Project Dragon Sustainable Aviation Fuel (SAF) Production Facility: Outline Drainage Strategy

Version D

August 2023

www.jbaconsulting.com

LanzaTech UK Limited
c/o TMF Group
8th Floor
20 Farringdon Street
LONDON
EC4A 4AB

JBA Project Manager

Faye Tomalin
Kings Chambers
8 High Street
Newport
NP20 1FQ

Revision History

Revision Ref/Date	Amendments	Issued to
June 2023	First Issue	Jadine Berry - Turley
July 2023	Second Issue – updates following red line boundary change	Jadine Berry - Turley
August 2023	Third Issue – minor changes	Jadine Berry – Turley
August 2023	Fourth Issue – red line boundary change	Jadine Berry - Turley

Contract

This report describes work commissioned by Jim Woodger, on behalf of LanzaTech UK Limited, by a email dated 12th April 2022. Faye Tomalin of JBA Consulting carried out this work.

Prepared by ..... Faye Tomalin BSc (Hons) MSc MCIWEM C.WEM

Principal Analyst

Reviewed by ..... René Dobson BEng CEng MICE

Technical Director

Purpose

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Abbreviations

ATJ	Alcohol to Jet Fuel
DTM	Digital Terrain Model
FRAW	Flood Risk Assessment Wales
JBA	JBA Consulting
LiDAR	Light Detection and Ranging
NRW	Natural Resources Wales
SAB	SuDS Approval Body
SPK	Jet Synthetic Paraffinic Kerosene
SuDS	Sustainable Drainage Systems

1 Introduction

1.1 Terms of Reference

JBA Consulting (JBA) were commissioned by LanzaTech UK Limited to produce an Outline Surface Water Drainage Strategy for a Sustainable Aviation Fuel production facility on land at Crown Wharf, Port Talbot Docks. This outline strategy shall be submitted to Neath Port Talbot SuDS Approval Body (SAB) for pre-application advice.

1.2 Site Description

The proposed development site is located on land at Crown Wharf, Port Talbot docks. As shown in Figure 1-1, 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 of the proposed development site. 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);
- There 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 Temporary Construction Areas (TCA1 – to the eastern extent, TCA East to the immediate east of the PDZ, and TCA West); 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.

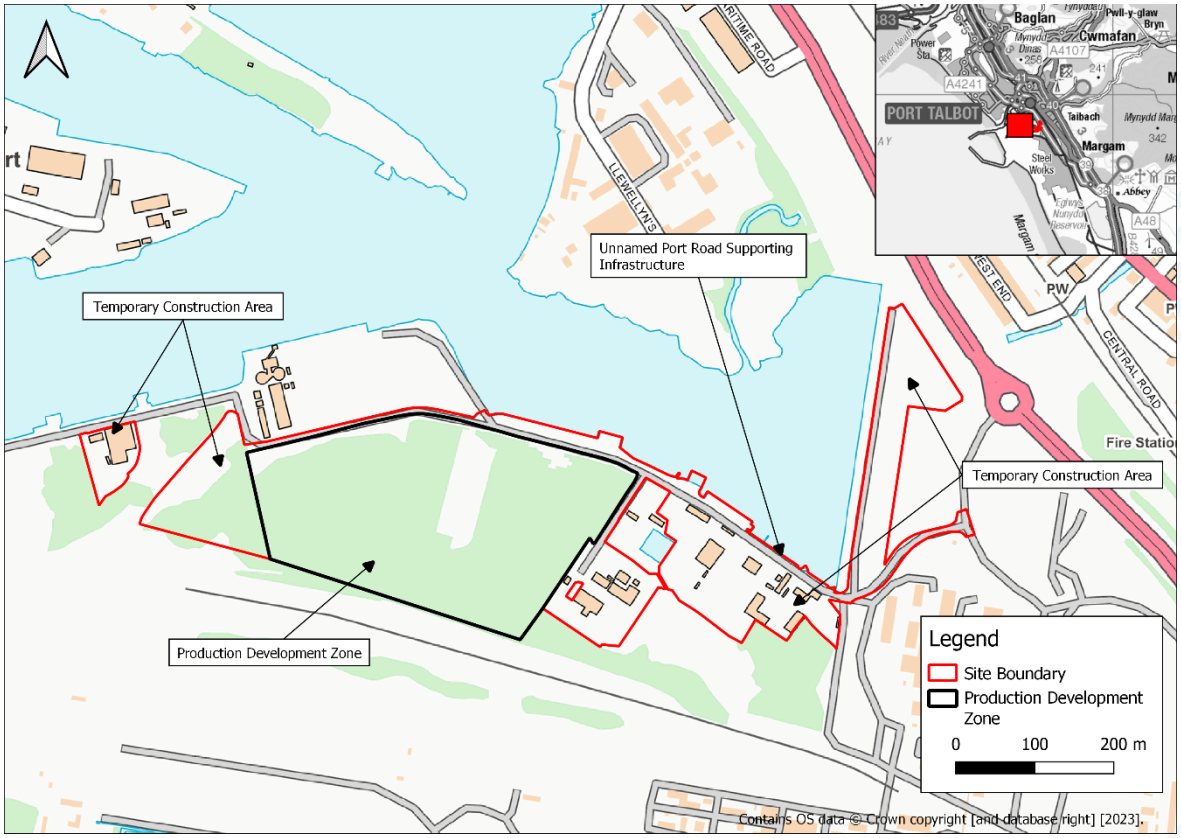

Figure 1-1 Site location

1.3 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 1-2.

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.

TCA1 has a slight fall from the east to the western boundary, with TCA East and TCA west falling towards the unnamed Port Road.

Two NRW designated Main Rivers are located in close proximity to the site, as shown in Figure 1-3. 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.

