.3.2 Downstream Boundaries

The downstream boundary condition for the 2D domain has been retained for fluvial flows discharging to the Swansea Bay via the Afon Cynffig. The model utilises a Head/Time (HT) type downstream boundary (2d_bc) to represent oscillating tide levels over time, based on the CFB dataset (node 474). These conditions have remained unchanged.

Water discharging from the Site via the TATA Upper Mother Outlet was assumed to outflow from the 1D domain via a HT downstream boundary (1d_bc). This simulates water leaving the model through the TATA Upper Mother Outlet when the water level at the outlet is low enough to permit flow through the structure.

Figure 3-7: Downstream Boundary Mean Highwater Springs (MHWS) Curve



It should be noted that all climate change scenarios included a sea level rise of 0.84m, as per Table 3 of the Welsh Government "Climate change allowances and flood consequence assessments" guidance[8].

[8] Welsh Government 2021 "Climate change allowances and flood consequence assessments" guidance. Accessed at https://www.gov.wales/climate-change-allowances-and-flood-consequence-assessments

3.4.4 Floodplain Topography (DTM)

The available 2D topography for the model extent from the NRW[9] is dated January 2022 and has not been updated since publication of the approved NRW model. Therefore, the existing 2m resolution DTM data has been mostly retained with exceptions made for Margam Duck Pond and the Spillway. These area were updated based on the collected survey data, completed 31 March 2025, and the detailed site survey completed 18 July 2024.

3.4.4.1 Bathymetric Survey

To improve the representation of flood storage capacity in the Margam Duck Pond, it was determined that a bathymetric survey would appropriately represent the current capacity of the pond in the 2D Domain. A bathymetric survey measured and mapped the depth, shape, and contours of underwater surfaces using sonar or echo sounders. It provided detailed information about the submerged terrain so that capacity of the pond could be best represented.

Survey data was represented as a point cloud, a collection of data points in 3D space that accurately depicted the topography under the waterline. This point cloud was resampled to represent a 0.2m grid in QGIS, by conversion to a raster utilising processing tools.

3.4.4.2 Duck Pond Spillway Survey

It was highlighted by JBA in the previous 2023 report that the base topographic data from NRW reflected uncertainty within the modelled outputs. To refine the representation of the Margam Duck Pond spillway, embankment crests, and existing exceedance flow paths. A topographic survey was completed covering the Pond spillway and a portion of the park grounds to the southwest. It was considered necessary to refine the ground levels around the Pond and through the park grounds to determine if the existing model misrepresented the capacity of the Pond provided by flanking berms or exceedance flow pathways moving towards the Site.

Utilising a drone equipped with LiDAR sensors, a point cloud representation of the floodplain was acquired and included in the model. The point cloud output was later subjected to post-processing analysis to derive a DTM from the data at 0.2m resolution and clipped along the extents of the bathymetric survey. This data was then screened and amended to fill any sinks and incorporated into the model.

Following technical guidance (GN 039)[10] presented by the Flood Risk Management Board and Flood Risk Analysis sub-group, building footprints were artificially increased in height by 0.3m.

3.4.4.3 Obstructions

The existing JBA model represents fluvial flood risk from Margam Duck Pond flowing south west from the spillway and across the park grounds. Using the Digital Surface Model (DSM) point cloud data outputs for ‘not-ground’ features (e.g. trees walls and buildings),

The park is characterised by several walls and buildings that would influence flood flow mechanisms. The DTM data was reviewed and overlaid with digitised 2D break lines marking wall lengths and other impermeable structures within the extent of the Duck Pond

9 Natural Resources Wales (2022) Welsh government LiDAR Tile Catalogue 2020 - 2023. Available at: View map | DataMapWales. [Accessed: 25 April 2025].

10 Flood Risk Management Board and Flood Risk Analysis sub-group (2021) What hydraulic models need to include Guidance to help design tender specifications (GN 039) Available from: Guidance note template, external

Spillway. TUFLOW's asc_to_asc[11] utility was then used in conjunction with the break lines to capture the crest levels and ensure appropriate representation within the model.

The generated break lines were later validated and amended where the point data sampled tops of trees instead of the wall crest. As demonstrated by Figure 3-8, the validation process was necessary to align the model with the observed dimensions of intercepting walls and structures by avoiding treetops.

Figure 3-8: Margam Park Cemetery Wall to the South West of the Duck Pond.



3.4.5 Model Roughness (Manning's n)

3.4.5.1 Land Use Updates

The material roughness across the model domain has been read into the hydraulic model using a .tmf file formatted to be read by TUFLOW. The 2015 model produced by NRW utilised Ordinance Survey (OS) data produced for the whole modelling extent. The current model version from JBA updated the land use and Manning's n values based on OS MasterMap data land licenced from TATA Steel (2022) and classified by OS land use ID for Manning's n values derived from NRW's indicative roughness values[12] and texts such as Chow[13] for open channels.

11 TUFLOW (April 2025) ASC to ASC Section 3.9: Extract Breaklines from DEM. Available from: https://wiki.tuflow.com/ASC_to_ASC [Accessed: 29 April 2025].

12 Natural Resources Wales (2023) Indicative 2D roughness values Available from: Natural Resources Wales / Indicative 2D roughness values

13 Chow, V.T. (1959) Open Channel Hydraulics. McGraw-Hill, New York.

The existing model was reviewed between Margam Duck Pond and the Site to confirm if any significant changes had occurred since the model. It was considered that the 2022 OS mapping data is current, and no significant changes had occurred. The extent of the 2022 data did not cover the grounds of Margam Park and therefore utilised the existing 2015 OS data.

It was noted that land use comprising of dense thickness of bamboo had been included in the model. It was confirmed during the site visit by SLR on the 10th of March, 2025, that these areas still exist and have thus been retained.

Representation of the complex stepped spillway outlet of the Duck Pond was selected to be within the 2D. As the 2D survey does not accurately represent discrete details of the spillway (i.e. spillway material or sharp weir like edges), the spillway outlet was represented in the model with a manning's roughness coefficient of 0.09.

3.4.5.2 1D Channel Roughness

Cross sectional data along the surveyed length of the Nant Cwm Philip provided by Storm Geomatics included truncated roughness coefficient values for the channel bed. These values were incorporated into the model using 'N' flags in the 1d_xs layer along the updated extent of the Nant Cwm Philip. Data points beyond the top bank where not included as these roughness values would be represented in the 2D domain.

3.4.6 Proposed Flood Defence Wall

The proposed development will exclude incoming fluvial floodwater by constructing a flood wall around both the existing and new substation areas. To assess the potential flood risk from displaced water, the Site was raised by 6.0m above the DTM, higher than the maximum modelled flood depths for all simulated events as determined from the current JBA model. This approach assumes complete exclusion of floodwater from the development and represents a conservative worst-case scenario.

3.4.7 Model Operation

The hydraulic model was simulated using the HPC solver for TUFLOW Build 2025.0.2 single precision (iSP). Initialisation of the TUFLOW model utilised a standard Windows Batch File linking the TUFLOW executable, control files (.tcf) and relevant event, scenario and variant logic. All model runs were performed on high-performance computing facilities using a NVIDIA A10 GPU with an approximate run time of 4 hours per model.

A summary of the events and scenarios used within the final model are presented within Table 3-4 below.

Table 3-4: Model Scenarios Definitions

Control File	MAR~s1~_~e1~_~e2~_113.tcf
Scenarios (~s1~)	SEN08 (RoG of site-specific contributing catchment area) EXG (Baseline Conditions) - Fluvial DEV (Development Scenario) SEN01 (IWL lowering Scenario - 43.0 m AOD) SEN02 (IWL lowering Scenario - 42.5 m AOD) SEN03 (Mannings Roughness increase 30%) SEN04 (Mannings Roughness decrease 30%) SEN05 (Structure blockage 25%) SEN06 (Structure blockage 50%) SEN07 (Margam Duck Pond sluice gate not opened) SEN09 (6hr Duration) - WINFAP Scaled Hydrology SEN09a (6hr Duration) - ReFH2 Hydrology
Events (~e1~)	30Y (3.3% AEP) 100Y (1% AEP) 100YCC40 (1%+40%CC AEP) 100YCC75 (1%+75%CC AEP) 1000Y (0.1% AEP) 1000YCC40 (0.1%+40%CC AEP)
Durations (~e2~)	34hr 6hr (sensitivity only)

4.0 Results and Discussion

4.1 Model Results

Finalised mapping of all hydraulic modelling results has been provided within the Appendices as follows:

Appendix C – Base Case Model Results

Appendix D – Proposed Case Model Results

Appendix E – Sensitivity Results

It is noted that all baseline and proposed results have considered results including the pluvial catchment. Sensitivity modelling has been completed on fluvial only model simulations to understand the model's sensitivity to change in hydraulic parameters.

4.1.1 Performance

The models performed well overall with marginal mass balance errors within the recommended +/-1% tolerance. Occurrences of negative depths appear along the extents of the Afon Cynffig, however, these are not considered to have a material impact to the Development Site or the Margam Duck Pond.

A summary of the checks and warnings which occur as a result of the updated model have been provided for below:

- WARNING 1991 – Negative depths occurred 76 times. These were ignored as impact to the Study Area is negligible.
- CHECK 1152 occurs 24 times - "using centre cross-section and ignoring end cross-section(s)." This occurs due to cross sections being digitised to the midpoint of a 1D structure. These are acceptable as they refer to surveyed data to specifically represent a structure.
- WARNING/CHECK 2118 - Lowered SX ZC Zpt by [X]m to 1D node bed level. This warning is commonly associated with the resolution of the input DTM not correlating with input levels for structures in the floodplain. This warning has been ignored due to the innate inaccuracy of the 2m resolution DTM, the location and impact in relation to the site, and the changes of the model being focused on the site only.
- CHECK 2370 - Ignoring coincident point found in Z Shape SGS layer. These occur at the Foot Bridge_01 layer where multiple vertices are digitised were unnecessary. This was not considered to have a material impact on the modelling results and were therefore ignored.
- CHECK 2541 – BC polyline selects no cells: The HX boundary condition was counted nine times using the midpoint method, but no cells were selected. This occurred because the resolution of the model grid was coarser than the digitised extent of the 1D open channel boundary condition. The issue was not pursued further, as the mismatch in resolution rendered the selected cells unsuitable for meaningful selection however is not expecting to impact results.

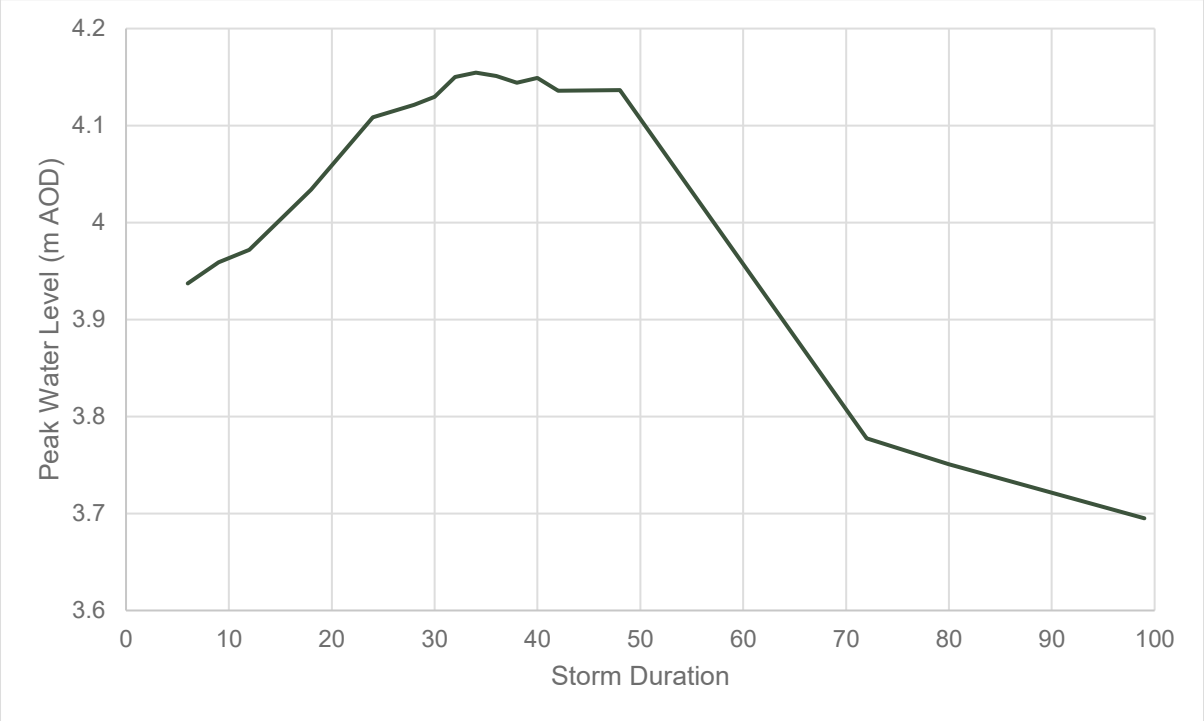
4.1.2 Duration Testing

Critical duration testing was conducted as described in **Section 2.0**. A range of storm durations were simulated through the updated hydraulic model to determine maximum flood levels at the Site. The critical duration assessment was completed on the 1% AEP + 30% CC only. Seventeen (17) storm durations from the 6-hour to the 99-hour storm were simulated. The wide range of storm durations were selected based on results indicating the

Site's location being highly volume driven. As such long storm durations proved to have a large impact of water levels in the low-lying and slow draining areas of the Site.

The critical duration assessment was conducted on the fluvial ReFH2 TYD_01 catchment only, as this catchment was the main fluvial contribution. The results indicated that the 34-hour storm duration produced the highest water levels at the Site and surrounding areas. Figure 4-1 below shows the peak water level at the site verse the modelled storm durations, depicting the 34-hour storm as critical.

Figure 4-1: Peak Water Level vs 1% AEP + 30% CC Storm Duration



4.1.3 Margam Duck Pond

For the (Q_{med}) 50% AEP event, the peak flood extents are shown to be confined to the area downstream of the spillway and adjacent to the Margam Culvert Inlet. The mapping no longer shows flooding moving west towards the M4. It is therefore considered that the modelling outputs have been validated against the local flood risk history as confirmed by NPTBC highways authority and the Welsh Government for frequent return periods.

However, the peak flood extents for the Baseline Scenario (EXG) for events with a frequency up to and less than 3.3% AEP all showed that the Margam Duck Pond begins to overtop the main spillway and outfall. The addition of significant overtopping flow overwhelms the discharge capacity of the Margam Culvert downstream and thus backs up, overtopping the west bank and flooding Margam Park.

Additionally, as was identified in the current model produced by JBA, the pond also overtops the west abutment which permits flows west down towards the M4. Flood flows travel west according to the prevailing regional topography across the M4 and towards the Site.

Investigation of flows through the outfall and emergency overflow reveals no significant instabilities at the discharge locations. It is therefore understood that the Duck Pond likely provides less volumetric storage than what would be required to accommodate an extreme event flow from the Nant Cwm Philip.

In high flow events it was also found that the main culvert downstream of the Duck Pond quickly reaches capacity and begins to break the banks, sending flows west and ultimately towards the Site. It was found that the capacity of this structure is also a key limitation of the fluvial flood risks of the Site.

4.1.4 Site Specific Results

Flooding is shown to occur at the Site in all baseline scenarios with a 3.3% AEP or less, including climate change allowances. As previously described, the primary flood mechanism is the exceedance of the flow capacity at Margam Duck Pond.

Flood flows moving west was shown to be intercepted by the M4 at Junction 38 before being channelled north along the slope of the highway; water then flows west towards Harbour Way. The modelling indicated that water flows around the north and south side of Harbour Way.

Floodwater is conveyed from the north side of Harbour Way via the Harbour Way Culvert, and subsequently through the ditch network surrounding the Upper Mother Ditch. The capacity of the ditch is quickly exceeded and leads to inundation of the Site. Flows then migrate northwards along the prevailing topography, eventually draining via the culvert network beneath the western railway line and the TATA Steel facility.

The Site is low-lying within the wider catchment, when flooded, the Site is inundated for a long period. This is because the surrounding landform of the railway, Harbour Way and rising topography to the east functions as a large attenuation basin.

Results have been sampled at six (6) locations around the site and summarised in the following sections. The sampling locations are provided below in Figure 4-2. Appendix references have been summarised in Table 4-1

Figure 4-2: Sample Locations

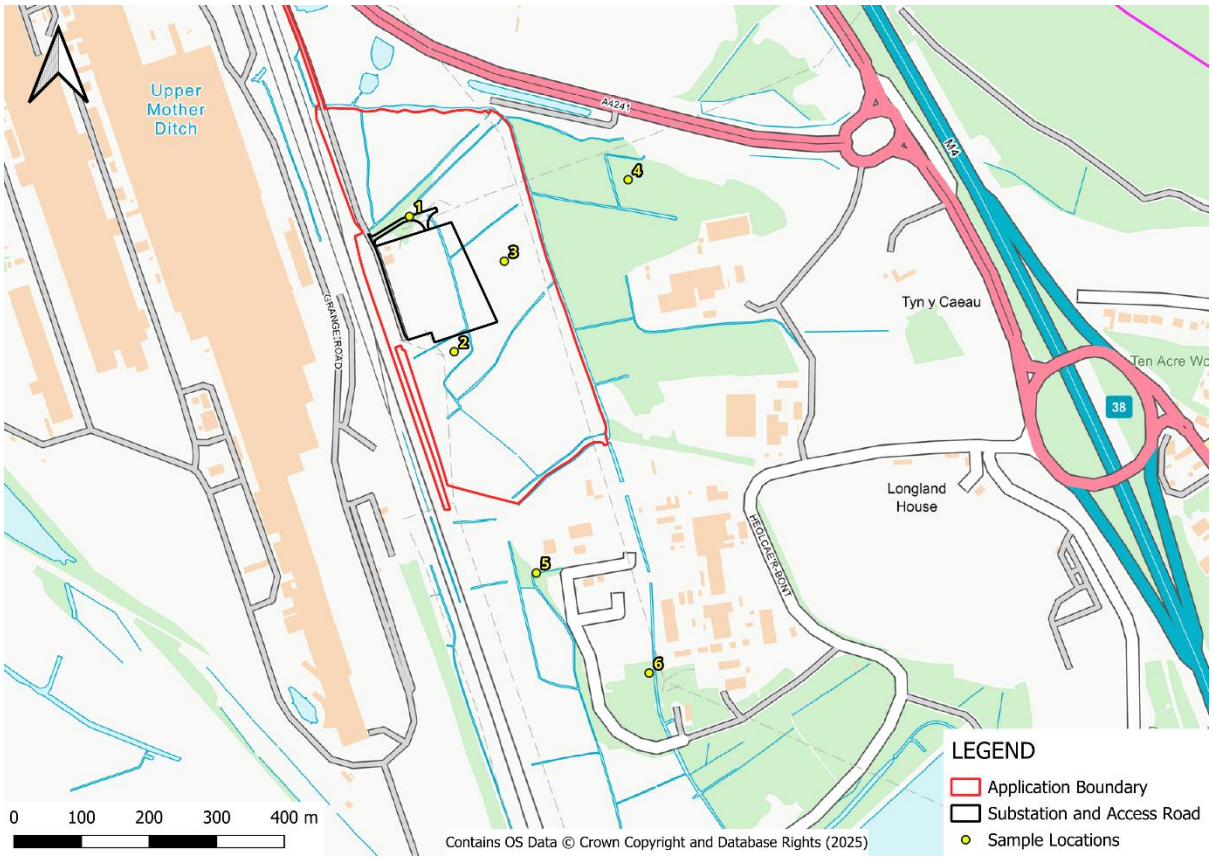


Table 4-1: Appendix Figure Reference

Fluvial Event Scenario	Peak Water Depth	Peak Water Level	Peak Water Velocity
50% AEP	Appendix C-1	Appendix C-9	Appendix C-17
3.3 % AEP	Appendix C-2	Appendix C-10	Appendix C-18
1.0% AEP	Appendix C-3	Appendix C-11	Appendix C-19
1.0% AEP + 30% CC*	Appendix C-4	Appendix C-12	Appendix C-20
1.0% AEP + 75% CC*	Appendix C-5	Appendix C-13	Appendix C-21
0.1% AEP	Appendix C-6	Appendix C-14	Appendix C-22
0.1% AEP + 30% CC*	Appendix C-7	Appendix C-15	Appendix C-23
0.1% AEP + 75% CC*	Appendix C-8	Appendix C-16	Appendix C-24

