

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

Version G

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Contract

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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 (approximately 9.12ha), comprising bare land adjacent to Crown Wharf (Port Talbot) (referred to as the Production Development Zone [PDZ]);
- Temporary Construction Areas located within the wider Port Talbot Docks, approximately 7.44ha in total (referred to as the Temporary Construction Areas); and
- An extent of Phoenix Way, running adjacent to the northern boundary of the PDZ (referred to as Phoenix Way 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 Phoenix Way Supporting Infrastructure from Harbour Way and the M4 to the east.

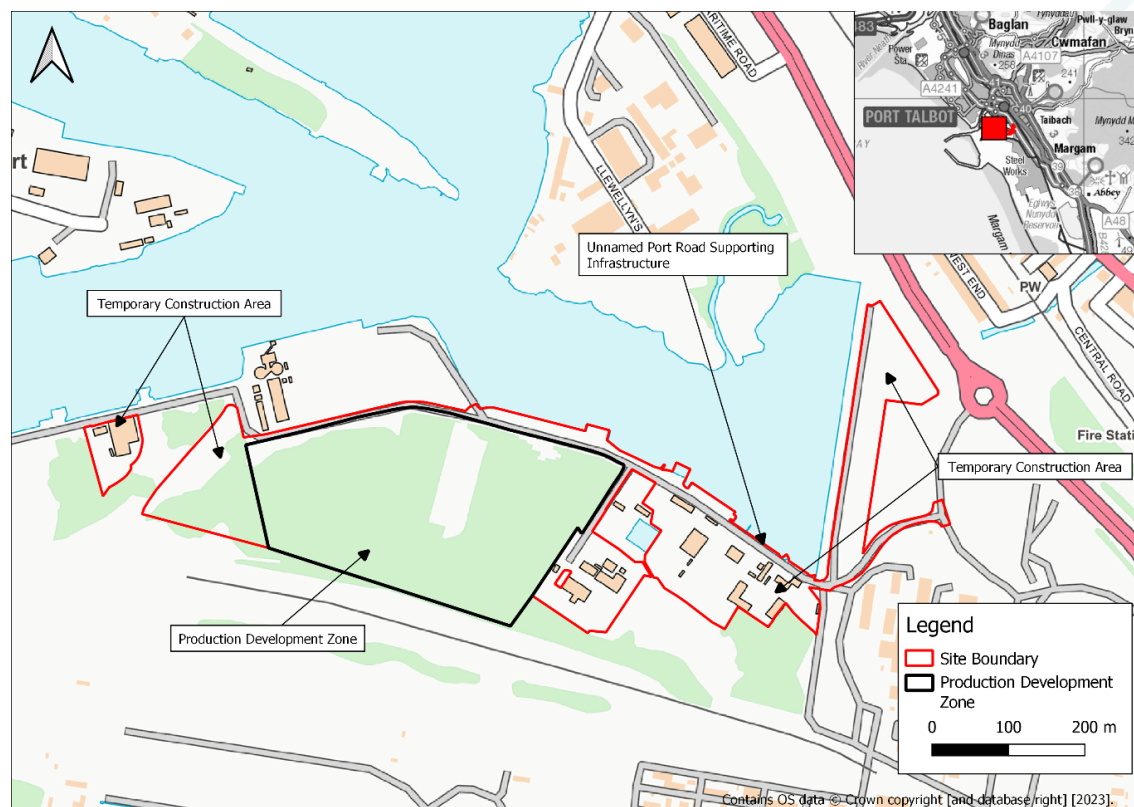


Figure 2-1 Proposed development site

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 Phoenix Way 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.