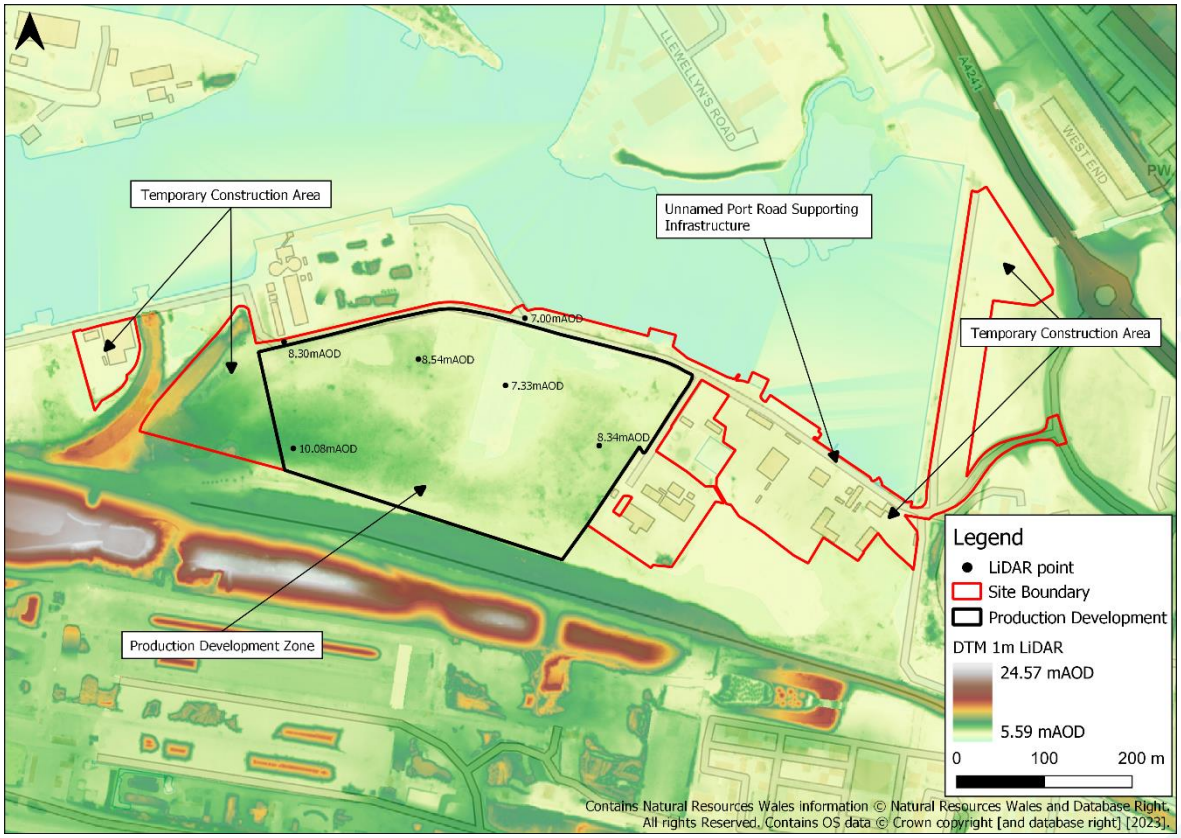

Figure 1-2 NRW 1m LiDAR DTM

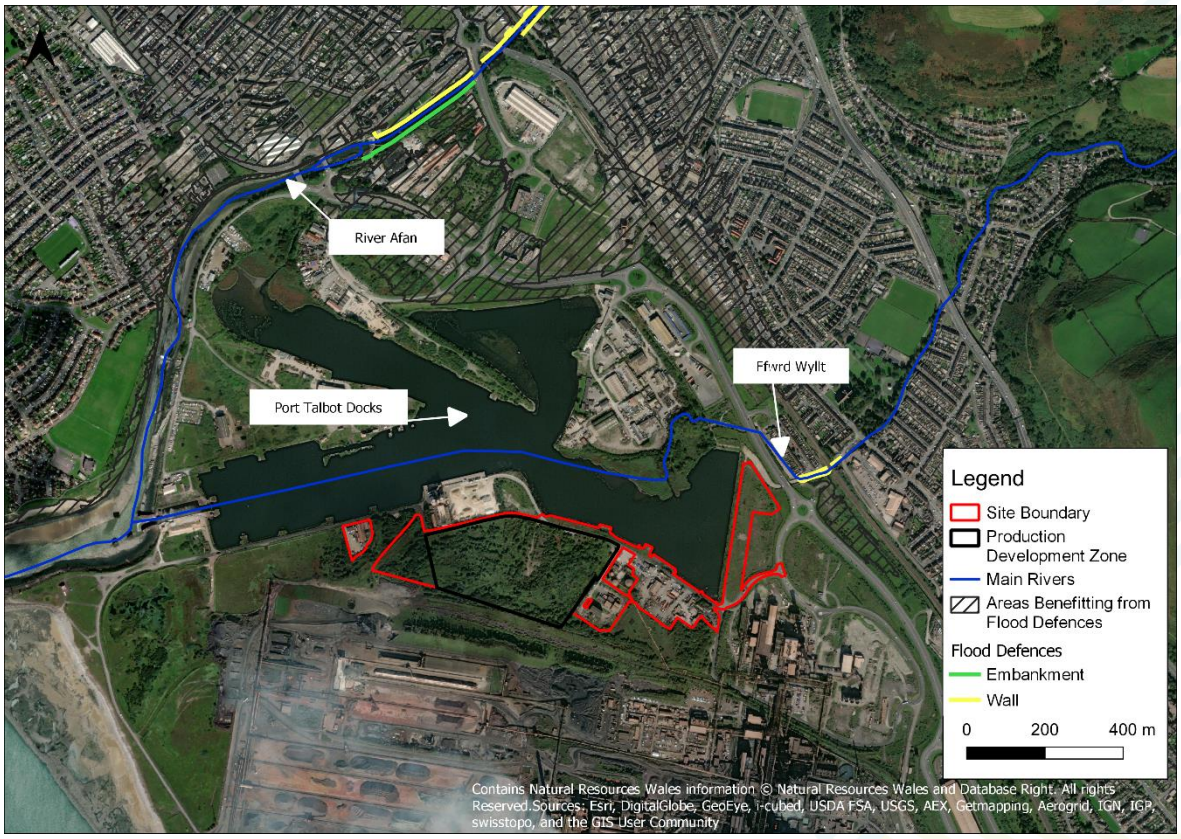

Figure 1-3 Watercourses

1.4 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 1-4, with the full development proposals contained in Appendix B.

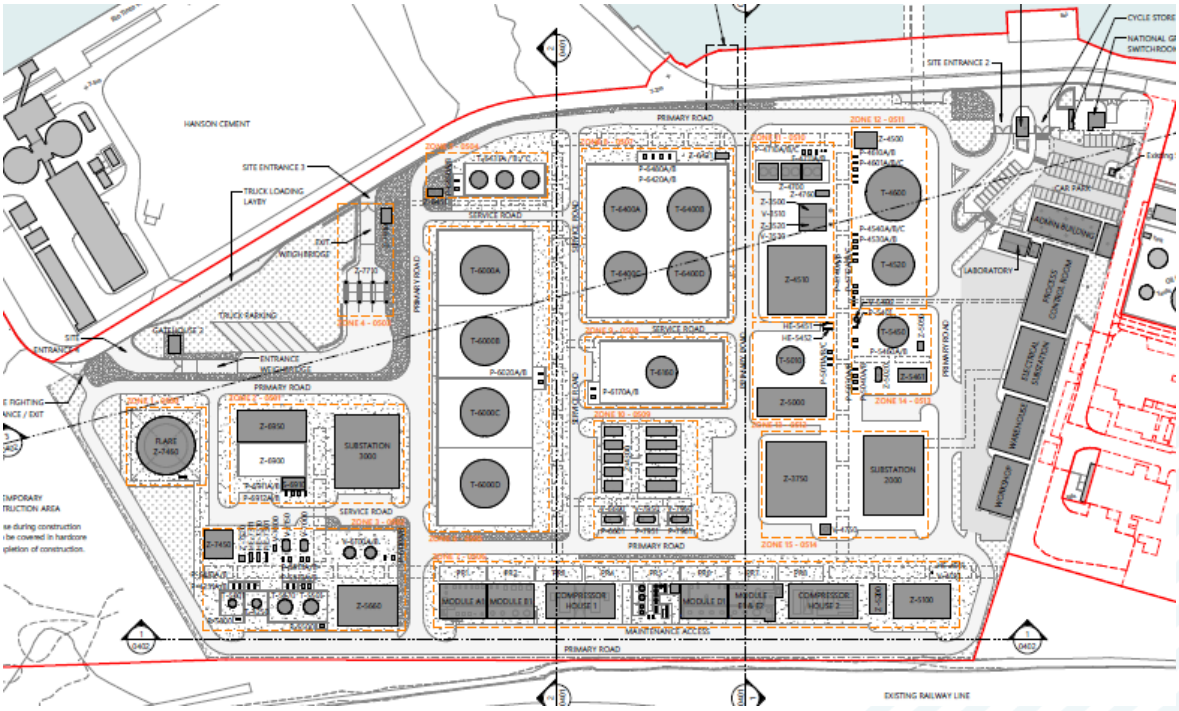

Figure 1-4 Extract of Proposed Development Zone (PDZ)

1.5 Summary of Flood Risk

1.5.1 Fluvial and Tidal Flood Risk

The proposed development site lies within the flood zones of the Flood Map for Planning (FMfP). The PDZ is located within Flood Zone 2 of both the FMfP for rivers, and the FMfP for sea. TCA1 is located within Flood Zone 3 of both the FMfP for rivers, and the FMfP for sea. TCA West is wholly located in Flood Zone 2 for flooding from sea, whilst TCA East is partially located in this zone.

The detailed fluvial and tidal flood risk modelling data for Port Talbot is sourced from a flood model, which was updated for another location close to the proposed development (planning reference P2020 0303). The model consisted of the 1D-2D linked ESTRY-TUFLOW Model of Port Talbot, developed by JBA Consulting in August 2017. For the purposes of this study, the model has been updated in line with the latest best practice guidelines.

The baseline results for the 0.1% AEP plus climate change fluvial event, and 0.1% AEP plus climate change event are shown in Figure 1-5 and 1-6, respectively. This indicates that the Temporary Construction Areas are flood free in all conditions.