* Climate Change

4.1.4.1 Flood Levels

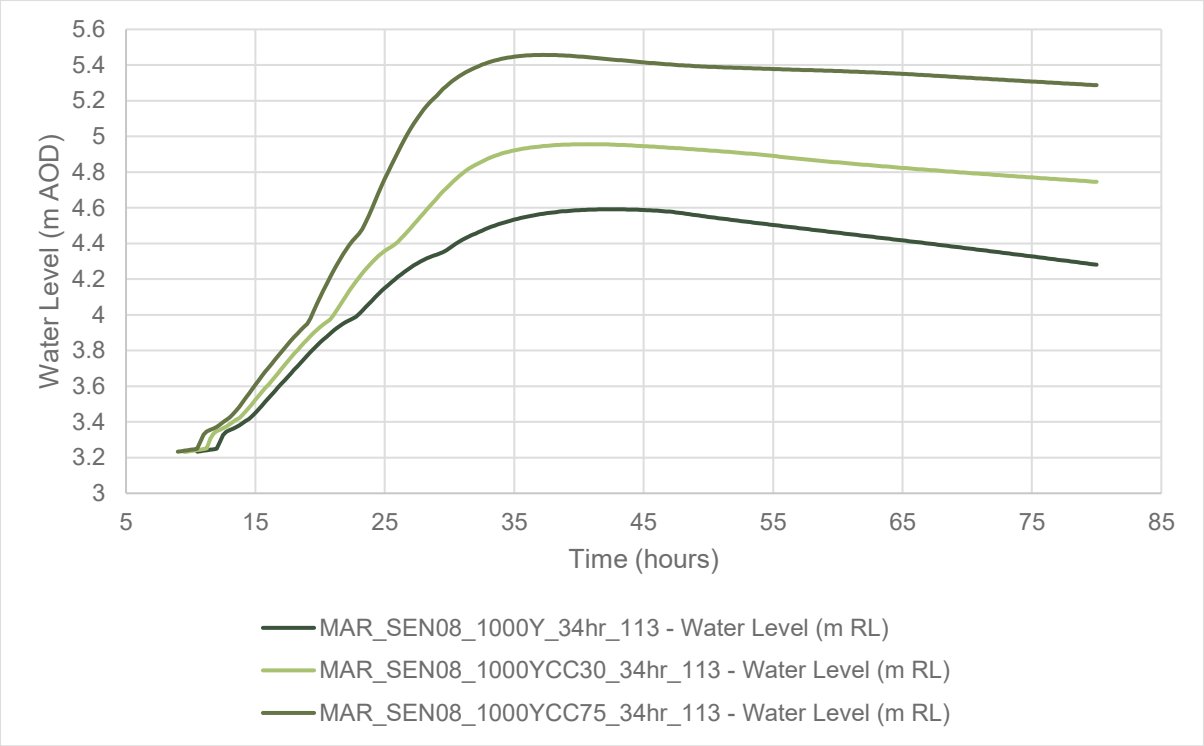
Flood levels around the Site for the baseline scenario have been sampled from the mapped outputs and presented in Table 4-2.

The peak flood level is shown to occur at 38 hours into the simulation for the 0.1% AEP event. The graph shown in Figure 4-3 demonstrates that the Site is flooded for an extended period and that the Site takes significant time to drain.

Table 4-2: Sampled Peak Water Levels from Baseline Scenario

Sample Location ID	Baseline Peak Water Level (m AOD)						
	3.3%	1%	1% + 30% CC	1% +75%CC	0.1%	0.1% + 30% CC	0.1% + 75% CC
1	3.82	4.13	4.35	4.68	4.59	4.96	5.46
2	3.82	4.13	4.35	4.68	4.59	4.96	5.46
3	3.82	4.13	4.35	4.68	4.59	4.96	5.46
4	3.83	4.13	4.35	4.68	4.59	4.96	5.46
5	-	-	4.35	4.68	4.59	4.96	5.46
6	-	-	-	4.68	4.59	4.96	5.46

Figure 4-3: Extreme Event Baseline Flood Elevations at the Site vs Time (Location 3)



4.1.4.2 Flood Velocities

Flows approaching the Site from Harbour Way are initially characterised by high velocities, particularly at the Harbour Way junction, where water rapidly descends embankments. Higher velocities are also observed at the inlets and outlets of the Harbour Way culvert and underpass, where flows are constricted.

The water then progresses through the lower-lying areas surrounding the Site, which include woodland and marsh habitats with high Manning's roughness values.

Peak velocities across the range of baseline scenarios were sampled around the Site. A summary of these results is provided in Table 4-3.

The results show that as the frequency of the return period decreases, flow velocities at the Site increases due to greater momentum of flood flows entering the Site. As flows reach the west side of the Site, velocities are shown to decelerate as water is distributed across the flood plain.

Table 4-3: Sampled Peak Water Velocities from Baseline Scenario

Sample Location ID	Baseline Peak Water Velocity (m/s)						
	3.3%	1%	1% + 30% CC	1% +75%CC	0.1%	0.1% + 30% CC	0.1% + 75% CC
1	0.01	0.01	0.01	0.01	0.01	0.01	0.02
2	0.13	0.13	0.13	0.14	0.14	0.14	0.14
3	0.00	0.01	0.01	0.01	0.01	0.02	0.03
4	0.29	0.36	0.38	0.39	0.38	0.39	0.40
5	-	-	0.01	0.02	0.02	0.03	0.05
6	-	-	-	0.02	0.02	0.02	0.02

4.1.4.3 Flood Depths

The depths of flooding during baseline scenarios with a return period of 3.3% AEP, is confined to the immediate extents of the Upper Mother Ditch as the lowest portion of the area around the Site. Due to the Site's relatively flat profile, as greater flood flows from less frequent events enters the site, the water depths increase relatively uniformly.

The results have shown flood depths along the extent of the Upper Mother Ditch and the inlet of the TATA Culvert Inlet. It is also observed within the extent of the proposed development given its low-lying topography. Deeper depths are also observed north of Harbour Way. This is likely due to the limited conveyance capacity of the Harbour Way Culvert.

Sampled depths have been provided in Table 4-4.

Table 4-4: Sampled Peak Water Depths from Baseline Scenario

Sample Location ID	Baseline Peak Water Depth (m)						
	3.3%	1%	1% + 30% CC	1% +75%CC	0.1%	0.1% + 30% CC	0.1% + 75% CC
1	0.34	0.65	0.86	1.19	1.11	1.47	1.97
2	0.61	0.92	1.13	1.46	1.38	1.74	2.24
3	0.28	0.59	0.80	1.13	1.05	1.41	1.91
4	0.14	0.45	0.66	0.99	0.91	1.27	1.77
5	-	-	0.06	0.33	0.25	0.60	1.10
6	-	-	0.00	0.35	0.28	0.63	1.13

4.2 Proposed Development Impacts

To understand the impact of storage losses and displacement of flood waters, based on the outputs of the updated model, the proposed development conditions (DEV), as described in **Section 3.4.6**, was simulated through the model. The impact assessment was considered for the 1% AEP + 30% Climate Change and 0.1% AEP + 30% Climate Change only.

Peak water level differences and Peak velocity differenced were extracted at the sampling locations and in provided in Table 4-5 and Table 4-6 respectively.

Peak water level difference maps for all modelled events have been included in Appendix D.

Table 4-5: Proposed Development Peak Water Level Difference Sampled at the Site

Sample Location ID	Difference in Peak Water Level (mm)	
	1% + 30% CC	0.1% + 30% CC
1	19	23
2	19	23
3	19	23
4	19	23
5	17	23
6	0	23

Table 4-6: Proposed Development Peak Water Velocity Difference Sampled at the Site

Sample Location ID	Difference in Peak Water Velocity (m\s)	
	1% + 30% CC	0.1% + 30% CC
1	0.00	0.00
2	-0.03	-0.03
3	0.00	-0.01
4	-0.01	-0.01
5	0.00	0.00
6	0.00	0.00

4.3 Model Sensitivity Testing

A suite of sensitivity scenarios was undertaken to test the robustness of the hydraulic model results under a range of altered input conditions and operational assumptions. These scenarios were selected to explore potential variations in flood extent, depth, and hazard to the Site and to further appraise the system behaviour. These sensitivity simulations were completed on the baseline fluvial only scenario is favour of run time and comparative nature.

The following sensitivity scenarios were assessed:

- **Initial Water Level Sensitivity (SEN01, SEN02):** Two scenarios were simulated with reduced initial water levels (IWL) of 43.0 m AOD and 42.5 m AOD respectively, to assess the influence of assumed antecedent conditions on peak flood levels and extents.
- **Channel Roughness Variation (SEN03, SEN04):** Manning's *n* values were adjusted by ±30% to evaluate the sensitivity of modelled flood behaviour to changes in assumed surface roughness across floodplain and channel domains.
- **Structure Blockage (SEN05, SEN06):** Two scenarios representing partial blockages (25% and 50%) were applied to key hydraulic structures to test how such obstructions may affect upstream water levels and local flood risk.
- **Operational Constraint Scenario (SEN07):** A conservative operational assumption was modelled in which the Emergency Overflow Sluice Gate at the Margam Duck Pond was not opened, simulating a potential failure of standard operational response.
- **Short-Duration Event Sensitivity (SEN09, SEN09a):** To explore the influence of more intense, short-duration rainfall events, a 6-hour design storm was simulated using both WINFAP-FEH scaled hydrographs (SEN09) and ReFH2-derived hydrographs (SEN09a).

Each scenario was run independently and compared against the baseline scenario. Results are presented in terms of changes in peak flood level .

4.3.1 Sensitivity Results

A mapped outputs of the different in peak water level results have been made available in Appendix E and have been summarised below.

4.3.1.1 Initial Water Level Sensitivity (SEN01, SEN02)

The modelled outputs of the initial water level sensitivity test showed virtually no change in flooding extent to the Site or downstream of the Margam Duck Pond from the baseline scenario.

4.3.1.2 Channel Roughness Variation (SEN03, SEN04)

Increasing Manning's n by 30% results in higher peak flood depths between the Duck Pond and the Site. Flows overtopping the Pond are impeded by the increased surface resistance across the floodplain, leading to backwater effects and reduced conveyance through the Pond Spillway.

This effect is illustrated in Appendix E-3, where increased flood levels are observed at the inlet to the Margam Culvert. Here, water overtopping the Pond is unable to discharge efficiently through the culvert inlet, contributing to increased flow volumes routed westwards in line with the flood mechanism described in **Section 4.1.3**.

As a result, the Site is impacted by similar increases due to the increased resistance, with flood levels increasing by approximately 100–200 mm. Expanded flood extents are also observed south of the Site and north of Harbour Way.

Conversely, when Manning's n is decreased by 30%, flood risk from the Duck Pond remains present; however, downstream areas, including those adjacent to the Nant Cwm Philip, experience a reduction in flood risk due to enhanced channel and floodplain conveyance. Floodwaters from the Pond are routed more quickly downstream, leading to increased levels in areas north of Harbour Way as flooding occurs more rapidly. Level increases of 50–200 mm were recorded, with the highest values observed at the Harbour Way underpass inlet due to broader floodplain inundation.

The impact on the Site in this scenario is minimal. This is attributed to the capacity constraints at the Harbour Way culvert, which limits flow moving into the Site. Consequently, changes in roughness within both the 1D and 2D domains have limited influence on flood behaviour at the Site itself.

4.3.1.3 Structure Blockage (SEN05, SEN06)

This sensitivity test assumes that all hydraulic structures are subjected to 25% and 50% blockage respectively. The resulting impact is generally observed as a reduction in flood levels across much of the floodplain downstream of the main dam and the Margam culvert inlet.

Blockage of the Margam Duck Pond outlet and emergency overflow leads to increased water levels within the Pond. This is evidenced by a slight rise in flood levels at the upstream end of the Pond, where backwater effects elevate upstream water levels. Consequently, increased flow is routed through the west abutment during the peak of the hydrograph, as alternative outfalls are restricted.

Downstream of the west abutment, additional areas become inundated due to redirected flow along this flood pathway. The relatively steep local topography facilitates rapid conveyance of water toward the area north of Harbour Way. As discussed in **Section 4.3.1.2**, the Site is particularly sensitive to the capacity of hydraulic structures located downstream of Harbour Way.

Flood levels north of Harbour Way are observed to increase by 20–200 mm, while flood levels at the Site decrease by approximately 20–50mm. This suggests that the Site's flood risk is sensitive to the efficiency of conveyance between the floodplain north of Harbour Way and the TATA Upper Mother Outlet.

4.3.1.4 Operational Constraint Scenario (SEN07)

This scenario tests the model's response to the inoperability of the emergency overflow sluice gate. It is understood that this sluice is normally operated by attendants at Margam Park to maintain a stable head above the primary Margam Duck Pond outfall. When the sluice is inoperable, the overall discharge capacity from the Pond is reduced, resulting in an increase in upstream water levels by approximately 50–100mm.

As water levels rise, overtopping of the main dam and west abutment becomes more significant. This leads to elevated flood levels across the model domain, with flood levels at the Site increasing by 100–200mm.

4.3.1.5 Short-Duration Event Sensitivity (SEN09, SEN09a)

The short duration sensitivity assessments assess the model's sensitivity for a the high-intensity storm event by applying a 6-hour design storm in place of the calculated critical duration of the 34-hour duration. These scenarios explore the effect of rapid catchment response on peak water levels and extents, and flow timing across the model domain.

In SEN09 (WINFAP-scaled hydrograph), the outputs indicate that both the Site and the wider catchment are particularly vulnerable to intense, short-duration storms. Rescaling to the WINFAP peak flow significantly increases flood levels across the floodplain, with flood depths at the Site rising by approximately 100–200mm. This suggests that when storm durations shorten but peak flows remain high, the capacity of the Margam Duck Pond and Nant Cwm Philip is quickly overwhelmed.

In SEN09a (ReFH2 6-hour hydrograph), the flood impacts differ. Flooding becomes more pronounced around the Pond and Margam Park, with greater flood depths occurring north of Harbour Way. However, the Site itself experiences a reduction in flood levels of approximately 50–100mm. This likely reflects the difference in hydrograph shape and timing associated with ReFH2, which produces a more physically distributed runoff response and lower peak inflows at critical routing points through the Site.

Together, these scenarios demonstrate that flood risk is sensitive not only to the magnitude of the peak flow, but also to the shape and timing of the inflow hydrograph, which varies considerably between statistical (WINFAP) and rainfall-runoff (ReFH2) methods.

4.4 Model Validation

The currently approved model, developed by JBA, produces similar flood extents to those observed in the updated model. Flooding originating from Margam Duck Pond follows expected catchment flow paths, with overtopping from the Pond and Nant Cwm Philip conveyed westward along prevailing topography. Flow is attenuated in low-lying and enclosed areas observed at the Site.

While the NPTBC Highways Authority and Welsh Government report no recorded instances of flooding on the M4, the current model outputs show significant flood extents affecting the motorway in events as small as the 50% AEP event. In contrast, the updated model no longer shows flooding at this location, marking a notable divergence between the two models and thus validating the likely flood risk frequency at the M4.

During a site visit on 10 March 2025, a 'Friends of Margam' volunteer described frequent localised flooding within the estate grounds. Anecdotal evidence highlighted flooding in the area west of the Nant Cwm Philip, downstream of the Duck Pond between the Pump House (NGR: SS 80285 86051) and the now derelict Saw Mill (NGR: SS 80213 85599). These observations are consistent with the outputs of both models. However, no direct overtopping from the Duck Pond itself was confirmed by the attendant.

Given the level of hydraulic and topographic refinement applied in the updated model, particularly around the Duck Pond, it is considered that this model more accurately represents the likely flood mechanisms and risks. Therefore, the modelled degree of risk is likely due to the current storage capacity of the Duck Pond having decreased over time due to sedimentation from upstream catchment inputs. This is supported by a walkover survey upstream of the updated model boundary, which identified extensive deposition of geological material. Southern parts of the Pond near the outfall show depth differences of up to 2m between the surveyed soft and hard bed levels.

The steep gradients of the Margam Moors to the north-east contribute to high-velocity runoff, assumed to mobilise suspended solids that are deposited downstream as flow velocities reduce in the vicinity of the Duck Pond. This process likely contributes to the reduction in effective storage and attenuation capacity within the Pond.

4.5 Limitations

Hydraulic and hydrological models are powerful tools for simulating flood behaviour and informing risk management; however, they are inherently limited by the quality and availability of input data, the assumptions required to represent complex physical processes, and the spatial and temporal resolution of the model. These models simplify real-world systems, meaning that uncertainties in topography, boundary conditions, structure operation, and rainfall-runoff relationships can all influence the accuracy of predicted flood behaviours. As such, modelling outputs should be interpreted as representations of likely conditions under defined scenarios, not absolute predictions.

4.5.1 The Development Site

A key limitation of the model is the representation of drainage capacity through the Upper Mother Ditch and the TATA Upper Mother Outlet. In the absence of detailed survey data or operational information, assumptions were required to allow outflow from the catchment to Swansea Bay. Sensitivity analysis highlights that flood risk at the Site is highly influenced by the restricted inflow capacity of structures beneath Harbour Way. Since floodwaters do not exit the Site via overland routes in the 2D domain, the Upper Mother Ditch functions as the primary hydraulic control governing flood levels in upstream areas.

It is also understood that the Site is serviced by a network of field ditches that ultimately drain to the Upper Mother Ditch. However, the full extent of culverts or connecting structures between the Site and the Upper Mother Outlet may not be fully represented in the model. This introduces uncertainty in the overall conveyance capacity through the Site toward the outlet.

Furthermore, TATA Steel's Environment Department confirmed that they do not hold detailed information on the Upper Mother Outlet; operation of the structure therefore remains unverified.

4.5.2 Harbour Way

Information obtained from the Harbour Way planning application (P2010/1100) was incomplete and required assumptions regarding the arrangement of structures. These assumptions do not account for potential environmental changes or design modifications that may have occurred since construction and would otherwise be identified through a detailed site survey.

