

Project Dragon – Sustainable Aviation Fuel (SAF) Production Facility: Flood Consequences Assessment

Version E

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Contract

This report describes work commissioned by LanzaTech UK Limited, by an email dated 20th April 2022. Hannah Booth of JBA Consulting carried out this work.

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Purpose

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1 Introduction

JBA Consulting were commissioned by LanzaTech UK Limited to prepare a Flood Consequence Assessment (FCA) to support a planning application for the construction of a Sustainable Aviation Fuel production facility on Land at Crown Wharf, Port Talbot Docks.

This FCA demonstrates the suitability of the proposed development and describes the flood mitigation measures recommended to manage flooding at the site.

1.1 FCA requirements

This FCA follows the Welsh Government guidance on development and flood risk set out in the Technical Advice Note 15: Development and Flood Risk (TAN15). Where appropriate, the following aspects of flood risk should be addressed in all planning applications over their expected lifetime:

- The likely mechanisms of flooding
- The likely source of flooding
- The depths of flooding through the site
- The speed of inundation of the site
- The rate of rise of flood water through the site
- Velocities of flood water across the site
- Overland flow routes
- The effect of access and egress and infrastructure, for example, public sewer outfalls, combined sewer outflows, surface water sewers and effluent discharge pipes from wastewater treatment works
- The impacts of the development in terms of flood risk on neighbouring properties and elsewhere on the floodplain

2 Site Description

2.1 Site Summary

The proposed development site is located on land at Crown Wharf, south of Port Talbot docks. As shown in Figure 2-1, the site is set within an established, heavily industrialised area and is bound to the north and east by a private road, a disused railway line section to the south, and existing industrial development to the west. Further to the east and south of the proposed development site lies the operational Port Talbot Steelworks, and Hanson Cement Works lies to the north. The development site forms part of the wider dock facilities of Port Talbot operated by Associated British Ports (ABP).

The red line boundary includes:

- Primary parcel of land for the location of the proposed production facility, referred to as the Production Development Zone (PDZ);
- Three discrete parcels of land located within the wider Port Talbot Docks to be used as a laydown area to temporary works during construction, referred to as the Temporary Construction Areas; and
- The unnamed Port Road running adjacent to the north boundary of the PDZ, referred to as Unnamed Port Road Supporting Infrastructure

The PDZ comprises brownfield industrial land that has slowly re-greened over a prolonged period of no use. A significant area of hardstanding (associated with historical uses and now demolished buildings) lies in the centre of the site and connects to the main access point to the north. The site is accessed via the Unnamed Port Road Supporting Infrastructure from Harbour Way and the M4 to the east.

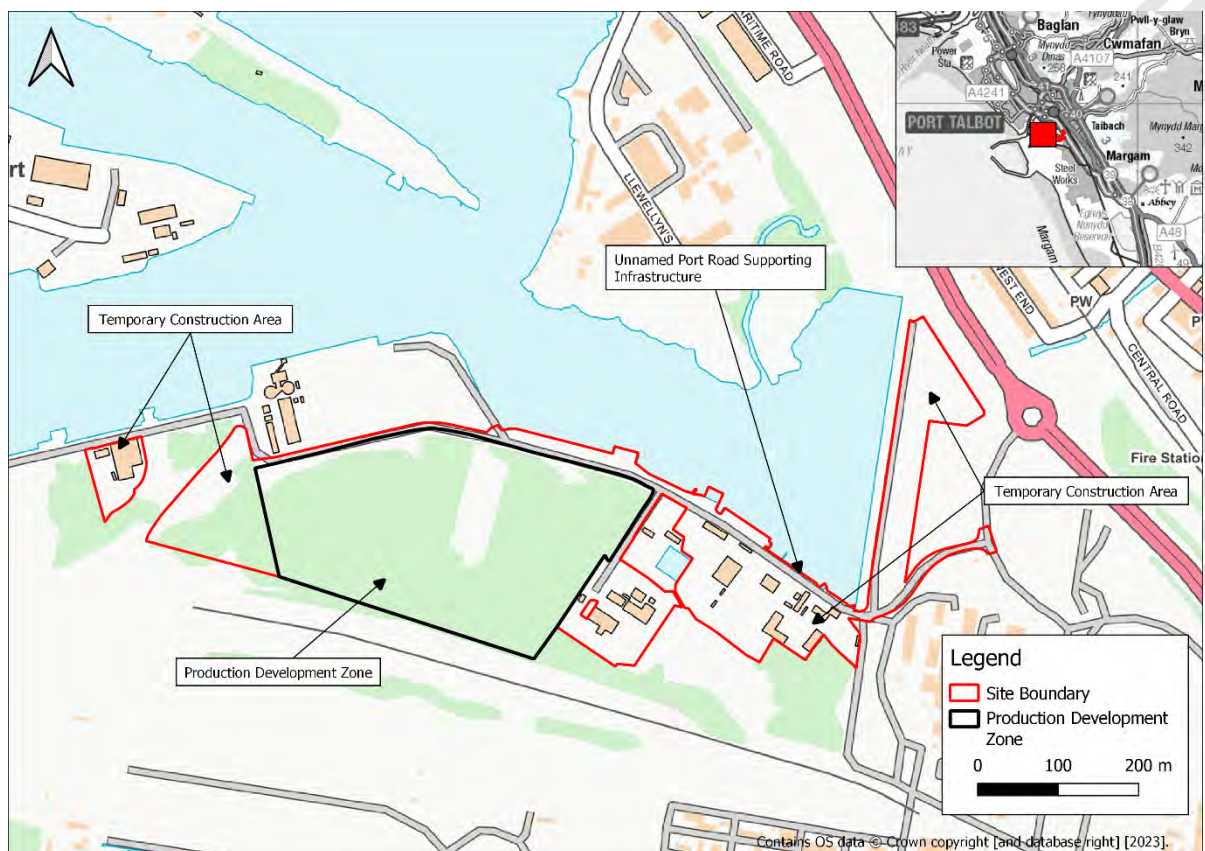


Figure 2-1 Proposed development site

2.2 Site topography and watercourses

AP Land Surveys undertook a topographic survey of the site in December 2021 and is contained in Appendix A. Natural Resources Wales (NRW) 1m LiDAR data has been used as an alternative illustration of site topography and is shown in Figure 2-2.

The topographic survey shows a crescent shaped embankment on the southern boundary of the PDZ which slopes gently down towards a low point at the central and northern part of the PDZ. Ground levels on the embankment reach a maximum of 10.4mAOD before falling to a low of 7.0mAOD in the central northern area of the PDZ. There is also a slight slope from west to east across the site, with a fall from 10.4mAOD to 8.8mAOD.

Due to the brownfield nature of the PDZ there are localised areas of raised ground on the site. The client has informed JBA that these are piles of rubble from demolished buildings that will be removed/ levelled during the development of the site.

The Unnamed Port Road Supporting Infrastructure has a ground level to the north of the PDZ ranging from 7.0 mAOD to 8.3 mAOD.

The Temporary Construction Area has a ground level of 8.06 mAOD to the eastern boundary of the area, falling to 7.57mAOD at the western boundary.

Two NRW designated Main Rivers are located in close proximity to the site, as shown in Figure 2-3. The River Afan is located 740m to the north of the PDZ and the Ffrwd Wyllt 230m north of the PDZ. The Ffrwd Wyllt flows into the Port Talbot Docks. Port Talbot Docks are located approximately 25m to the north of the site.

The proposed development site does not benefit from the presence of flood defences.

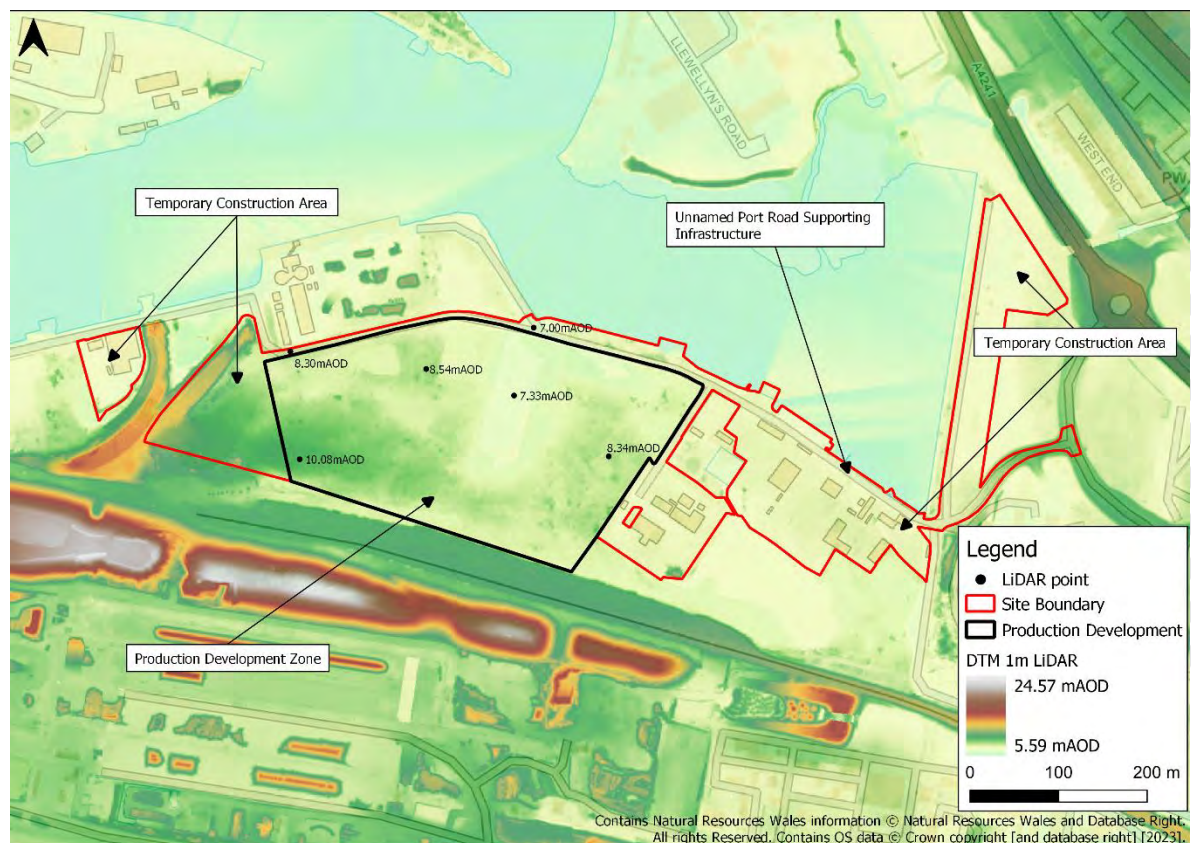


Figure 2-2 Topography



Figure 2-3 Watercourses

2.3 Soils and geology

The geology of the site has been assessed using the BGS Geology of Britain Viewer¹. The bedrock geology is shown to be South Wales Middle Coal Measures Formation comprised of mudstone, siltstone and sandstone. Superficial deposits overlaying the bedrock are Tidal Flat Deposits comprised of clay, silt and sand.

The soils on the site have been assessed using the Cranfield University Soilscales Viewer² and are shown to be loamy and clayey soils of coastal flats with naturally high groundwater.

2.4 Proposed development

Development proposals for the site are as follows:

Demolition of existing structures and erection of a Sustainable Aviation Fuel (SAF) production facility, including enclosed ground flare, storage tanks, installation of pipework and electrical, processing and utility equipment, administration, warehouse and laboratory buildings, new access, car parking and transport infrastructure including a truck loading area and associated works, hard and soft landscaping, areas for temporary construction laydown, and associated development.

An extract of the proposed development plan is shown in Figure 2-4, with the full development proposals contained in Appendix B.

¹ Geology Viewer. https://geologyviewer.bgs.ac.uk/?_ga=2.75172241.266172825.1657115636-2037829421.1650550580

² Cranfield Soilscales Viewer. <https://landis.org.uk/soilscales/>

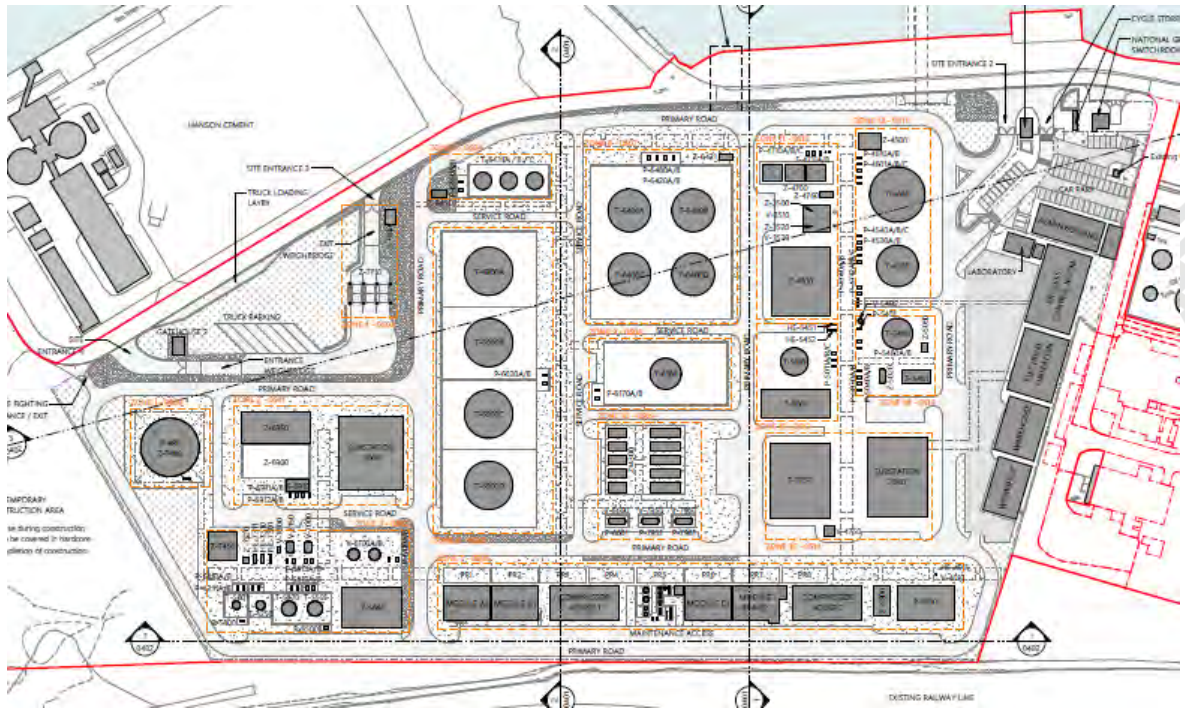


Figure 2-4 Extract of Proposed Development Layout (PDZ)

3 Planning Policy and flood risk

3.1 Planning context

Planning Policy Wales (PPW) 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. These policies have the aim that all development in Wales is sustainable and improve the social, economic, environmental, and cultural wellbeing of Wales as set out in the Wellbeing of Future Generations Act 2015.

PPW uses a series of Technical Advice Notes to provide more guidance on areas of planning and development in Wales. Technical Advice Note 15 (TAN15), introduced by the Welsh Government in 2004, provides technical guidance relating to development planning and flood risk in Wales.

The initial requirements of TAN15 are to identify the vulnerability classification(s) and flood zones relevant to the proposed development, and to apply this information to the application of the justification tests.

An update for TAN-15 was released in October 2021 and was due to come in force on the 1st December 2021. However, Welsh Government have since suspended the implementation of the new TAN-15 until further notice. Although the new TAN15 is not a material consideration, Welsh Government and NRW are advising that some consideration is given to the draft Flood Map for Planning (FMfP) as best available information. Therefore, where a site is located in a FMfP flood risk zone it is recommended that an FCA is carried out, even where the site is not shown to be at risk on the Development Advice Map.

As a result of the above, both the DAM and the FMfP are considered as part of this FCA, although only the current TAN-15 has been applied to assessment.

3.2 Vulnerability classification

As shown in Table 3-1, TAN15 assigns one of three flood risk vulnerabilities to development. The Production Development Zone, unnamed Port Road supporting infrastructure and temporary construction area are **classified under TAN15 as 'less vulnerable' development**.

In the area of the Unloading/Loading Facility dockside structures within or immediately adjacent to the dock may be flooded. However, these shall be water compatible structures designed to cope with these conditions. By virtue of the nature and location³ of such water compatible development the Justification Tests of TAN15 do not apply. All new structures within the zone must be designed to safely tolerate flooding.

Table 3-1 Development categories as defined by TAN15

Development category	Types
Emergency services	Hospitals, ambulance stations, fire stations, police stations, coastguard stations, command centres, emergency depots and buildings used to provide emergency shelter in time of flood.
Highly vulnerable development	All residential premises (including hotels and caravan parks), public buildings, (e.g. schools, libraries, leisure centres), especially vulnerable industrial development (e.g. power stations, chemical plants, incinerators), and waste disposal sites.

³ Welsh Government TAN15 (5.3) outline water compatible development, such as 'boatyards, marinas, essential works required at mooring basins'. Such development is not subject to the Justification Tests of TAN15.

Less vulnerable development	General industrial, employment, commercial and retail development, transport and utilities infrastructure, car parks, mineral extraction sites and associated processing facilities, excluding waste disposal sites.
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3.3 Development Advice Map classification

Figure 3-1 shows that the proposed development site falls into Zone B and Zone C2 of the DAM. The proposed Production Development Zone is located in Zone B whilst the unnamed Port Road supporting infrastructure and temporary construction area are located in Zone B and Zone C2.