The PDZ is predicted to flood in both of these events, with a flood level of 7.41 mAOD and 7.3 mAOD in the fluvial and tidal events, respectively. Consequently, ground levels across the PDZ are to be set to a minimum of 7.5 mAOD to mitigate against the risk of flooding, resulting in the PDZ being flood free in all design events.

The unnamed Port Road supporting infrastructure is predicted to flood to shallow depths, well within the tolerable limits as set out in A1.15 of TAN-15.

Further information on flood risk to the proposed development site is contained in the Flood Consequences Assessment prepared by JBA Consulting, July 2023 reference "*P&C - Project Dragon - Flood Consequences Assessment – LANT30006 – Rev C – 21 July 2023".*

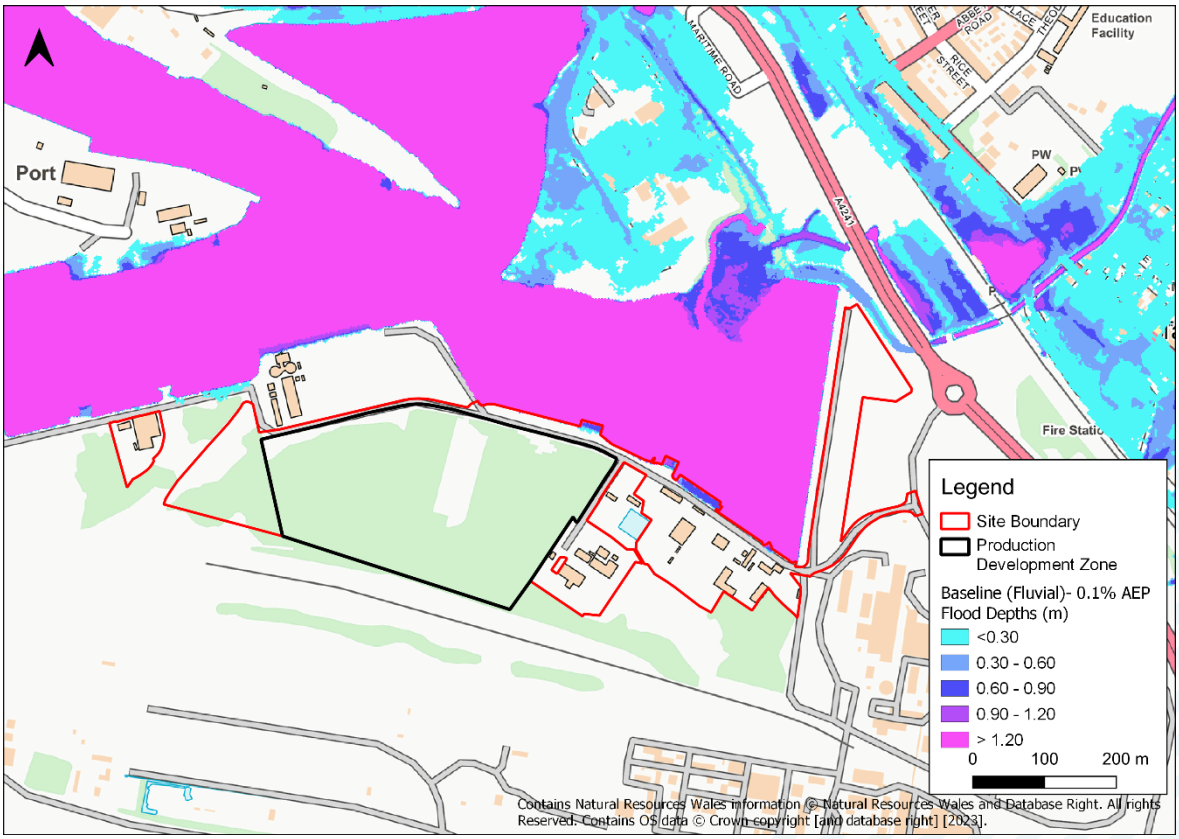

Figure 1-5 0.1% AEP plus climate change fluvial event

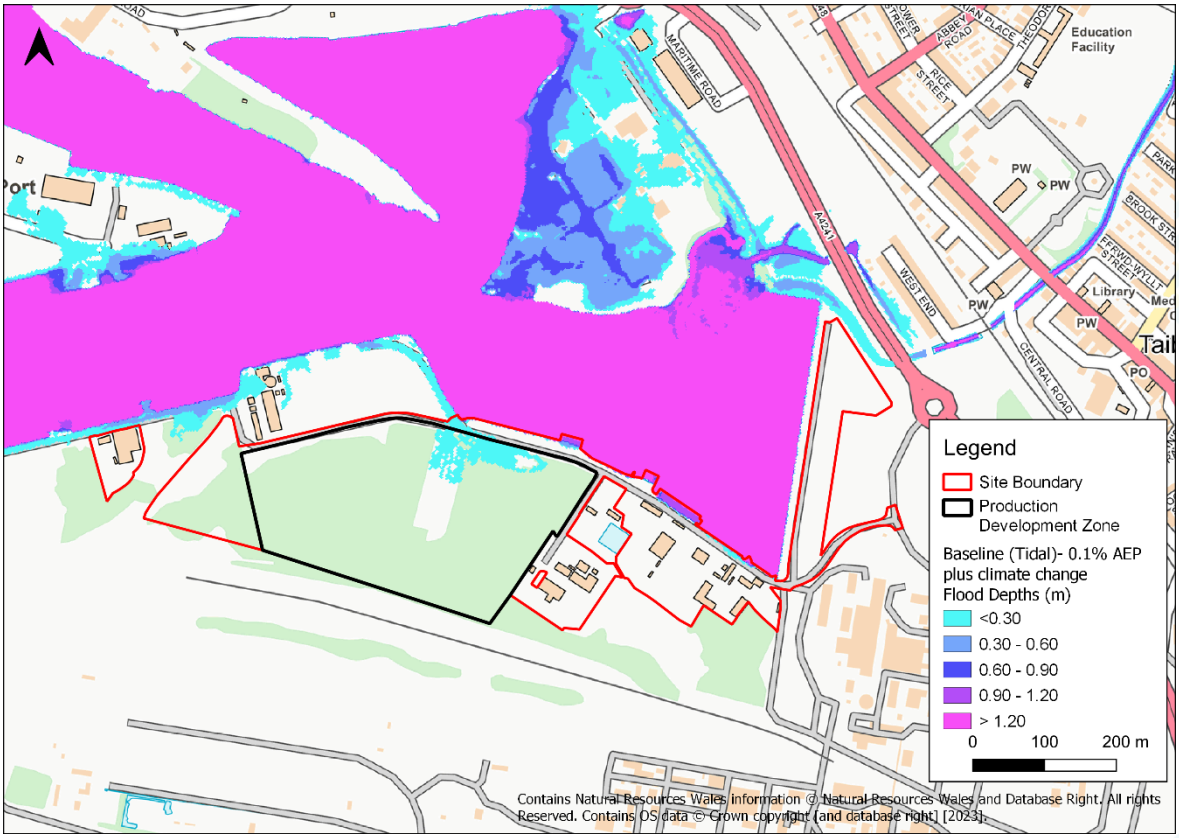

Figure 1-6 0.1% AEP plus climate change tidal event

1.5.2 Surface Water Flood Risk

Surface water flooding occurs when rain falling on saturated ground flows overland, following the local topography. Surface water flooding and subsequent overland flow can also originate from surcharging blocked sewers or drains. Depending on the return period, sewer flooding can also occur from overloading of sewers due to their flow conveyance capacity being exceeded. This typically occurs in events exceeding the 1 in 30 year. Overland flow can therefore pose a risk to both the development site and surrounding land. Overland flows may originate from the site itself or adjoining from land at a higher elevation migrates onto the site.