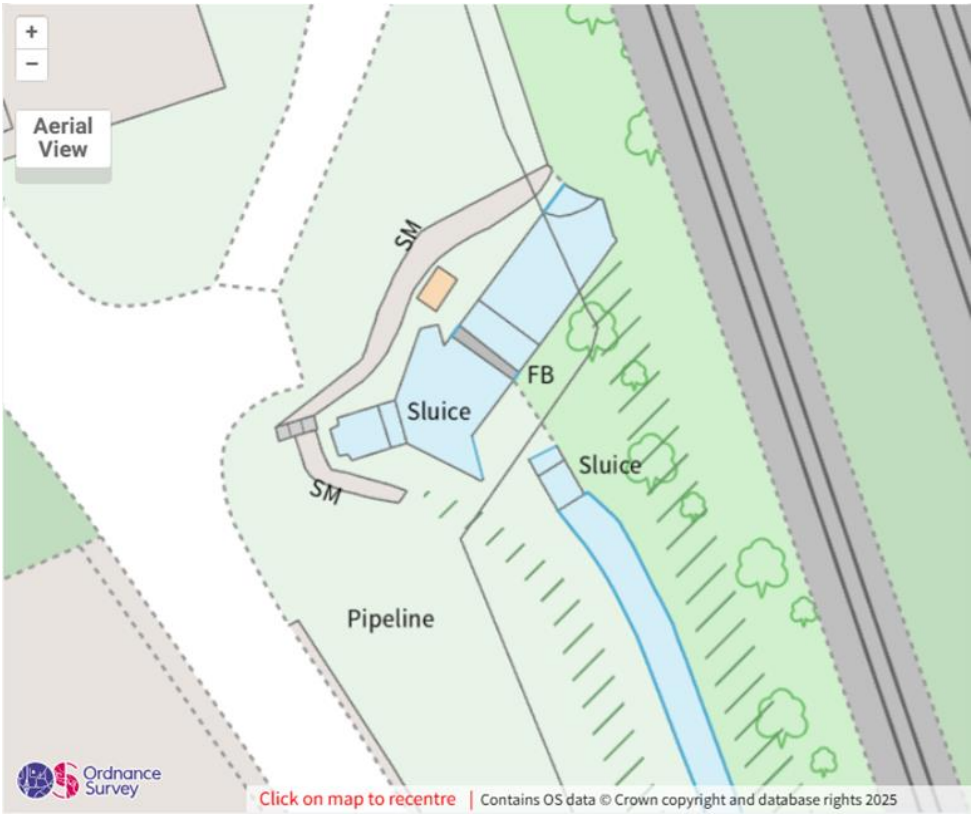
4.5.3 TATA Upper Mother Outlet

In the absence of surveyed data, the TATA Steel outlet culvert was assigned the same dimensions as the upstream rail culvert. As ownership of the outlet remains unconfirmed, no

survey has been undertaken to verify these assumptions. This introduces uncertainty regarding the outlet's true capacity and operational behaviour.

While the true dimensions remain unknown, sensitivity of the TATA Steel outlet proved that results do not appear to be impacted by the capacity and the tide locking of the structure. In addition outlet information visible at Swansea Bay show that possible outlet structures on a similar dimension exists in the vicinity of the modelled structure.

Figure 4-4: Extract of OS Mapping Data[14] of the TATA Upper Mother Outlet



4.5.4 Hydrology

Analysis of shorter storm periods rescaled with WINFAP typically provides estimates for peak flows to emulate a synthetic hydrograph for input into the model. The consequences of which may distort the flow volume or timing as flows move through Margam Duck Pond. Therefore, the outputs of these results are likely to subject to a high margin of error. This is observed when compared to the outputs of the ReFH2 hydrology which demonstrates a significant variance in modelled outputs.

Climate change uplifts prescribed by NRW are based on national-scale allowances for increases in peak river flows , rainfall and sea level rise, derived from UKCP climate projections and applied uniformly by time horizon and emission scenario. These uplifts represent plausible future conditions but do not account for local catchment-specific factors such as land use change, soil characteristics, or small-scale hydrological responses, introducing uncertainty into future flood predictions.

[14] Ordinance Survey (2025) UK Map Centre OS Mastermap GIS | CAD Data 1 : 500 Scale OS Mapping. Available from: Ordnance Survey Mastermap for CAD|GIS in Many Formats

4.5.5 Topographical Information

The updated model's topography beyond the extent of the Margam Duck Pond utilises a 2m resolution grid in the 2D domain. There is a possibility that conveyance capacity through the remainder of the model domain may not be fully captured by the base DTM.

4.6 Assumptions

The main assumptions made within the Updated Model are as follows:

- Flows from the Afon Cynffig have no impact to flood risk within the Study Area;
- The downstream tidal boundary condition is consistent across all current day modelling scenarios, and all climate change modelling scenarios;
- Crest levels of obstructions within Margam Park were derived from aerial drone photogrammetry, which captures both vegetation and structural features. Where break lines were digitised to represent walls or other barriers, crest elevations were estimated using professional judgement, based on the surveyor's understanding of local topography and relative height differences observed in the data;
- Underlying 2m LiDAR was considered sufficient for use as the DTM;
- Bridge structures above the Margam Duck Pond Outlet and Emergency Overflow do not contribute to hydraulic control of water overtopping the Main Dam;
- An attendant of Margam Park operates the Emergency Overflow (sluice gate) reliably when a storm event occurs;
- The conveyance of water through structures west of the proposed development Site have not been accurately surveyed and therefore rely on assumptions only;
- Based on the assumption that the Upper Mother Outlet is subject to tidal locking, it was modelled as a unidirectional culvert discharging to Swansea Bay and linked to the MHWS boundary condition; and
- No water abstraction from the Upper Mother Ditch for onsite processes at the TATA Steel facility has been accounted for.

4.7 Recommendations

Fluvial flood risk to the Site has been shown to be highly sensitive to both inflow via structures beneath Harbour Way and outflow through the Upper Mother Ditch to Swansea Bay. The ability of the model to accurately represent flood behaviour is therefore limited by uncertainties in the arrangement, dimensions, and operation of these structures. To improve the confidence in model outputs and better inform future flood risk management, the following recommendations are made:

1. **Survey of Structures beneath Harbour Way**

   As the culverts underneath Harbour Way play an important part of the flooding mechanise at the site, we recommend verification of these structures. It is however noted that the verification is not expected to alter the conclusions of the overall results due to the sensible assumptions based on observations including a site walk over and available environmental drawings online.

2. **Survey and Investigation of the Upper Mother Outlet**

   The outfall structure discharging from the Upper Mother Ditch to Swansea Bay should be surveyed in detail. This includes confirming dimensions, structural condition, outfall destination, and operational arrangements (e.g., tidal flap, sluice gates or valves).

Understanding the degree to which tidal locking influences outflow is critical to assessing the Upper Mother Drain's ability to discharge during high water events.

3. Sensitivity analysis of the desilted Margam Duck Pond

To verify if the Margam Duck Pond is vulnerable to failure due to its effective storage, sensitivity testing using the 'hard' bed level bathymetry may inform future decision makers as to effective management of this particular vulnerability.

5.0 Conclusion

This report summarises the hydraulic modelling completed to inform the design of the proposed substation extension at Margam Moors. Building upon the baseline JBA model, the updated analysis incorporates refined representations of key hydraulic structures, including a detailed survey of Margam Duck Pond and its associated inflows and outflows.

The original model predicted significant flooding along the M4 due to overtopping from the Nant Cwm Philip, which is not supported by local flood history. In contrast, the updated model shows that while the Margam Duck Pond remains a critical source of flood risk, particularly during events exceeding a 3.3% AEP, the M4 does not flood for the 50% AEP event.

The current representation of the Pond in the model is considered to reflect present-day conditions given the detailed topographic and bathymetric surveys to improve its accuracy. It is considered that effective storage of the Duck Pond has likely diminished over time due to siltation from the upper catchment beyond the upstream boundary condition.

The Site remains at risk of fluvial flooding; however, the updated model indicates that this risk is highly sensitive to both inflow restrictions under Harbour Way and the outflow capacity of the Upper Mother Ditch and connecting culverts.

It is recommended that detailed survey data be collected for conveyance structures at the Site and along the Upper Mother Ditch, including the TATA Upper Mother Outlet. Although assumptions have been made on the structural dimensions, they are consistent on the pre and post development scenario and will not change the conclusions of the analysis completed.



Appendix A NRW Correspondence

Hydraulic Modelling Report

Margam Moors – Substation Extension

BakerHicks Limited

SLR Project No.: 402.065496.00001

22 August 2025

Subject: RE: Information request - Margam_FMC_5_V1.0_2023 Update
Sent: 04/02/2025, 11:30:30
From: Flood Risk Analysis South<FRASouth@cyfoethnaturiolcymru.gov.uk>
To: Chris Middleton
Cc: Travis Malmsheimer; Robert Walker

Hi Chris,

Cross Sections collected at approximately 50 metres spacing upstream of the inlet culvert appears reasonable. We recommend a cross section to be taken just downstream of the inlet culvert, this is to aid in the construction/modification of the model at this location.

We hope that answers your queries.

Thanks

Tim

Tim Gibson
Cynghorydd Dadansoddi Risg Llifogydd / Flood Risk Analysis Advisor
Dadansoddi Risg Llifogydd / Flood Risk Analysis
Rhif ffôn / Phone number: 07977 141665

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi.
Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.

From: Chris Middleton <cmiddleton@slrconsulting.com>
Sent: 04 February 2025 10:27
To: Flood Risk Analysis South <FRASouth@cyfoethnaturiolcymru.gov.uk>
Cc: Travis Malmsheimer <tmalmsheimer@slrconsulting.com>; Robert Walker <robertwalker@slrconsulting.com>
Subject: RE: Information request - Margam_FMC_5_V1.0_2023 Update

Rhybudd: Deilliodd yr e-bost hwn o'r tu allan i'r sefydliad. Peidiwch â chlicio dolenni, atodiadau agored nac sganio codau QR oni bai eich bod yn cydnabod yr anfonwr ac yn gwybod bod y cynnwys yn ddiogel.

Caution: This email originated from outside of the organisation. Do not click links, open attachments or scan QR Codes unless you recognise the sender and know the content is safe.

Morning Tim,

Thank you for your email. Your requirements are acknowledged, and we concur that the hydraulic structures at the lake are critical.

Before we update Storm Geomatics' scope, could I ask NRW to confirm our understanding of the required cross-sections at the locations highlighted below and shown in yellow on the attached plan? Furthermore, could you confirm that the cross-sections surveyed upstream of the lake inlet at 50m intervals is acceptable to NRW?

Our provisional date for attendance on-site is the week commencing 10th March.

Kind regards,
Chris.

Chris Middleton ***(he/him/his)***
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From: Flood Risk Analysis South <FRASouth@cyfoethnaturiolcymru.gov.uk>
Sent: 03 February 2025 08:33
To: Chris Middleton <cmiddleton@slrconsulting.com>
Cc: Travis Malmsheimer <tmalmsheimer@slrconsulting.com>; Robert Walker <robertwalker@slrconsulting.com>
Subject: RE: Information request - Margam_FMC_5_V1.0_2023 Update

Hi Chris,

Thank you for your email we have the following comments:

- NRW strongly recommends that survey cross sections be taken upstream of the inlet culvert of the lake, for approximately 150 metres.
- NRW recommend that an additional cross section is taken downstream of the inlet culvert.
- The lake outlet structures are critical to understanding flood risk and we recommend that the surveyor collect detailed information as this may help in better understanding of the flow capacity of these structures.
- We suggest if safe to do so to collect an additional cross section at the confluence of the two outlet drains.
- Storm Geomatics are familiar of NRW specification for hydraulic modelling survey which is based on the Environment Agency National Standard Technical Specification for Surveying Services.
- NRW recommend that Q_{med} simulation is also ran for all simulations.

As previously stated, that it is for the modeller/consultant to review the selected methodology during the development of the hydraulic model to ensure that it is delivering the intended requirements for the study.

Thanks,

Tim Gibson
Cynghorydd Dadansoddi Risg Llifogydd / Flood Risk Analysis Advisor
Dadansoddi Risg Llifogydd / Flood Risk Analysis
Rhif ffôn / Phone number: 07977 141665

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi.
Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.



From: Chris Middleton <cmiddleton@slrconsulting.com>
Sent: 31 January 2025 11:07
To: Flood Risk Analysis South <FRASouth@cyfoethnaturiolcymru.gov.uk>
Cc: Travis Malmsheimer <tmalmsheimer@slrconsulting.com>; Robert Walker <robertwalker@slrconsulting.com>
Subject: RE: Information request - Margam_FMC_5_V1.0_2023 Update

Rhybudd: Deilliodd yr e-bost hwn o'r tu allan i'r sefydliad. Peidiwch â chlicio dolenni, atodiadau agored nac sganio codau QR oni bai eich bod yn cydnabod yr anfonwr ac yn gwybod bod y cynnwys yn ddiogel.

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Prynhawn Da Alistair,

I hope you've been well.

We are looking to move forward with the Flood Map Challenge for the Margam Moor/Park area and would like to discuss the project with you further.

We'd like to establish a line of communication with NRW to validate our methodology for the Flood Map Challenge. The attached technical note summarises our method based on the requirements you outlined in the email thread below should you wish to comment further.

Is it acceptable for us to engage with you directly regarding this project moving forward?

Thank you for your time and assistance.

Kind regards,
Chris.

Chris Middleton ***(he/him/his)***
Graduate Hydrologist - Hydrology & Hydrogeology

O +44 3300 886631
M +44 7890 971494
E cmiddleton@slrconsulting.com

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From: Flood Risk Analysis South <FRASouth@cyfoethnaturiolcymru.gov.uk>
Sent: 11 September 2024 11:58
To: Chris Middleton <cmiddleton@slrconsulting.com>
Subject: RE: Information request - Margam_FMC_5_V1.0_2023 Update

Hi Chris,

The time frame for a model review is 6 weeks from submission.

Thanks,

Alastair Papworth
Cynghorydd Dadansoddi Risg Llifogydd/ Flood Risk Analysis Advisor
Dadansoddi Risg Llifogydd / Flood Risk Analysis
Yn Ardystiedig o ran Llythrennedd Carbon / Certified Carbon Literate

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi.
Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.



From: Chris Middleton <cmiddleton@slrconsulting.com>
Sent: Wednesday, September 11, 2024 11:24 AM
To: Flood Risk Analysis South <FRASouth@cyfoethnaturiolcymru.gov.uk>
Subject: RE: Information request - Margam_FMC_5_V1.0_2023 Update

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Morning Alastair,

Thank you for for providing this information. We will ensure that we cover these points within our modelling report.

In the interest of scoping our programme, may I ask as to the approximate time it takes to review or accept a model's outputs following submission of a Flood Map Challenge? Based on the 2023 JBA report, it appears it took over a year to complete the FMC.

If you are unable to answer, please provide a suitable contact so I may discuss the process.

Kind regards,
Chris.

Chris Middleton ***(he/him/his)***
Graduate Hydrologist - Hydrology & Hydrogeology

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From: Flood Risk Analysis South <FRASouth@cyfoethnaturiolcymru.gov.uk>
Sent: Wednesday, September 11, 2024 11:11 AM
To: Chris Middleton <cmiddleton@slrconsulting.com>
Subject: RE: Information request - Margam_FMC_5_V1.0_2023 Update

Good Afternoon Chris,

Thank you for the query regarding the Margam_FMC_5_V1.0_2023 hydraulic model.

Following extensive review of this area, NRW considers the following additional requirements to be completed for the hydraulic model.

- NRW note that there is a hydraulic structure at the inlet of the Lake, this is a culvert that may control the inflow to the lake. NRW does not have detailed survey of this structure or the river in this area. NRW recommend that this area be surveyed and including a length of the channel up and downstream to understand the impact of this hydraulic structure. This is shown on OS maps please see: Side by side georeferenced maps viewer - Map images - National Library of Scotland (nls.uk).
- NRW are unaware if there are any other hydraulic structures that would constrict the flow within the stream to the Lake.
- Two culverts missing under A4241 approximate at location SS78458675, NRW does not have detailed survey of these structures. It will depend on your client's site if these may need to be added.
- In may need additional survey data at the outlet of the lake including the channel and confirm the car park levels on the western edge of the lake as this area is where the floodwaters break out.
- The operation of the lake and how the lake level is maintained.
- The final point regarding hydraulic model is the hydrology applied within the model. This has undergone review by both JBA and NRW and is based on the current methodology which is considered suitable. Although it is NRW's opinion that the issue may relate to the flow estimate and will require a detail hydrological study to understand if the current methodology is over estimating Q_{med}.

We hope the above will assist you developing your modelling methodology and requirements for the work you are undertaking. It is for the modeller/consultant to review the selected methodology to ensure that it is delivering the intended requirements for the study.

Kind Regards,
Alastair Papworth
Cynghorydd Dadansoddi Risg Llifogydd/ Flood Risk Analysis Advisor
Dadansoddi Risg Llifogydd / Flood Risk Analysis
Yn Ardystiedig o ran Llythrennedd Carbon / Certified Carbon Literate

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi.
Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.



From: Chris Middleton <cmiddleton@slrconsulting.com>
Sent: Tuesday, September 10, 2024 3:10 PM
To: Flood Risk Analysis South <FRASouth@cyfoethnaturiolcymru.gov.uk>
Subject: Information request - Margam_FMC_5_V1.0_2023 Update

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Good afternoon,

Regarding the Margam_FMC_5_V1.0_2023 hydraulic model, I would like to request guidance on updating the flood maps for planning within the modelled boundary. On behalf of our client, we aim to confirm the fluvial risk to the wider area.

The accompanying JBA report (Rev.: B, February 2023) notes that the flood risk from the 'Ty Du' reservoir does not align with the area's flood history, particularly west along the M4.

Could you provide guidance on aligning our model revision with the required approach? Please clarify which elements of the model should remain unchanged and the acceptable level of detail for challenging the previous model.

Pending receipt of Product 7 from NRW, I'm available to discuss the requirements via a call if needed.

Kind regards,
Chris

Chris Middleton ***(he/him/his)***
Graduate Hydrologist - Hydrology & Hydrogeology

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E cmiddleton@slrconsulting.com

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Appendix B Margam Lake Survey

Hydraulic Modelling Report

Margam Moors – Substation Extension

BakerHicks Limited

SLR Project No.: 402.065496.00001

22 August 2025

E 280,300

E 280,400

N 186,500

N 186,400

NORTH

Sheet Layout (not to scale)



22 Imagery@2022 Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group

SYMBOL KEY

- TOP OF BANK
- BOTTOM OF BANK
- SOFT REC (EVL)
- HARD RED LEVEL
- WATER LEVEL
- BANDT LEVEL
- SUPPT LEVEL
- GROUND LEVEL

NOTES:

ALL LEVELS ARE METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE STATED.
ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.