The DAM zone classification is used to trigger different planning actions based on a precautionary assessment of flood risk. Zone B which is described as areas known to have been flooded in the past evidenced by sedimentary deposits. Zone B indicates areas which are generally suitable for most forms of development and there is no requirement for the application of the Justification Test for any proposed development located within DAM Zone B. Zone B is used as part of a precautionary approach to indicate where site levels should be checked against the extreme (0.1%) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further. Zone C2 is described as areas of the floodplain without significant flood defence infrastructure. Zone C2 is used to indicate that only less vulnerable development should be considered subject to application of justification test, including acceptability of consequences.

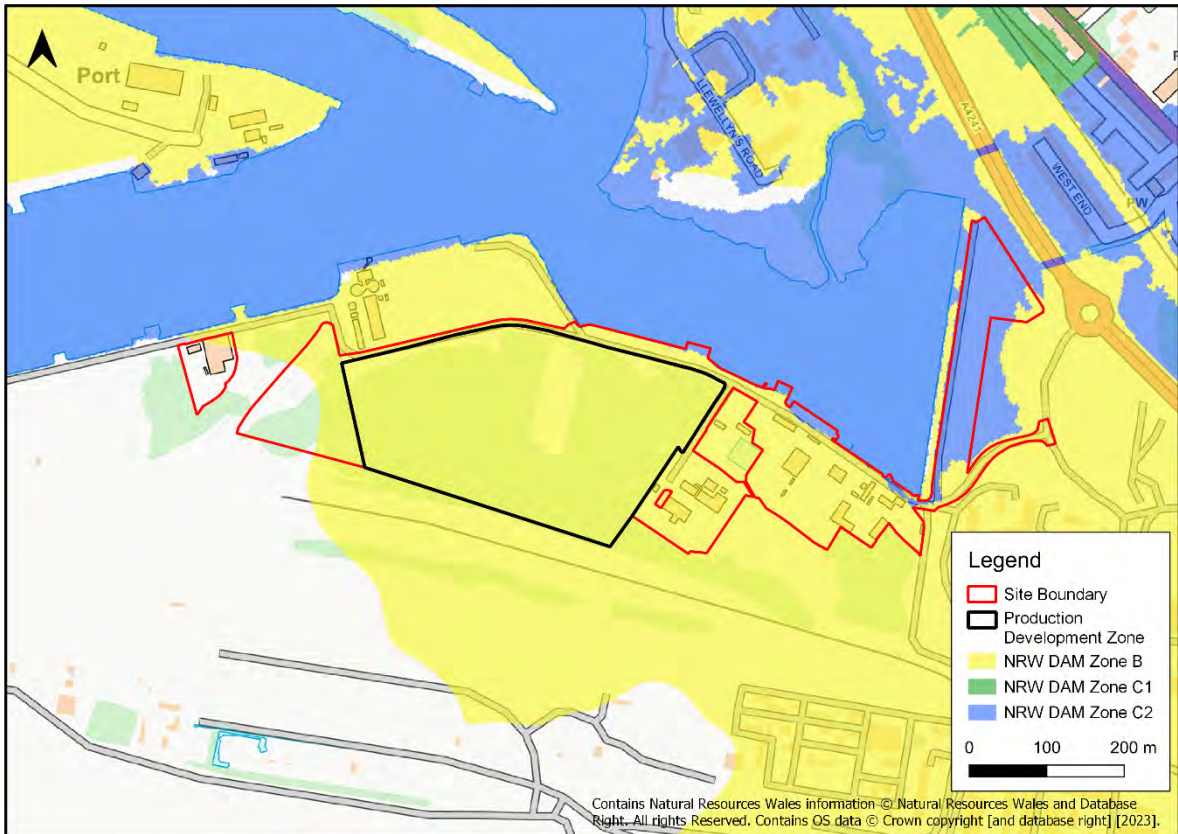


Figure 3-1 Development Advice Map

3.4 Draft TAN-15- Flood Map for Planning

The Flood Map for Planning (FMfP) is used to trigger different planning actions based on a precautionary assessment of flood risk.

As shown in Figure 3-2, a small part of the Production Development Zone is located in Flood Zone 2 (between a 0.1% and 1% chance of flooding in any given year) of the Flood Map for Planning for Rivers. The remainder of the Production Development Zone is located in Flood Zone 1 (less than a 0.1% chance of flooding in any given year).

The Unnamed Port Road Supporting Infrastructure is located in Flood Zone 1 with a small part of this area located in Flood Zones 2 and 3. The Temporary Construction Area to the eastern extent of the red line boundary is located in Flood Zones 2 and 3. The remaining Temporary Construction Areas are located in Flood Zone 1



Figure 3-2 Flood Map for Planning Rivers

As shown in Figure 3-3, a small part of the Production Development Zone is located in Flood Zone 2 (between a 0.1% and 0.5% chance of flooding in any given year) and Flood Zone 3 (greater than 0.5% chance of flooding in a given year) of the Flood Map for Planning for the Sea. The rest of the Production Development Zone is located in Flood Zone 1 (less than a 0.1% chance of flooding in any given year).

The Unnamed Port Road Supporting Infrastructure is located in Flood Zones 2 and 3 with a small part of located in Flood Zone 1. The Temporary Construction Area to the eastern extent of the red line boundary is located in Flood Zones 2 and 3, whilst flood zone 2 encroaches fully or partially into the remaining Temporary Construction Areas.

NRW have advised that any site located within Flood Zone 3 will require an assessment of flood risk. It is for this reason that this FCA has been prepared.



Figure 3-3 Flood Map for Planning Sea

3.5 Local Development Plan

The Neath Port Talbot Local Development Plan (LDP), adopted in 2016, provides land use policies and proposals to encourage sustainable growth within the Neath Port Talbot Council area until 2026.

Overarching Objective 1 (OB1) aims to “adapt to climate change through consideration of its effects in the design and location of new development”. The proposed development aims to raise the site levels to reduce the flood risk to future new development and therefore contributes to OB1.

The proposed development also complies with ‘Policy EC 3 Employment Area Uses’ which specifies that within existing employment areas, only uses within specific employment land use classes will be deemed appropriate for development. As the proposed development is located in an existing employment area which is surrounded by industrial uses, it meets the criteria of this policy.

The proposed development also supports the LDP vision that ‘previously developed, underused, and unsightly former industrial and commercial areas are redeveloped’. The proposed development will redevelop an existing brownfield land site that was previously used for industrial use therefore it supports the LDP vision.

3.6 Justification Test

The PDZ is located within DAM Zone B and therefore the Justification Test does not apply.

The Temporary Construction Areas are located within Zone C2 of the DAM or located in the flood zones associated with the FMfP. However, these areas will be used for a short period of time and no permanent structure will be built on this area. As such the proposals in this area will not constitute ‘New Development’ as set out in Section 6 of TAN15.

Notwithstanding the points above regarding the relevance of the Justification Tests, for **completeness, consideration the scheme’s compliance with the Tests is set out below.**

TAN-15 states that development will be justified if it can be demonstrated that:

Its location in zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement;

or

Its location in zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region;

and

It concurs with the aims of Planning Policy Wales and meets the definition of previously developed land;

and,

The potential consequences of a flooding event for the particular type of development have been considered and found to be acceptable.

Table 3-2 summarises the proposed developments compliance with the Justification Tests, should they be applicable:

Table 3-2: Justification Test applied to the proposed development

TAN 15 Justification Criteria	Comments	Achieved
<i>Its location is necessary to assist a local authority regeneration initiative or strategy, or contribute to key employment objectives, necessary to sustain an existing settlement or region.</i>	The proposed development will assist with the relevant policies listed in the Local Development Plan as well as supporting the overall vision of the LDP.	✓
<i>The site meets the definition of previously developed land (i.e., it is not a Greenfield site) and concurs with the aims of Planning Policy Wales (i.e., the presumption in favour of sustainable development).</i>	The site is located on previously developed brownfield land. (ref. Section 2.1). The site therefore concurs with the aims of Planning Policy Wales.	✓
<i>A Flood Consequence Assessment has been produced to demonstrate that the potential consequences of a flood event up to the extreme flood event (1 in 1000 chance of occurring in any year) have been considered and meet the [Acceptability Criteria] ... in order to be considered acceptable.</i>	The flood consequences have been assessed and are detailed further in Sections 4 and 5.	✓

4 Flood Risk Assessment

This section assesses the risk to the proposed development from all sources of flooding, the risk of increased flooding to others, and how flood risks can be managed. This FCA is based solely on a desk-based analysis of existing flood risk data.

4.1 Review of existing flood risk data

The latest available information on flood risk at the site is summarised in Table 4-1 below.

Table 4-1 Summary of flood risk

Source of Flooding	Onsite Presence	Description
Flood Risk from Rivers	✘	The site is at very low risk of flooding from rivers. Further assessment is required to assess the potential implications of climate change on river flooding.
Flood Risk from the Sea	✘	The site is at very low risk of tidal flooding. Further assessment is required to assess the potential implications of climate change on tidal flooding.
Flood Risk from Surface Water and Small Watercourses	✓	The site is at low risk of surface water flooding.
Flood Risk from Groundwater	✓	The site is at low risk of flooding from groundwater.
Flood Risk from Reservoirs	✘	The site is at very low risk of flooding from reservoirs.
Flood Risk from Sewers	✘	The site is at very low risk of sewer flooding.

4.2 Historical flooding

NRW's map of recorded flood extents does not show any evidence of historic flooding on the site. No other historic flooding records were identified at the site in the Neath and Port Talbot Flood Risk Management Plan. In the Neath and Port Talbot Preliminary Flood Risk Assessment, historical flood events from a local source of flooding are indicated. In Neath and Port Talbot, 749 surface water flooding events occurred between April and December 2010. The proposed development site is located in this general area, but it is unclear whether historic flooding has occurred at the site.

4.3 Flood Risk from Rivers

Parts of the proposed development site are at risk of flooding from rivers, **according to NRW's FRAW Flood Risk from the Rivers map**, as shown in Figure 4-1.

The proposed Production Development Zone is at very low risk of flooding from rivers, **according to NRW's FRAW Flood Risk from Rivers map**. This means there is less than a 0.1% AEP chance of fluvial flooding in any given year. This is shown by a transparent layer on the FRAW mapping.

The Unnamed Port Road Supporting Infrastructure is predominantly at very low risk of flooding. A small part of this area has a high risk of fluvial flooding.

The Temporary Construction Areas have a very low to low risk of fluvial flooding. A low risk of flooding means there is a chance of flooding of fluvial flooding between 0.1% and 1% in any given year.

To better understand the potential implications of climate change on the risk of river flooding, further assessment using modelled data has been undertaken and is discussed in Section 5.



Figure 4-1 Risk of flooding from Rivers

4.4 Flood Risk from the Sea

The proposed Production Development Zone, Unnamed Port Road Supporting Infrastructure, and Temporary Construction Area are at very low risk of flooding from the Sea, according to **NRW’s FRAW Flood Risk from the Sea map**. This means that there is less than a 0.1% AEP chance of tidal flooding in any given year. This is shown by a transparent layer on the FRAW mapping, as shown in Figure 4-2.

The unnamed Port Road Supporting Infrastructure marginally encroaches into areas of high risk of tidal flooding.

Further assessment using modelled data has been undertaken and is discussed in Section 5.

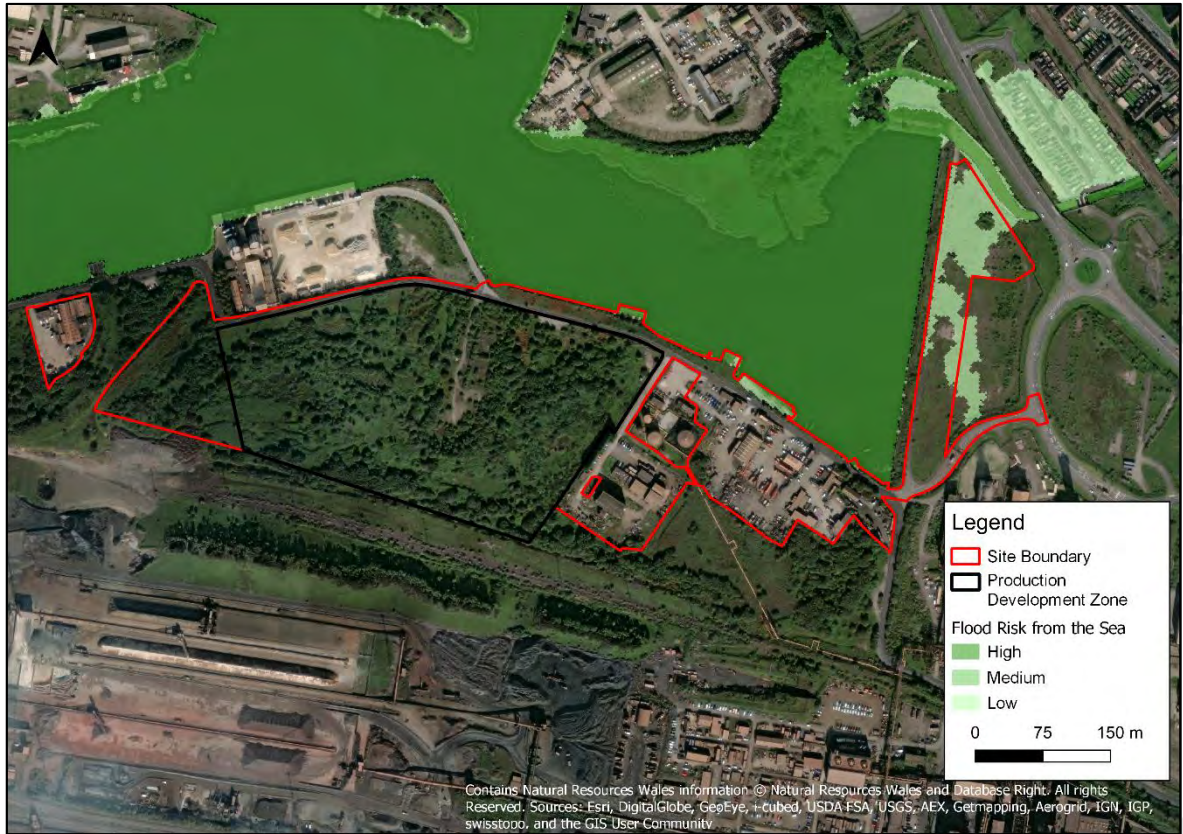


Figure 4-2 Risk of flooding from the Sea

4.5 Flood Risk from Surface Water and Small Watercourses

Parts of the proposed development site are at risk of flooding from surface water and small watercourses, **according to NRW's FRAW Flood Risk from the Surface Water and Small Watercourses map**, as shown in Figure 4-3.

The proposed Production Development Zone is predominantly at a very low risk of flooding **from Surface Water and Small Watercourses according to NRW's FRAW Flood Risk from the Surface Water and Small Watercourses map** shown. This means there is less than a 0.1% AEP chance of flooding from these sources in any given year. A small area of surface water ponding is present along the southern boundary of this area. This area of ponding is only present in the low-risk scenario (between 1 in 1000 (0.1%) and 1 in 100 (1%)). The NRW National Flood Hazard mapping shows that flood depths in these areas of surface water ponding are between 0.15-0.3m.

The Unnamed Port Road Supporting Infrastructure is at very low risk of surface water and small watercourse flooding.

The Temporary Construction Areas are predominantly at very low risk of surface water and small watercourse flooding with isolated areas of surface water ponding predicted to be at low risk of flooding. The NRW National Flood Hazard mapping shows that flood depths in these areas of surface water ponding are between 0.15-0.3m.



Figure 4-3 Risk of flooding from Surface Water and Small Watercourses

4.6 Flood Risk from Groundwater

Groundwater flooding is caused by unusually high groundwater levels, and it occurs as excess water emerges at the ground surface or within manmade structures such as basements. Groundwater flooding tends to be more persistent than surface water flooding, sometimes lasting for weeks or months, and can damage property. This risk of groundwater flooding depends on the nature of the site's geological strata and the local topography.

The Envirocheck Report included as part of the desk study⁴ undertaken by Tweedie Evans Consulting Ltd identifies that the BGS Groundwater Flooding Susceptibility dataset shows that the majority of the proposed development site has the potential for groundwater flooding to occur in properties situated below ground level. Small sections along the northern boundary of the site is categorised as having the potential for groundwater to occur at the surface. The groundwater table is presumed to be linked to the water level in the dock, which is therefore unlikely to force groundwater emergence in ground at levels substantially above the dock level. It can therefore be concluded that the risk of groundwater flooding at the site is low.

4.7 Flood Risk from Reservoirs

NRW flood maps indicate that the proposed Production Development Zone and the Unnamed Port Road Supporting Infrastructure are at very low risk of flooding due to reservoir failure, as shown in Figure 4-4.

The Temporary Construction Area to the eastern extent of the red line boundary is predicted to be at risk of flooding due to reservoir failure. As the enforcement authority for the Reservoirs Act 1975 in Wales, NRW ensure that reservoirs are inspected regularly, and

⁴ Tweedie Evans Consulting Ltd (2022) *Crown Wharf, Port Talbot Desk Study*

essential safety work is carried out. The regulatory nature of reservoir management means that the probability of a failure at a statutory reservoir is very low.