The Natural Resources Wales (NRW) Flood Risk Assessment Wales (FRAW) maps shows that the risk of surface water and small watercourse flooding to the site is very low, as shown in Figure 1-7. This means that there is less than a 0.1% AEP chance of flooding from these sources in any given year. A small area of the southern boundary of the PDZ, and small isolated areas of the Temporary Construction Areas are classified as having a low risk of surface water flooding. This means that there is between a 0.1% and 1% AEP chance of flooding from these sources in any given year. This flooding is likely to be due to localised topographical depressions on the site.

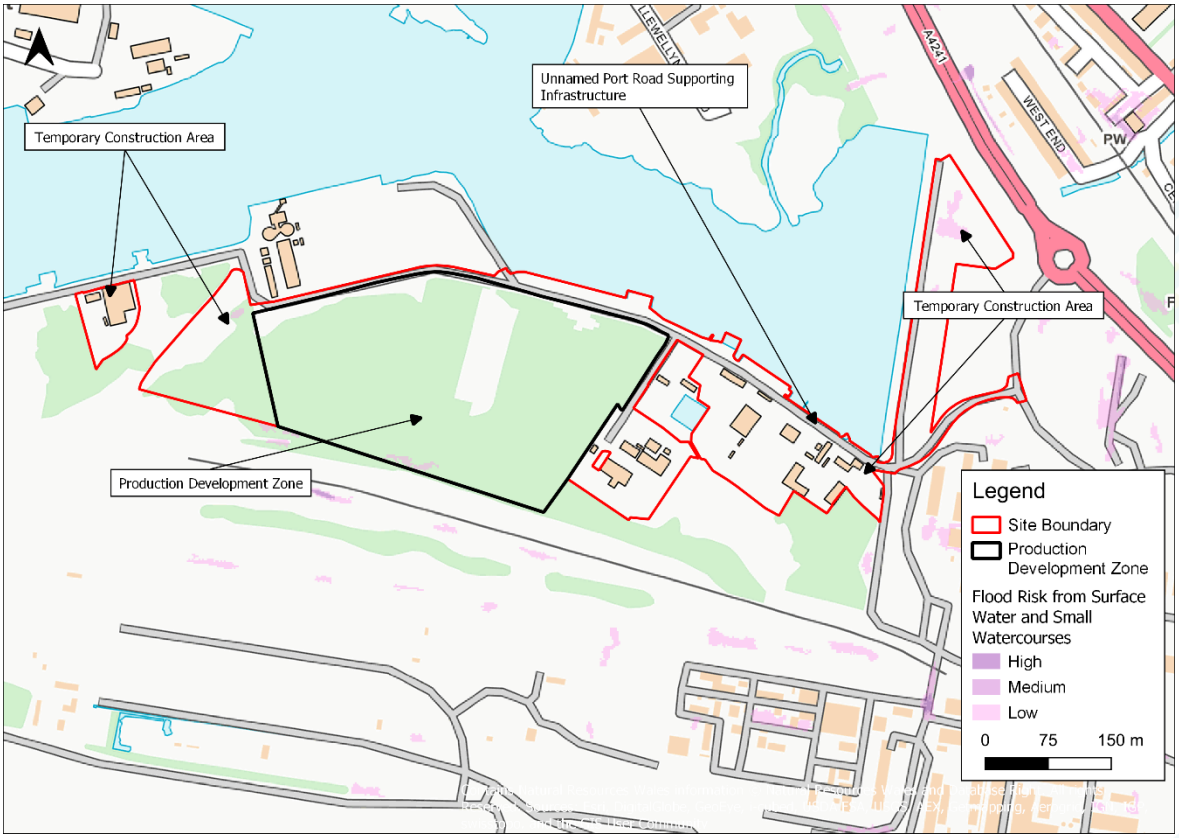

Figure 1-7 Risk of flooding from surface water and small watercourses

2 Existing surface water regime

2.1 Geology and hydrogeology

2.1.1 Geology and soils

The British Geological Society (BGS) GeoIndex[1] indicates that the proposed development site is underlain by South Wales Middle Coal Measures Formation comprised of Mudstone, Siltstone and Sandstone. The site is shown to have superficial deposits of clay, silt and sand. Soils on the site are described as 'loamy and clayey soils of coastal flats with naturally high groundwater' by the Soilscapes viewer[2].

A desktop Ground Investigation (GI) report was undertaken by TEC in May 2022 for the PDZ and is contained in Appendix C. The report highlights that there are likely to be significant areas of made/landscaped ground on the site, due to the industrial history of the site.

The report also references GI work for a site 175m to the west of the proposed development, indicating high groundwater levels of approximately 0.8-4.4mbgl. Groundwater levels tend to fluctuate across the year getting closer to the surface in the winter and lower in the summer. The time of year these groundwater samples were collected has not been given. However, groundwater level is expected to be high due to the close proximity to the docks.

The desktop GI report also identifies that the underlying geology of the PDZ as being a Secondary Aquifer A with medium groundwater vulnerability. The report also identifies that the northern part of the PDZ is located in an area with potential for groundwater flooding; this is expected due to the close proximity at the docks.

In addition, the report highlights that there are likely to be contaminants on the site due to the historic industrial nature of the PDZ and recommends further detailed investigation works.

GI works are ongoing across the site and shall further inform the detailed design of the surface water drainage system as the project progresses.

2.2 Existing drainage network

No existing site drainage details are available for the PDZ or the Temporary Construction Area. It is known that a small portion of the Unnamed Port Road Support Infrstructure drains directly to the dock via a number of surface water outfalls. The exact design information (ie size, level, condition) of these outfalls are unknown.

Given the historic industrial uses on the PDZ, it is likely that drainage infrastructure is or was present on the site draining surface water towards the dock. As all buildings on the site were demolished in 2009 any existing drainage is likely to be in a state of disrepair. For the purposes of this report, it is assumed that there is no existing system which can be utilised within the drainage strategy.

2.3 Current Site Runoff Rates

Table 24.1 of the SuDS Manual[3] indicates that the FEH methods (FEH Statistical and ReFH) should be the preferred methods for calculating peak runoff rates. This is supported by Natural Resources Wales GN008 Flood Estimation: Technical Guidance and Environment Agency research by Faulkner et al which concluded that FEH methods are applicable across a range of catchment sizes and that they should be used in place of outdated methods such as IH124 and ADAS 345 where possible.

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[1] Geology of Britain Viewer: http://mapapps.bgs.ac.uk/geologyofbritain/home.html?

[2] Landis Soilscapes viewer: http://www.landis.org.uk/soilscapes/

3 The SuDS Manual (C753), CIRIA 2015. https://www.ciria.org.

Section 3.3.2 of the SuDS Manual states that 'For previously developed sites, site runoff rates should be reduced to the greenfield rates wherever possible'. Therefore, the UK SUDS tool has been used to calculate Greenfield runoff rates for the PDZ using the FEH Statistical Method, as shown in Appendix D.

Catchment descriptors were extracted from the FEH Webservice as point data. The SAAR value is 1143 and the BFIHOST is 0.726. The PDZ has an area of 9.12 hectares.

The calculated Greenfield runoff rates are shown in Table 2-1.

Table 2-1 Current Site Runoff Rates

Return Period	Specific Runoff (l/s/ha)	Peak Runoff Rate (l/s)
1	3.34	33.21
QBAR	3.79	37.74
30	6.75	67.18
100	8.27	82.28

3 Surface water management approach

3.1 Surface water drainage proposal

An outline surface water drainage proposal for the site has been developed which will aim to control surface water runoff without increasing flood risk to other developments or impacting on water quality downstream. The development of the drainage strategy is via a number of steps where drainage objectives, options and estimated sizes of features are determined. Further detailed design of the drainage scheme will be determined once an agreement in principle has been received from the SuDS Approval Body (SAB).

No works are proposed to the Unnamed Port Road Supporting Infrastructure, and it is therefore not included further within this strategy. The Temporary Construction Areas shall be used for a limited time, solely during construction of the production facility. Consequently, drainage for these areas shall be covered by the Construction Environmental Management Plan required for full SAB approval. This is detailed further in Section 3.9.1.