SURVEY LEGEND

AC	AIR DUCT	FH	FIRE HYDRANT MARKER	PHP	POST & WIRE FENCE
AV	AIR VALVE	FHH	FIRE HYDRANT MARKER	PI	NEWS SHOP
B	BOLLARD	FL	FLOOR LEVEL	PL	STREAM LEVEL
BCN	BEACON	FP	FLOOD POINT	PO	POST OFFICE
BDY	BOUNDARY	FWL	FOUL WATER MANHOLE	PTW	PETRAMIC WALL
BH	BOREHOLE	G	GATE POST	PW	PUMPING STATION
BL	BOLLARD	GL	GATE/RAIL (LEVEL)	Q	STOP COCK
BMK	BENCH MARK	GP	GATE POST	QUP	STEAM VENT
BO	BOLLARD	GT	GATE/RAIL POST	R	RAILWAY LEVEL
BR	BENCH MARK	GV	GAS VALVE	RL	SUPPT LEVEL
BW	BRICK WALL	HR	HEAD RAIL	SMH	SLAB W/ 3 HOLE MANHOLE
CBF	CLOSE BOARDED FENCE	HT	HEDGE TOP (LEVEL)	SP	SLAB W/ 4 HOLE MANHOLE
CBT	CLOSE BOARDED TRACK	K	KERB LEVEL	SV	SIGN POST
CH	CORNICE/CHIMNEY POTS	KP	IRON FENCE/RAIL POST	SVT	STEEL PALISADE FENCE
CL	CHAIN LINK FENCE	LP	LAMP POST (LEVEL)	TC	TOP OF CUT
CLT	CHAIN LINK TRACK	LV	LEVEL TOP	TV	SLUICE VALVE
CONC	CONCRETE	MD	MINI BOLLARD	UP	SUB_VENT PIPE
CP	CONCRETE POST	MH	MANHOLE	VC	VERTICAL STOCK MARK
CPT	CHESTNUT PALING FENCE	OTB	OTTER BOX	VCP	TELEPHONE CALL BOX POST
CS	CYCLE RACK	OT	LAMP POST	W	TELECOM CABINET
CT	CLOSE TRACK - HARDPOSE	P	POST (LEVEL) LOAD	WC	WATER COURSE
CUL	CULVERT	PAL	MESH CHAIN LINK FENCING	WL	THRESHOLD (LEVEL)
DA	DISCP WORK	PB	BUNKER	WT	TRAFFIC LIGHT
DP	DRAIN POINT	PC	PEDESTAL	X	TELEPHONE POLE
DT	DORMANT	PF	ACCORDAL RAIL	YB	TELEGRAPH POLE
EPC	EDGE TRACK COURSE	PMT	METAL CLOSING TOAD	YBS	TIMBER SLEEPER STRIP
EW	EDGE WALL	PO	POST (LEVEL)	YC	TOP OF CUT
EWB	EDGE WATER BAR	PR	PATRICE BOARD	YG	TOP OF STEEL BOLLARD
ES	ENVIRONMENT AGENCY	PRC	PATRICE BOARD - ALPHONEY	YP	WOOD POST
EV	ELECTRIC VALVE	PS	SHEEPHEAD GUARD	WS	WATER SIDE
FCP	ELECTRIC GATE POST	PT	TOP OF POST	WL	WATER LEVEL
FCT	ELECTRIC GATE TRACK	PTA	STEEL POST & RAILS	WMH	WATER MANHOLE
FMP	ELECTRICITY MARKER POST	R	RAIL	WMP	WBG MESH FENCE
FP	ELECTRIC POLE	RB	RAILWAY BUSH	WP	WOOD POST
GL	ELECTRIC POLE	RK	TIMBER/METRE	WPR	WOODEN POST & RAIL FENCE
ETL	ELECTRICITY TRANSFORMER - JBC	RP	POST	WS	WATER VALVE
FB	FLOWER BED	RT	RAIL & RAIL FENCE		
FBL	FLOODLIGHT	RTA	TIMBER TRUST MOUND		

REV.	AMENDMENT	DRN	CHKD	DATE

CONTROL USED:

ID	DESCRIPTION	Easting	Northing	Height
66 Margam	PK Nail	280288.068	186360.199	44.207

STORM GEOMATICS
Tel: 01608 664910
mail@storm-geomatics.com
www.storm-geomatics.com

CLIENT
SLR Consulting

PROJECT
Margam Park Survey

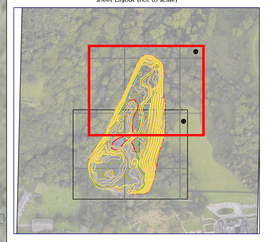
SITE
Margam Park, Margam,
Port Talbot, Wales
Bathymetric Survey - Soft Bed Contours Shown
Sheet 1 of 2

SURVEYED BY: Storm Geomatics Ltd		Project Ref: 2432/022409
SURVEY DATE: March 2025		
SCALE: 1:200 (A0 Sheet)	DRN: WJ	CHKD: ARP
DATUM: OS Newlyn (15)	DATE: 24/03/2025	DATE: 28/03/2025
GRID: OS Grid (15)	DRAWING NO.	REV.
CAD FILENAME: 014418-425_070.dwg	014418-425-09	–

E 280,300
E 280,400
N 186,600
N 186,500

NORTH

Sheet Layout (not to scale)



22 Imagery@2022 Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group

SYMBOL KEY

- TOP OF BANK
- BOTTOM OF BANK
- SOFT REC LEVEL
- HARD REC LEVEL
- WATER LEVEL
- BANGAT LEVEL
- SLOPPY LEVEL
- GROUND LEVEL

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SURVEY LEGEND

AC	AIR DUCT	FH	FIRE HYDRANT MARKER
AV	AIR VALVE	FHR	FIRE HYDRANT RISER
B	BOLLARD	FL	FLOOR LEVEL
BCP	BOUNDARY CONCRETE POST	FP	FLOOR PLATE
BDY	BOUNDARY	FWA	FOUL WATER MANHOLE
BH	BOREHOLE	G	GAS VALVE
BL	BOLLARD LIGHT	GL	GROUND LEVEL
BRA	BRACKETARM	GT	GATE POST
BS	BUS STOP	GV	GAS VALVE
BX	BOXED DRAIN	GY	GULLY INLET
BW	BRICK WALL	HR	HEAD RAIL
CF	CLOSE BOARDED FENCE	HT	HEIGHT OF OBJECT
CLF	CLOSE BOARDED TRELLIS	IL	INVERT LEVEL
CM	CORRUGATED IRON FENCE	IRP	IRON RAILING POST
CO	CABLE OUTLET	IRR	IRON RAILINGS
CV	CHAMBER VALVE	JV	JUNCTION VALVE
CWC	CONCRETE WALL COPING	KO	KERB INVERT OUTLET
CWF	CONCRETE POST FENCE	LC	LAMP COLUMN
CPF	CHESTNUT PALING FENCE	LTO	LETTER BOX
CS	CYCLE STAND	LT	LAMP POST
CT	CABLE TV MANHOLE	MB	MAST BOTTOM GUY
CUL	CULVERT	MF	MESH & WROUGHT IRON FENCING
DA	DISAP ACMS	MH	MANHOLE
DC	DRAIN CAP	MO	MOORING
DT	DOMESTIC TANK	MP	MOORING PILE
DPC	DAMP PROOF COURSE	MRT	METAL RAILING POST
DW	DOOR WAY	NP	NOTICE POST
DWE	DRIVE WAYS IN	NS	NOTICE BOARD
EA	ENVIRONMENT AGENCY	OHL	OVERHEAD LINE SUPPORT
EB	ELECTRIC BOX	OHC	OVERHEAD CABLE
ELP	ELECTRIC GATE POST	OL	OUTLET
ELT	ELECTRIC LIGHT TOWER	OS	ORDNANCE SURVEY BENCH MARK
ESP	ELECTRICITY PYLON	P	PILE
ET	ELECTRICITY TOWER	PC	PILE CAP
EX	ELECTRIC METER	PE	PALISADE METAL FENCE
ETL	ELECTRICITY TRANSFORMER (UK)	PO	POST
FB	FLOWER BED	PR	PALISADE TIMBER FENCE
FBL	FLOODLIGHTS	PTA	PLANTING TREATMENT AREA
PWF	POST & WIRE FENCE		
RI	RIVER BANK		
SA	SLUICE VALVE		
SBF	STEEL BOARDED FENCE		
SF	SIGN POST		
SGP	STAKE AND WIRE		
SL	SLOPPY LEVEL		
SMH	SURFACE WATER MANHOLE		
SP	SPOT HEIGHT		
ST	STAIRS		
STF	STEEL PALISADE FENCE		
SV	SLUICE VALVE		
SW	SLUICE VALVE		
SWP	SOIL VENT PIPE		
TC	TELEPHONE BOOK MARKER		
TCP/TCV	TELEPHONE CALL BOX/POST		
TE	TELECOM CABINET		
TH	TELEPHONE HOUSE		
TPS	TIMBER POST & WIRE FENCE		
TS	TRAFFIC LIGHT		
TV	TELEVISION MAST		
TW	TELEGRAPH POLE		
TWS	TIMBER SLEEPERS STEP		
UC	UNDER CUT		
VP	VERGE POST		
WA	WATER APPLIANCE		
WC	WATER COURSE		
WL	WATER LEVEL		
WM	WATER METER		
WMP	WELL MESH FENCE		
WP	WOODEN POST		
WPF	WOODEN POST & WIRE FENCE		
WS	WATER SHUTOFF		
WV	WATER VALVE		

(above survey legend is for all survey data sets)

REV.	AMENDMENT	DRN	CHKD	DATE

CONTROL USED:

ID	DESCRIPTION	Easting	Northing	Height
66 Margam	PK Nail	280288.068	186360.199	44.207

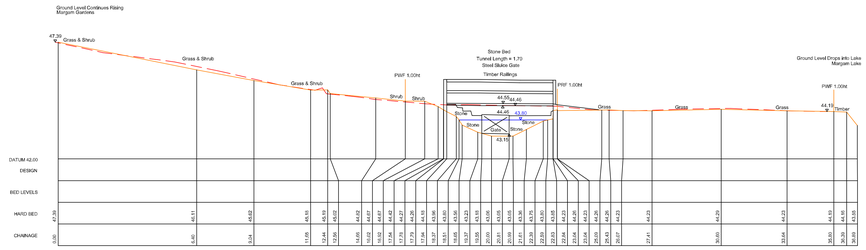
STORM GEOMATICS
Tel: 01608 664910
mail@storm-geomatics.com
www.storm-geomatics.com

CLIENT
SLR Consulting

PROJECT
Margam Park Survey

SITE
Margam Park, Margam,
Port Talbot, Wales
Bathymetric Survey - Soft Bed Contours Shown
Sheet 2 of 2

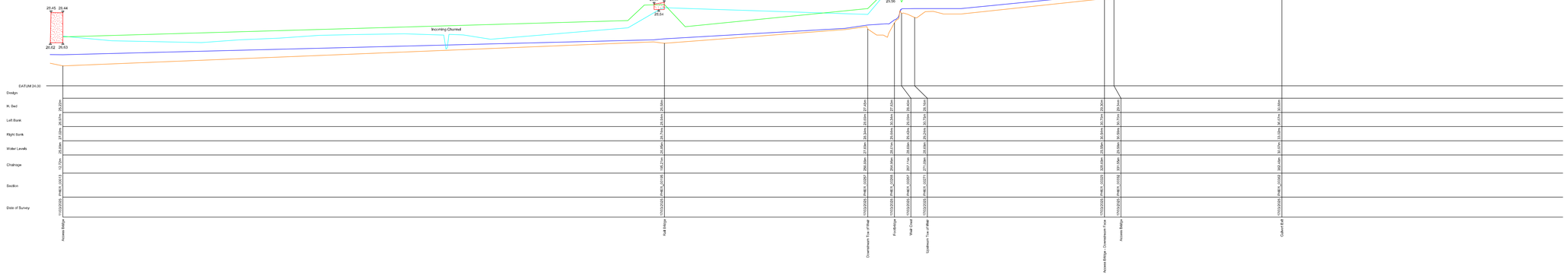
SURVEYED BY: Storm Geomatics Ltd		*Project Ref: 2452/022409*
SURVEY DATE: March 2025		
SCALE: 1:200 (A0 Sheet)	DRN: WJ	CHKD: ARP
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GRID: OS Grid (15)	DRAWING NO.	REV.
CAD FILENAME: 014418-425_070.dwg	014418-425-10	–


Ground Level Continues Rising Morgam Gardens
47.39
Grass & Shrub
Grass & Shrub
Grass & Shrub
PWF 1.00M
Shrub
Shrub
Stone Bed
Tunnel Length = 1.70
Steel Sluice Gate
Timber Railings
PWF 1.00M
44.56
44.48
44.45
43.60
Stone
Gate
Stone
43.53
Grass
Grass
Grass
Ground Level Drops Into Lake Margam Lake
PWF 1.00M
44.19
Timber
DATUM 42.00
DESIGN
BED LEVELS
HARD BED
47.39
CHAINAGE
0.00
44.11
44.02
44.10
44.03
44.02
44.07
44.07
44.02
44.27
44.26
44.06
44.00
43.95
43.95
43.93
43.93
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44.23

LONG SECTION KEY:

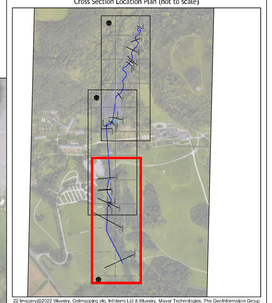
WATER LEVEL
BED LEVEL
SILT LEVEL
STRUCTURES
RIGHT BANK
LEFT BANK

VIEWED LOOKING DOWNSTREAM.
POINTS INDICATED BY 'C' ON CROSS SECTIONS AND ACCEPTANCE POINTS BETWEEN SECTIONS





Cross Section Location Plan (not to scale)



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NOTES:

ALL CROSS SECTIONS VIEWED IN A DOWNSTREAM DIRECTION UNLESS OTHERWISE STATED.
ALL LEVELS ARE IN METRES ABOVE TRENAMETS DATUM UNLESS OTHERWISE STATED.
ALL DIMENSIONS & CHAINAGES ARE IN METRES UNLESS OTHERWISE STATED.

SURVEY LEGEND

AB	AIR BRICK	FH	FIRE HYDRANT	PWF	POST & WIRE FENCE
AV	AIR VALVE	FHW	FIRE HYDRANT MARKER	RE	NEWT KERB
BH	BOREHOLE	FL	FLOOR LEVEL	RL	ROOF LEVEL
BO	BOLLARD / BILLSTON	FP	STAKE POST	SL	SLAG BANK
BOT	BOTTOM	FWA	FULL WATER MARKER	STW	SETBACK WALL
BR	BRICK WALL	G	GRATE	TB	TELEGRAPH POLE
BL	BUILDING OUTLINE	GL	GROUND LEVEL	TF	TOP OF FENCE
BW	BRICK WORK	GP	GATE POST	TOP	TOILAC PIPE
CA	CAR PARK AREA	GT	GATE TO POST	TR	TRAFFIC LIGHT
CH	CHAIN HOOK	GV	GAS VALVE	TL	TOPPED LEVEL
CW	CHAIN WALL	HH	HEAD WALL	TWC	TURF ACC TO CENTRE OF MANHOLE
CF	CHAIN LINK FENCE	HL	HEDGE TO BOUNDARY	TWF	TURF ACC TO FENCE
CP	CLOSE BOARDED FENCE	IL	INVERT LEVEL	UC	UNKNOWN
CV	CONDUCTED MESH FACE	IRP	IRON RAILING POST	UTF	UTILITY FENCE
CC	CONCRETE	IRF	IRON RAILING FENCE	UTL	UTILITY LINE
CH	CHAIN LINK FENCE	JB	JUNCTION BOX	VC	VOLVO CURVE
COMC	COMPACT	KB	KERB / KERB EDGE	VP	VOLVO POST
CP	CONCRETE POST	LB	LIFT BUTT	WM	WATER METER
CPT	CONCRETE PLANE FENCE	LT	LIFT TOP	TOP TCP	TELEPHONE CALL BOX POST
CT	CONCRETE	LP	LAMP POST	TC	TELEPHONE CABINET
CTV	CABLE T.V. MANHOLE	ME	MOORING BOLLARD	TMH	TELECOM MANHOLE
CB	CATCH BASIN	MF	MOORING POST & RING	TP	TELEPHONE POLE
CL	CULVERT	MH	MANHOLE	TL	TRAFFIC LIGHT
DL	DOOR LEVEL	MKP	MARKER	TLB	TRAFFIC LIGHT BOX
DP	DRAINAGE PIPE	MP	MARKER POST	TLP	TRAFFIC LIGHT POST
DPT	DAME TRUCK COURSE	MSF	METAL SLEEPER FENCE	TBS	TRIBBLE BUSINESS SYSTEM
DR	DRAIN	NS	NAIL STAKE	TS	TREE STUMP
DS	DRAINAGE SUMP	OB	OVERHEAD BARRIER	TW	TOP OF WALL / BANKING
EA	ENVIRONMENT AGENCY	OHB	OVERHEAD BARRIER	UP	UNDER PIPE
ES	ELECTRICITY BOX	OHC	OVERHEAD CABLE	WB	WASTE BIN
EST	ELECTRICITY CABLE TEST	OL	OVERHEAD LINE	WC	WATER COURSE / WATER LINE
EOT	ELECTRICITY CLOSE TEST	OM	OPEN STEEL RAILINGS	WM	WATER METER
EMP	ELECTRICITY MARKER POST	P	PILLAR	WMP	WALL MOUNTED POST
ET	ELECTRICITY TOWER	PB	POST & BOX	WP	WOOD POST
EX	EARTHING POST	PM	PEDESTRIAN BARRIER	WPR	WOODEN POST & RAIL FENCE
ETL	ELECTRICITY TRANSFORMER LINE	PO	POST	WS	WATER VALVE
FB	FLOWER BED	PR	PEDESTRIAN RAIL FENCE	YD	YARD DRAIN
FM	FOOTBRIDGE	PTH	THERMAL TEXT MACHINE		(data received by EG via survey data only)

REV.	AMENDMENT	DRN	CHKD	DATE

CONTROL USED:

ID	DESCRIPTION	Easting	Northing	Height
Es Margam	FK Nail	280268.068	186360.999	44.207

STORM GEOMATICS
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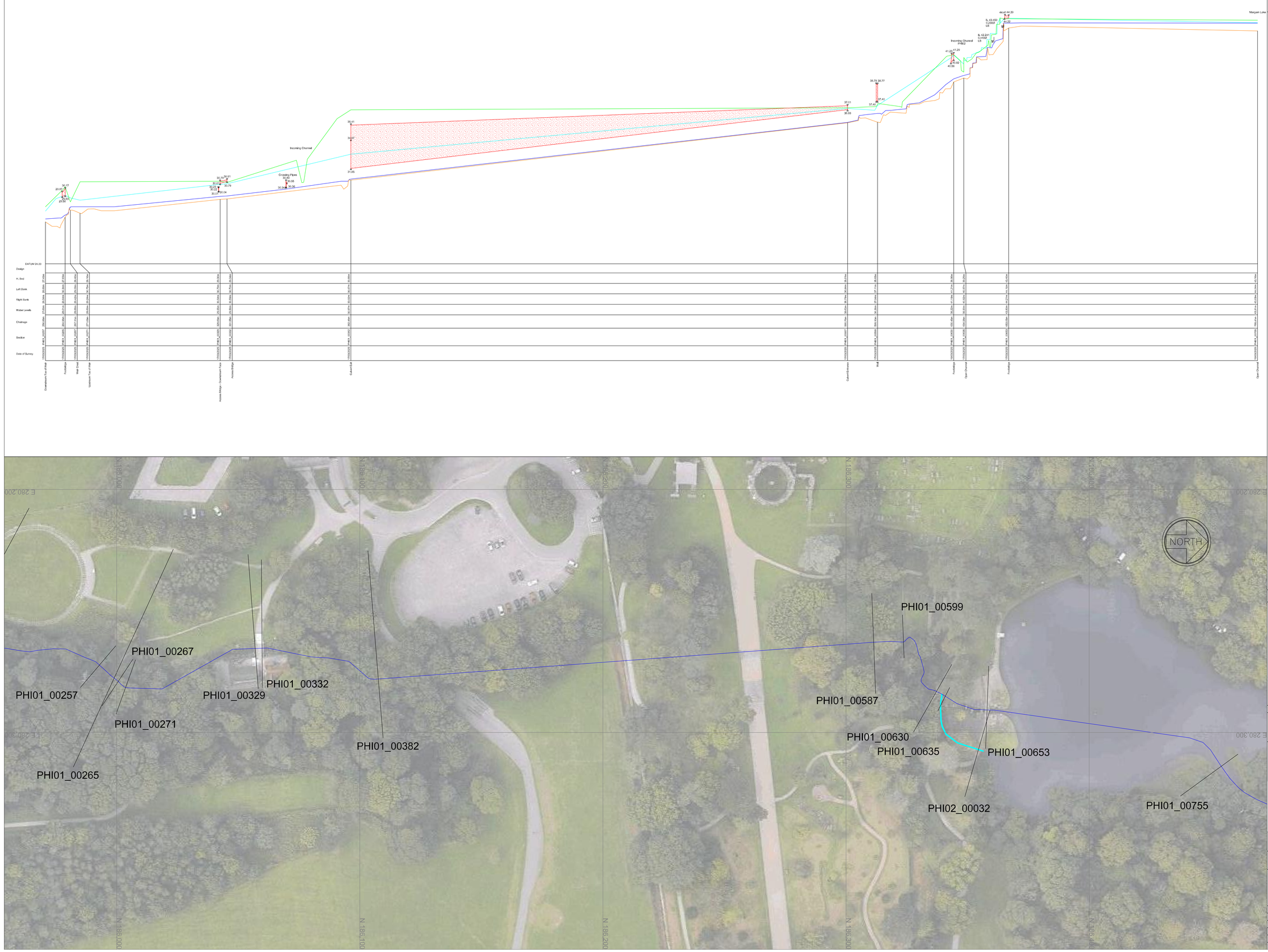
CLIENT: SLR Consulting