Figure 4-4 Risk of flooding from Reservoirs

4.8 Flood Risk from Sewers

The Neath Port Talbot County Borough Council Flood Risk Management Plan does not contain evidence of historic sewer flooding on or close to the site. Furthermore, with the exception of a small private sewer on the Unnamed Port Road Supporting Infrastructure, there are no sewers on site currently. It can therefore be concluded that the risk of sewer flooding at the site is very low.

5 Detailed Fluvial and Tidal Flood Risk Assessment

As identified in Sections 3 and 4, a better understanding of the tidal and fluvial flood risks and potential implications of climate change is required. The following section assesses these sources of flood risk in more detail.

5.1 JBA Flood Modelling

5.1.1 Model provenance

To comprehensively assess the risk of flooding to the proposed development site, updated detailed flood modelling has been undertaken for the study area. The detailed fluvial and tidal flood risk model of Port Talbot is 1D-2D linked ESTRY-TUFLOW Model. This was originally developed by JBA Consulting in August 2017 for Neath Port Talbot CBC and subsequently adopted by NRW.

The 2017 detailed model was subsequently updated by JBA for another location close to the proposed development (planning reference P2020 0303). These updates included:

- Updating the building representation to be based solely on the OS Mastermap layer with a 90% blockage factor applied.
- Run the model with the latest version of TUFLOW.
- Update the tidal boundary conditions to be uplifted to 2021 to represent present-day conditions and consider the impact of the 2096 climate change epoch.

In accordance with Welsh Government Guidance on Climate Change Allowances for Planning Purposes⁵ the 75-year cumulative Sea Level Rise needs to be considered for commercial land uses. To account for the impact of sea level rise over the lifetime of the development a further uplift was calculated for the 2096 scenario based on the Higher Central allowance (70th percentile) of the UKCP 18 for 2100, RCP 8.5 dataset. Table 5-1 summarises the sea level rise uplifts applied to the tidal boundary conditions and the resulting peak tide levels.

Table 5-1 Sea level rise uplifts and peak tide levels

Scenario	Sea level rise uplift (m)	Peak tide level (m AOD)	
		0.5% AEP	0.1% AEP event
2096	0.711	7.08	7.40

5.1.2 Project Dragon Model Updates (2023)

For this FCA the tidal boundaries have not be updated from a base year of 2021 to 2023 for **consistency with other recent FCA's in the area. From 2096 to 2098 an** additional increase of 25mm is expected based of the UKCP18 dataset. This negligible difference is not expected to impact on the results. Therefore, the tidal boundaries have not been updated for these additional 2 years.

The model uses TUFLOW executable 2020-01-AB. Whilst it is acknowledged that this is not the most recent version of the software, subsequent software updates have focused on the TUFLOW HPC solver, not TUFLOW classic, which has been used as part of this modelling.

For the Project Dragon FCA, the initial conditions have been updated so that the use of restart files is no longer required. This is considered to be an improvement on the previous model as new initial conditions no longer need to be produced for each different model scenario as is the case when using restart files.

⁵ Welsh Government Guidance on Climate Change Allowances for Planning Purposes: <https://gov.wales/sites/default/files/publications/2018-11/flood-consequence-assessments.pdf>

Additional minor updates, include fixing the initial water level in the dock to the target level maintained by ABP (5.66mAOD) and removing duplicate points from the 1D Initial Water Level (IWL) layer which is used to specify the initial conditions for the 1D river channel.

There are a small number of 1D Negative depths present, however these occur at the start on the simulation. Whilst it would be preferable for these to not be present, their location at the downstream end of the River Afan, and occurrence at the start of the simulation means that they have no impact on the peak results at the site of interest.

The flood model and results were submitted to NRW for review prior to the completion of this assessment. This review **concluded that the model results "are suitable to support an FCA"**. The NRW review certificate is contained in Appendix C.

The results for the 0.5% AEP plus climate change and 0.1% plus climate change were used to assess the risk of tidal flooding and 0.1% AEP defended events were used for this assessment to assess the risk of fluvial flooding. The results from these return periods are detailed below.

5.2 Fluvial Flood Risk

5.2.1 Baseline Flood Risk

0.1% AEP event

The baseline modelling shows that the land within the site is predicted to be flood free in the 0.1% AEP fluvial flood event, as shown in Figure 5-1. Flood water is confined to the docks with flooding within the red line boundary limited to the water compatible dockside structures immediately adjacent to the dock. There are no proposals to modify these structures or ground levels as part of this development.

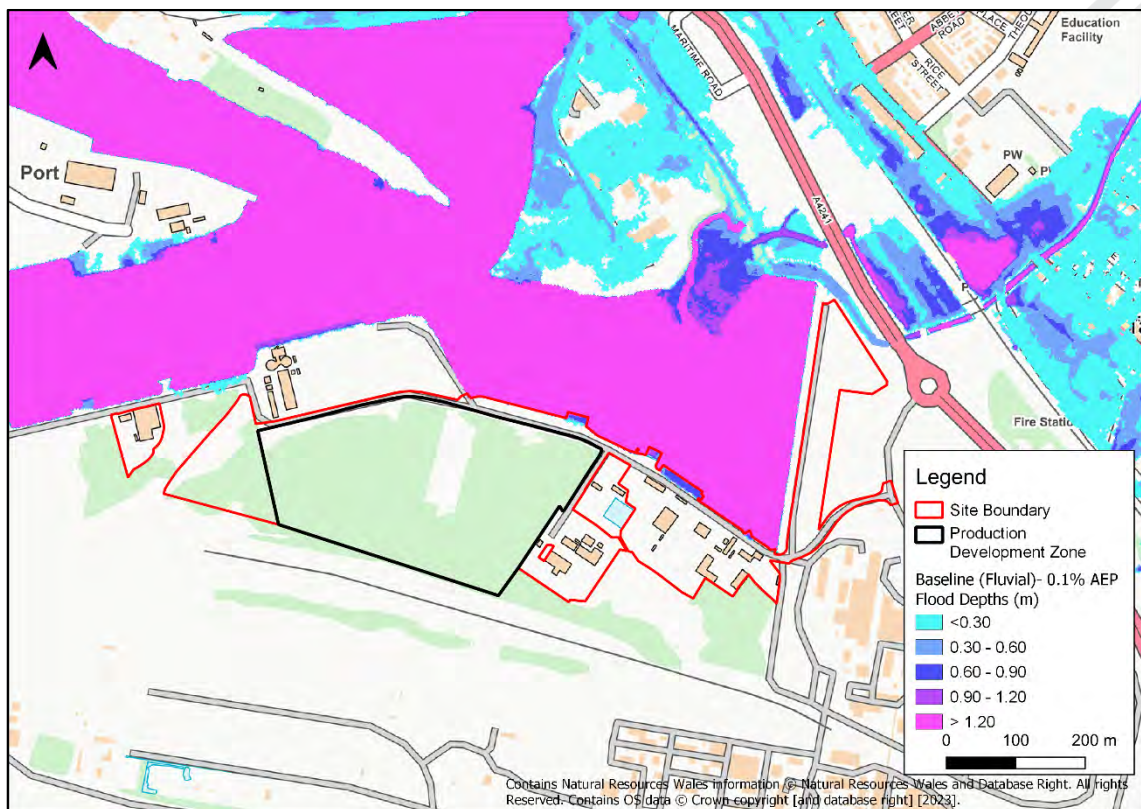


Figure 5-1 0.1% AEP flood depths

As the proposed development site is not predicted to flood in the 0.1% AEP, no further assessment of the post development scenario has been undertaken.

5.3 Tidal Flood Risk

5.3.1 Baseline Model Results

The present day 0.5% AEP and 0.1% AEP event show that the land within the site is predicted to be flood free and as a result, have not been presented.

0.5% AEP 2096 event

The baseline modelling shows that the land within the site is not predicted to flood in the 0.5% AEP 2096 tidal flood event, as shown in Figure 5-2. Flood water is confined to the docks with flooding limited to the water compatible dockside structures immediately adjacent to the dock. There are no proposals to modify these structures or ground levels as part of this development.

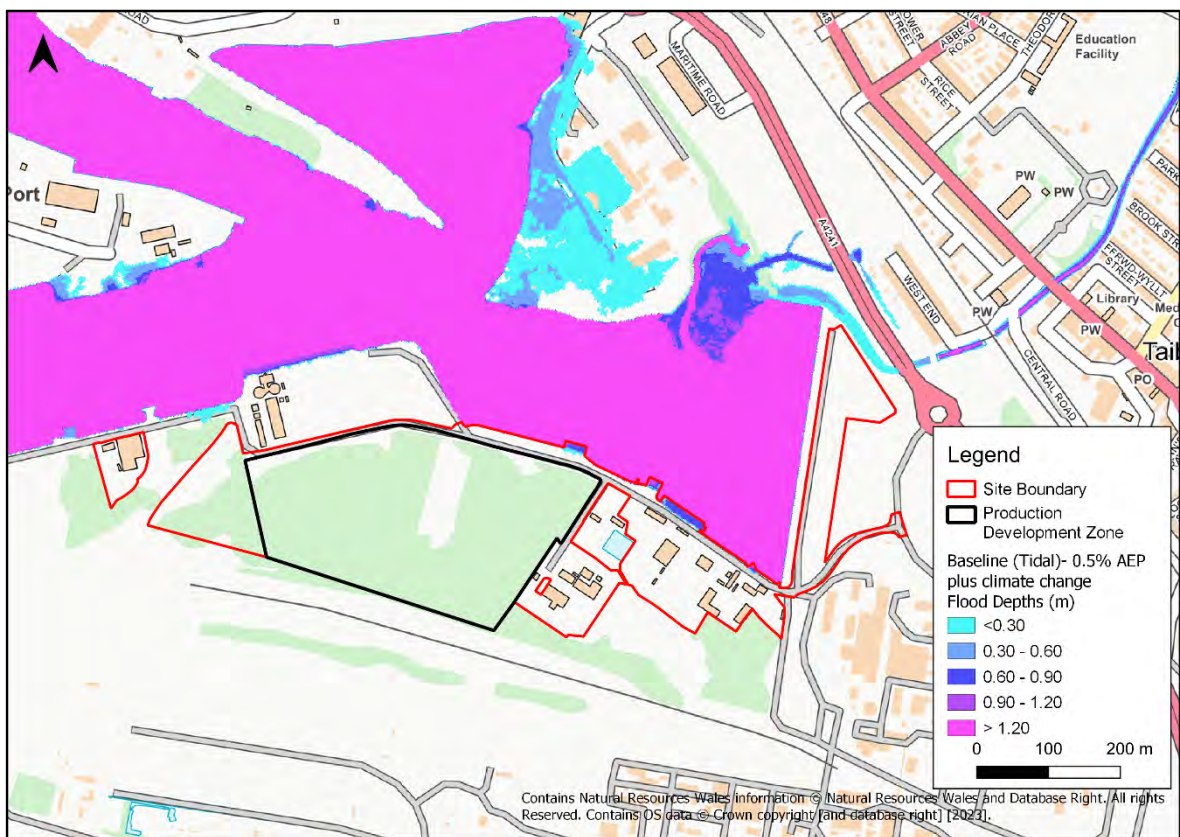


Figure 5-2 0.5% AEP plus climate change baseline flood depths

0.1% AEP 2096 event

Areas of the proposed Production Development Zone are predicted to flood in the 0.1% AEP 2096 event, as shown in Figure 5-3 below. During this event, the majority of the site is flood-free, with a small amount of flood water overtopping from the Port Talbot Docks onto the access roads to the north of the site and flowing in a southerly direction before ponding into the topographic depression in the north of the Production Development Zone. Predicted flood depths across the site are shallow and are less than 300mm with a maximum flood depth of 250mm. Water levels remain consistent across the site at a level of 7.30m AOD.

The Unnamed Port Road Supporting Infrastructure is predominantly at very low risk of flooding. A very small part of the access road is predicted to flood to depths of up to 4mm. The Temporary Construction Area is not predicted to flood during this event. The water compatible dockside structures immediately adjacent to the dock to the northern extent of the Unnamed Port Road Support Infrastructure may be flooded in this event.

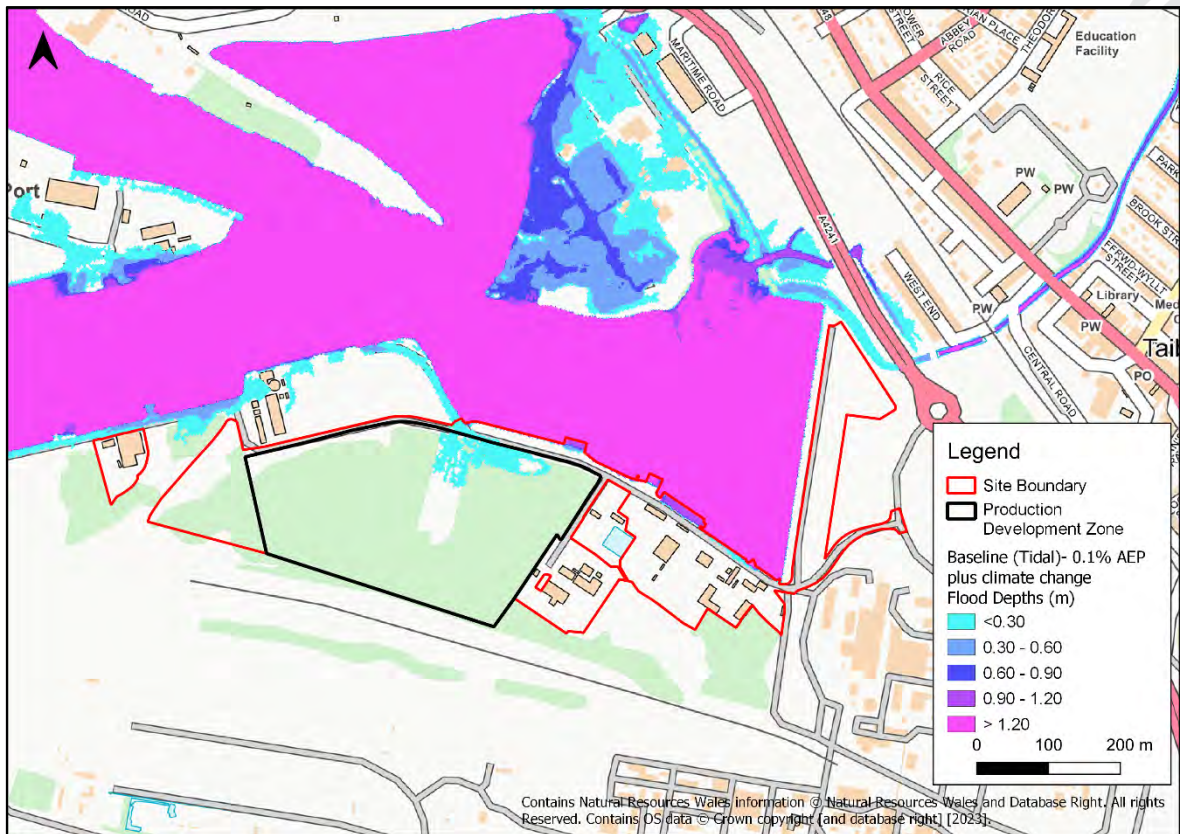


Figure 5-3 0.1% AEP plus climate change baseline flood depths

5.3.2 Post-Development Model Results

As a result of the predicted flood depths across the site in the 0.1% AEP 2096 event and engineering requirements of the project, ground levels across the Production Development Zone will be raised to a minimum ground level of 7.5mAOD. Most areas of the site already exceed this level. No changes in level to the Unnamed Port Road Supporting Infrastructure or the Temporary Construction Area are proposed.

As the proposed development site is not predicted to flood in the 0.5% AEP 2096 event, this event is not presented below for the post-development scenario.

0.1% AEP 2096 event

As a result of ground raising to the Production Development Zone, this area is predicted to be flood free in the 0.1% AEP 2096 event. The predicted flood extent for the 0.1% AEP 2096 event post-development scenario is shown in Figure 5-4.

As no changes in level are proposed to the Unnamed Port Road Supporting Infrastructure, this area is still predicted to flood to shallow depths, although these flood depths remain well within acceptable tolerances set out in TAN15. No level changes are proposed to water compatible dockside structures, therefore there will be no change in flood depths to this area.