Consequently, the outline drainage strategy focuses on the provision of surface water drainage across the PDZ only, functioning for the lifetime of the development and meeting the requirements of the statutory standards for SuDS in Wales.

This outline drainage strategy discusses each SuDS standard in turn and details the way in which the proposed surface water drainage strategy across the PDZ will comply with each standard.

3.2 Sustainable drainage systems

Sustainable Drainage Systems (SuDS) aim to mimic the natural processes of Greenfield surface water drainage by allowing water to flow along natural flow routes and also aims to reduce the runoff rates and volumes during storm events, whilst providing water treatment benefits. SuDS also have the advantage of providing Blue and Green Infrastructure and ecology and recreational benefits when designed and maintained properly.

Schedule 3 of the Flood and Water Management Act 2010 was enacted in Wales in January 2019, leading to the requirement for all new developments to incorporate the four pillars of SuDS design, shown in Figure 3-1:

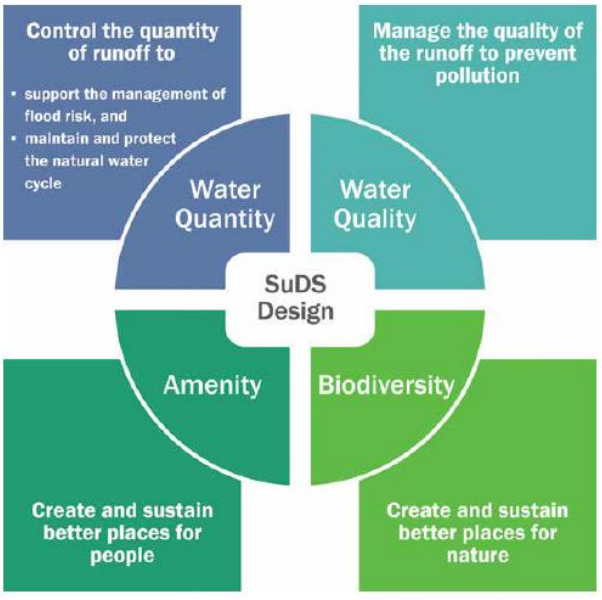

Figure 3-1 Four Pillars of SuDS Design (Ciria, 2015)

3.2.1 Design criteria

The following national guidance documents and design standards have been considered when developing this outline surface water drainage strategy:

- C753 "The SuDS Manual" (CIRIA, 2015)
- Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems (Welsh Government, 2018)
- Rainfall Runoff Management for Developments – SC030219 (Environment Agency, 2013)
- Planning Policy Wales (Edition 11, February 2021)
- The Building Regulations 2010: Part H: Drainage and Waste Disposal
- Design and Construction Guidance for foul and surface water sewers (May 2021)

In line with Sustainable Drainage Systems Standards for Wales (2018), surface water runoff events up to the 1% AEP (1 in 100 year return period event) should be managed to protect people and property on and adjacent to the site from flooding from the drainage system.

Neath Port Talbot Council do not currently have specific local guidance for SuDS. Should guidance be available at detailed design stage, it should also be consulted to inform the drainage strategy.

3.3 The Conceptual Strategy

The PDZ is a highly industrialised site with the production of sustainable aviation fuel. Consequently, as a nature of the chemicals contained on site and the processes used on site, the management of surface water shall need to reflect the industrial setting, along with meeting the requirements of the statutory standards for SuDS in Wales. The proposed surface water drainage strategy is contained in Appendix E.

Due to the industrial nature of the site, consideration has been given to the potential of contamination of the surface water system. Further detail is contained in Section 3.7. Surface water across the PDZ shall be managed through two streams: the clean water drain, and the contaminated drain.

The clean water drain shall flow through a SuDS system, discharging to Port Talbot dock. The contaminated drain shall flow to the 'AOC basin' and onsite effluent treatment plant and prior to being reused in the industrial processes. Any remaining sludge retained in the system is to be tinkered off site via road.

The clean water drain shall be managed through a SuDS system where possible. This shall consist of rain gardens, trapezoidal ditches (gravel based swales), and permeable paving. Biodiversity and amenity benefits are limited as a consequence of the nature of the site. Further detail is contained in Section 3.8. However, biodiversity and amenity benefits are maximised wherever possible across the site, particularly to the admin and truck loading areas of the PDZ.

3.4 Principles of SuDS

The proposed surface water drainage scheme complies with the standard principles of SuDS in the following way:

- Wherever possible across the PDZ, water is managed as close to the surface as possible through the use of permeable paving, rain gardens and trapezoidal ditches.
- Rainwater is treated as a valuable natural resource across the PDZ by reutilising water within the site's industrial processes where viable. Water is kept as close

to the surface as possible and integrated into the landscape and biodiversity requirements for the site

- Rainfall will be managed across the site to ensure that the site does not flood during the 1 in 30-year event, and buildings will not flood during the 1 in 100-year event plus 40% for climate change.
- During detailed design, a 40% climate change allowance will be applied to peak rainfall intensity and design inflows. There is no requirement for the application of urban creep.
- A SuDS Management Train is included across the clean drain system of the PDZ as water is intercepted at source and filters through a SuDS assets prior to be discharged into the dock. The Simple Index Approach, in line with C753, will be used to demonstrate how surface water shall be managed to ensure that the proposed development shall not have a detrimental effect on water quality.
- Biodiversity and amenity benefits are maximised across the site wherever possible, integrating SuDS into the PDZ. Biodiversity and amenity benefits are promoted in line with the industrial use of the site, along with linking to the wider biodiversity of the docks area.
- We propose to make the best use of available land by integrating SuDS into the open space wherever possible, whilst considering the industrial nature of the PDZ. Careful consideration has been given to the requirements of the Control of Major Accident Hazards (COMAH) Regulations and the potential for ignition risk across the site in relation to the provision of vegetated SuDS. Further information is provided in Section 3.8.
- To ensure that the scheme performs reliably and effectively for the lifetime of the development, a maintenance plan shall be produced during detailed design stage. The plan will detail the management and maintenance requirements of the proposed SuDS system to ensure that it functions to its optimal capacity in perpetuity. Prior to operational use on site, a designer's risk assessment shall be carried out to ensure that all SuDS assets are safe and fit for purpose.
- All surface water shall be drained via gravity towards the dock to the north of the PDZ.

3.5 S1: Surface water runoff destination

The statutory standards for SuDS in Wales address the use of surface water by the development and where it should be discharged. It has developed a destination hierarchy which sets out the preferred routes for discharge of runoff from the site:

- Priority Level 1: Surface water runoff is collected for reuse
- Priority Level 2: Surface water runoff is infiltrated to ground
- Priority Level 3: Surface water runoff is discharged to a surface water body
- Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system
- Priority Level 5: Surface water runoff is discharged to the combined sewer

Priority Level 1 is the preferred (highest priority) and 4 and 5 should only be used in exceptional circumstances. The following outlines how the proposed development adheres to the drainage hierarchy.

Priority Level 1 - Water for re-use

Wherever possible, process and utility water across the site shall be reused as plant water. Surface water landing in high contamination risk areas of the site (further detail in section

3.7) shall be routed towards the onsite 'AOC basin' and effluent treatment plant. The treatment process will remove organics and other contaminants to allow for water re-use across the industrial facility, with water directed towards the cooling tower or utility usage post-treatment.

Additional surface water, not required for use within the sites operational processes shall be managed through the clean water drain.

Priority Level 2 – Infiltration

The clean water drain shall be managed through the use of SuDS.

Preliminary Ground Investigations have been undertaken across the PDZ, with the Exploratory Ground Investigation Report contained in Appendix C. The geotechnical report indicates that the site is comprised of Made Ground, underlain by superficial deposits of Blown Sand, Tidal Flat Deposits and Alluvial Fan Deposits. The bedrock geology of the PDZ is South Wales Middle Coal Formation, comprised of sandstone.

Groundwater observations were recorded during the works. Perched groundwater was recorded within the made ground materials across the site, with a shallow groundwater body recorded within the superficial Tidal Flat Deposits, as well as a deeper groundwater body encountered in the Alluvial Fan Deposits. Groundwater depths range from 06mbgl to 15.2mbgl. Given the depths to groundwater onsite, infiltration SuDS are unlikely to be viable.