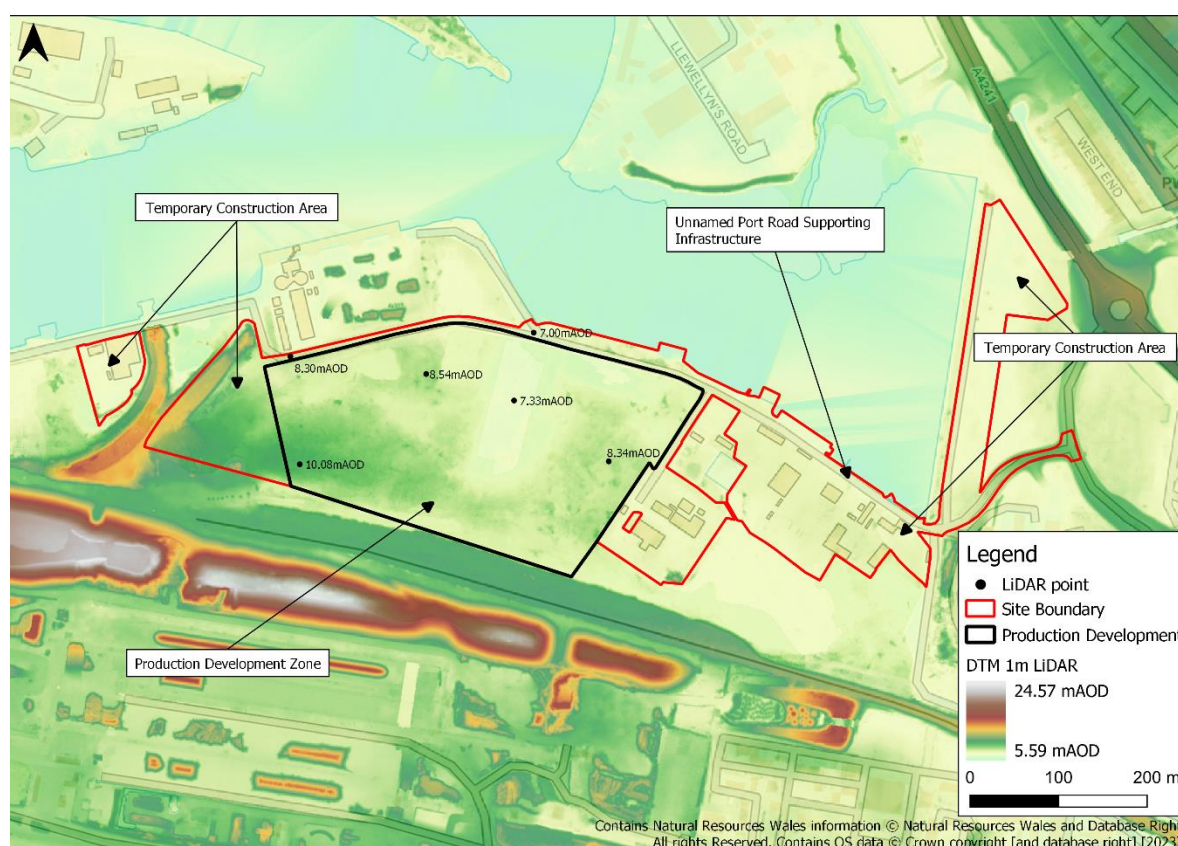


Figure 2-2 Topography

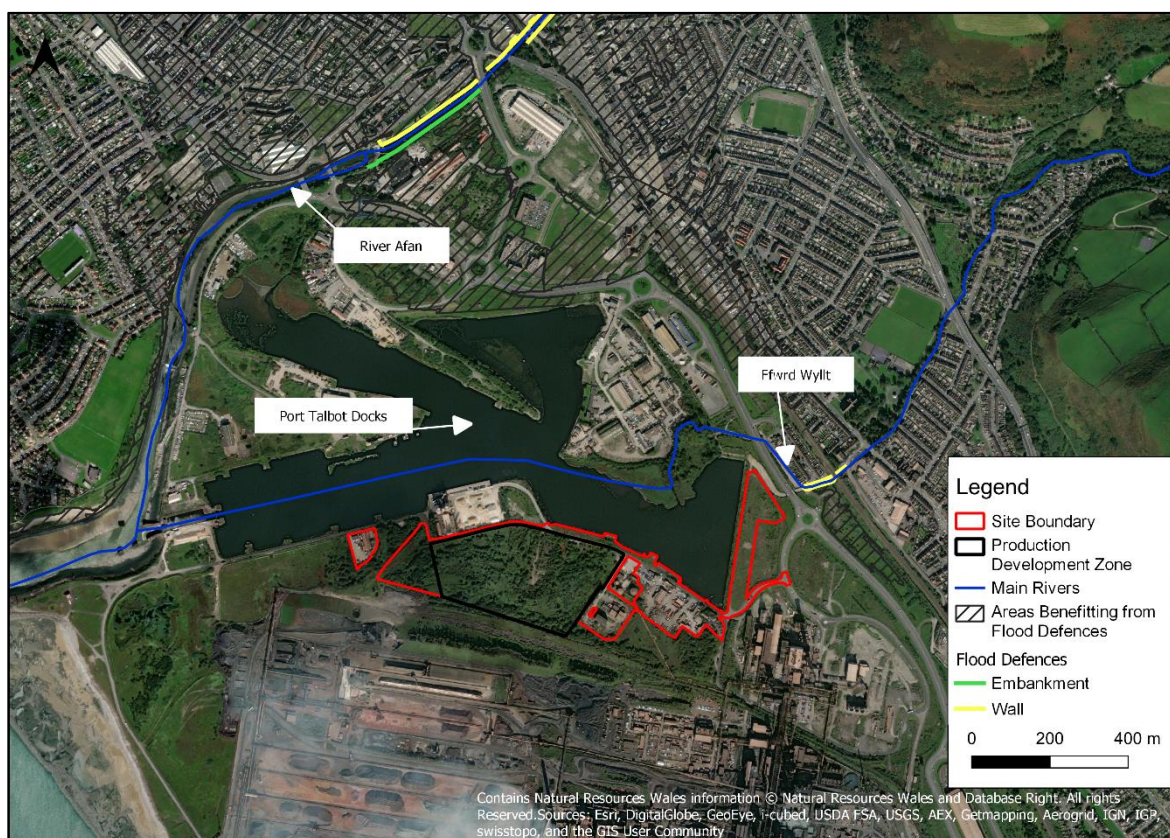


Figure 2-3 Watercourses

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/>

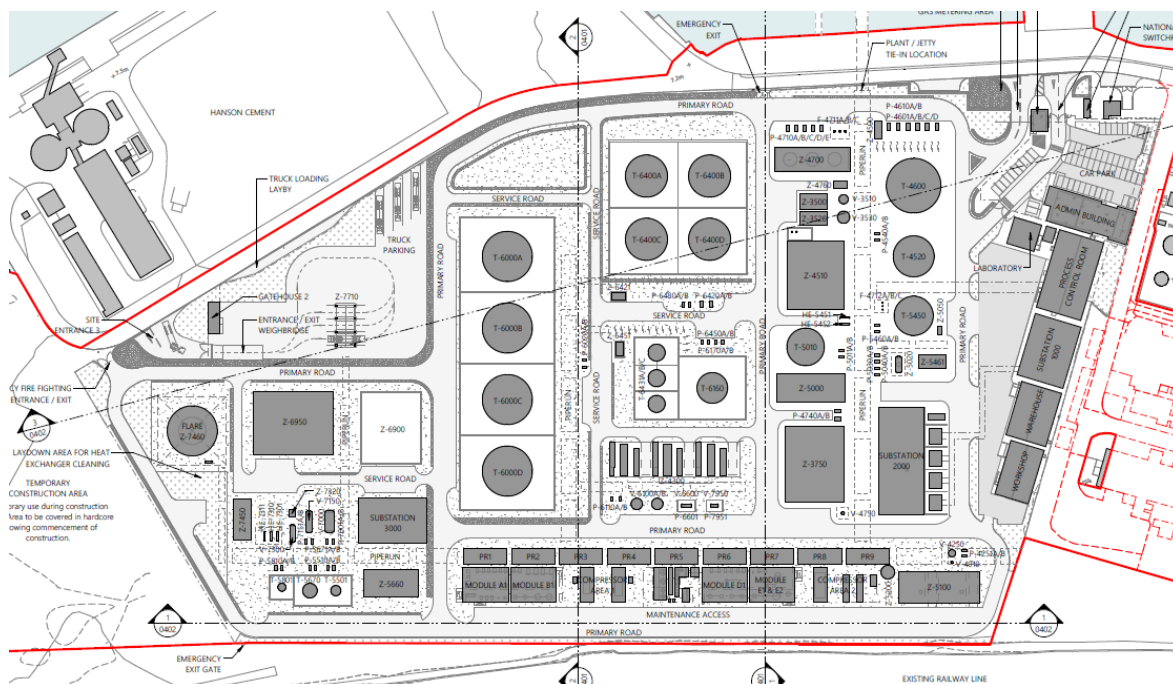


Figure 2-4 Extract of Proposed Development Layout (PDZ)

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, Phoenix Way 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 Phoenix Way 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.