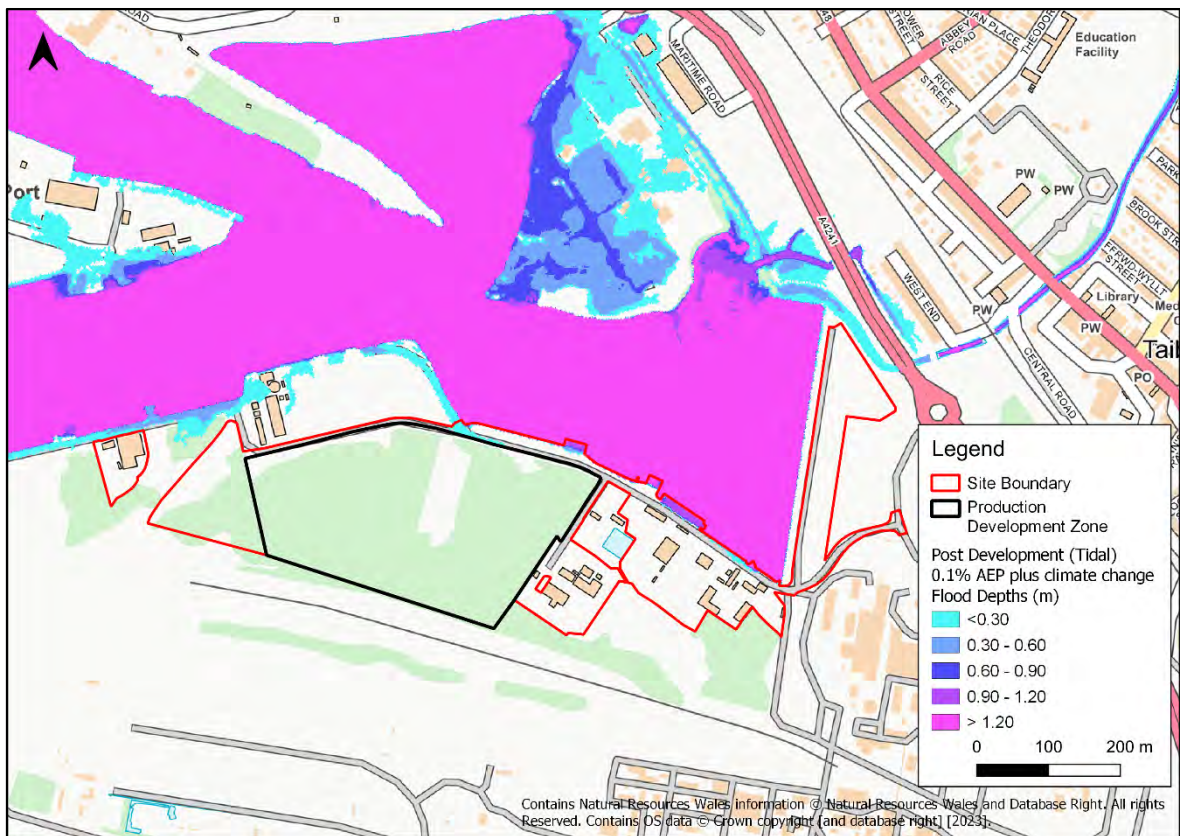


Figure 5-4 0.1% AEP plus climate change post development flood depths

5.3.3 Third-Party Impacts

TAN-15 Section 7.3 requires that new development **should ensure 'minimal impact of the proposed development on flood risk generally'**. Although TAN-15 provides little guidance on how off-site impacts should be assessed and evaluated, NRW has published guidance on **'Modelling for Flood Consequence Assessment'**⁶, which provides guidance on the measurable limits of flood models and assessment of off-site impacts.

A comparison of maximum water depths from the baseline and post-development model results was undertaken to determine the impacts of the proposed development on off-site flood risk.

0.1% AEP 2096 event

Figure 5-5 shows the impact on water depths during the 0.1% AEP plus climate change tidal flood event. The analysis shows that there is no detrimental change to flood depths around the site resulting from the proposed development.

⁶ Modelling for Flood Consequence Assessments (Ref. GN028). Natural Resources Wales, Jan 2020

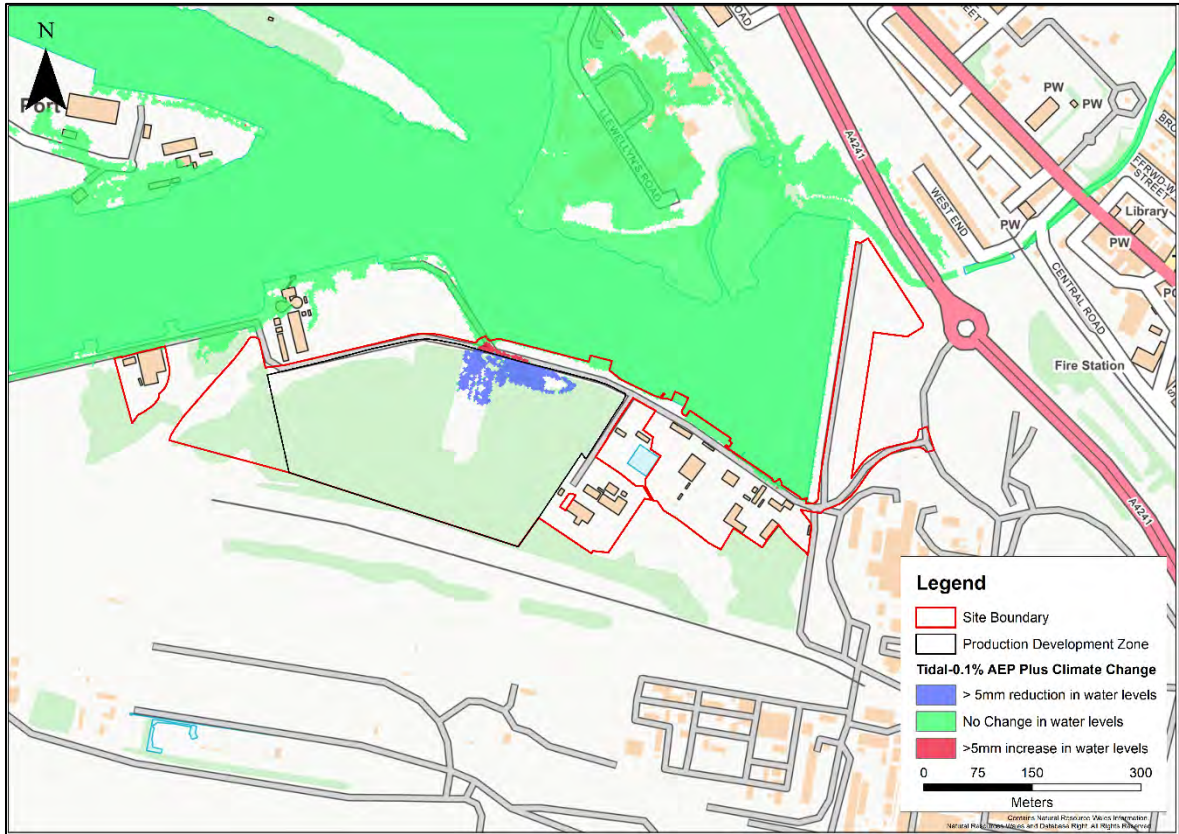


Figure 5-5 0.1% AEP plus climate change Depth Comparison Grid

6 Assessment of Acceptability Criteria

Table 6-1 below details the acceptability criteria required by TAN-15.

Table 6-1 TAN-15 Acceptability Criteria

TAN-15 Acceptability Criteria	Comments	Satisfied
Developer is required to demonstrate that the site is designed to be flood free for the lifetime of development for a 1 in 100(1%) chance (fluvial) and 1 in 200 (0.5%) chance (tidal) flood event including an allowance for climate change, in accordance with Tan-15 Table A1.14.	The land within the proposed development site will be flood free in the 1% AEP plus climate change fluvial flood event and the 0.5% AEP plus climate change tidal flood event. In the area of the Unnamed Port Road Support Infrastructure, dockside structures within or immediately adjacent to the dock may be flooded. However, these shall be water compatible structures designed to cope with these conditions.	Yes
In respect of the residual risk to the development it should be designed so that in an extreme (1 in 1000 chance) fluvial flood event and 0.1 plus climate change tidal flood event there would be less than 600mm of water on access roads and within property.	In the 0.1% AEP fluvial flood event, the development will be flood free. In the 0.1% plus climate change tidal flood event, the proposed development will also be flood free following ground raising to a minimum ground level of 7.5mAOD. In the area of the Unnamed Port Road Support Infrastructure, dockside structures within or immediately adjacent to the dock may be flooded. However, these shall be water compatible structures designed to cope with these conditions.	Yes
No flooding elsewhere	The proposed development has no impact on flood risk to third parties (Section 5.2.3)	Yes
Flood defences must be shown by the developer to be structurally adequate particularly under extreme overtopping conditions (i.e. that flood with a 1 in 1000 chance of occurring in any given year).	The proposed development site is not protected by the presence of flood defences.	Yes
Effective flood warnings are provided at the site.	The site is not located in a Flood Warning or Flood Alert area due to the low flood risk. The proposed development site is predicted to be flood free under all conditions.	Yes
The developer must ensure	The site is predicted to be flood free	Yes

that future occupiers of the development are aware of the flooding risks and consequences.	therefore there is no risk of flooding to the site.	
Escape/evacuation routes are shown by the developer to be operational under all conditions.	In the 1% plus climate change fluvial flood event and the 0.5% plus climate change tidal flood event, safe access/egress from the site is maintained. In the most extreme and exceptional 0.1% AEP plus climate change tidal flood event, flooding is shallow and will not affect access to and from the site.	Yes
The development is designed by the developer to allow the occupier the facility for rapid movement of goods/possessions to areas away from flood waters.	The proposed development site is predicted to be flood free for all fluvial and tidal design flood events.	Yes
Development is designed to minimise structural damage during a flooding event and is flood proofed to enable it to be returned to its prime use quickly in the aftermath of the flood.	The proposed development site is predicted to be flood free for all fluvial and tidal design flood events.	Yes

7 Conclusions

- JBA Consulting were commissioned by LanzaTech UK Limited to undertake a Flood Consequence Assessment to support a planning application for the construction of Sustainable Aviation Fuel production facility in the Port Talbot Docks.
- The proposed development site is located on land at Crown Wharf, Port Talbot Docks. It is set within an established heavily industrialised area and is bound to the north and east by a private road, to an unused section of railway line to the south and brownfield land to the west.
- The red line boundary includes the Production Development Zone, the Unnamed Port Road Supporting Infrastructure, and Temporary Construction Areas.
- Development proposals are *Demolition of existing structures and erection of a Sustainable Aviation Fuel (SAF) production facility, including enclosed ground flare, storage tanks, installation of pipework and electrical, processing and utility equipment, administration, warehouse and laboratory buildings, new access, car parking and transport infrastructure including a truck loading area and associated works, hard and soft landscaping, areas for temporary construction laydown, and associated development*
- The proposed site is located in Zone B of Natural Resources Wales (NRW) Development Advice Map (DAM). Zone B is defined as areas of the floodplain that is known to have flooded before, as evidenced by sedimentary deposits. Development within Zone B can occur subject to the acceptability of consequences being satisfied.
- The site is at little or no risk of flooding from reservoir failure and a low risk of groundwater and surface water flooding.
- The dominant flood risk to the site is tidal and fluvial. An updated detailed flood model of Port Talbot has been used to gain a better understanding of the potential implications of climate change on the risk of tidal and fluvial flooding. This model has been accepted by NRW as suitable to inform an FCA for the proposed development.
- During the pre-development scenario, the land within the PDZ is predicted to be flood free during the tidal 0.5% AEP plus climate change and fluvial 1% AEP plus climate change and 0.1% AEP events. Flood water is confined to the docks with flooding limited to the water compatible dockside structures within or immediately adjacent to the dock.
- During the 0.1% AEP plus climate change tidal event, the PDZ is predicted to experience shallow flooding, to a maximum depth of 250mm. To manage this, the ground levels of the site will be raised to a minimum ground level of 7.5mAOD, a level above the 0.1% AEP design event.
- In the post-development scenario, the PDZ is predicted to remain flood free during the 0.1% plus climate change tidal flood event as a result of ground raising works.
- A comparison of maximum water depths from the baseline and post-development model results was undertaken to determine the impacts of the proposed development on off-site flood risk. There will be no third-party impacts resulting from ground raising.
- In conclusion, this FCA demonstrates that the proposed development satisfies the Justification Test requirements, including managing flood risk in line with the acceptability criteria. It is therefore concluded that the development meets the principles and requirements set out in TAN15 and the aims of Planning Policy Wales.

Appendices

A Topographic Survey

ABP Port Centric Survey Report

APLS-1174 Harbourside Port Talbot
Survey Control & Topographic Survey

NGR: SS 755 885



**APLS-1174 Harbourside Port Talbot
Survey Control & Topographic Survey
Survey Report**

To: Sophie Young
Associated British Ports
Port of Southampton
Ocean Gate
Atlantic Way
Southampton
SO14 3QN

From: Andy Pitcher
AP Land Surveys Ltd.
21 Grandisson Drive
Ottery St Mary
Devon
EX11 1JD

Tel: 01392 690 222

Fax: 01392 690 223

**APLS-1174 Harbourside Port Talbot
Survey Control & Topographic Survey
Survey Report**

Contents

- 1.0 Scope
- 2.0 Survey Control
- 3.0 Methodology
- 4.0 Presentation
- 5.0 Comments

- Appendix 1 – Equipment List
- Appendix 2 – Calibration Certificates
- Appendix 3 – Installed Survey Control
- Appendix 4 – Survey Drawings

**APLS-1174 Harbourside Port Talbot
Survey Control & Topographic Survey
Survey Report**

Report of Survey

Job No: APLS-1174

Date of Survey: December 2021

1.0 Scope

- 1.1 Following the commission of AP Land Surveys Ltd by Sophie Young of ABP Ports to undertake a topographic survey of a site in Harbourside, Port Talbot attached are copies of the survey information.
- 1.2 Survey control and data has been collected in line with the survey brief provided by the client.

2.0 Survey Control

- 2.1 Temporary control stations (PK Nails or timber pegs) were installed within the site location to capture the survey information. Each monument has been observed twice for a period of 180 seconds with a dormant period of at least 20 minutes in line with the specification. Only control coordinates with RMSE's of <15mm have been accepted.
- 2.2 All survey control has been reduced to OSGB 1936(2015) using the OSTN15 and OSGM15 parameters.
- 2.3 All surveyed heights are therefore relative to Ordnance Datum Newlyn.
- 2.4 Pairs of survey stations were left on the site to provide a fixed site datum for construction going forward.
- 2.5 Details of this fixed survey control can be found in Appendix 3.

3.0 Methodology

- 3.1 All topographic survey data has been surveyed using either a Leica TS16 robotic total station or by direct GPS measurement. Where access was

problematic or dangerous, reflector less measurements and steel tape observations have been made.

- 3.2 All site levelling has carried out using a digital Leica NA720 level.
- 3.3 All survey data has been reduced and collated using SCC version 13 and Leica Infinity version 3.4.3.

4.0 Presentation

- 4.1 All survey information has been produced as the following 2D AutoCAD drawings.

APLS-1174-001 to 005 – Site topography

Previews of these drawings can be found in Appendix 4.

5.0 Comments

- 5.1 Every effort has been made to collect all visible data on all areas of the site. Due to the nature of the terrain there were areas that were inaccessible due to dense vegetation and health & safety issues.
- 5.2 All visible service covers have been surveyed but there may be others that have not been located.



Andy Pitcher
Director
AP Land Surveys Ltd.

**Appendix 1
Equipment List**

Equipment List

Item	Number	Manufacturer & Model	Used (Yes/No)
<i>Control Observation</i>			
GNSS GX1230+Receiver	1	Leica 1200 series GNSS Base/Rover Unit with AX1202GG Antenna	No
GNSS GX1230+Receiver	1	Leica 1200 series GNSS Base/Rover Unit	No
GS18 GNSS Receiver	1	Leica Net Rover	Yes
GS14 GNSS Receiver	1	Leica Net Rover	Yes
<i>Total Station Equipment</i>			
Total Stations	1	Leica TS16 R1000 robotic Total Station	Yes
Traverse Tripods	2	Leica	Yes
Traverse Prisms	4	Leica GPR1 with carriers and stem	Yes
Mini Prism '0 const'	2	Leica GMP-111	No
Optical Plummet	1	Wild (Leica) ZNL (1:30,000)	No
<i>Levelling Equipment</i>			
Automatic Level	1	Leica Sprinter 250M (1.5mm)	Yes
4m Barcode Staff	1	Leica Sprinter Series	Yes
5m Con Staff	1	Seco	No
Change Plate	1	YSSC	Yes
<i>General Site Equipment</i>			
Decontamination Set		Steriliser spray for equipment, antibacterial hand wipes	Yes
Site PPE		Yellow jacket, safety boots, road signs	Yes
Water Safety Gear		Life jacket, throw lines, Hi visibility clothing	No
Drilling Equipment		Rotary hammer drill and assorted bits, eye protection, gloves	Yes
Echosounder		SonarMite BTX Echosounder Odom Hydrotrack	No
Laser Scanner		Leica P40	No

Appendix 2
Calibration Certificates



Unit 2, St. Catherine's Park, Pengam Road, Cardiff, CF24 2RZ
029 2267 9583 | service@sunbeltsurvey.co.uk | sunbeltsurvey.co.uk

Certificate of Conformity

Certificate No.: 0000205316

Instrument Serial No.: 3010414

Prepared For: A P Land Surveys Ltd

Instrument Make: Leica

Instrument Model: Leica TS16 I 5" R1000

This is to certify that the equipment detailed hereon has been inspected and unless otherwise stated conforms in all aspects to the manufacturer's original specifications or company work instructions.

Testing was carried out using equipment which is subject to regular verification and where applicable, is traceable to International/National standards.

Signed for and on behalf of
Sunbelt Rentals - Survey

Dominic Barrett

Technician: Dominic Barrett

Test Date: 01/07/2021

Retest Due: 01/07/2022



Unit 3, Exeter Trade Centre, Silverton Road, Marsh Barton Trading Estate, Exeter, EX2 8LD
01392 824045 | service@sunbeltsurvey.co.uk | sunbeltsurvey.co.uk

Certificate of Conformity

Certificate No.: 0000220021

Instrument Serial No.: 5673890

Prepared For: A P Land Surveys Ltd

Instrument Make: Leica

Instrument Model: NA720

This is to certify that the equipment detailed hereon has been inspected and unless otherwise stated conforms in all aspects to the manufacturer's original specifications or company work instructions.