In addition, that some contaminants of potential concern have been identified within some of the groundwater encountered. The report concludes that with the anticipated low mobility of the identified contaminants and the presence of hardstanding limiting the potential for infiltration, the potential for contaminant migration is considered likely to be low. However, as a consequence of the potential for mobilisation of these contaminants, it is considered that infiltration shall not be a viable means of surface water disposal across the PDZ.

For the purposes of this outline drainage strategy, it is assumed that infiltration shall not be a viable option for the disposal of surface water.

As a consequence of the above, consideration is being given to the potential requirement to line SuDS assets across the site. Confirmation on the need for lining of assets shall be provided at detailed design stage.

Priority Level 3 – Discharge to a surface water body

As infiltration is not seen as a viable option for the site, discharging to a surface water body should be considered.

Port Talbot docks on the northern boundary of the site is a suitable discharge location. During an extreme tide, the docks are inundated with tidal waters, effectively making them a tidal waterbody.

It is also noted that the dock is also required to abstract water from the River Afan at Green Park weir to manage levels within the dock. The accumulation of the introduction of additional surface water flows from developments directly adjacent to the dock would reduce the volume of water needed to be directed towards the dock at this structure, and it would therefore be beneficial for the area to allow this unrestricted runoff rate and volume to the dock.

As the docks are considered to be a viable discharge location, priority level 4 and 5 do not need to be considered.

3.6 S2: Surface Water Runoff Hydraulic Control: Proposed Discharge Rates

There are typically three design storm events which should be considered when designing the surface water system for managing flows and volumes:

- 1 in 1 year event, on sloping sites without basements, where surcharging above soffits of any surface water drainage pipework is not permitted.

- 1 in 30 year storm event, where surface water flooding of the site is not permitted at this frequency.
- 1 in 100 year storm event with allowances for future climate change, where runoff should be managed within the extents of the development site, ensuring that it cannot affect people or properties either within the development or surrounding developments.

3.6.1 Discharge limits

As Port Talbot docks is tidally influenced there is no requirement to attenuate flows from the development site, this is in line with Standard G2.1 of the Statutory Standards for SuDS[4]:

"Where the surface water body is unaffected by either the discharge rate or volume of runoff (e.g. an estuary, the sea or a water body identified in the Local Flood Risk Management Strategy [LFRMS] as not needing hydraulic control of runoff to it), the hydraulic management control requirements are limited to the drainage service provisions for the site and adjacent areas that could be affected by the performance of the drainage system."

As noted above, the water level in the dock is currently maintained via an abstraction point from the River Afan at Green Park weir. The accumulation of the introduction of additional surface water flows from developments directly adjacent to the dock would reduce the volume of water needed to be directed towards the dock at this structure, and it would therefore be beneficial for the area to allow this unrestricted runoff rate and volume to the dock.

Therefore, flows from the site will be unattenuated and there is no requirement for surface water storage across the PDZ. SuDS shall be utilised in low risk areas to treat and convey flow, and to provide amenity and biodiversity benefits wherever possible.

3.6.2 Interception of Rainfall

In accordance with G2.1 of the Statutory Standards for SuDS in Wales, Standard 2 applies to discharges to surface water bodies, surface water sewers or combined sewerage systems, with the exception of systems where surface water is discharged to a waterbody unaffected by the discharge rate or volume of runoff; i.e. a tidal body.

The proposed surface water system is proposed to discharge into Port Talbot Docks. As a result, there is no requirement to limit runoff from the proposed development as a consequence of discharging surface water directly into tidal waters or in order to mitigate fluvial flood risk.

Reduction to greenfield runoff rates is a measure specifically designed to mitigate fluvial flood risk, therefore reduction to greenfield runoff rates is not particularly relevant to this site. As interception aims to "mimic greenfield runoff conditions" (G2.11) and the scheme is not strictly required to reduce to greenfield runoff rates, it is considered that the requirements of Standard 2 and interception do not apply to the proposed SuDS scheme for this development.

3.6.3 Allowance for climate change

The Welsh Government has produced Adapting to Climate Change guidance[5] which contains updated representative climate changes allowances for Wales for peak flows. The guidance contains indicative sensitivity ranges for peak rainfall intensity. As the proposed development site is heavily industrial in nature, the assumed lifetime of development is 75 years, and as

4 Statutory Standards of SuDS (2018) https://gov.wales/sites/default/files/publications/2019-06/statutory-national-standards-for-sustainable-drainage-systems.pdf

5 Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales: https://gov.wales/sites/default/files/publications/2021-09/adapting-to-climate-change-guidance-for-flood-and-coastal-erosion-risk-management-authorities-in-wales.pdf

such the 2070-2115 estimate should be used. The recommended climate change factor for small catchments using the Higher estimate for the 2070-2115 epoch is 40%.

3.6.4 Exceedance events

Extreme events exceeding the design event could occur and may result in overland flows across the site. It is envisaged that exceedance flow routes shall be retained within the highway of the PDZ, with surface water conveyed to the Unnamed Port Road Supporting Infrastructure at the northern boundary of the PDZ.

3.7 S3: Water Quality

To mitigate against adverse impacts on the water quality of the receiving water environment the CIRIA SUDS Manual recommends the following steps to determine the required water quality management for discharges to surface waters and groundwaters:

- Identify the pollution hazard level associated with the given type of development.
- Select risk assessment approach based on receiving water environment and the pollution hazard level.
- Carry out the risk assessment for each outfall considering the pollution hazard level, the status of the receiving water environment and effectiveness of the proposed SUDS techniques.

Table 4.3 of the SuDS Manual advocates the use of the "simple index approach" to determine an appropriate level of pollution mitigation for development sites. This splits pollution into three contaminant types (Total Suspended Solids, Metals and Hydrocarbons) and assigns a "pollution hazard index" to each type. Different SuDS features are then assigned a "SuDS Mitigation Index" and sufficient treatment is deemed to be provided if the "SuDS Mitigation Index" is equal to or greater than the "pollution hazard index" for each pollutant type. When more than one SuDS component is required a multiplication factor of 0.5 is applied to mitigation indices for secondary and tertiary components to account for reduced performance.

The proposed development results in surface water draining from various sources. Surface water within the process areas of the PDZ is considered to be at high risk of contamination as a result of the industrial processes and storage of fuel on site. Admin areas and highways across the PDZ are considered to have a low risk of contamination.

Whilst ordinarily the highest pollution hazard level would be considered for the entirety of a site, it is considered appropriate to manage surface water in line with catchments in accordance with contaminant levels given the high pollution hazard for some areas of the site. Table 3-1 (supported by Appendix F) outlines key areas of the site, along with the designated pollution hazard for each area and subsequent pollution hazard indices.

Table 3-1 Pollution Hazard Indices from CIRIA C753 The SuDS Manual

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Roads	Low	0.5	0.4	0.4
Admin Area	Low	0.5	0.4	0.4
Enclosed Ground Flare	Low	0.5	0.4	0.4
Truck Loading	Medium	0.7	0.6	0.7

Utility	Medium	0.7	0.6	0.7
Storage	High	0.8	0.8	0.9
Process	High	0.8	0.8	0.9

Contaminated Drain and High Hazard Areas

Across the PDZ, surface water within the high hazard areas and consequently having a high risk of contamination, shall be drained through the Contaminated Drain. This water stream shall drain surface water through a piped system towards the onsite 'AOC basin' and effluent treatment plant. The treatment processes shall provide sufficient treatment to remove organics and other contaminants, prior to water being re-used within the industrial processes across the PDZ.

Clean Water Drain and Medium / Low Hazard Areas

It is proposed to drain the medium and low hazard areas of the PDZ via the Clean Water Drain using SuDS techniques where possible, applying the Simple Index Approach within the outline drainage strategy to demonstrate that the proposed development shall not have a detrimental impact on the receiving waterbody. The Clean Water Drain shall discharge surface water to Port Talbot Dock.