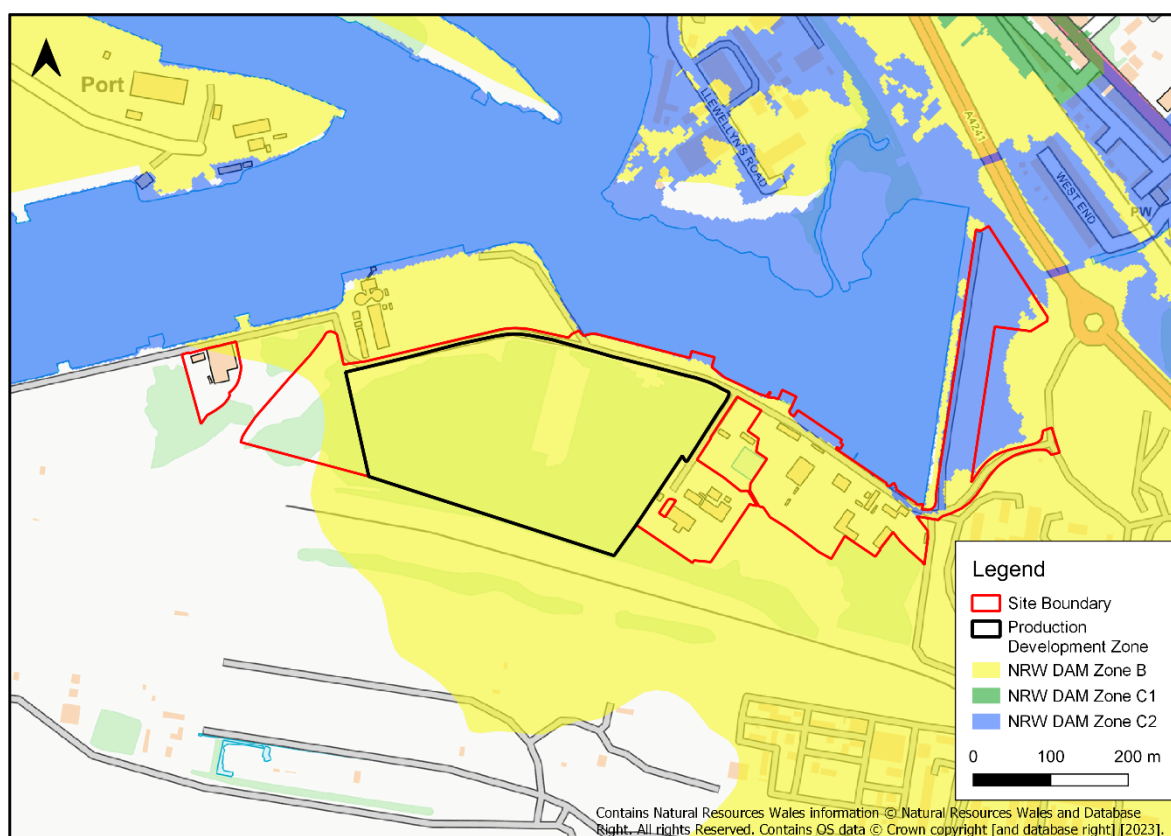


Figure 3-1 Development Advice Map

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 Phoenix Way 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 Phoenix Way 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.