Testing was carried out using equipment which is subject to regular verification and where applicable, is traceable to International/National standards.

**Signed for and on behalf of
Sunbelt Rentals - Survey**

Mike Blake

Technician: Mike Blake

Test Date: 05/01/2022

Retest Due: 05/01/2023

Appendix 3
Installed Survey Control

AP Land Surveys Limited

21 Grandisson Drive, Ottery St Mary, Devon EX11 1JD

Tel 01392 690 222 Fax 01392 690 223

www.aplandsurveys.co.uk



APB Port Centric – Port Talbot Installed Control Stations

Station ID : STN10
Easting : 275344.430
Northing : 188557.341
Elevation : 9.124mAOD
Description : MAG nail & washer installed in tarmac access road.
Photos:



AP Land Surveys Limited

21 Grandisson Drive, Ottery St Mary, Devon EX11 1JD

Tel 01392 690 222 Fax 01392 690 223

www.aplandsurveys.co.uk



Installed Control Stations

Station ID : STN11
Easting : 275398.920
Northing : 188635.081
Elevation : 10.647mAOD
Description : MAG nail & washer installed in tarmac access road

Photos:



**Appendix 4
Survey Drawings**



1. ORDANCE SURVEY MATERIAL REPRODUCED WITH THE PERMISSION OF THE CONTROLLER OF H.M.S.O.
2. ALL LEVELS SHOWN ARE IN METRES ABOVE ORDANCE DATUM.

NOTES:

SURVEY LEGEND					
AB	AIR BRICK	FB	FIRE HYDRANT	PAW	POST & WIRE FENCE
AV	AIR VALVE	FH	FIRE HYDRANT MARKER	RB	ROOF BANK
B	BOLLARD	FL	FLOOR LEVEL	RE	RECORDING EYE
BB	BORDER BEACON	FP	FENCE POST	RFW	RETAINING WALL
BD	BORDER	FWM	FUILL WATER MANHOLE	RSP	RAINWATER PIPE
BH	BORDURE	GS	GROUND LEVEL	SC	STOP COCK
BL	BED LEVEL	GP	GATE POST	SD	STANDARD PIPE
BLK	BLOCK	GV	GAS VALVE	SN	SOAKAWAY
BLS	BULB STOP	GW	GAS WAREHOUSE	SN	SOFT LEVEL
BM	BENCH MARK	HW	HWY WALL	SNM	SHOULDER WATER MANHOLE
BW	BARBED WIRE FENCE	IC	INSPECTION CHAMBER	SMP	SHEET METAL PILING
CBF	COLE BARBED WIRE FENCE	IL	INVERT LEVEL	SP	SIGN POST
CF	CONCRETE FENCE	IRF	IRON RAILING FENCE	STN	STATION
CFI	CHAIN LINK FENCE	IRF	IRON RAILING FENCE	SW	SOUL VALVE
CFI	CHAIN LINK FENCE	JBC	JUNCTION BOX	SWP	SOIL VENT PIPE
CONC	CONCRETE	KIB	KIBB RILEY GULLY	SWF	SHEEP FENCE
CP	CONCRETE POST	LB	LEFT BANK	TBM	TEMPORARY BENCH MARK
CPF	CRESTED FRANKING FENCE	LFB	LEFT BANK	TCR	TELEPHONE CAB BRACKET
CS	CYCLE SIGN	LFP	LAMP POST	TC	TELECOM CABINET
CTV	CABLE TV MANHOLE	LHB	LEFT BANK	TCM	TELECOM MANHOLE
CV	CHANNEL	LMB	LEFT BANK	TR	TRAFALGAR LEVEL
DL	DRAIN	M	MANHOLE	TL	TRAFFIC LIGHT
DK	DROP KERB	M	MANHOLE	TL	TRAFFIC LIGHT
DM	DRAIN	M	MANHOLE	TL	TRAFFIC LIGHT
DP	DOWNPIPE	MP	MODORING PILE	TP	TELEGRAPH POLE
DR	DRAIN	MF	METAL RAILING FENCE	TS	TREE STRIP
DR	DRAIN	MS	MILE STONE	TS	TREE STRIP
EA	ENVIRONMENT AGENCY	NR	NATIONAL RIVERS AUTHORITY	TS	TURKISH STEEL RAILINGS
EB	ELECTRICITY BOX	O	ODENANCE SURVEY	WB	WATER PIPE
ECF	ELECTRIC CABLE FENCE	OS	ORDNANCE SURVEY	WL	WATER LEVEL/WATER LINE
EF	ELECTRICITY CABLE FIT	OJ	OPEN JELLY MANHOLE	WM	WATER METER
EMH	ELECTRICITY MANHOLE	P	PILLAR BOX	WMM	WALL MARKER
EP	ELECTRICITY POST	PA	PARKING AREA	WOP	WOODEN POST & BAIL FENCE
ETL	ELECTRICITY TRANSMISSION LINE	PD	POST	WW	WATER WIRE
FB	FOOTBRIDGE	PI	POST & RAIL FENCE	WV	WOODEN VALVE
		PTM	PARKING TICKET MACHINE	YD	YARD GULLY

(Abbreviations apply to EA survey data only)

REV.	AMENDMENT	DRN	CHKD	DATE

STATIONS ESTABLISHED:
NAME CO-ORDINATES LEVEL
STN10 275344.430E 188557.341N 9.124m AOD
STN11 275398.920E 188635.081N 10.647m AOD



PROJECT/WATERCOURSE
Port Centric Manufacturing Sites

SITE/LIMITS
**ABP Port Talbot
Topographic Survey
Site Overview**

SURVEYED BY: AP Land Surveys Ref: APLS-1174
SURVEY DATE: DECEMBER 2021
SCALE: Not to scale DRN: AMP CHKD: AJP
DATUM: ODN DATE: DEC 21 DATE: DEC 21
GRID: NATIONAL DRAWING NO. APLS-1174-001 REV: —



1. ORDNANCE SURVEY MATERIAL REPRODUCED WITH THE PERMISSION OF THE CONTROLLER OF H.M.S.O.
 2. ALL LEVELS SHOWN ARE IN METRES ABOVE ORDNANCE DATUM.

NOTES:

SURVEY LEGEND					
AB	AIR BRICK	FH	FIRE HYDRANT	PWF	POST & WIRE FENCE
AV	AIR VALVE	FHM	FIRE HYDRANT MARKER	RB	ROOF BANK
B	BOLLARD	FL	FLOOR LEVEL	RE	ROOFING EYE
BB	BELONG BEACON	FP	FENCE POST	RF	RETAINING WALL
BDV	BOUNDARY	FWM	FULL WATER MANHOLE	RWP	RANWATER PIPE
BS	BOROUGH	G	GALV	SC	STOP COCK
BL	BED LEVEL	GS	GROUND LEVEL	SDP	STAND PIPE
BK	BROOKSOME	GP	GATE POST	SD	SOIL DAM
BL	BUS STOP	GM	GAS METER	SN	SOUNDING
BM	BENCH MARK	GV	GAS VALVE	SL	SOFT LEVEL
BW	BULK WALL	HW	HEAD WALL	SN	SOUNDING WATER MANHOLE
BWP	BARBED WIRE FENCE	IC	INSPECTION CHAMBER	SMP	SHEET METAL PILING
CB	COLE BOARD FENCE	IL	INLET LEVEL	SP	SHOE POST
CF	CORRUGATED IRON FENCE	IRF	IRON RAILING FENCE	STN	STATION
CL	COVER LEVEL	IRP	INTERPRETER FENCE	SV	SURFACE VALVE
CLF	CHAIN LINK FENCE	JB	JUNCTION BOX	SWP	SOIL VENT PIPE
CC	CONCRETE	JCB	JOB BUILT GULLY	SWF	SHARP WIRE FENCE
CP	CONCRETE POST	LB	LEFT BANK	TBM	TEMPORARY BENCH MARK
CPT	CHESTNUT FRANK FENCE	LB	LEFT BANK	TCB	TELEPHONE CAB BENCH MARK
CR	CYCLE RACK	LP	LAMP POST	TC	TELECOM CABINET
CV	CABLE TV MANHOLE	MR	MODERN BOLLARD	TMR	TELECOM MANHOLE
CUL	CULVERT	MF	MISCELLANEOUS FENCING	TR	TRIMMED LEVEL
DK	DROP KERB	MH	MANHOLE	TL	TRAFFIC LIGHT
DM	DRAIN	MN	MANHOLE	TLB	TRAFFIC LIGHT BOX
DR	DOWNPIPE	MP	MODERN PILE	TP	TELEGRAPH POLE
DRC	DAMP RIDGE COURSE	MRF	METAL RAILING FENCE	TSS	TRUSS RIBBING STOP
DR	DRAIN	MS	MILE STONE	TS	TREE STRIP
DWB	DROP WASTE BIN	NR	NOTICE BOARD	TSS	TURKISH STEEL RAILINGS
EA	ENVIRONMENT AGENCY	NIA	NATIONAL RIVERS AUTHORITY	VP	VERT PIPE
EB	ELECTRICITY BOX	OC	OPEN ROAD CROSSING	WB	WATER BIN
ECF	ELECTRIC CABLE FENCE	OS	ORDNANCE SURVEY	WL	WATER LEVEL/WATER LINE
ECF	ELECTRICITY CABLE FIT	OS	OPEN STEEL RAILINGS	WM	WATER METER
EMH	ELECTRICITY MANHOLE	P	PILLAR	WMF	WATER METER FITTING
EP	ELECTRICITY POLE	PB	PILLAR BOX	WP	WOODEN POST
ETL	ELECTRICITY TRANSMISSION LINE	PA	PARKING AREA	WP	WOODEN POST & BASS FENCE
FB	FLOWER BED	PD	POST	WV	WATER VALVE
FBR	FOOTBRIDGE	PTM	PARKING TICKET MACHINE	YD	YARD GULLY

REV.	AMENDMENT	DRN	CHKD	DATE

STATIONS ESTABLISHED:

NAME	CO-ORDINATES	LEVEL
STN10	275344.430E 188557.341N	9.124m AOD
STN11	275398.920E 188635.081N	10.647m AOD



PROJECT/WATERCOURSE			
Port Centric Manufacturing Sites			
SITE/LIMITS			
ABP Port Talbot Topographic Survey Sheet 1 of 4			
SURVEYED BY: AP Land Surveys		Ref: APLS-1174	
SURVEY DATE: DECEMBER 2021			
SCALE: 1:1,000@A1	DRN: AMP	CHKD: AJP	
DATUM: ODN	DATE: DEC 21	DATE: DEC 21	
GRID: NATIONAL	DRAWING NO.:	REV.:	
	APLS-1174-002	-	



1. ORDNANCE SURVEY MATERIAL REPRODUCED WITH THE PERMISSION OF THE CONTROLLER OF H.M.S.O.
 2. ALL LEVELS SHOWN ARE IN METRES ABOVE ORDNANCE DATUM.

NOTES:

SURVEY LEGEND					
AB	AIR BRICK	FM	FIRE HYDRANT	PWF	POST & WIRE FENCE
AV	AIR VALVE	FHM	FIRE HYDRANT MARKER	RB	ROOF BANK
B	BOLLARD	FL	FLOOR LEVEL	RE	ROOFING EYE
BB	BELONG BEACON	FP	FENCE POST	RI	ROOFING PIPE
BCH	BOUNDARY	FWM	FULL WATER MANHOLE	RTW	RETAINING WALL
BH	BORDERLINE	G	GALV	RWP	RAN/WATER PIPE
BL	BED LEVEL	GL	GROUND LEVEL	SC	STOP ROCK
BNE	BROWSE	GP	GATE POST	SDP	STAND PIPE
B	BUS STOP	GV	GAS VALVE	SD	SOIL MARK
BMA	BENCH MARK	GW	WATER MAIN	SM	SURFACE WATER MANHOLE
BW	BARRICADE WIRE FENCE	HC	INSPECTION CHAMBER	SN	SOFT LEVEL
CBF	COTED BARBED WIRE FENCE	HL	INLET LEVEL	SMP	SHEET METAL PILING
CCF	CORRU-GATED IRON FENCE	HP	IRON PILING FENCE	SNP	SHOULDER
CE	CEMENT	HPF	INTERPROVER FENCE	SP	SHOULDER POST
CF	CHAIN LINK FENCE	J	JUNCTION BOX	SPW	SOIL VENT PIPE
CC	CONCRETE	KB	KEB BLET GULLY	SWF	SHARP WIRE FENCE
CP	CONCRETE POST	LB	LEFT BANK	TBM	TEMPORARY BENCH MARK
CPE	CRESTED FRANKING FENCE	LBR	LEFT BANK RIVER	TCR	TELEPHONE CABLE BRACKET
CP	CYCLE RACK	LBP	LAMP POST	TC	TELECOM CABINET
CV	CURB V MANHOLE	MB	MODERNS BOLLARD	TMH	TELECOM MANHOLE
CUL	CULVERT	MF	MISCELLANEOUS FENCING	TR	TRIMMING LEVEL
DK	DROP KERB	MH	MANHOLE	TL	TRAFFIC LIGHT
M	MANDE	MP	MODERN PILE	TLB	TRAFFIC LIGHT BOX
DP	DOWNPIPE	MP	MODERN PILE	TP	TELEGRAPH POLE
DC	DAMP PROOF COURSE	MS	METAL RAILING FENCE	TRB	TRUNK RUBBING STRIP
DR	DRAIN	MS	MILE STONE	TS	TREE STRIP
DWB	DROP WASTE BIN	NB	NOTICE BOARD	TSS	TURKISH STEEL RAILINGS
EA	ENVIRONMENT AGENCY	NIA	NATIONAL RIVERS AUTHORITY	VP	VENT PIPE
EB	ELECTRICITY BOX	OC	OVERHEAD CABLE	WB	WATER BUTTE
ECF	ELECTRIC CABLE FENCE	OS	ORDNANCE SURVEY	WL	WATER LEVEL/WATER LINE
EC	ELECTRICITY CABLE HIT	OS	ORDNANCE SURVEY	WM	WATER METER
EMH	ELECTRICITY MANHOLE	OS	ORDNANCE SURVEY	WM	WATER METER
EP	ELECTRICITY PILE	P	PILLAR	WP	WOODEN POST
EP	ELECTRICITY PILE	P	PILLAR	WP	WOODEN POST
ETL	ELECTRICITY TRANSMISSION LINE	PD	POST & RAIL FENCE	WV	WATER VALVE
FB	FLOOR BEG	PTM	PARKING TICKET MACHINE	YD	YARD GULLY
FBR	FOOTBRIDGE				

REV.	AMENDMENT	DRN	CHKD	DATE

STATIONS ESTABLISHED:
 NAME CO-ORDINATES LEVEL
 STN10 275344.430E 188557.341N 9.124m AOD
 STN11 275398.920E 188635.081N 10.647m AOD