The SuDS Manual suggests that the Simple Index Approach should only be considered appropriate for use in consideration of mitigation for water quality when used as part of a detailed risk assessment. When dealing with High Hazard sites, the environmental regulator (Natural Resources Wales [NRW]) should be consulted for pre-permitting advice to determine the most appropriate approach to the development of the design solution. Whilst the surface water drainage strategy splits the PDZ into risk catchments with only the clean drain discharging surface water to Port Talbot dock, it is considered best practice to consult with NRW as to the permitting requirements for the proposed outfall.

Preliminary engagement has been undertaken with NRW regarding applicable best available techniques reference documents (BREF's) for the proposed activities which includes discharge activities/ emission limit values to water. These discussions are ongoing and further information shall be provided at detailed design stage. Any discharge to the dock will be aligned within the concentration limits imposed by the regulations/BREF - (BAT conclusions – Best Available Technique Emission Limit Values BAT-AELs).

Medium and Low Hazard areas of the site, including the truck loading, shall dispose of surface water through SuDS located at the centre of the area.

Surface water in Low Hazard areas of the PDZ shall be managed through the use of SuDS. Table 26.3 of the SuDS Manual provides indicative SuDS mitigation indices for discharges to surface water. Rain gardens and swales on the site shall mostly comprise of gravel substrates to the surface with shallow soils where any planting is permitted across the site. As a result, when considering the Simple Index Approach, these features have been considered as filter drains for simplicity. The Pollution Mitigation Indices for a filter drain are shown in Table 3-2. These are equal to or greater than the Pollution Hazard Indices for metals and hydrocarbons on a low risk site, and it is therefore considered that water quality requirements for these elements shall be met across the low risk areas of the site.

Table 3-2 Pollution Mitigation Indices

SuDS Asset	Pollution Mitigation index **TSS**	Pollution Mitigation index **Metals**	Pollution Mitigation index **Hydrocarbons**	**Sufficient Mitigation Supplied?**
Filter Drain	0.4	0.4	0.4	Yes

Due to risk of contamination of surface waters in medium risk areas, the need to further mitigate against the TSS loading of surface water draining from the highway, and as a consequence of the industrial use of the site, it is proposed to locate a separator upstream of the outfall to Port Talbot dock in line with the Guidance for Pollution Prevention 3 (GPP3)[6] and Ciria SuDS Manual. Consequently, all surface water drained via the clean water drain shall be treated via the separator prior to discharge to Port Talbot Dock. More details on the proposed separator shall be supplied at detailed design.

3.8 S4 & S5: Amenity and Biodiversity value

The design of the surface water management system should maximise amenity and biodiversity benefits across the site. SuDS components can enhance the provision of high-quality, attractive space which can help to provide health and well-being benefits, improve employee welfare and can contribute to improving the climate resilience of new developments. The ecological potential of a SuDS scheme can be maximised by utilising local planting and providing measures to enhance the existing ecosystem and/or work to mitigate against the impact of the development to its surroundings.

The proposed site use, layout and space constraints across the site makes the use of conventional SuDS assets difficult across the PDZ. However, opportunities have been explored wherever possible to maximise their use and keep surface water as close to the surface as possible.

Admin Block and Truck Loading Area

The proposed truck loading and admin areas of the site provide the most opportunity for integrating SuDS in line with the four pillars of SuDS design into the proposed layout. Appendix E contains a preliminary conceptual design for the implementation of SuDS across these two areas, prepared in collaboration with The Environmental Dimension Partnership Ltd (EDP) acting as landscape architect for the project, and RPS Consulting UK & Ireland (RPS), acting as the ecologist for the project. A holistic approach to ecology, landscape and SuDS has been undertaken to maximise the potential for SuDS, biodiversity and landscape across the PDZ. The approach has also been discussed collaboratively with NPT at pre-application planning stage with both the SAB and ecologists, incorporating, where possible, site specific information and authority-wide requirements for SuDS and biodiversity enhancements.

Planting within SuDS assets primarily occurs within the admin and truck loading area. Planting is sympathetic to the wider dock area, including pioneer vegetation and flower-rich grassland on nutrient poor substrate akin to biodiversity which naturally occurs in the docks. Site-won substrates shall be used where possible (subject to the results of ground investigations), or alternatively shall be sourced from the wider dock area. The vegetation proposed is associated with industrial sites which can support key foodplants for invertebrates

[6] Guidance for Pollution Prevention 3 (March 2022): https://www.netregs.org.uk/media/1899/guidance-for-pollution-prevention-3-2022-update-v2.pdf

and provide sources of pollen and nectar. Both habitat types are suitable for periodic disturbance, with low maintenance requirements.

With the admin area, it is proposed to utilise trapezoidal ditches (gravel based swales) along the highway to intercept and treat flows from the highway. Gravel substrate based rain gardens are proposed to areas of hard landscaping across the entrance of the PDZ to also receive flows from the highway. Biodiverse gabion walls are proposed in and adjacent to areas of rain gardens with large rock features allowed to self-colonise with native species.

Biodiverse brown roofs, sympathetic to the industrial environment, are proposed to the admin building, gatehouse and amenity shelters within the admin area.

Permeable paving is proposed across staff car parking areas, with macro-permeable paving proposed to the front of the warehouses to allow for HGV loading.

Within the truck loading area, surface water shall drain from impermeable areas towards the centre of the site which shall be surfaced with site won substrate. Again, this shall form a rain garden, treating and conveying flows to the wider surface water system. Pioneer species shall be incorporated into this area. Biodiverse Gabion Walls shall also be incorporated into this area, with a secondary function as site boundary treatment, promoting the multifunctional benefits of this asset.

Across these areas, insect hotels and bug-habitat features will be incorporated into the SuDS features in line with ecologist requirements, which shall enhance the amenity and biodiversity benefits of the drainage system.

Wider Site Area

Across the wider site area, opportunities for the provision of planted SuDS features are limited. The proposed development comprises the production of Sustainable Aviation Fuel. Consequently, consideration must be given to the requirements of the Control of Major Accident Hazards (COMAH) Regulations. These regulations ensure that businesses take all necessary measures to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any major accidents which do occur. One such consideration is to the potential for fire hazards and increased risk of fire from ignitable materials. A full Quantitative Risk Assessment (QRA) is not yet available; however Environmental Resource Management (ERM) have undertaken a preliminary model to provide indicative guidance on the provision of landscaping across the site. Planting is required to be sited at a suitable distance away from processing areas of the site to not be impacted by the 12.5kW/m^2 thermal radiation level capable of igniting plants.

Across the wider PDZ, consideration is to be given to the proximity of vegetated SuDS to flammable jet fuel storage tanks, with a recommended 80m buffer suggested from this location. Other assets across the site which result in a risk of fire include the enclosed ground flare, high-pressure boiler and fuel storage tanks. In the vicinity of the flare an exclusion zone is required to comply with engineering standards which together with preliminary calculations indicate that a vegetated SuDS are suitable at the boundary of the PDZ, with consideration given to the spacing out of planted species with rocks and gravel to reduce the risk of fire spread.

ERM have provided an indicative plan for suitable locations for vegetated SuDS (contained in Appendix G). Generally, vegetated SuDS are permitted at the western, northern and eastern boundary of the PDZ area only. It is therefore proposed to incorporate rain gardens into these locations, utilising site-won material where possible to promote biodiversity benefits. Biodiverse Gabion Walls shall also be incorporated into some of these areas, along with 'insect hotels' to maximise the amenity and biodiversity potential of these areas.

In the centre of the PDZ, vegetated SuDS shall not be permitted as a result of the fire risk to the site. The centre of the site mainly comprises process areas, classified as having a high risk of contamination. Consequently, these areas shall drain directly to contaminated drain via a piped system.

Highways across the site shall drain to trapezoidal ditches aligning the highway where space and operational requirements allow. These shall be comprised of gravel, and ultimately form a piped connection to the point of discharge. This shall allow for treatment and conveyance of flows from the highway, keeping water as close to the surface as possible.

3.9 S6: Design for Construction, Maintenance and Structural Integrity

The national SuDS standards state that components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance.