PROJECT: Margam Park Survey

SITE: Margam Park, Margam, Port Talbot, Wales
Long Section & Location Plan
Sheet 1 of 3

SURVEYED BY: Storm Geomatics Ltd	*Project Ref: 2405/032409*	
SURVEY DATE: March 2025		
SCALE: As Shown (A0 Sheet)	DRN: MJ	CHKD: ARP
DATUM: OS Newlyn (15)	DATE: 24/03/2025	DATE: 26/03/2025
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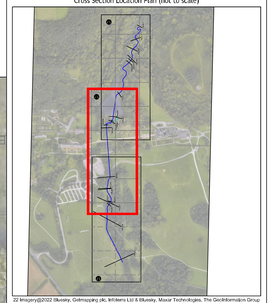


LONG SECTION KEY:

- WATER LEVEL
- BED LEVEL
- SILT LEVEL
- STRUCTURES
- RIGHT BANK
- LEFT BANK

VIEWED LOOKING DOWNSTREAM. POINTS INDICATED BY 'C' ON CROSS SECTIONS AND ADDITIONAL POINTS BETWEEN SECTIONS

Cross Section Location Plan (not to scale)



22 Imagery@2022 Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group

NOTES:

1. ALL CROSS SECTIONS VIEWED IN A DOWNSTREAM DIRECTION UNLESS OTHERWISE STATED.
2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE STATED.
3. ALL DIMENSIONS IN CENTIMETRES ARE IN METRES UNLESS OTHERWISE STATED.

SURVEY LEGEND

AB	AIR BRICK	FH	FIRE HYDRANT	PHF	POST & MESH FENCE
AV	AIR VALVE	FHW	FIRE HYDRANT MARKER	PB	NEWS BOARD
BH	BOREHOLE	FP	FENCE POST	PC	PLANTING AREA
BL	BOLLARD / BILLICON	FR	FENCE RAIL	PL	SIGN POST
BST	BOOMGATE	FWA	FOUL WATER MANHOLE	PTW	PETRAMESH WALL
BT	BT MANHOLE	G	GULLY	PW	POST & WIRE FENCE
BL	BUS LEVEL	GA	GATEWAY (STEEL)	R	STEP LEVEL
BW	BUSH/HEDGE	GP	GATE POST	SCP	STUMP/TREE
CB	CATCH PIT	GR	GUARD RAIL	SL	SLOPE LEVEL
CH	CHAIN LINK FENCE	GV	GAS VALVE	SL	SUPPLY LEVEL
CW	CHAIN LINK FENCE	HW	HEAD WALL	SMH	SURVEY MONUMENT
CP	CLOSE BOARDED FENCE	IC	INSPECTION CHAMBER	SP	SIGN POST
CP	CLOSE BOARDED TRELLIS	IL	INVERT LEVEL	SP	SIGN POST
CF	CORRUGATED IRON FENCE	IRP	IRON RAILING POST	STF	STEEL PALISADE FENCE
CL	CROWN LEVEL	IRW	IRON RAILING WALL	SV	SLUICE
CLF	CHAIN LINK FENCE	JC	JUNCTION BOX	SV	SLUICE VALVE
COMC	COMMS CABLE	KB	KERB (TOP EDGE)	TB	TELEGRAPH BOX
CP	CONCRETE POST	LA	LIFT AWAY	TBM	TEMPORARY BENCH MARK
CP	CONCRETE PALING FENCE	LB	LIFT BOARD	TCP/SV	TELEPHONE CABLE BUS POST/ SERVICE VALVE
CT	CABLE TV	LD	LEAD DOT	TM	TELECOM MANHOLE
CTV	CABLE T.V. MANHOLE	ME	MOORING BOLLARD	TMH	TELECOM MANHOLE
CVL	CONTOUR LEVEL	MF	METAL FENCE (GENERAL)	TS	TRAFFIC SIGNAL
D	DOOR STEP	MH	MANHOLE	TSC	TRAFFIC LIGHT
DL	DOOR LEVEL	MHT	MANHOLE TBC	TSP	TRAFFIC LIGHT SIGN
DP	DRAINAGE POINT	MP	METAL PALING FENCE	TW	TIMBER FENCE
DPC	DAMP PROOF COURSE	MSF	METAL SLIDING GATE	TWB	TIMBER RAILWAY SLEEPER WALL
DR	DRAIN	NC	NAIL STONE	TY	TREE STUMP
E	ELECTRICITY BOX	NF	NEW FENCE (TBC)	UC	UNDERGROUND CABLE MARKER
EA	ENVIRONMENT AGENCY	NSB	NOTICE BOARD	UP	UTILITY POLE
EB	ELECTRICITY BOX	O/C	OVERHEAD CABLE	VC	VALVE CAP
ECP	ELECTRICITY CONTROL POST	OB	OPEN BOARD	WC	WATER COMPANY MANHOLE
ELP	ELECTRICITY CLOSED TOP	OBF	OPEN STEEL RAILINGS	WM	WATER METER
EMP	ELECTRICITY MANHOLE	P	PILLAR	WMF	WIRE MESH FENCE
ES	ELECTRICITY SUB STATION	PA	PALISADE FENCE	WP	WOODEN POST
ES	ELECTRICITY SUB STATION	PB	PARKING METER	WPR	WOODEN POST & RAIL FENCE
ETL	ELECTRICITY TRANSFORMER	PO	POST	WV	WATER VALVE
FB	FLOWER BED	PR	PALISADE RAIL FENCE	XS	CROSS SECTION
FM	FOOTBRIDGE	PTR	PLANTING TRUST MACHINE		Underground services shown by ES Surveys data only

REV.	AMENDMENT	DRN	CHKD	DATE

CONTROL USED:

ID	DESCRIPTION	Easting	Northing	Height
Es Margam	FK Nail	280268.068	186360.999	44.207

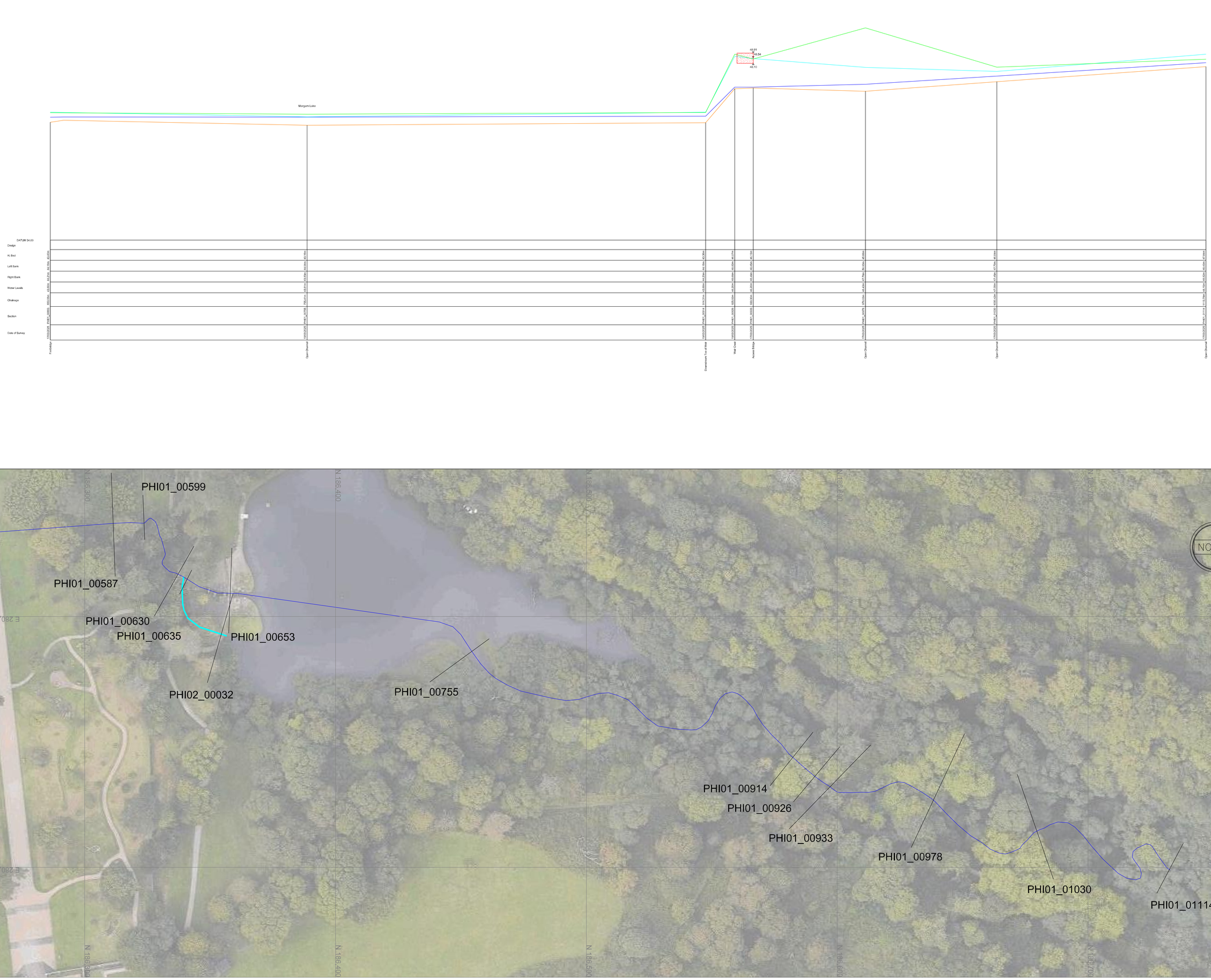
STORM GEOMATICS
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mail@storm-geomatics.com
www.storm-geomatics.com

CLIENT: SLR Consulting

PROJECT: Margam Park Survey

SITE: Margam Park, Margam, Port Talbot, Wales
Long Section & Location Plan
Sheet 2 of 3

SURVEYED BY: Storm Geomatics Ltd	Project Ref: 2405/022409	
SURVEY DATE: March 2025		
SCALE: As Shown (A0 Sheet)	DRN: MJ	CHKD: ARP
DATUM: OS Newlyn (15)	DATE: 24/03/2025	DATE: 26/03/2025
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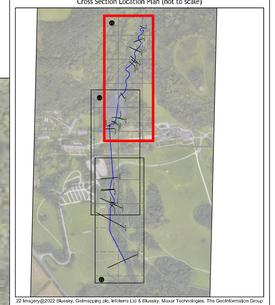


LONG SECTION KEY:

- WATER LEVEL
- BED LEVEL
- SILT LEVEL
- STRUCTURES
- RIGHT BANK
- LEFT BANK

VIEWED LOOKING DOWNSTREAM. POINTS INDICATED BY 'C' ON CROSS SECTIONS AND ADDITIONAL POINTS BETWEEN SECTIONS

Cross Section Location Plan (not to scale)



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NOTES:

ALL CROSS SECTIONS VIEWED IN A DOWNSTREAM DIRECTION UNLESS OTHERWISE STATED.
ALL LEVELS ARE METRES ABOVE TRIDANTZ DATUM UNLESS OTHERWISE STATED.
ALL DIMENSIONS & CHAINAGES ARE METRES UNLESS OTHERWISE STATED.

SURVEY LEGEND

AB	AIR BRICK	FH	FIRE HYDRANT	THF	POST & WIRE FENCE
AV	AIR VALVE	FHW	FIRE HYDRANT MARKER	TR	NEWT SIGN
BH	BOREHOLE	FL	FLOOR LEVEL	TS	TRAFFIC SIGN
BS	BOLLARD, BILLSTON	FP	FENCE POST	TV	VALVE BOX
BST	BOOMGATE	FWA	FULL WATER MANHOLE	UTM	NETAMERIC MAST
BT	BT MANHOLE	G	GULLY	VC	VEGETATION CUT
BL	BED LEVEL	GL	GROUND LEVEL	W	SLOPE LEVER TIP
BW	BASE WORK	GP	GATE POST	WP	STAKE/PIPE
CB	CATCH PIT	GT	GATE TO FIELD	WT	WATER TAP
CH	CHAIN HOOK	GV	GAS VALVE	XL	SLOPED LEVEL
DW	DRIVE WALL	HH	HEAD WALL	YMH	TLAP NETA TEE MANHOLE
EF	ELECTRIC BASE FENCE	IL	INVERT LEVEL	YP	TELEGRAPH POLE
EP	CLOSE BOARDED TREAT	K	KERB LEVEL	ZP	BUS POST
CF	CONDUCTED MESH FENCE	MP	IRON RAILING POST	STF	STEEL PALISADE FENCE
CP	CONCRETE POST	MV	MANHOLE VALVE	SV	SLUICE
CT	CHAIN LINK FENCE	PC	CAST IRON TEE	SV	SLUICE VALVE
CWK	CONCRETE WALL	PL	PLANTING POST GULLY	TW	TOP OF WALL
DP	DRAINAGE POST	LB	LEFT BANK	TBM	TEMPORARY BENCH MARK
CP	CONCRETE PILING FENCE	LT	LEFT TOE	TCP/TCV	TELEPHONE CABLE BUS POST
CV	CULVERT	LV	LEVER VALVE	TL	TELEGRAPH LINE
CTV	CABLE T.V. MANHOLE	ME	MOORING BOLLARD	TMH	TELECOM MANHOLE
CB	CATCH PIT	MF	MOORING POST STAKING	TS	TELEPHONE POST
CL	CULVERT	MH	MANHOLE	TL	TRAFFIC LIGHT
CL	DUCK LEVEL	MHT	MARKER	TLB	TRAFFIC LIGHT BOX
DP	DRAIN POST	MHP	MANHOLE PILE	TP	TRAFFIC LIGHT POST
DPT	DUMP TRUCK COURSE	MSP	METAL SLEEVE POST	TBS	TIMBER SLEEPERED SUMP
DR	DRAIN	MS	METAL STAKE	TS	TREE STUMP
DS	DRAIN SUMP BIN	NB	NEWT BOARD	TW	TOP OF WALL (ON BANKED)
EL	ENVIRONMENT AGENCY	NSB	NATIONAL SHORE ALIGNMENT	UP	WEST PIPE
ES	ELECTRICITY BOX	OHC	OVERHEAD CABLE	WB	WASTE BIN
EP	ELECTRICITY BOX POST	OP	OUTLET PIPE	WC	WATER COURSE WIDTH (BC
ELT	ELECTRICITY CABLE TRT	OSB	OPEN STEEL BARRIER	WBL	WATER METER
EWP	ELECTRICITY WARNLT	P	PILLAR	WMP	WING MESH FENCE
EP	ELECTRIC POST	PB	PLANTING BOX	WP	WOOD POST
ES	ELECTRIC STAY	PH	PHONE METER	WPR	WOOD POST & RAIL FENCE
FTL	ELECTRICITY TRANSFORMER (BC	PO	POST	WV	WATER VALVE
FB	FLOWER BED	PT	PLANTING TUBE/TRAY	WT	WATER TAP
FM	FOOTBRIDGE	PTH	THERMAL TILLEY MACHINE		

Data received in OS 27 survey data only

REV.	AMENDMENT	DRN	CHKD	DATE

CONTROL USED:

ID	DESCRIPTION	Easting	Northing	Height
Es Margam	FM Nail	280288.068	186360.999	44.207

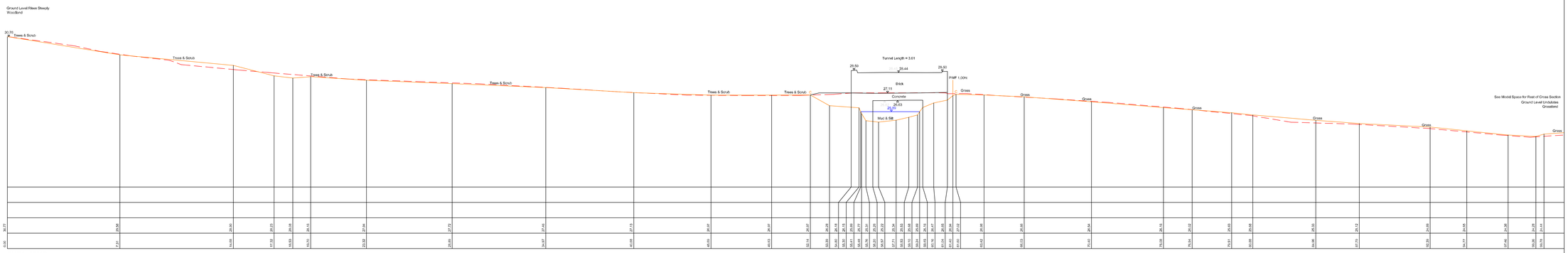
STORM GEOMATICS
Tel: 01608 664910
mail@storm-geomatics.com
www.storm-geomatics.com

CLIENT: SLR Consulting

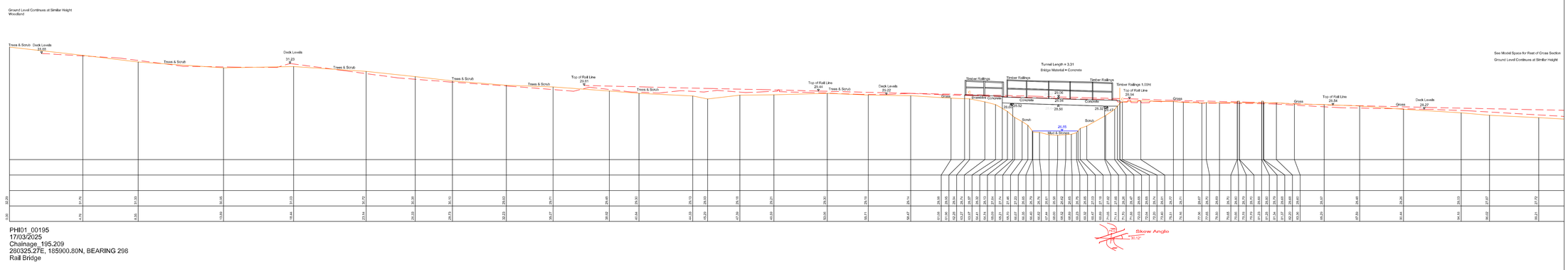
PROJECT: Margam Park Survey

SITE: Margam Park, Margam, Port Talbot, Wales
Long Section & Location Plan
Sheet 3 of 3

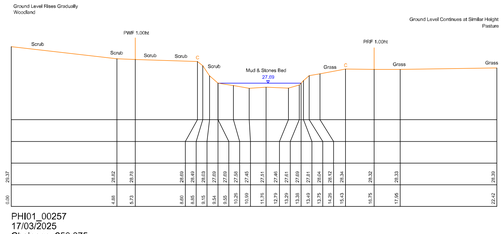
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SURVEY DATE: March 2025		
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GRID: OS Grid (15)	DRAWING NO.: 014418-425-07	REV.: –
CAD FILENAME: 014418-425_DCS_DPP_XS+LP.dwg		



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11/03/2025
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Access Bridge



PHI01_00195
17/03/2025
Chainage_195.209
280325.27E, 185900.80N, BEARING 298
Rail Bridge



PHI01_00257
17/03/2025
Chainage_256.875
280281.47E, 185985.13N, BEARING 310
Downstream Toe of Weir

PHI01_00265
17/03/2025
Chainage_264.960
280314.18E, 185982.19N, BEARING 295
Footbridge

CROSS SECTION KEY:
- WATER LEVEL
- BED LEVEL
- SILT LEVEL

NOTES:
ALL LEVELS RELATIVE TO ORDNANCE DATUM NEWLYN (TYNEMOUTH).
ALL LEVELS AND HEIGHTS ABOVE ORDNANCE DATUM UNLESS OTHERWISE STATED.
ALL DIMENSIONS IN MILLIMETRES (M) OR METRES UNLESS OTHERWISE STATED.