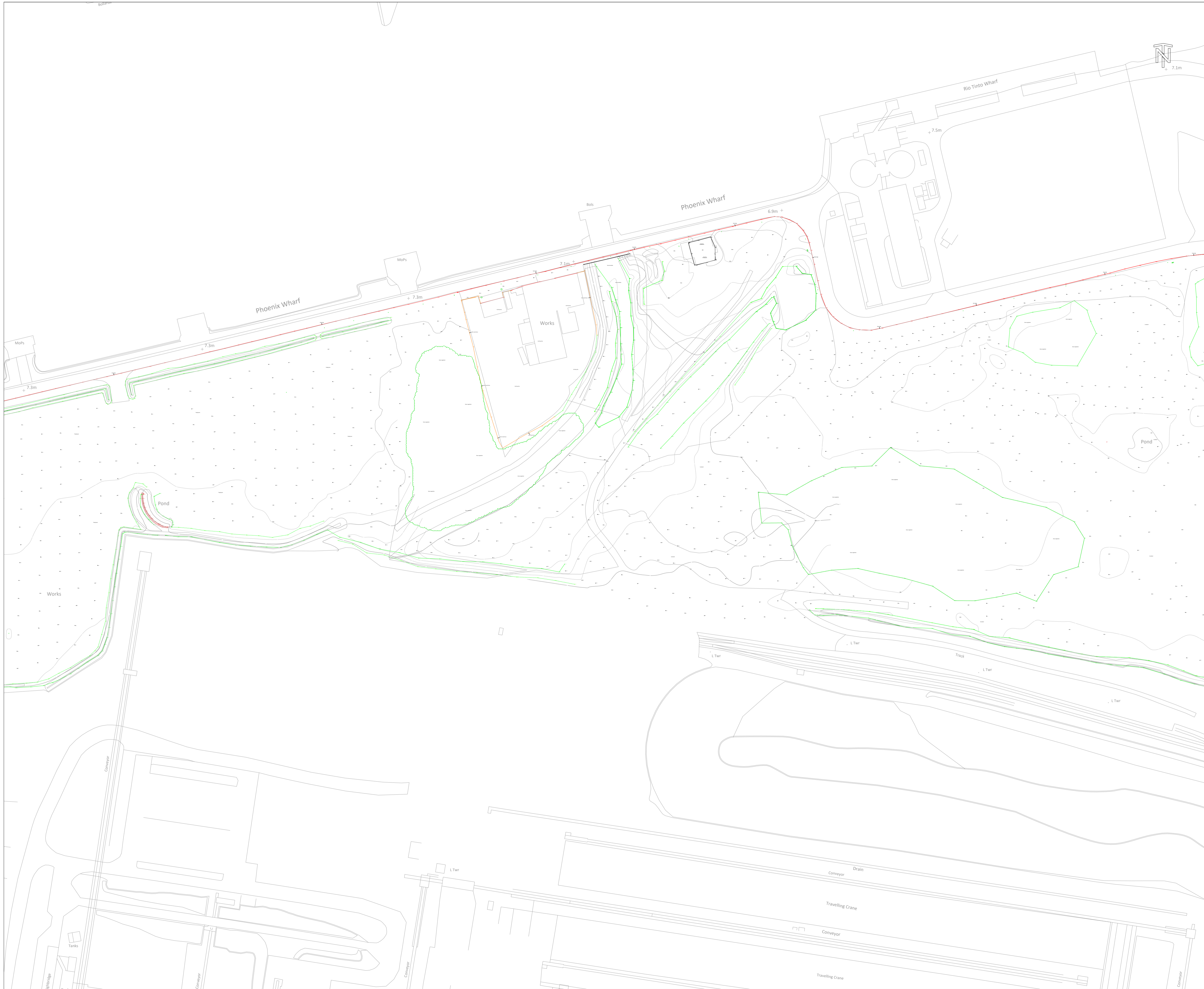


PROJECT/WATERCOURSE
Port Centric Manufacturing Sites

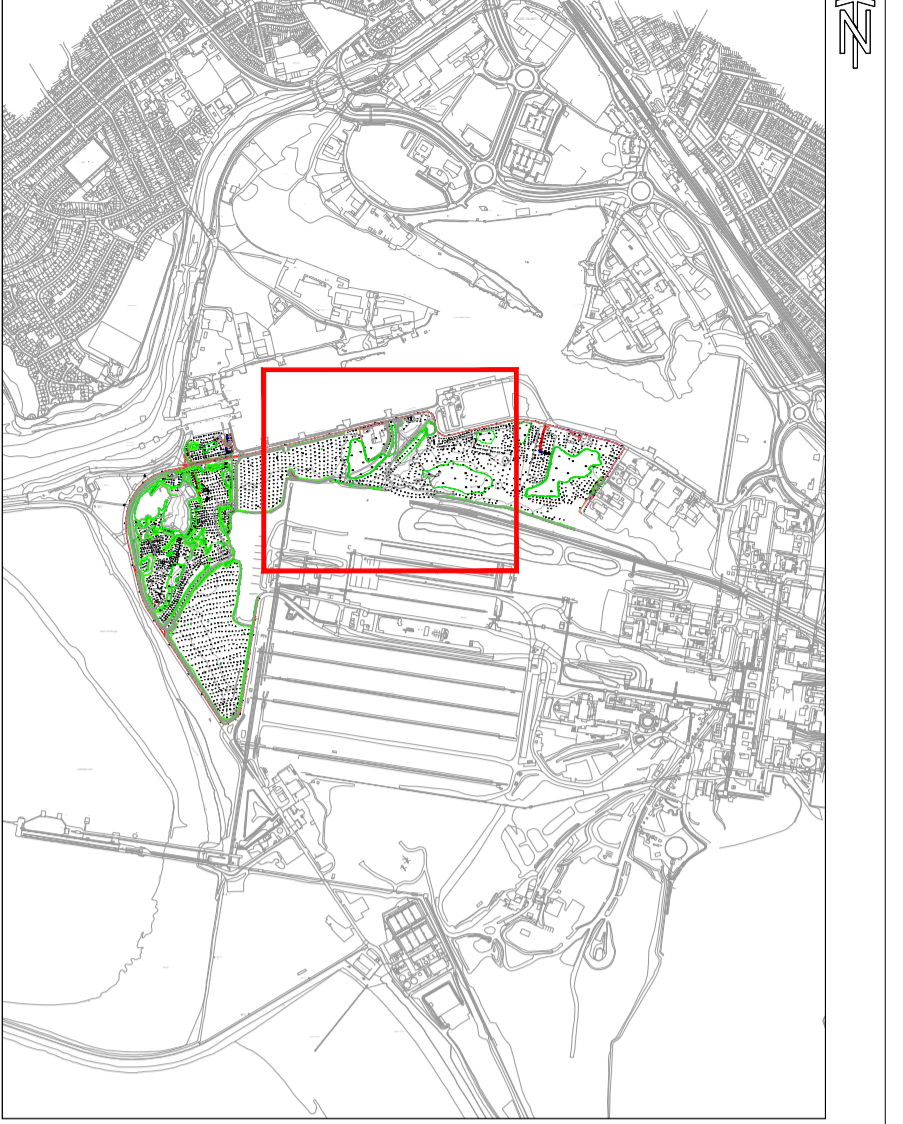
SITE/LIMITS
ABP Port Talbot Topographic Survey
 Sheet 2 of 4

SURVEYED BY: AP Land Surveys Ref: APLS-1174
 SURVEY DATE: DECEMBER 2021

SCALE: 1:1,000@A1	DRN: AMP	CHKD: AJP
DATUM: ODN	DATE: DEC 21	DATE: DEC 21
GRID: NATIONAL	DRAWING NO. APLS-1174-003	REV: -



LOCATION PLAN - SCALE 1:20,000



1. ORDNANCE SURVEY MATERIAL REPRODUCED WITH THE PERMISSION OF THE CONTROLLER OF H.M.S.O.
2. ALL LEVELS SHOWN ARE IN METRES ABOVE ORDNANCE DATUM.

NOTES:

SURVEY LEGEND					
AB	AIR BRICK	FH	FIRE HYDRANT	PWF	POST & WIRE FENCE
AV	AIR VALVE	FHM	FIRE HYDRANT MARKER	RB	RIDGE BANK
B	BOLLARD	FL	FLOOR LEVEL	RE	ROCKING EYE
BB	BELONGS BELCON	FP	FENCE POST	RF	RETAINING WALL
BDY	BOUNDARY	FWM	FUUL WATER MANHOLE	RWP	RAINWATER PIPE
BH	BENCHMARK	G	GALV	SC	STOP COCK
BL	BED LEVEL	GL	GROUND LEVEL	SDP	STAND PIPE
BNE	BROOKSOME	GP	GATE POST	SP	SOFTY LEVEL
BS	BUS STOP	GM	GAS MANHOLE	SR	SOULWELL
BSM	BENCH MARK	GV	GAS VALVE	SL	SHOFT LEVEL
BSW	BANK SIDE	HW	HIGH WALL	SM	SURFACE WATER MANHOLE
BSW	BARBED WIRE FENCE	IC	INSPECTION CHAMBER	SMP	SHEET METAL PILING
CBF	CLOSE BARBED FENCE	IL	INLET LEVEL	SP	SOFT POST
CF	CORRUGATED IRON FENCE	IF	IRON RAILING FENCE	STN	STATION
CL	CORNER LEVEL	IF	INTERFERENCE FENCE	SW	SOFT VALVE
CLF	CHAIN LINK FENCE	JB	JUNCTION BOX	SWP	SOFT VENT PIPE
CONC	CONCRETE	KG	KEEL BUILT GULLY	SWF	SOFT WIRE FENCE
CP	CONCRETE POST	LB	LEFT BANK	TBM	TEMPORARY BENCH MARK
CPT	CRESTED FRANKING FENCE	LB	LEFT BANK	TCR	TELEPHONE CABLE BENCHPOST
CR	CYCLE RACK	LP	LAMP POST	TC	TELECOM CABINET
CIV	CABLE TV MANHOLE	MB	MOUNDING BOLLARD	TMH	TELECOM MANHOLE
CLV	CULVERT	MF	MISCELLANEOUS FENCING	TR	TRAP
DK	DROP KERB	MH	MANHOLE	TL	TRAFFIC LIGHT
DL	DRAIN	MK	MANHOLE	TLB	TRAFFIC LIGHT BOX
DP	DOWNTYPE	MP	MODORING PILE	TP	TELEGRAPH POLE
DPC	DAMP PROOF COURSE	MS	METAL RAILING FENCE	TS	TRIGGER RIBBING STRIP
DR	DRAIN	MS	MILE STONE	TS	TREE STRIP
DWB	DOG WASTE BIN	MS	NOTICE BOARD	TSS	TURKISH STEEL BRACKING
EA	ENVIRONMENT AGENCY	NIA	NATIONAL RIVERS AUTHORITY	VP	VENT PIPE
EB	ELECTRICITY BOX	OHC	OVERHEAD CABLE	WB	WHITE BANK
ECC	ELECTRIC CABLE FENCE	OS	ORDNANCE SURVEY	WL	WATER LEVEL/WATER LINE
ECP	ELECTRICITY CABLE PIT	OS	ORDNANCE SURVEY	WB	WATER BUTTE
EMH	ELECTRICITY MANHOLE	OS	ORDNANCE SURVEY	WM	WATER MAIN
EP	ELECTRICITY POLE	P	P	WM	WATER MAIN
ETL	ELECTRICITY TRANSMISSION LINE	PA	PARKING AREA	WP	WOODEN POST
FB	FLOWER BED	PD	POST	WV	WATER VALVE
FBR	FOOTBRIDGE	PTM	PARKING TICKET MACHINE	YD	YARD GULLY

REV.	AMENDMENT	DRN	CHKD	DATE

STATIONS ESTABLISHED:
NAME CO-ORDINATES LEVEL
STN10 275344.430E 188557.341N 9.124m AOD
STN11 275338.920E 188635.081N 10.647m AOD



PROJECT/WATERCOURSE
Port Centric Manufacturing Sites

SITE/LIMITS
ABP Port Talbot Topographic Survey
Sheet 3 of 4

SURVEYED BY: AP Land Surveys	Ref: APLS-1174
SURVEY DATE: DECEMBER 2021	
SCALE: 1:1,000@A1	DRN: AMP
DATUM: ODN	CHKD: AJP
GRID: NATIONAL	DATE: DEC 21
DRAWING NO. APLS-1174-004	DATE: DEC 21
	REV: -



1. ORDNANCE SURVEY MATERIAL REPRODUCED WITH THE PERMISSION OF THE CONTROLLER OF H.M.S.O.
2. ALL LEVELS SHOWN ARE IN METRES ABOVE ORDNANCE DATUM.

NOTES:

SURVEY LEGEND					
AB	AIR BRICK	FH	FIRE HYDRANT	PWF	POST & WIRE FENCE
AV	AIR VALVE	FHM	FIRE HYDRANT MARKER	RB	RIDGE BANK
B	BOLLARD	FL	FLOOR LEVEL	RE	RECORDING EYE
BB	BELONG BEACON	FP	FENCE POST	RFW	RETAINING WALL
BDY	BOUNDARY	FWM	FOLI WATER MANHOLE	RWP	RAN WATER PIPE
BS	BORDERLINE	G	GATE	SC	STOP COCK
BL	BELT STOP	GL	GROUND LEVEL	SDP	STAND PIPE
BLK	BLOCK	GM	GAS METER	SM	SOIL MARK
BLM	BLOCK MARK	GV	GAS VALVE	SL	SOFT LEVEL
BM	BENCH MARK	HW	HEAD WALL	SMR	SHOULDER WATER MANHOLE
BWP	BARBED WIRE FENCE	IC	INSPECTION CHAMBER	SMP	SHEET METAL PILING
CBF	COLE BARBED FENCE	IL	INLET LEVEL	SP	SHOE POST
CF	CORRUGATED IRON FENCE	IRF	IRON RAILING FENCE	STN	STATION
CL	CONCRETE	IRFV	IRON RAILING FENCE	SW	SURFACE
CLF	CHAIN LINK FENCE	JB	JUNCTION BOX	SWP	SOIL VENT PIPE
CONC	CONCRETE	KCB	KEB RILEY CULV	SWF	SOIL VENT FENCE
CP	CONCRETE POST	LB	LEFT BANK	TBM	TEMPORARY BENCH MARK
CPF	CRESTED FRANK FENCE	LB	LEFT BANK	TCB	TELEPHONE CABLE BRACKET
CR	CYCLE RACK	LP	LAMP POST	TC	TELECOM CABINET
CTV	CABLE TV MANHOLE	MB	MODURING BOLLARD	TMR	TELECOM MANHOLE
CU	CULVERT	MF	MISCELLANEOUS FENCING	TR	TRAP
DK	DROP KERB	MH	MANHOLE	TL	TRAFFIC LIGHT
DL	DRAIN	MK	MANHOLE	TLB	TRAFFIC LIGHT BOX
DP	DOWNTYPE	MP	MODURING PILE	TP	TELEGRAPH POLE
DPC	DAMP PROOF COURSE	MR	METAL RAILING FENCE	TRB	TRUNK RAILING STRIP
DR	DRAIN	MS	MILE STONE	TS	TREE STUMP
DWB	DROP WASTE BIN	MS	MILE STONE	TSB	TURKISH STEEL RAILINGS
EA	ENVIRONMENT AGENCY	NIA	NATIONAL RIVERS AUTHORITY	VP	VENT PIPE
EB	ELECTRICITY BOX	ONC	ORDNANCE CABLE	WB	WATER BIN
ECF	ELECTRIC CABLE FENCE	OS	ORDNANCE SURVEY	WL	WATER LEVEL/WATER LINE
ECR	ELECTRICITY CABLE HIT	OST	OPEN STEEL MANHOLE	WM	WATER METER
EMH	ELECTRICITY MANHOLE	P	P	WMF	WOODEN FENCE
EP	ELECTRICITY PILE	PA	PULL BAR	WP	WOODEN POST & RAIL FENCE
ETL	ELECTRICITY TRANSMISSION LINE	PD	POST	WV	WATER VALVE
FB	FLOWER BED	PE	POST & RAIL FENCE	YD	YARD GULLY
FBR	FOOTBRIDGE	PTM	PARKING TICKET MACHINE		

REV.	AMENDMENT	DRN	CHKD	DATE

STATIONS ESTABLISHED:
 NAME CO-ORDINATES LEVEL
 STN10 275344.430E 188557.341N 9.124m AOD
 STN11 275398.920E 188635.081N 10.647m AOD



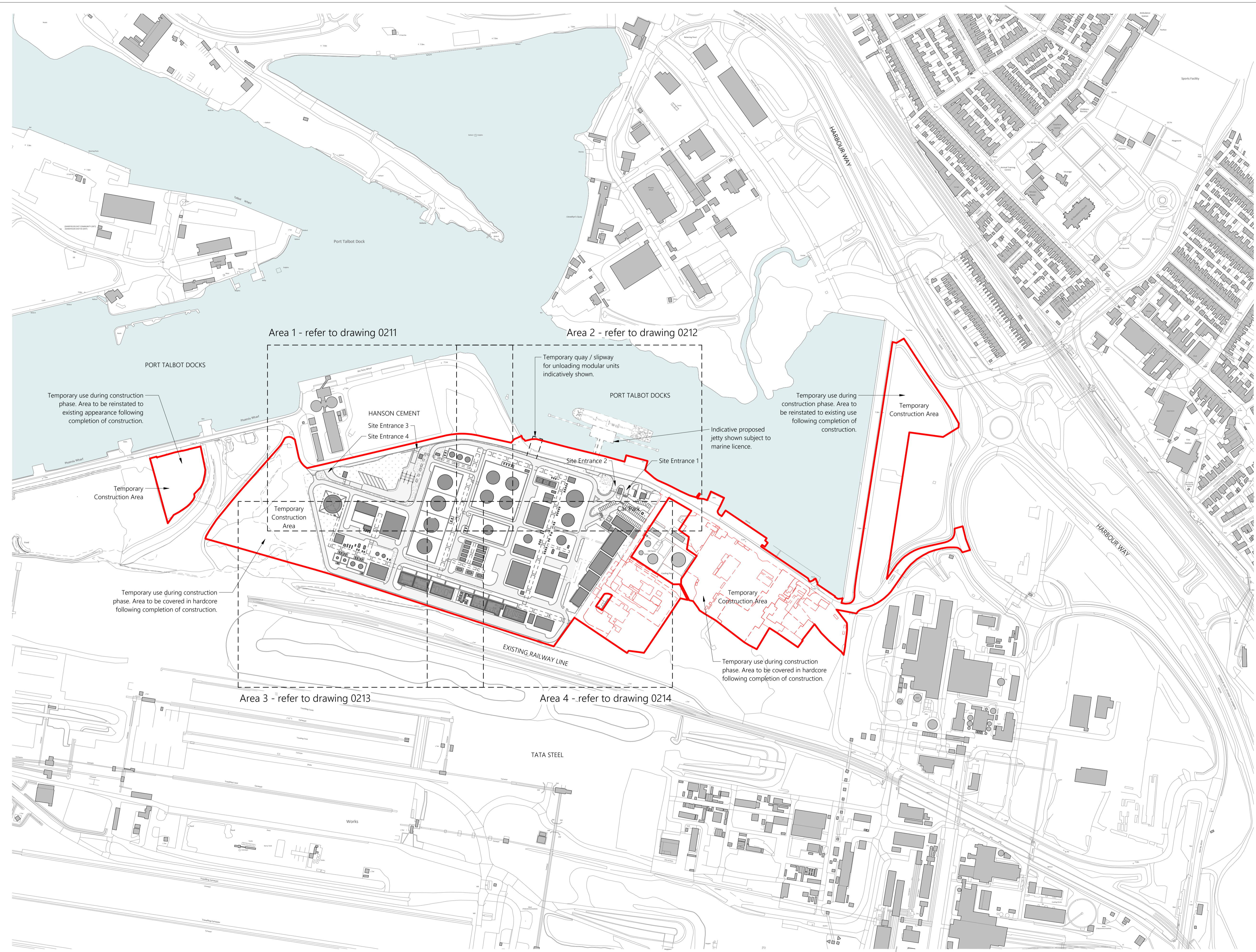
21 Grandisson Drive, Ottery St Mary, Devon, EX11 1JD

PROJECT/WATERCOURSE
Port Centric Manufacturing Sites

SITE/LIMITS
ABP Port Talbot Topographic Survey Sheet 4 of 4

SURVEYED BY: AP Land Surveys		Ref: APLS-1174	
SURVEY DATE: DECEMBER 2021			
SCALE: 1:1,000@A1	DRN: AMP	CHKD: AJP	
DATUM: ODN	DATE: DEC 21	DATE: DEC 21	
GRID: NATIONAL	DRAWING NO. APLS-1174-005	REV: -	

B Proposed Development Design



GENERAL NOTES

- All works proposed shall be conducted in accordance with the related H&S and CDM regulations. Where doubt arises over any aspect of safety, consult Inspire Architects.
- Should any discrepancy be found on this drawing or related project information then the matter should be brought to the attention of Inspire Architects for resolution as soon as possible.
- This drawing may be based on a measured survey or Ordnance Survey information. Do not scale from this drawing unless for planning purposes.
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NOTES

- Survey information taken directly from drawings issued on December 2021 by AP Land Surveys.
- Inspire Architects are not responsible for the design of the plant equipment identified on this drawing.