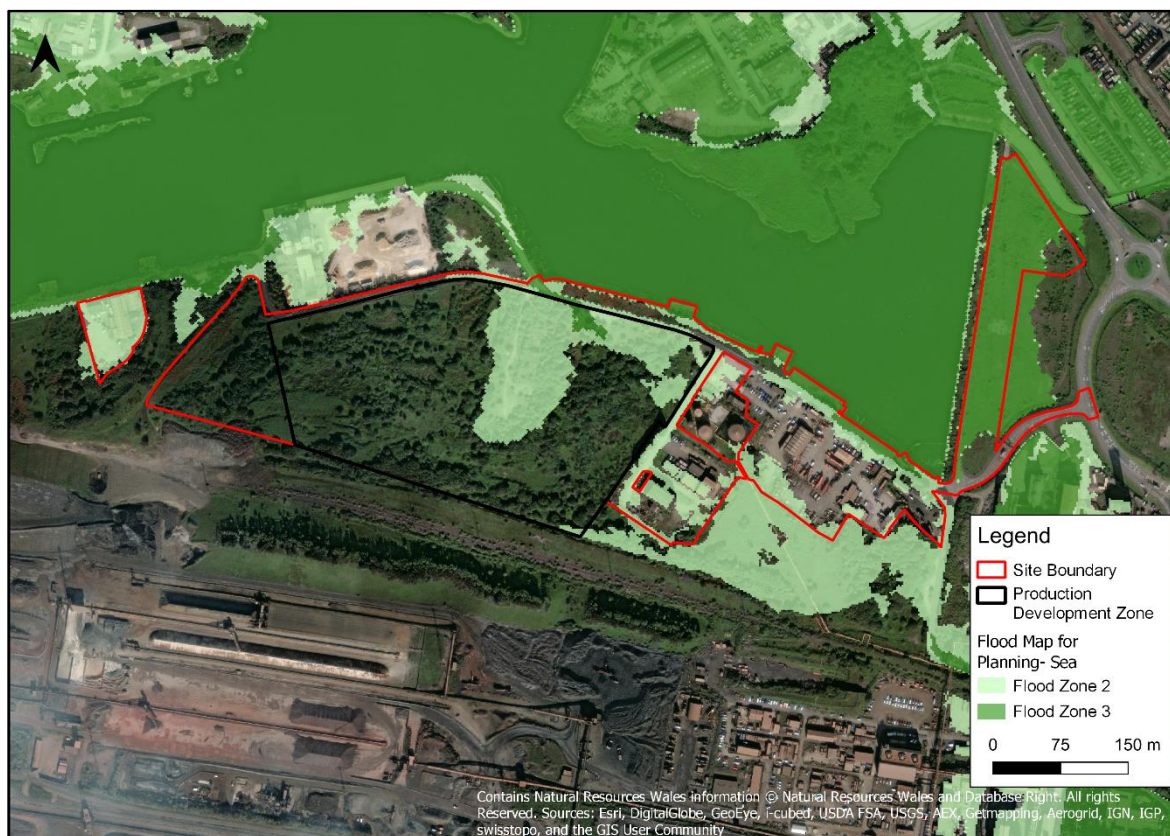


Figure 3-3 Flood Map for Planning Sea

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 Phoenix Way 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, Phoenix Way 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 Phoenix Way 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.

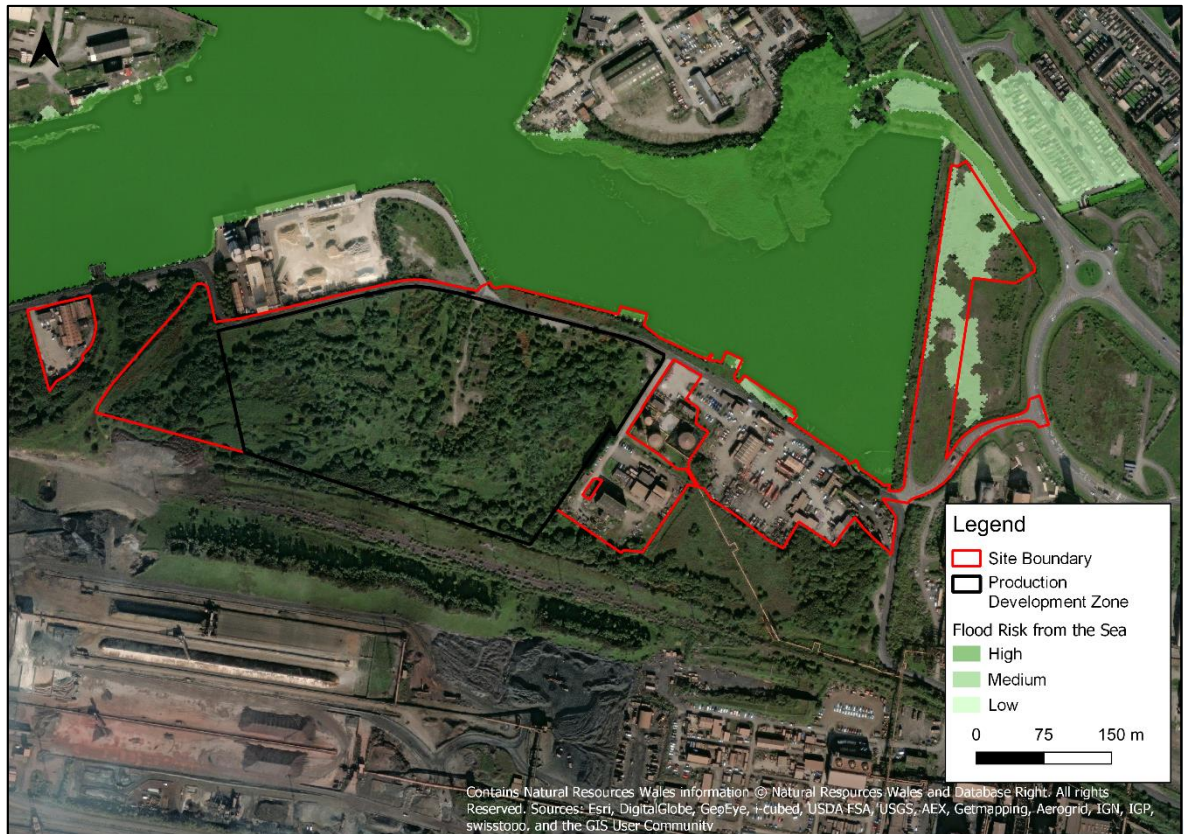


Figure 4-2 Risk of flooding from the Sea

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 Phoenix Way 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 substantively 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 Phoenix Way 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 Phoenix Way 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**.