SURVEY LEGEND

AB	AIR BRICK	FH	FIRE HYDRANT	PWF	POST & WIRE FENCE
AV	AIR VALVE	FHR	FIRE HYDRANT MARKER	SI	SIGN (MISC.)
B	BOLLARD	FL	FLOOR LEVEL	SL	STREET LIGHT
BC	BOUNDARY CLOSURE	FP	FLAG POLE	SP	SOIL VENT PIPE
BDY	BOUNDARY	FWL	FOUL WATER MANHOLE	STW	SEWAGE TREATMENT WORKS
BH	BOREHOLE	G	GULLY	SV	STOP VALVE
BL	BOLLARD	GA	GATE (AERIAL)	SW	STOP COCK
BMA	BENCH MARK	GF	GATE POST	SWP	STONE WALL
BT	BT MANHOLE	GP	GUARD POST	T	TREE
BW	BOUNDARY MARKER	GR	GAS VALVE	TA	TOP OF BANK
BWL	BRICK WALL	HR	HEAD RAIL	TBM	TEMPORARY BENCH MARK
C	CENTRE LINE (FENCE)	HW	HEADWALL (CULVERT)	TC	TOP OF CUTTING
CAP	CLOSED DIAMETER PIPE	IL	INVERT LEVEL	TE	TOP OF EMBANKMENT
CF	CORRUGATED IRON FENCE	INF	IRON FENCE POST	TFT	TYPICAL PALISADE FENCE
CH	CHAINAGE	IP	INSPECTION PIT	TH	TOP OF HEDGE
CLV	CHAIN LINK FENCE	JU	JUNCTION BOX	TV	TOILET VALVE
CONC	CONCRETE	KEB	KERB (MATT GUY)	TVP	TOP OF WALL
COP	CONCRETE POST	LB	LAMP BOX	UP	UTILITY POLE
CPT	CHESTNUT PALING FENCE	LTG	LETTING	VC	VERTICAL CURVE MANHOLE
CS	CYCLE RACK	LT	LAMP POST	VP	VENT POST
CT	CABLE TV MANHOLE	MF	MESH FENCE (LOW)	WC	WATER COURSE
CUL	CULVERT	MP	MESH / BARBED RAIL	WL	WATER LEVEL
DA	DISAPPEARING	MH	MANHOLE	WP	WOODEN POST
DC	DRAIN COVER	MK	MARKER	WT	WATER TANK
DF	DOMESTIC FUEL	MP	MOORING RAIL	WV	WATER VALVE
DPC	DAMP PROOF COURSE	MST	METAL GUIDING POST	YB	YARD BOLLARD
DR	DRAIN	NP	NOTICE POST		
DWE	DOG WASTE BIN	NS	NOTICE BOARD		
EL	ELECTRICITY MANHOLE	OHL	OVERHEAD LINE (SUPPORT)		
ES	ELECTRICITY SUB STATION	OHW	OVERHEAD WIRE		
EP	ELECTRIC GATE POST	OL	OIL VALVE		
EW	ELECTRIC GATE WIRE	OS	ORDNANCE SURVEY BENCH MARK		
FBP	ELECTRICITY MARKER POST	P	PILE		
FC	FENCE CORNER POST	PB	POST & RAIL FENCE		
GL	ELECTRIC GATE	PH	PHOTO REFERENCE		
ETL	ELECTRICITY TRANSFORMER (UM)	PO	POST		
FE	FENCE END	PT	PUMP TRAP		
FM	FOOTBRIDGE	PTA	PUMPING TEST ACCESS		

REV.	AMENDMENT	DRN	CHKD	DATE

CONTROL USED:

ID	DESCRIPTION	Easting	Northing	Height
Ela Margam	TN Nail	280358.358	186360.199	44.227

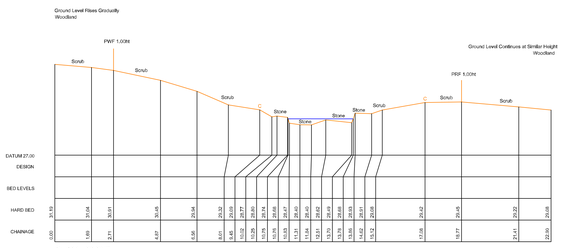
STORM GEOMATICS
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mail@storm-geomatics.com
www.storm-geomatics.com

CLIENT: SLR Consulting

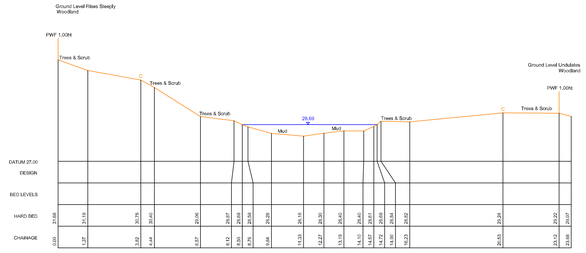
PROJECT: Margam Park Survey

SITE: Margam Park, Margam, Port Talbot, Wales
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Sheet 1 of 4

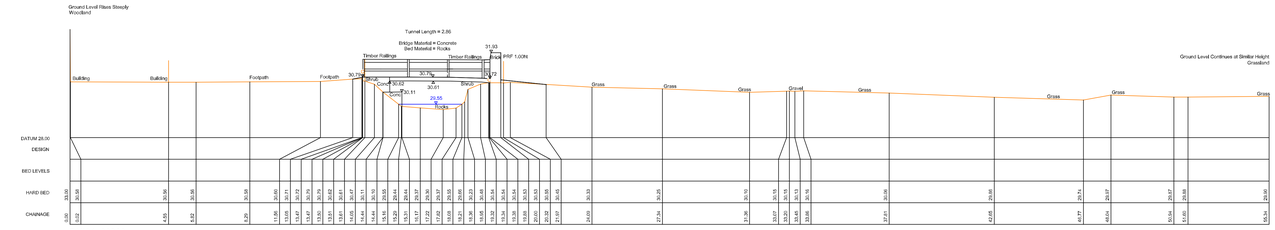
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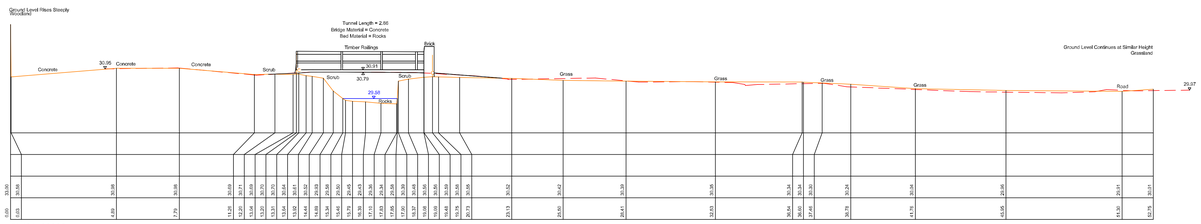
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Weir Crest



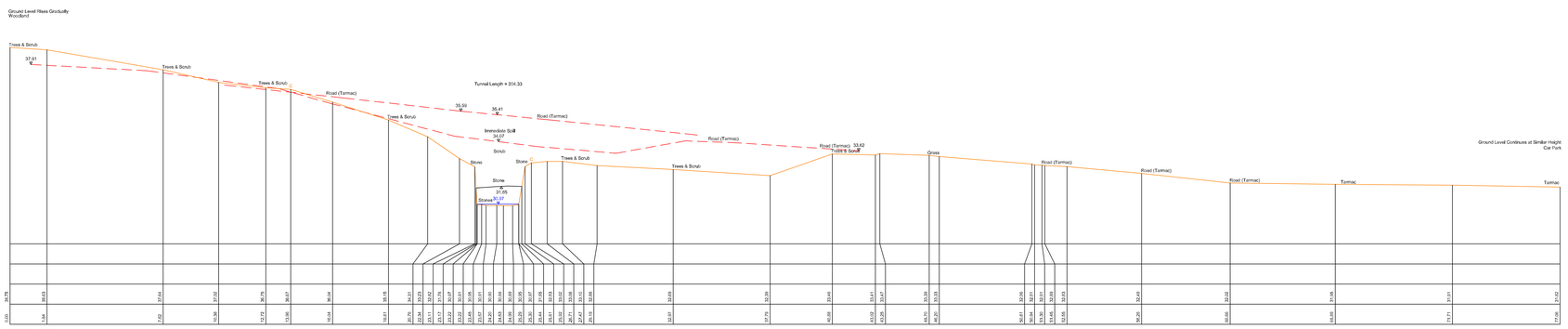
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17/03/2025
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17/03/2025
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Access Bridge - Downstream Face



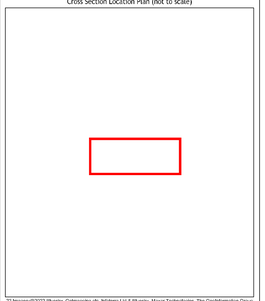
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Access Bridge



PHI01_00382
17/03/2025
Chainage_382.480
280302.16E, 186109.57N, BEARING 265
Culvert Exit

CROSS SECTION KEY:
WATER LEVEL
BED LEVEL
SILT LEVEL

Cross Section Location Plan (not to scale)



22 Imagery@2022 Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group

NOTES:
ALL LEVELS ARE METRES ABOVE ORDNANCE DATUM (NEWLYN).
ALL DIMENSIONS & CHAINAGES ARE IN METRES UNLESS OTHERWISE STATED.

SURVEY LEGEND

AB	AIR BRICK	FH	FIRE HYDRANT	PWF	POST & WIRE FENCE
AV	AIR VALVE	FHW	FIRE HYDRANT MARKER	RB	NEWT SUMP
BH	BOREHOLE	FP	FLOOD POINT	RE	RAILWAY LINE
BK	BULBUL BULLOW	FR	FENCE POST	RL	NAIL BOX
BSP	BOLLARD	FWA	FOUL WATER MANHOLE	RTW	RETAINING WALL
BT	BT MANHOLE	GA	GATE	SA	SATELLITE ANTENNA
BL	BED LEVEL	GL	GROUND LEVEL	SF	STEP LEVEL
BW	BASTWORK	GP	GATE POST	SCP	STUMP/PIPE
CH	CATCH PIT	GV	GAS VALVE	SL	SIGN POST
BH	ROOTS HOME	LV	LEV VALVE	SL	SLIPPED LEVEL
BW	BRICK WALL	MH	HEAD MOLL	SMH	SURVEY CONTROL MARKER
CF	CLOSE BOARDED FENCE	ML	MANHOLE CHAMBER	SP	SOIL PIPE
CP	CLOSE BOARDED TRENCH	N	WATER LEVEL	SP	SIGN POST
CV	CONDUCTED MONITOR	WP	IRON RAILING FENCE	SPT	STEEL PALISADE FENCE
CL	CHAIN LINK FENCE	PP	POWER POLE	SV	SLUICE
CLF	CHAIN LINK FENCE	PV	JUNCTION TUR	SV	SLUICE VALVE
COMC	CONCRETE	RA	RAILWAY SIGNAL POST	TB	TELEPHONE
CP	CONCRETE POST	RB	LIFT SHAFT	TBK	TELEPHONE BOOK MARK
CP	CONCRETE PILING FENCE	RC	LIFT MACHINE	TCP/TCV	TELEPHONE CABLE BUILT POST
CV	CABLE	RE	LEVER ARM	TL	TELEGRAPH POLE
CTV	CABLE T.V. MANHOLE	RE	HOUSING BOLLARD	TMK	TELEGRAPH MARKER
DA	DRAIN ARM	RE	RAILWAY SIGNAL POST	TN	TELEPHONE MANHOLE
DA	DOUGHTER	RE	RAILWAY LEVER	TL	TRAFFIC LIGHT
DL	DOOR LEVEL	RET	RAILWAY	TLB	TRAFFIC LIGHT BOX
DP	DRAINAGE POINT	RF	RAILWAY SIGNAL RUZ	TP	TELEGRAPH POLE
DPC	DAMP PROOF COURSE	RSF	METAL RAILING FENCE	TR	TIMBER RAILWAY FARM
DR	DRAIN	RS	RAILS TO RAIL	TS	TREE STUMP
DS	DRAIN SUB BIN	RT	RAILWAY TRACK	TW	TIMBER RAILWAY BOARD
EL	ENVIRONMENT AGENCY	RW	NATIONAL RIVERS AUTHORITY	UP	VENT PIPE
ES	ELECTRICITY BOX	SHC	SHEPHERDS CABLE	WB	WASTE BIN
ESP	ELECTRICITY SUPPLY POST	SL	SIGN POST	WC	WATER COURSE WATER JNC
EST	ELECTRICITY CABLE TST	SM	OPEN STEEL RAILINGS	WM	WATER METER
FMP	ELECTRICITY MARKER POST	T	TILE	WMF	WING MESH FENCE
EW	ELECTRIC WIRE	TA	TRAFFIC SIGN	WP	WOOD POST
ES	ELECTRIC BOX	TW	TIMBERED METRE	WPF	WOOD POST & WIRE FENCE
FTL	ELECTRICITY TOWER/DASH JNC	PO	POST	WV	WATER VALVE
FM	FLOW METER	PT	POST & TUBE FENCE	YD	YARD DRAIN
FM	FOOTBRIDGE	PTA	TUBEMETAL POST ANCHRE		

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REV.	AMENDMENT	DRN	CHKD	DATE

CONTROL USED:

ID	DESCRIPTION	Easting	Northing	Height
Es Margam	FK Nail	280268.068	186360.199	44.207

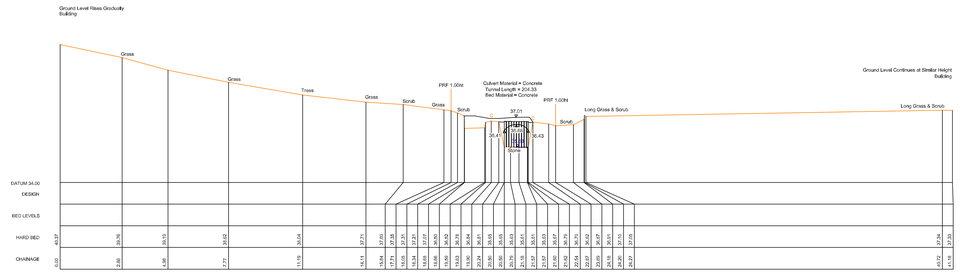
STORM GEOMATICS
Tel: 01608 664910
mail@storm-geomatics.com
www.storm-geomatics.com

CLIENT
SLR Consulting

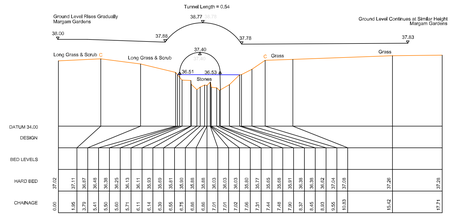
PROJECT
Margam Park Survey

SITE
Margam Park, Margam,
Port Talbot, Wales
PHI01_00267 to PHI01_00382
Sheet 2 of 4

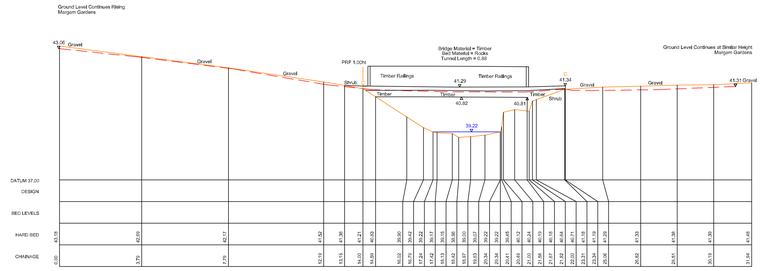
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SURVEY DATE: March 2025		
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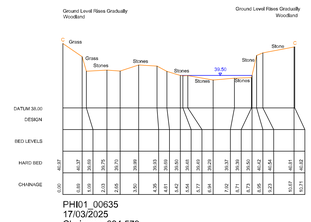
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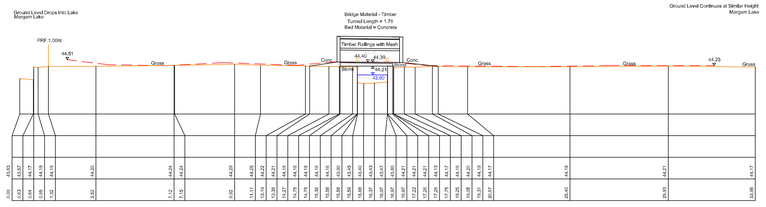
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Wall



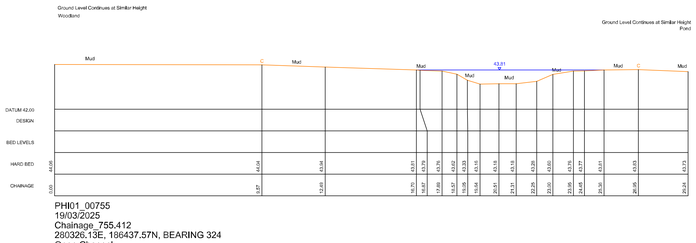
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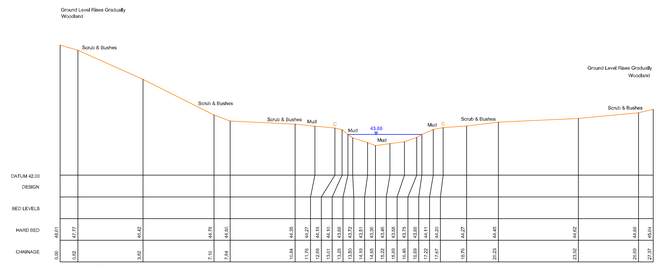
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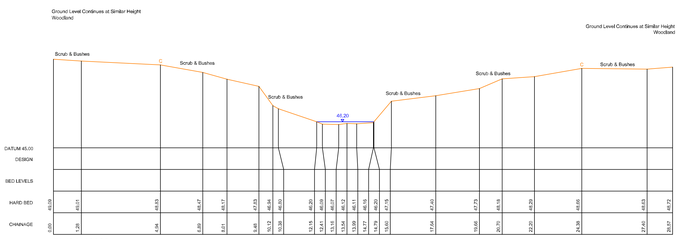
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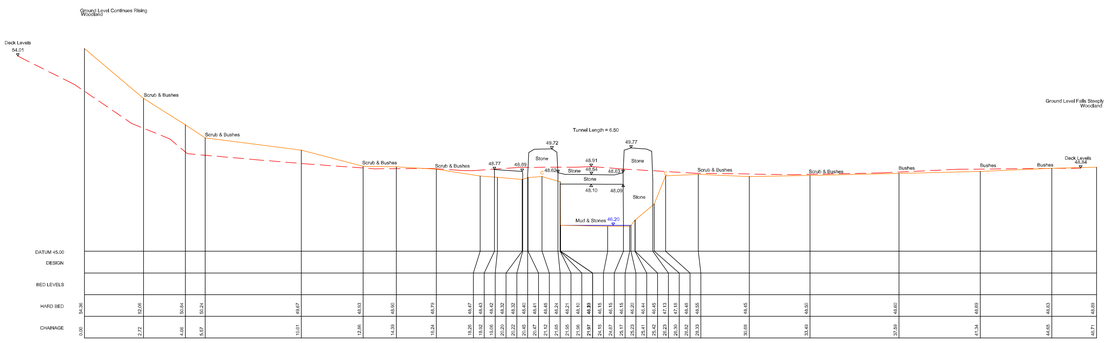
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Open Channel



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19/03/2025
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Downstream Toe of Weir



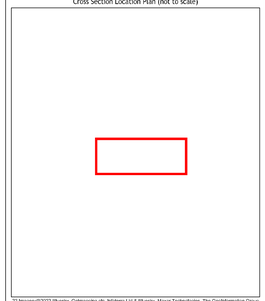
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Weir Crest



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Access Bridge

CROSS SECTION KEY:
WATER LEVEL
BED LEVEL
SILT LEVEL

Cross Section Location Plan (not to scale)



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NOTES:
ALL LEVELS SECTIONS VIEWED IN A DOWNSTREAM DIRECTION UNLESS OTHERWISE STATED.
ALL LEVELS ARE METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE STATED.
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.