LEGEND

- Application Boundary
- Existing Buildings
- Proposed Buildings
- Existing buildings to be demolished

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P9	CH	NC	09.08.2023
P8	CH	NC	25.07.2023
P7	CH	NC	17.07.2023
P6	CH	NC	13.07.2023
P5	CH	NC	30.06.2023
P4	CH	NC	23.06.2023
P3	CH	NC	31.05.2023
DRAFT	CH	NC	26.04.2023
Revision	Drawn	Checked	Date



PROJECT NAME
 Project Dragon - Sustainable Aviation Fuel (SAF) Production Facility

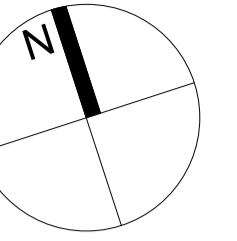
CLIENT
 LanzaTech UK Limited

SHEET NAME
 Proposed Site Key Plan

SHEET SIZE A1 **SCALE** 1:2500 @ A1
STATUS CODE S2 **STATUS** PLANNING

REVISION DATE 09.08.2023 **REVISION** P9

DRAWING NUMBER
 2143.01-IA-ZZ-ST-DR-A-0210



GENERAL NOTES

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- This drawing may be based on a measured survey or Ordnance Survey information. Do not scale from this drawing unless for planning purposes.
- All dimensions are in millimetres unless otherwise stated. Do not scale from this drawing. All information and layouts detailed on this drawing are subject to site dimension checks.
- Copyright - All Inspire Architects drawings are the property and copyright of Sophem Limited and are not to be used for any purpose without prior written agreement.

NOTES

- Survey information taken directly from drawings issued on December 2021 by AP Land Surveys.
- Inspire Architects are not responsible for the design of the plant equipment identified on this drawing.

LEGEND

- Application Boundary
- Existing Buildings
- Proposed Plant / Buildings
- Existing buildings to be demolished
- Industrial Plant Zones - Refer to 0500 series drawings for detailed elevations

P9	CH	NC	09.08.2023
P8	CH	NC	25.07.2023
P7	CH	NC	17.07.2023
P6	CH	NC	13.07.2023
P5	CH	NC	30.06.2023
P4	CH	NC	23.06.2023
P3	CH	NC	02.06.2023
P2	CH	NC	31.05.2023
Revision	Drawn	Checked	Date



PROJECT NAME

Project Dragon - Sustainable Aviation Fuel (SAF) Production Facility

CLIENT

LanzaTech UK Limited

SHEET NAME

Proposed PDZ Layout

SHEET SIZE

A1

SCALE

1: 1000 @ A1

STATUS CODE

S2

STATUS

PLANNING

REVISION DATE

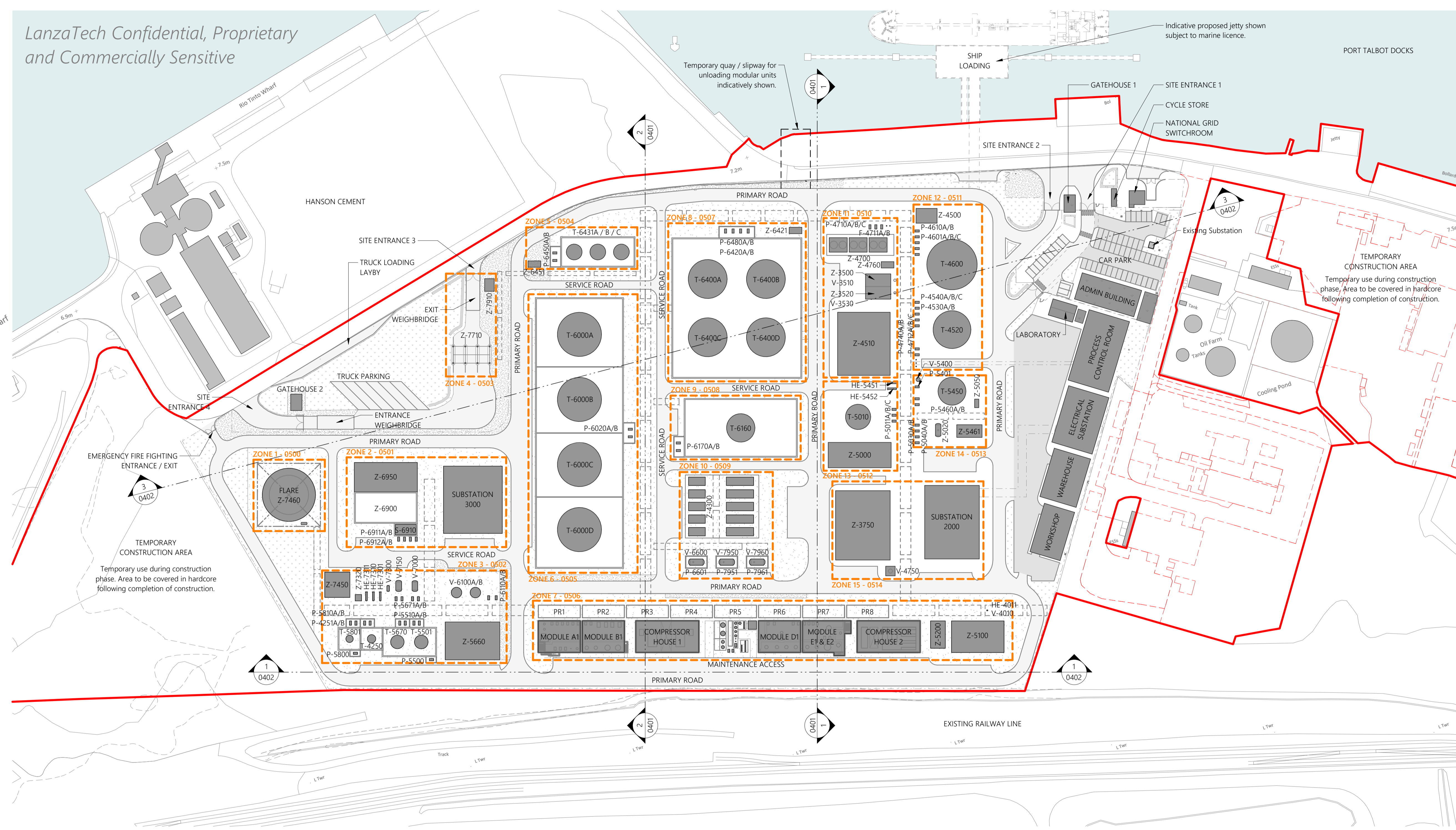
09.08.2023

REVISION

P9

DRAWING NUMBER

2143.01-IA-ZZ-ST-DR-A-0215



C NRW Review Certificate

Project Dragon – Phoenix Wharf – Limited Model Review

Version No	Prepared By	Checked By	Approved	Date
1.0	Filippo Scimone	Anna Minchinton	Richard Derrick	10 May 2023

This short review note is regarding the hydraulic modelling undertaken by JBA Consulting Ltd for the proposed development at Phoenix Wharf, Port Talbot.

The site is currently land that is disused at the dock which is located and owned by Associated British Ports (ABP), in Port Talbot. The proposed site covers an area of approximately 10 hectares and has areas of concrete slabs with the site mainly being overgrown. The aerial image below is from 2006 and the approximate area for the proposed site is shown within the black and yellow dotted line.



Figure 1 Approximate site boundary

Model Review

This is a limited model review as this model has been previously used for other FCA's and hence, has undergone reviews although it has evolved over time from the original NRW Port Talbot licenced model. A "Flood Risk and Drainage" report dated December 2022 has been supplied with the model.

The flood risk is assessed using 1d/2d linked hydraulic modelling software, which is TUFLOW 1d/2d using version 2020-01-AB-iSP and utilising the Classic module. Although this was not the latest version of the software at the time the simulations were run it is still considered appropriate software for this study.

The data has been supplied in appropriate folder structure and all the information appears to be present.

The model message logs have been reviewed and we observe two messages of note:

- "WARNING 2079 - 3D breakline failed to modify any Zpts. Check elevations, snapping and correct GIS projection.
- WARNING 1991 - 7:MM:SS: Negative depth at Node AFAN0197.1

The 3D Break line is used to re-enforce the road elevations at Velindre Bridge to ensure flow path to the fourth arch opening. Reviewing the fluvial data, it does not appear to have any impact to the flow mechanism at this location or to the stability of the model. Due to the distance away from the site, it therefore, will not have an impact to the results to the site in question.

We recommend that this feature is either removed from the model or corrected to stop the warning message that is being produced in future use of this model.

We have reviewed the negative depths which occur near Newbridge Road for both fluvial and tidal runs, there appears not to be any impact to the flood mechanism at this location. We recommend that this area is reviewed and corrected to stop the negative depths from occurring in future use of this model.

Reviewing the Mass Balance error, we note that both the final and maximum error is within $\pm 1.0\%$, which is inside the recommended range.

Topographical changes to model

2d_zsh_PW_SiteOutline_072 is the only GIS layer used to alter the ground profile of the proposed site, which sets the ground level at 7.7mAOD. There are no other changes to the topography e.g., like roads or buildings etc. within this layer. As this is the case NRW will assume that an access road into the site will be graded to meet the current road, hence the positioning of this access road will determine if it is at risk in the extreme flood events.

As no site plans have been provided, hence, the topography will not reflect the future development. Also, the Manning's values reflect the current conditions and not the future design of this site. NRW considers that this is not an issue if the site has a minimum ground level set at 7.7mAOD as this is above the extreme tide level for the proposed lifetime of the development.

Results

Fluvial Data

On reviewing the original results, it appears that incorrect fluvial results have been supplied and NRW requested updated fluvial results to review.

Following on from our request (above) and providing information to the consultants relating to our initial findings we have received the data and an email from JBA consulting covering points within this report. The email is provided in Appendix A below.

Reviewing the data there appears to be no increase in fluvial depths/elevation based on NRW guidance (see [Natural Resources Wales / Modelling for Flood Consequence Assessments](#) or [Cyfoeth Naturiol Cymru / Modelu ar gyfer Aseidiadau o Ganlyniadau Llifogydd \(naturalresources.wales\)](#)). On reviewing the data supplied we note areas that have become dry due to the proposed ground raising and note the site is now flood free. Figure 2 also shows areas that are now wet that were previously dry in red. These are small patches of ground that have an increase of less than 5mm in flood depths and are considered areas of no change to flood risk based on the above guidance. These areas are believed to be land owned by the ABP.

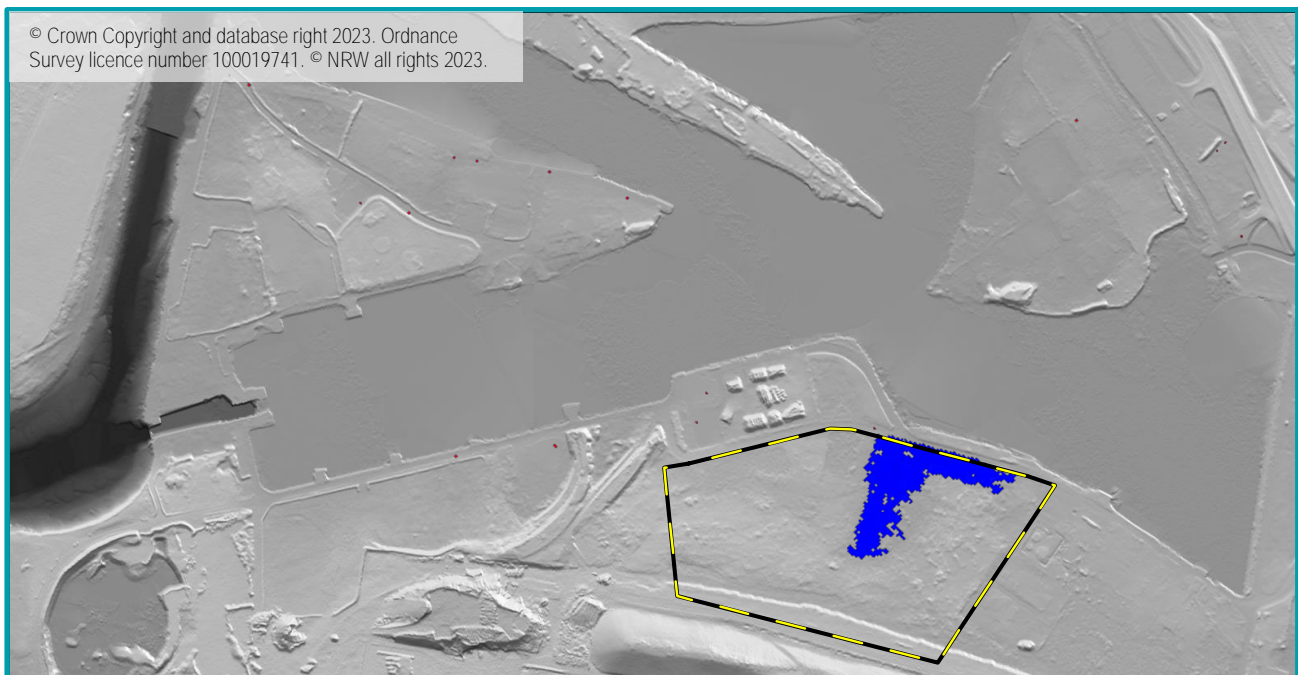


Figure 2 Fluvial Flood Risk Changes. Areas 'Now dry' in blue. Areas 'Now wet' in Red.

Tidal Data

There appears to be no increase in tidal depths/elevation based on NRW guidance. Reviewing areas that have become dry are soling within the proposed site which is now flood free. This is due to ground levels being flattened or raised to 7.7mAOD. Figure 3 shows the area that are now wet that were previously dry in red. These are small patches of ground

that have an increase of less than 5mm and are considered areas of no change to flood risk. These areas are believed to be owned by the ABP.

The road to the north of the site has approximately 70 metres of its length with increased flood depths. NRW has reviewed the data in this area and note the maximum increase is less than 5 cm, this has been reported in the “Flood Risk and Drainage” report. The road is owned by ABP, and it is indicated that this additional risk has been accepted by ABP.

The blue region is the area that has been removed from flood risk based on the ground being altered, this can be seen in Figure 3.



Figure 3 Tidal Flood Risk Changes. Areas 'Now dry' in blue. Areas 'Now wet' in Red.

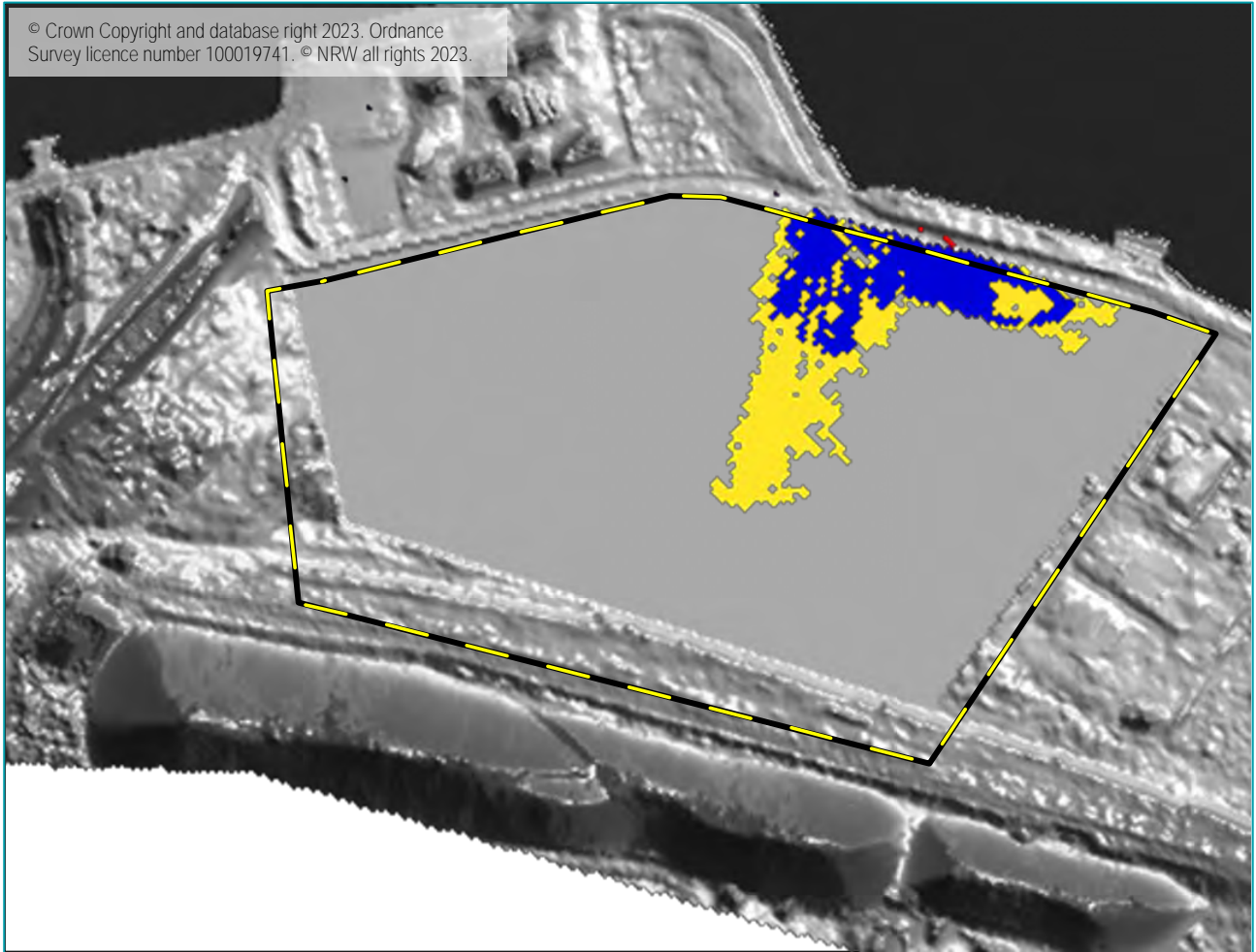


Figure 4 shows the proposed development area that has been flatten/raised to 7.7mAOD. The map shows the area that has had a reduction in flood risk, with the blue area being the tidal reduction and the yellow extent the fluvial reduction.

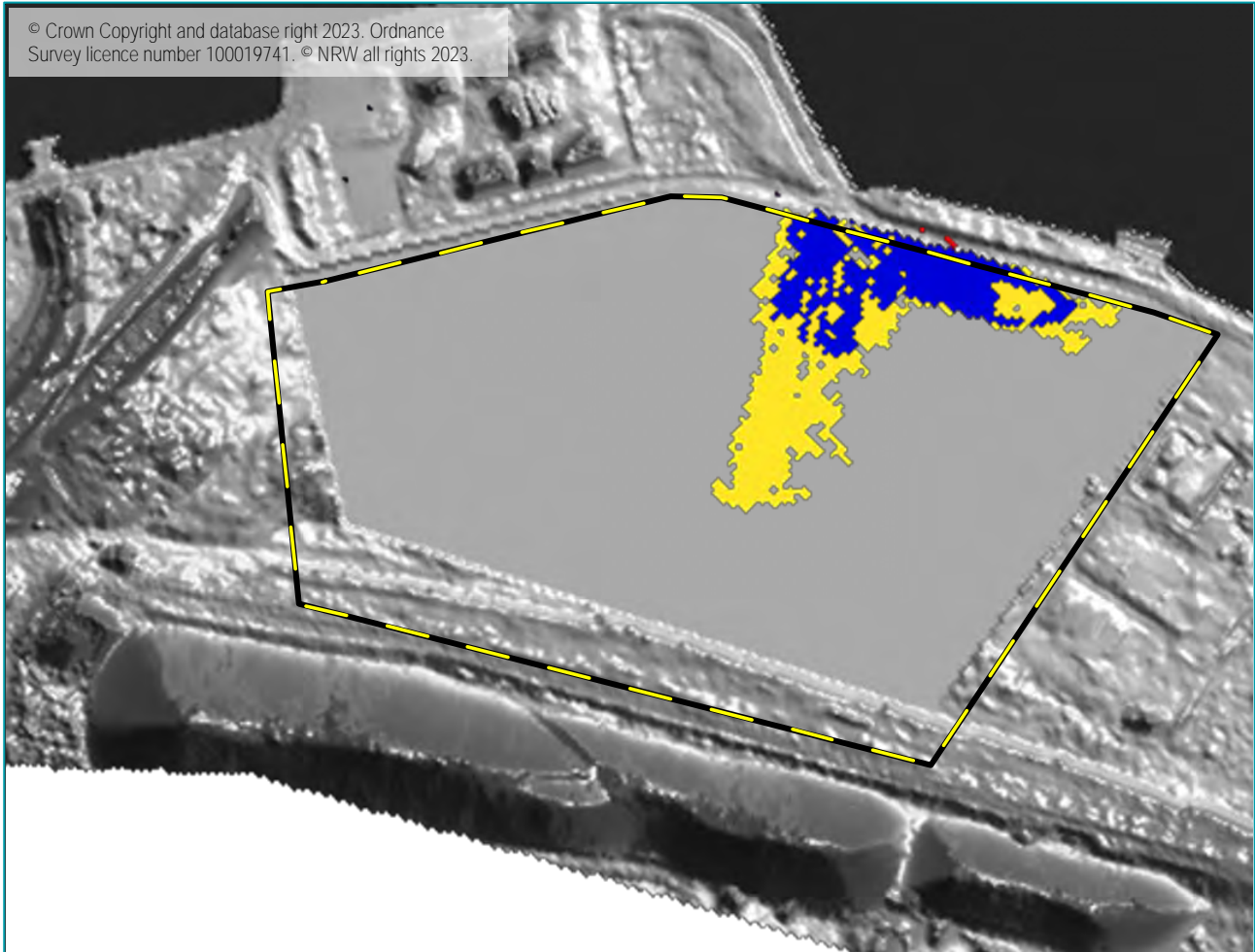


Figure 4 Image shows flatten/raised land, with blue and yellow areas showing where the flood risk has been removed.

Recommendation and Conclusions

The model has a few issues which are the negative depths and the topography change failing at Velindre Bridge, these issues are not considered by NRW to impact the proposed site. We recommend that these two issues are fixed for future model runs, which the consultant has acknowledged, see Appendix A, for more detail information provided by the consultant on this matter. NRW have reviewed and noted the explanation provided in the email, which the reviewer considers reasonable technical justification.

We note that the site will need to be cleared and if the site elevation is set at a minimum of 7.7mAOD the development will be flood free in the extreme tidal and fluvial events. The only consideration is that the model does not reflect the proposed site design and hence it is assumed that the access road will be position as not to be at risk from flooding.

There is a change to flood risk on the road to the north of the site with maximum increase in flood depths of less than 5cm although it is stated that this road is on ABP land.

Taking account of all the above points, it is considered that the results are suitable to support an FCA.

Appendix A

Hi Fil,

Thank you for your queries regarding our flood modelling and assessment work for Project Dragon. Please find our responses set out below:

1. ***The Flood Risk and Drainage Report indicates that the site is at fluvial flood risk for the current day scenario for the 0.1%AEP plus climate change, and not for the proposed development. On checking it appears that both the fluvial results for the proposed and base line are identical.***

The 0.1% AEP plus climate changes fluvial results were not provided initially, as they are not required under the current TAN15. The 0.1% AEP plus climate change fluvial event is expected only to be relevant if/when the new TAN15 comes into effect. Given the possibility of this eventuality, we agree that it would be useful for you to see these results. These have been collated as a supplementary package and will be uploaded as per the previous model package.

2. ***1D negative depths are present in both the fluvial and tidal design event simulations a short distance upstream of Newbridge Weir.***

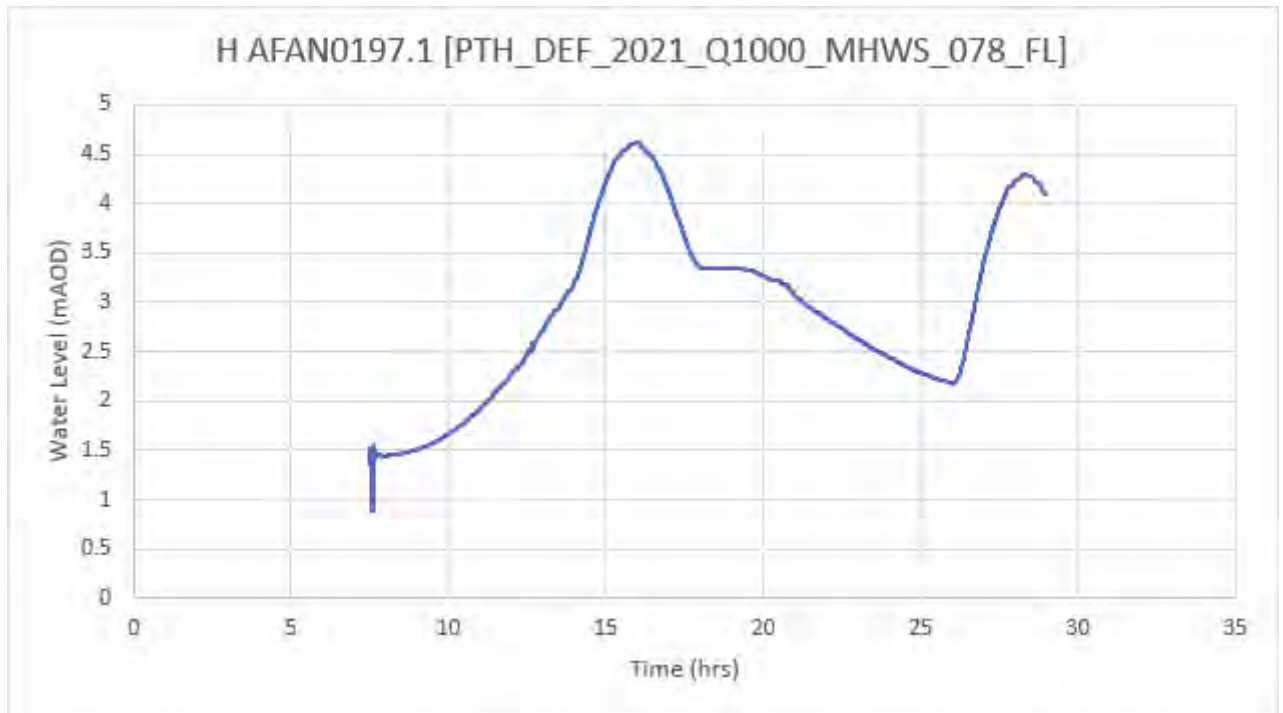
The 1D negative depths are present in both the fluvial and tidal design event simulations. These all occur at model node AFAN0197.1. This is located approximately 50m upstream of Newbridge Bridge.

To coincide the fluvial - tidal interaction, the fluvial design event scenarios have a model start time of 7.5 hours. All the 1D negative depths occur between 7 hrs 30 mins and 7 hrs 40 mins implying an issue with the initial conditions at this node.

In the tidal design event scenarios, the model uses a start time at 0 hours. The 1D negative depths occur in both the T200 and T1000 events and occur between 0 hours and 0 hrs 8 minutes. Again, this indicates an issue with the initial conditions.

Analysis of the 1D Level plot for the Q1000 event shows the oscillation in water level at the start of the simulation (see below). This shows how the issue is quickly resolved and has no bearing on the peak model results. Therefore, we consider this to be an acceptable limitation and preferable to using the previous model restart file that introduces its own challenges. This issue has been noted in the modelling section of the FCA report.

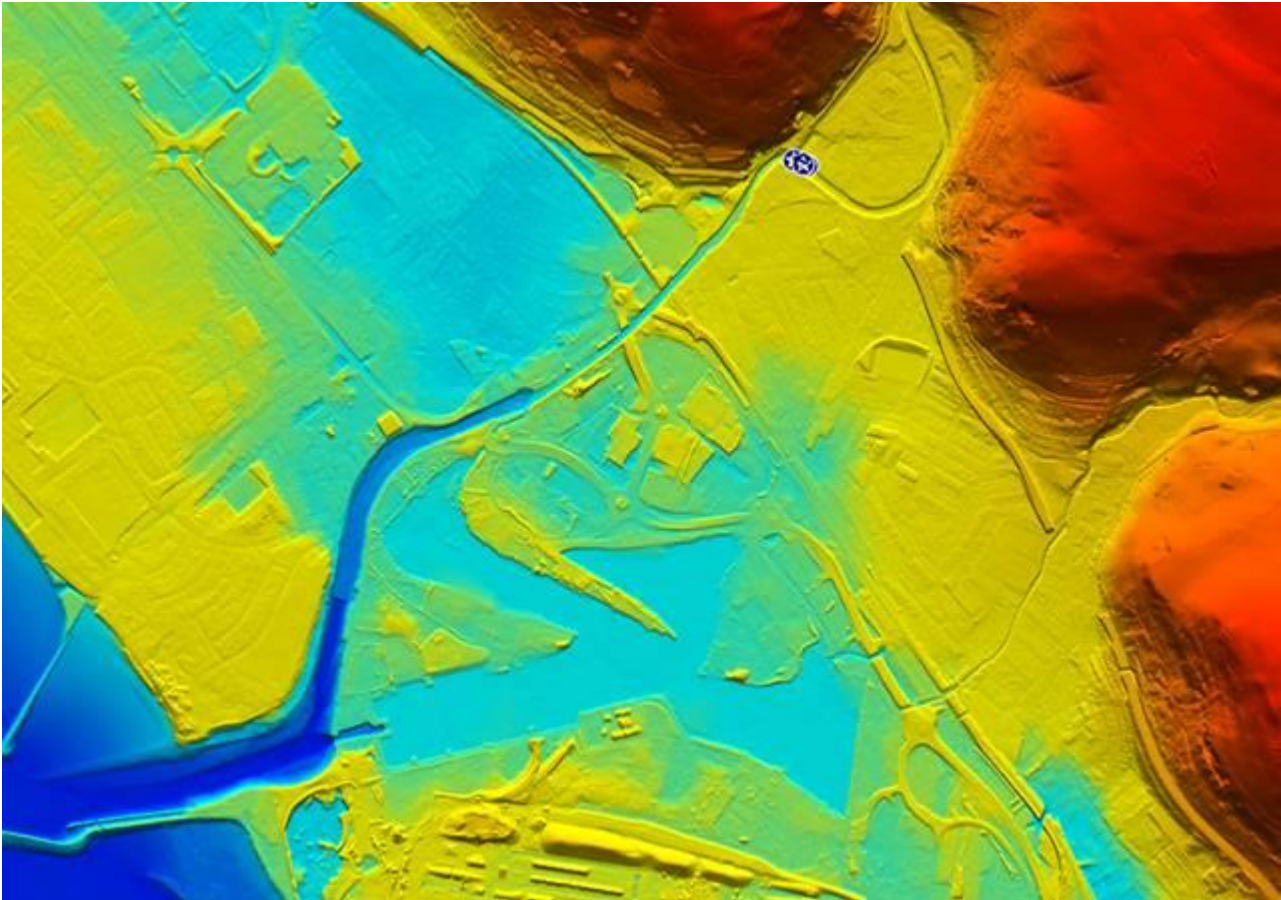
The Initial Water Level (IWL) used at model node AFAN0197.1 results in a drop in water level in comparison to the nodes located immediately upstream and downstream. For future model simulations in Port Talbot, we will update the initial water level at node AFAN0197.1, to enable a consistent water surface profile through this reach at the start of the simulation. However, we do not propose to update and re-run the model for this FCA as it shall have no bearing on the assessment.



3. **The TUFLOW warning message ‘WARNING 2079 - 3D break line failed to modify any Zpts.’**

We have checked the elevations, snapping and correct GIS projection of this layer – all appear to be correct. The issue appears to be linked to the use of the ‘MIN’ command in the .tgc. We have completed a test simulation to regenerate the check files with the ‘MIN’ command removed and this warning message was no longer present.

Analysis of the LIDAR data suggests that the zline has slightly (200-300mm) lower elevations than the base DTM. Therefore, we would expect that the use of the ‘MIN’ command to be appropriate and not result in an error message. At this time, we are not sure why the command is not working as intended. However, given the location of this feature on the right-hand side floodplain of the Afan (opposite bank to our site), significant distance from our site of interest (shown below) and questionable benefit of this feature to the model, we do not consider it necessary for us to update and re-run the simulations for the purpose of the FCA. We will however remove the MIN command for this feature from future model re-runs, be it for this project or others in the area. We would also welcome NRW’s thoughts on the necessity of this modest DTM modification.



I hope that the above responses satisfactorily answer your queries. However, should you have any further queries we would be happy to hear from you.

Kind regards,

George Baker

Associate Director | JBA Consulting

JBA Consulting, Kings Chambers, 8 High Street, Newport, NP20 1FQ

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