SURVEY LEGEND

AB	AIR BRICK	FH	FIRE HYDRANT	PHF	POST & WIRE FENCE
AV	AIR VALVE	FHW	FIRE HYDRANT MARKER	PB	NEWT SUMP
BH	BOREHOLE	FL	FLOOR LEVEL	PS	PUMPING STATION
BK	BULBOUS BULLOCK	FN	FENCE POST	PL	NAIM BOX
BST	BOREPOINT	FWL	FOUL MUTTER MANHOLE	RTW	RETAINING WALL
BT	BRITISH TELECOM	GL	GAS LEVEL	SA	SOIL VENT PIPE
BL	BED LEVEL	GL	GROUND LEVEL	SF	STOP COCK
BM	BENCH MARK	GP	GATE POST	SCP	STUMP/TREE
BW	BOUNDARY WIRE	GV	GAS VALVE	SL	SLOPE LEVEL
BW	BRICK WALL	GV	GAS VALVE	SL	SLOPE LEVEL
CF	CLOSE BOARDED FENCE	HW	HEAD WALL	SMH	SURVEY MANHOLE
CP	CLOSE BOARDED TRELLI	IL	INVERT LEVEL	SP	SOIL PIPE
CV	CONSULVO MESH FACE	IRP	IRON RAILING POST	SPF	STEEL PALISADE FENCE
CL	CROWN LEVEL	IRP	IRON RAILING POST	ST	STUMP
CV	CHAMLEAH VALVE	JB	JUNCTION BOX	SV	SLUICE VALVE
COMC	CONCRETE	KB	KERB BOTTOM EDGE	TB	TELEPHONE BOX
CP	CONCRETE POST	LS	LIFT SHAFT	TBM	TEMPORARY BENCH MARK
CP	CHESTNUT PALING FENCE	LT	LIGHT POST	TCP/TCV	TELEPHONE CABLE DUB POST
CW	CONCRETE WALL	LV	LEAD VALVE	TL	TOP OF LEVEL
CTV	CABLE T.V. MANHOLE	ME	MOORING BOLLARD	TMH	TELECOM MANHOLE
DA	DRAIN ARROW	MF	MOORING FOR FISHING	TP	TELEGRAPH POLE
DA	DOG FLATOR	MH	MANHOLE	TL	TRAFFIC LIGHT
DL	DOOR LEVEL	MHT	MARKER	TLB	TRAFFIC LIGHT BOX
DP	DRAIN POINT	MHT	MARKER POST	TP	TRAFFIC POLE
DPC	DAMP PROOF COURSE	MSF	METAL SLEAL FENCE	TR	TIMBER RAILWAY TYRE
DR	DRAIN	NC	NAIL STONE	TS	TREE STUMP
DSB	DRAIN SUMP BIN	NP	NEWT PROTECTIVE BARRIER	UP	UNDERGROUND PIPE
EA	ENVIRONMENT AGENCY	NSA	NATIONAL SAVES ALPHONEY	VP	VENT PIPE
ES	ELECTRICITY BOX	OHC	OVERHEAD CABLE	WB	WASTE BIN
ESP	ELECTRICITY POWER POST	OL	OPEN LEVEL	WBP	WATER BOARD WATCH JMC
EST	ELECTRICITY CLASS TST	OM	OPEN STEEL RAILINGS	WM	WATER METER
FMP	ELECTRICITY MARKER POST	P	PILE	WMP	WING MESH POST
FP	ELECTRICITY POLE	PH	PIPE HANDRAIL	WP	WOOD POST
FE	ELECTRIC RETD	PM	PARKING METER	WPR	WOODEN POST & RAIL FENCE
FTL	ELECTRICITY TRANSFORMER JMC	PO	POST	WV	WATER VALVE
FW	FENCE WIRE	PR	PROTECTIVE RAIL FENCE	YL	YARD LEVEL
FW	FOOTWIRE	PTR	PARKING TICKET MACHINE		rotated elevations apply to EU survey data only

REV.	AMENDMENT	DRN	CHKD	DATE

CONTROL USED:

ID	DESCRIPTION	Easting	Northing	Height
Es Margam	FK Nail	280268.068	186360.199	44.207

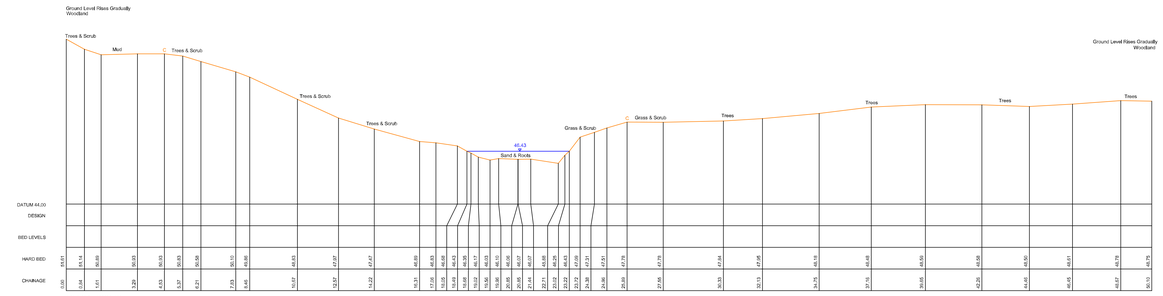
STORM GEOMATICS
Tel: 01608 664910
mail@storm-geomatics.com
www.storm-geomatics.com

CLIENT
SLR Consulting

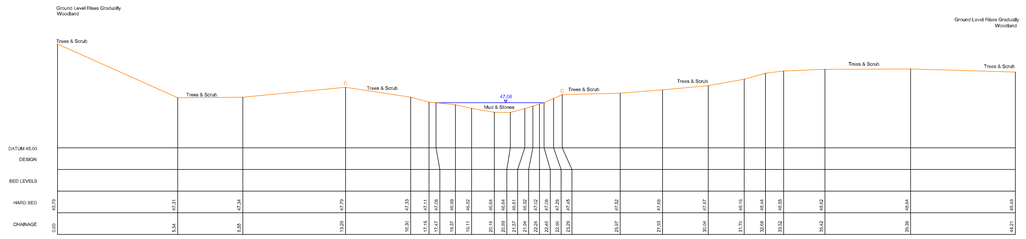
PROJECT
Margam Park Survey

SITE
Margam Park, Margam,
Port Talbot, Wales
PHI01_00587 to PHI01_00933
Sheet 3 of 4

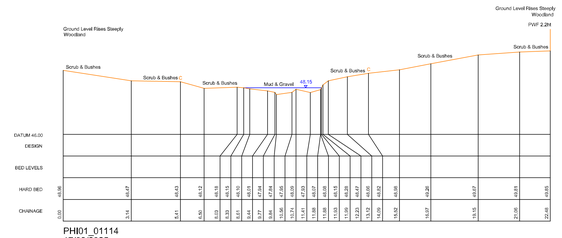
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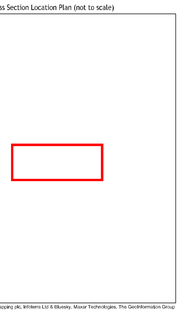
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17/03/2025
Chainage_1113.780
280410.25E, 186727.47N, BEARING 298
Open Channel

CROSS SECTION KEY:
WATER LEVEL
BED LEVEL
SILT LEVEL

Cross Section Location Plan (not to scale)



22 Imagery@2022 Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, This GeoInformation Group

NOTES:
ALL LEVELS SECTIONS VIEWED IN A DOWNSTREAM DIRECTION UNLESS OTHERWISE STATED.
ALL LEVELS ARE METRES ABOVE TIDEDATUM DATUM UNLESS OTHERWISE STATED.
ALL DIMENSIONS & CHAINAGES ARE IN METRES UNLESS OTHERWISE STATED.

SURVEY LEGEND

AD	AIR DUCK	FH	POST & WIRE FENCE
AI	AIR VALVE	FMK	REC KISWAP MARKER
B	BOLLARD	FL	FLOOR LEVEL
BC	BOUNDARY JUNCTION	FM	FLOW METER
BH	BOREHOLE	FMA	FUEL WATER MANHOLE
BK	BRICKWORK	G	GULLY
BL	BOLLARD LEVEL	GL	GROUND LEVEL
BM	BENCHMARK	GT	GUYED POST
BS	BUS STOP	GR	GAS MARKER
BW	BRICK WORK	GV	GAS VALVE
BX	BRICK W.C.	HR	HEAD RAIL
BWF	BARBED WIRE FENCE	IC	INSPECTION CHAMBER
C	CONIFER TREE (SPECIFY)	K	KERB LEVEL
CF	CONIFER HEDGEROW	KF	IRON HAND RAIL FENCE
CL	COVER LEVEL	BHF	KITCHEN FENCE
CH	CONIFER HEDGE	L	LAMP POST
CHC	CHICANETTE	ML	KITH MAST 12.5.7
CP	CONCRETE POST	LS	LIFT SHAFT
CPF	CONCRETE PANEL FENCE	LT	LIFT TOWER
CV	CYCLE RACK	LT	LAMP POST
CTX	CABLE T.V. MANHOLE	MF	MODERN WELDED
D	DRAIN	MH	MANHOLE (SPECIFYING)
DL	DISC LEVEL	MI	MANHOLE
DP	DRAINAGE POINT	MM	MAST MARKER
DP	DOMPOST	MP	MOORING PILE
DT	DRAINAGE COURSE	MPF	METAL PANEL FENCE
DK	DITCH	MS	MILE STONE
DHK	DOR HANDLE BAR	NS	NOTICE BOARD
E	ELECTRICITY AUTHORITY	NSA	NOTICE BOARD AUTHORITY
EL	ELECTRICITY (UG)	OHC	OVERHEAD CABLE
ECF	ELECTRIC (LIGHT) FENCE	OL	OS Grid (15)
EM	ELECTRICITY MANHOLE	OTF	OTHER STEEL BARRIER
EMF	ELECTRICITY MARKER	P	POST
EP	ELECTRICITY POLE	PB	PILLAR BOX
ES	ELECTRICITY SUB STATION	PM	PARKING METER
ETL	ELECTRICITY TRANSFORMER (AR)	PO	POST
PL	PLANTED BED	PRT	POST & RAIL TERC
PR	PITCH MARCE	PTA	TUBABLE TRUITT ANCHRE

PWF	POST & WIRE FENCE	TE	SIGHT TUBE
R	SIGHT RAIL	TE	TOILAND LITE
RE	RAILWAY LINE	TF	TIMBER FENCE
RM	RETAINING WALL	TTA	RETAINING WALL
RP	RAILWAY POST	UMP	SUBMERSIBLE PIPE
RW	RETAINING WALL	V	VALVE
SA	SCRUB AREA	VT	STAKE POST
SB	SIGN BOARD	W	WARNING
SC	SCRUB CLUMP	WA	WATER VALVE
SH	SHRUB	WM	WATER MANHOLE
SMF	SHEET METAL FENCE	WP	WATER POST
SP	SIGN POST	WT	WATER TANK
ST	STEEL PALLISADE FENCE	WV	WATER VALVE
SV	SLUICE VALVE	WW	WOOD WORK
SW	SOIL VENT PIPE	WWF	WOOD WORK FENCE
TBM	TEMPORARY BENCH MARK		
TC	TELECOM CABLE (SPECIFY)		
TC	TELECOM CABLE		
TMK	TELECOM MARKER		
TP	TELEPHONE POST		
TS	TRAFFIC LIGHT		
TSP	TELEPHONE SWITCH BOX		
TW	TELEGRAPH POLE		
TWF	TELEGRAPH WIRE FENCE		
TX	TREE STUMP		
TW	TUBULAR STEEL RAILINGS		
VC	VICARAGE		
WB	WATER BIN		
WL	WATER LEVEL/ WATER JNC		
WM	WATER METER		
WMF	WELL MESH FENCE		
WP	WOODEN POST		
WPF	WOODEN POST & TAR PITCH		
WS	WATER VALVE		
YC	YARD COVER		

(data in brackets applies to EA survey data only)

REV.	AMENDMENT	DRN	CHKD	DATE

CONTROL USED:

ID	DESCRIPTION	Easting	Northing	Height
Eli Margam	TR Nail	280358.06m	186360.199	44.237

STORM GEOMATICS
Tel: 01608 664910
mail@storm-geomatics.com
www.storm-geomatics.com

CLIENT
SLR Consulting

PROJECT
Margam Park Survey

SITE
Margam Park, Margam,
Port Talbot, Wales
PHI01_00978 to PHI01_01114
Sheet 4 of 4

SURVEYED BY: Storm Geomatics Ltd		*Project Ref: 2432/0224/09*
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Appendix C Base Case Model Results

Hydraulic Modelling Report

Margam Moors – Substation Extension

BakerHicks Limited

SLR Project No.: 402.065496.00001

22 August 2025

278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX C-1

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Depth (m)

- 0.00-0.10
- 0.10 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00



BakerHicks.

SLR
www.slrconsulting.com

MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

50% AEP
PEAK WATER DEPTH

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX C-2

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Depth (m)

- 0.00-0.10
- 0.10 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00



BakerHicks.

SLR
www.slrconsulting.com

MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

3.3% AEP
PEAK WATER DEPTH

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000

186500

186000

185500

N

0 100 200 300 400 m

APPENDIX C-3

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Depth (m)

- 0.00-0.10
- 0.10 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00



BakerHicks.

SLR
www.slrconsulting.com

MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

1% AEP
PEAK WATER DEPTH

Scale	Date
1:8000 @ A3	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000

186500

186000

185500

N

0 100 200 300 400 m

APPENDIX C-4

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Depth (m)

- 0.00-0.10
- 0.10 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00



BakerHicks.

SLR
www.slrconsulting.com

MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE PEAK WATER DEPTH

Scale	Date
1:8000 @ A3	AUGUST 2025

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N
0 100 200 300 400 m

APPENDIX C-5

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Depth (m)

- 0.00-0.10
- 0.10 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

1% AEP + UPPER END ALLOWANCE FOR CLIMATE CHANGE PEAK WATER DEPTH

Scale	Date
1:8000 @ A3	AUGUST 2025

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187000 186500 186000 185500

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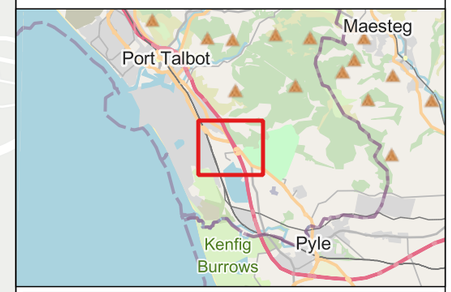
APPENDIX C-6

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Depth (m)

- 0.00-0.10
- 0.10 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

0.1% AEP
PEAK WATER DEPTH

Scale	Date
1:8000 @ A3	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

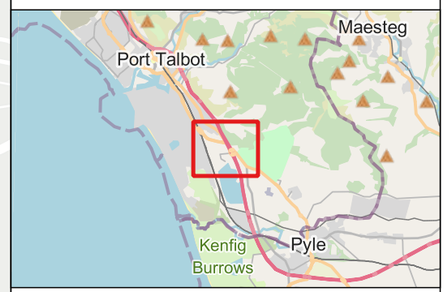
APPENDIX C-7

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Depth (m)

- 0.00-0.10
- 0.10 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

0.1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE PEAK WATER DEPTH

Scale	Date
1:8000 @ A3	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX C-8

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Depth (m)

- 0.00-0.10
- 0.10 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

0.1% AEP + UPPER END ALLOWANCE FOR CLIMATE CHANGE PEAK WATER DEPTH

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX C-9

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level (mAOD)

- <= 6
- 6 - 12
- 12 - 18
- 18 - 24
- 24 - 30
- 30 - 36
- > 36



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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

50% AEP
PEAK WATER LEVEL

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX C-10

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level (mAOD)

- <= 6
- 6 - 12
- 12 - 18
- 18 - 24
- 24 - 30
- 30 - 36
- > 36



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

3.3% AEP
PEAK WATER LEVEL

Scale	1:8000 @ A3	Date	AUGUST 2025

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400 m

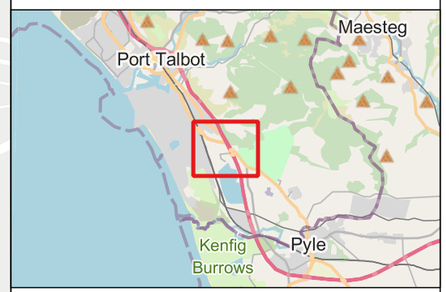
APPENDIX C-11

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level (mAOD)

- <= 6
- 6 - 12
- 12 - 18
- 18 - 24
- 24 - 30
- 30 - 36
- > 36



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

1% AEP
PEAK WATER LEVEL

Scale	Date
1:8000 @ A3	AUGUST 2025

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0 100 200 300 400 m

APPENDIX C-12

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level (mAOD)

Band 1 (Gray)

- <= 100
- > 100



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE
PEAK WATER LEVEL

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX C-13

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level (mAOD)

- <= 6
- 6 - 12
- 12 - 18
- 18 - 24
- 24 - 30
- 30 - 36
- > 36



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

1% AEP + UPPER END ALLOWANCE FOR CLIMATE CHANGE PEAK WATER LEVEL

Scale	1:8000 @ A3	Date	AUGUST 2025

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0 100 200 300 400 m

APPENDIX C-14

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level (mAOD)

- <= 6
- 6 - 12
- 12 - 18
- 18 - 24
- 24 - 30
- 30 - 36
- > 36



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

0.1% AEP
PEAK WATER LEVEL

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX C-15

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level (mAOD)

- <= 6
- 6 - 12
- 12 - 18
- 18 - 24
- 24 - 30
- 30 - 36
- > 36



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

0.1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE PEAK WATER LEVEL

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX C-16

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level (mAOD)

- <= 6
- 6 - 12
- 12 - 18
- 18 - 24
- 24 - 30
- 30 - 36
- > 36



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

0.1% AEP + UPPER END ALLOWANCE FOR CLIMATE CHANGE PEAK WATER LEVEL

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX C-17

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Velocity (m/s)

- Below 0.5
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- Above 1.5



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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

50% AEP
PEAK WATER VELOCITY

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX C-18

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Velocity (m/s)

- Below 0.5
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- Above 1.5



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

3.3% AEP
PEAK WATER VELOCITY

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

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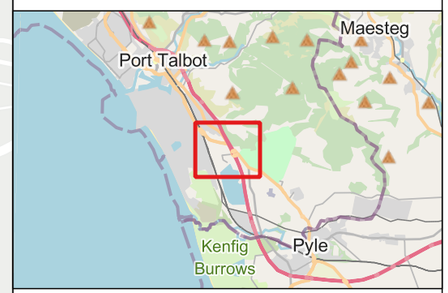
APPENDIX C-19

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Velocity (m/s)

- Below 0.5
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- Above 1.5



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

1% AEP
PEAK WATER VELOCITY

Scale	Date
1:8000 @ A3	AUGUST 2025

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278000 278500 279000 279500 280000 280500

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N

0 100 200 300 400 m

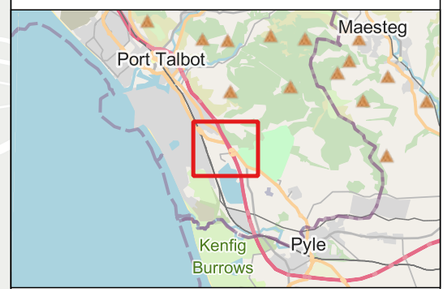
APPENDIX C-20

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Velocity (m/s)

- Below 0.5
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- Above 1.5



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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE
PEAK WATER VELOCITY

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

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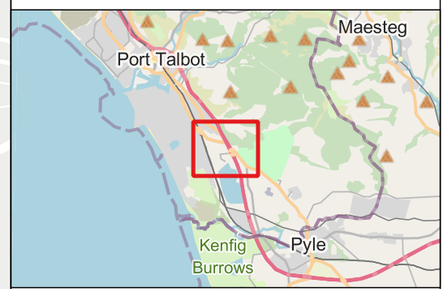
APPENDIX C-21

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Velocity (m/s)

- Below 0.5
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- Above 1.5



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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

1% AEP + UPPER END ALLOWANCE FOR CLIMATE CHANGE PEAK WATER VELOCITY

Scale	1:8000 @ A3	Date	AUGUST 2025

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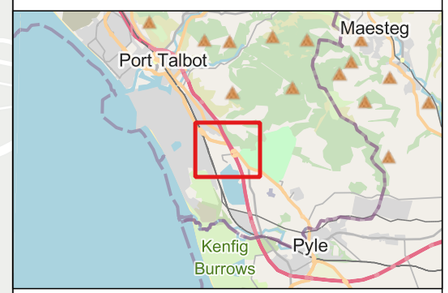
APPENDIX C-22

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Velocity (m/s)

- Below 0.5
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- Above 1.5



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

0.1% AEP
PEAK WATER VELOCITY

Scale	Date
1:8000 @ A3	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

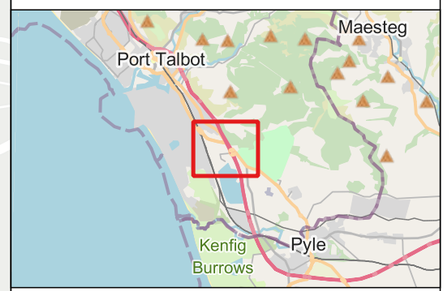
APPENDIX C-23

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Velocity (m/s)

- Below 0.5
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- Above 1.5



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

0.1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE PEAK WATER VELOCITY

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX C-24

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Velocity (m/s)

- Below 0.5
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- Above 1.5



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

BASELINE SCENARIO

0.1% AEP + UPPER END ALLOWANCE FOR CLIMATE CHANGE
PEAK WATER VELOCITY

Scale	Date
1:8000 @ A3	AUGUST 2025

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Appendix D Proposed Case Results

Hydraulic Modelling Report

Margam Moors – Substation Extension

BakerHicks Limited

SLR Project No.: 402.065496.00001

22 August 2025

278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

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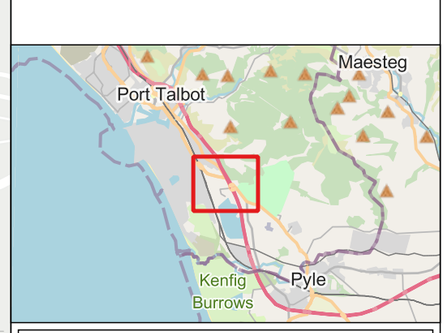
APPENDIX D-1

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level Difference (mm)

- Was wet, now dry
- Below -100
- -100 to -50
- -50 to -20
- -20 to -10
- -10 to 10
- 10 to 20
- 20 to 50
- 50 to 100
- 100 to 200
- Above 200
- Was dry, now wet



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

PROPOSED DEVELOPMENT SCENARIO

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE
PEAK WATER LEVEL DIFFERENCE

Scale	1:8000 @ A3	Date	AUGUST 2025

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187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX D-2

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

PROPOSED DEVELOPMENT SCENARIO

0.1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE PEAK WATER LEVEL DIFFERENCE

Scale	1:8000 @ A3	Date	AUGUST 2025

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Appendix E Sensitivity Results

Hydraulic Modelling Report

Margam Moors – Substation Extension

BakerHicks Limited

SLR Project No.: 402.065496.00001

22 August 2025

278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX E-1

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level Difference (mm)

- Was wet, now dry
- Below -100
- -100 to -50
- -50 to -20
- -20 to -10
- -10 to 10
- 10 to 20
- 20 to 50
- 50 to 100
- 100 to 200
- Above 200
- Was dry, now wet

BakerHicks.

SLR
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MARGAM SUBSTATION HYDRAULIC MODEL

SENSITIVITY TEST 01: MARGAM DUCK POND IWL LOWERING (43.0 MAOD)

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE
PEAK WATER LEVEL DIFFERENCE

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX E-2

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level Difference (mm)

- Was wet, now dry
- Below -100
- -100 to -50
- -50 to -20
- -20 to -10
- -10 to 10
- 10 to 20
- 20 to 50
- 50 to 100
- 100 to 200
- Above 200
- Was dry, now wet

BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

SENSITIVITY TEST 02: MARGAM DUCK POND IWL LOWERING (42.5 MAOD)

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE
PEAK WATER LEVEL DIFFERENCE

Scale	1:8000 @ A3	Date	AUGUST 2025

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278000 278500 279000 279500 280000 280500

187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX E-3

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level Difference (mm)

- Was wet, now dry
- Below -100
- -100 to -50
- -50 to -20
- -20 to -10
- -10 to 10
- 10 to 20
- 20 to 50
- 50 to 100
- 100 to 200
- Above 200
- Was dry, now wet



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

SENSITIVITY TEST 03: +30% MANNING'S ROUGHNESS

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE
PEAK WATER LEVEL DIFFERENCE

Scale	1:8000 @ A3	Date	AUGUST 2025

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187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX E-4

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level Difference (mm)

- Was wet, now dry
- Below -100
- -100 to -50
- -50 to -20
- -20 to -10
- -10 to 10
- 10 to 20
- 20 to 50
- 50 to 100
- 100 to 200
- Above 200
- Was dry, now wet

BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

SENSITIVITY TEST 04: -30% MANNING'S ROUGHNESS

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE
PEAK WATER LEVEL DIFFERENCE

Scale	1:8000 @ A3	Date	AUGUST 2025

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187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX E-5

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level Difference (mm)

- Was wet, now dry
- Below -100
- -100 to -50
- -50 to -20
- -20 to -10
- -10 to 10
- 10 to 20
- 20 to 50
- 50 to 100
- 100 to 200
- Above 200
- Was dry, now wet

BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

SENSITIVITY TEST 05: STRUCTURE BLOCKAGE 25%

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE
PEAK WATER LEVEL DIFFERENCE

Scale	1:8000 @ A3	Date	AUGUST 2025

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187000 186500 186000 185500

N

0 100 200 300 400 m

APPENDIX E-6

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level Difference (mm)

- Was wet, now dry
- Below -100
- -100 to -50
- -50 to -20
- -20 to -10
- -10 to 10
- 10 to 20
- 20 to 50
- 50 to 100
- 100 to 200
- Above 200
- Was dry, now wet



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

SENSITIVITY TEST 06: STRUCTURE BLOCKAGE 50%

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE PEAK WATER LEVEL DIFFERENCE

Scale	1:8000 @ A3	Date	AUGUST 2025

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187000 186500 186000 185500

N

0 100 200 300 400 m

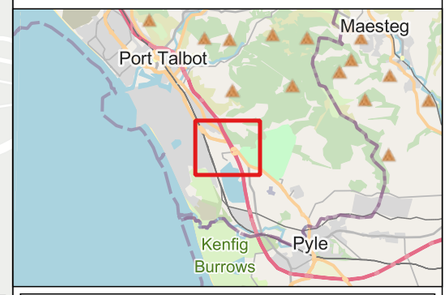
APPENDIX E-7

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level Difference (mm)

- Was wet, now dry
- Below -100
- -100 to -50
- -50 to -20
- -20 to -10
- -10 to 10
- 10 to 20
- 20 to 50
- 50 to 100
- 100 to 200
- Above 200
- Was dry, now wet



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

SENSITIVITY TEST 07: TY DU RESERVOIR SLUICE GATE NOT OPENED

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE PEAK WATER LEVEL DIFFERENCE

Scale	Date
1:8000 @ A3	AUGUST 2025

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N

0 100 200 300 400 m

APPENDIX E-8

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level Difference (mm)

- Was wet, now dry
- Below -100
- -100 to -50
- -50 to -20
- -20 to -10
- -10 to 10
- 10 to 20
- 20 to 50
- 50 to 100
- 100 to 200
- Above 200
- Was dry, now wet



BakerHicks.

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MARGAM SUBSTATION HYDRAULIC MODEL

SENSITIVITY TEST 09: 6HR DURATION - WINFAP SCALED HYDROLOGY

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE
PEAK WATER LEVEL DIFFERENCE

Scale	1:8000 @ A3	Date	AUGUST 2025

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N

0 100 200 300 400 m

APPENDIX E-9

Legend

- Application Boundary
- Substation and Access Road
- Model Boundary

Peak Water Level Difference (mm)

- Was wet, now dry
- Below -100
- -100 to -50
- -50 to -20
- -20 to -10
- -10 to 10
- 10 to 20
- 20 to 50
- 50 to 100
- 100 to 200
- Above 200
- Was dry, now wet



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MARGAM SUBSTATION HYDRAULIC MODEL

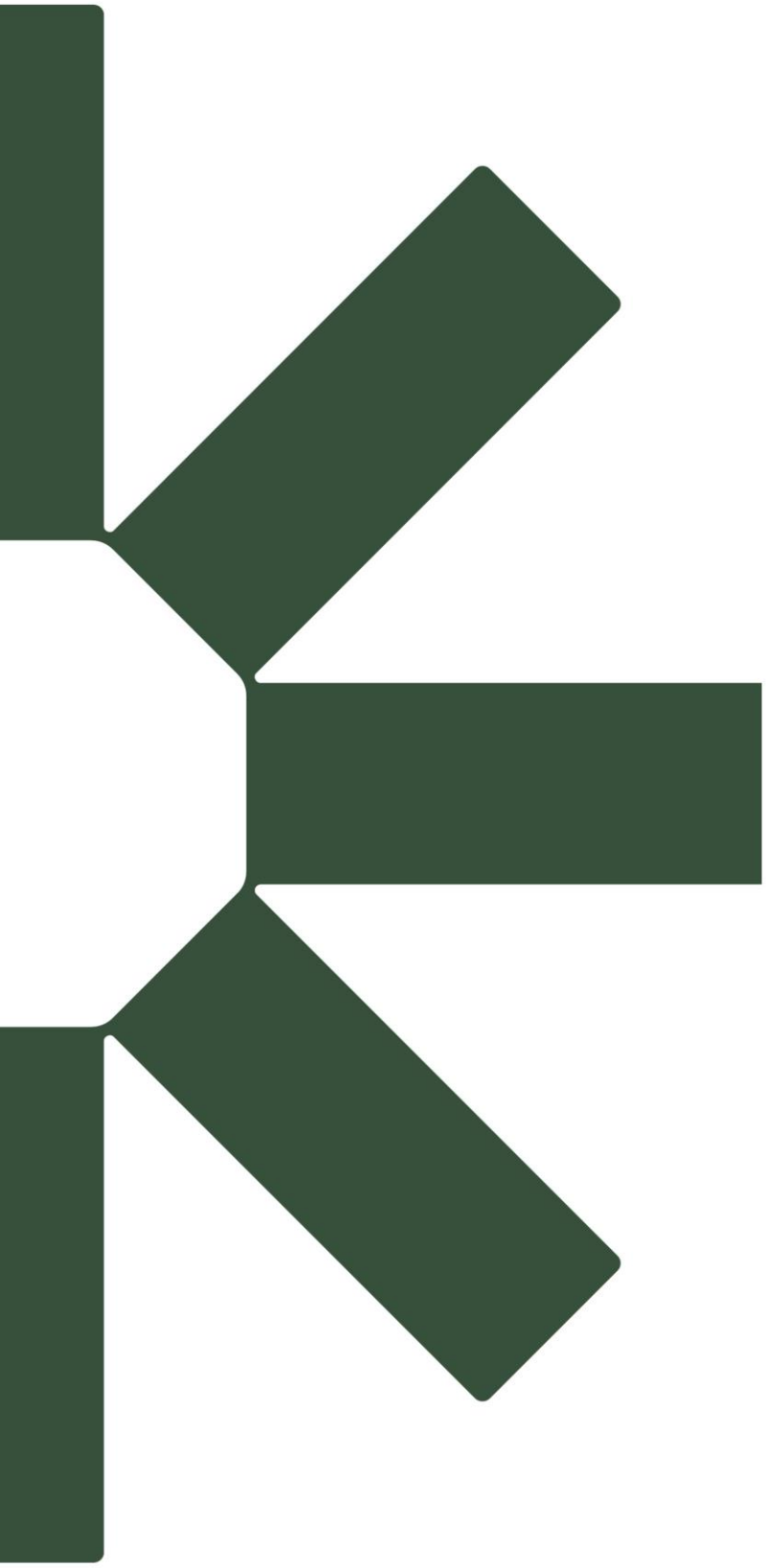
SENSITIVITY TEST 09A: 6HR DURATION - REFH2 HYDROLOGY

1% AEP + CENTRAL ALLOWANCE FOR CLIMATE CHANGE
PEAK WATER LEVEL DIFFERENCE

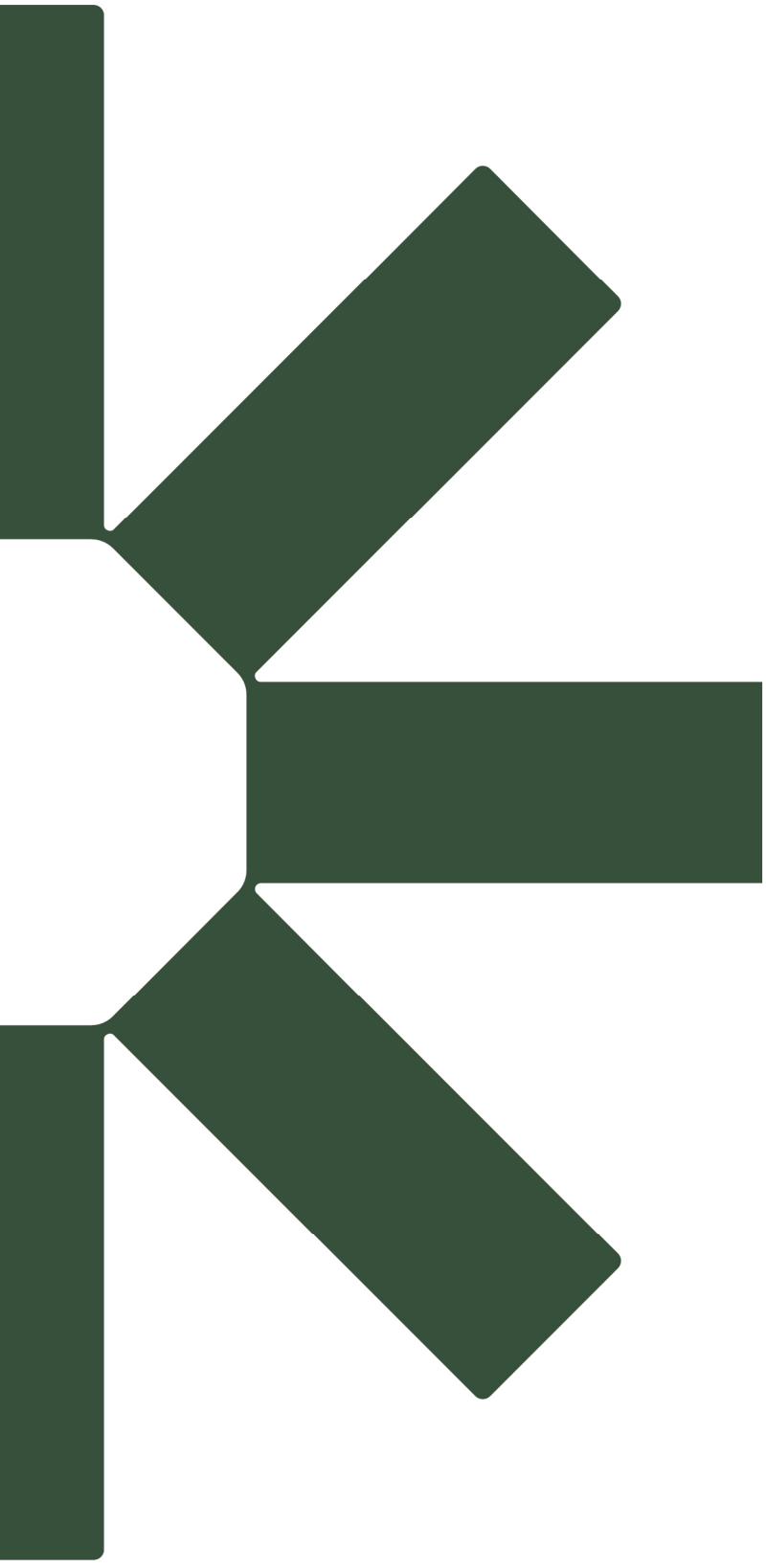
Scale	1:8000 @ A3	Date	AUGUST 2025

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