Schedule 3 of the Flood and Water Management Act was implemented in Wales on the 7th January 2019. Under this legislation, SuDS that serve multiple properties must be approved and adopted by the SuDS Approval Body (SAB) – a function performed by the Lead Local Flood Authority at Neath Port Talbot County Council. In the case of the proposed use of the site, the SuDS will serve a single curtilage and therefore the Client shall retain the management and maintenance responsibilities for the proposed surface water drainage system. A detailed management and maintenance plan for the proposed system shall be provided at detailed design stage.

3.9.1 Construction Environment Management Plan

During construction of the proposed development surface water runoff shall need to be managed carefully to mitigate and minimise the risk of silt laden runoff (or other contaminants) entering the drainage system and ultimately, the dock. A full Construction and Environmental Management Plan (CEMP) shall be submitted with the full SAB application. The following guidance documents should be referred to in the preparation of the CEMP.

- PPG1 General Guide to the Prevention of Pollution
- PPG2 Above Ground Oil Storage Tanks
- PPG5 Works and Maintenance in or near Water
- PPG6 Working and Construction and Demolition Sites
- PPG13 Jet Washing
- Ciria C768 Guidance on the construction of SuDS
- Ciria C698 Site handbook for the construction of SuDS
- Ciria C742 Environmental Good Practice on Site

There are known fluctuating high levels of groundwater across the PDZ. Management of high groundwater levels shall also need to be considered within the CEMP.

Temporary Construction Area

Temporary Construction Areas will be utilised throughout the construction stage. The Temporary Construction Areas shall be utilised solely during the construction phase of the development, anticipated to be a duration of 2.5 years. Given the temporary use, it will be necessary to undertake a ground conditions assessment and report, to ensure that following use of the TCAs they are returned to their previous condition or agreed alternative position. This assessment may require a degree of ground investigations (i.e., boreholes) to establish existing contamination conditions.

It is anticipated that one of the TCAs (yet to be confirmed) will house the main principal contractor compound and associated amenities, whilst all TCAs will be used for a combination of car parking, welfare facilities, material delivery, drop off and storage and potential pre-fabrication stations. Smaller satellite compounds may be located within TCAs where required.

Following the establishment of the existing site conditions a degree of site preparation will be required, including:

- Within TCA East existing buildings and above ground structures will be demolished to slab level. This will include soft strip of buildings and structure where necessary, with waste arisings separated out for recycling or disposal. Demolition will occur using manual demolition methods (i.e., demolition from height down using appropriate plant). Hardcore material will be retained on-site for crushing and re-use. The suitability of hardcore for reuse will be determined using standard screening methods. All waste arisings will be removed from Site for correct disposal, in line with the nature of the waste;
- Identification and removal of Japanese Knotweed (considered likely to be present within TCA East and West), followed by the implementation of a medium-term management plan to ensure control of Japanese Knotweed throughout the construction stage. All works will be undertaken by an appropriately licensed contractor and in line with CIRIA's 'Invasive species management for infrastructure managers and the construction industry (C679)';
- Vegetation clearance and removal. Where vegetation is to be retained, appropriate fencing/hoarding will be implemented to ensure its not disturbed;
- Installation of protective fencing in and around any other features to be retained within or adjacent to the Temporary Construction Areas; and
- Implementation of any ground protection management strategies (where applicable).

Previous discussion with the SAB has indicated that SuDS shall need to be provided across the Temporary Construction Areas. Given the temporary nature of the site, the provision of a drainage system to this area should be proportional to the proposed land use and site lifetime.

Technip Energies Process Technology (T.EN) have been appointed as the design and build contractors for the proposed development. T.EN are in the process of preparing a Temporary Site Facilities Plan detailing the proposed use of the Temporary Construction Areas. A Framework CEMP, outlining the requirements for mitigating the impacts on the environment during construction is contained in Appendix J.

TCA1 will likely comprise of site laydown areas and contractor compounds with contractor parking, requiring some soil improvement works to assure sufficient mechanical strength under the construction situation, gravel surfacing, with stabilization with bitumen (for parking areas) and some minor levelling works to allow for flat surfacing for laydown area and storage. The final slope of the area shall be realised to direct surface water to the drainage system for the site. Drainage proposals for this area of still to be confirmed. However current considerations surround the draining of surface water to ditches with drainage pumps to manage silt-laden runoff and build-up of materials across the area.

TCA East and TCA West are existing hardstanding areas. TCA East is currently utilised for industrial purposes. Whilst existing buildings across TCA West have been demolished, the area remains impermeably surfaced. Consequently, there shall be no change in hardstanding area across both TCA East and TCA West, with solely site operations varying in nature as a result of the proposals. It is therefore proposed to retain the existing drainage systems serving these areas, with appropriate pollution prevention measures implemented as necessary to mitigate the risk of contaminants entering the existing drainage system.

3.9.2 Health and safety

Under the construction (Design and Management) Regulations (CDM 2015) it is the designer's duty to:

- eliminate foreseeable health and safety risks to anyone affected by the project.
- take steps to reduce or control any risks that cannot be eliminated.
- communicate, cooperate and coordinate with the client, other designers and contractors involved in the project so that designs are compatible, and health and safety risks accounted for during the project and beyond.

A CDM Designers Risk Assessment is contained in Appendix I. It should be noted that the document identifies only significant hazards and risk within and in the immediate vicinity of the site based on a desk-based assessment of available information. The list therefore should not be considered as exhaustive, and a detailed site/services survey should be undertaken prior to commencing any construction activities on site.

4 Foul Drainage

4.1 Building Regulations 2010: Part H: Drainage and Waste Disposal

Part H of the Building Regulations 2010 states that foul drainage should be connected to the foul or combined sewer where reasonably practical.

4.2 Dŵr Cymru Welsh Water Developer Enquiry

A pre-planning consultation request has been submitted to Dŵr Cymru Welsh Water (DCWW) to determine if there is sufficient capacity within the existing public sewerage network to receive sanitary foul flows from the PDZ. A plan of the public sewerage network is contained in Appendix J.

DCWW advise that foul flows from the PDZ can be accommodated within the public combined system which drains to Afan New Works Wastewater Treatment Works (WwTW). The nearest public sewer comprises a strategic asset in the form of a 1200mm combined sewer located to the south-east of the PDZ, with a connection viable to chamber reference SS77881201, as indicated on the plans contained in Appendix J.

No problems are envisaged with the WwTW for the treatment of domestic discharges from the PDZ.

5 Conclusion

- JBA Consulting were commissioned by LanzaTech UK Limited to prepare an outline surface water drainage strategy for a proposed Sustainable Aviation Fuel production facility at land adjacent to Port Talbot Dock.
- The development includes *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*.
- As a consequence of fluvial and tidal flood risk associated with the development site, ground levels shall be set at a minimum of 7.5mAOD.
- The PDZ is a highly industrialised site with the production of Sustainable Aviation Fuel. Consequently, as a nature of the chemicals contained on site and the processes used on site, the management of surface water shall need to reflect the industrial setting, along with meeting the requirements of the statutory standards for SuDS in Wales.
- Consideration has been given to the potential of contamination of the surface water system. Surface water across the PDZ shall be managed through two streams: the clean water drain, and the contaminated drain.
- The contaminated drain shall flow to the onsite effluent treatment plant and 'AOC basin' prior to treated water being reused in the industrial processes.
- The clean water drain shall flow through a SuDS system, discharging to Port Talbot dock.
- The SuDS system shall consist of rain gardens, trapezoidal ditches (gravel based swales), and permeable paving.
- Biodiversity and amenity benefits are limited as a consequence of the nature of the site. However, biodiversity and amenity benefits are maximised wherever possible across the site, particularly to the admin and truck loading areas of the PDZ.
- As the site shall retain in single ownership, long term management and maintenance shall be undertaken by LanzaTech UK Limited, and the system shall not be offered for adoption by the SAB.
- A detailed management and maintenance plan shall be submitted at detailed design.

Appendices

A Topographic Survey

B Site Layout

C Ground Investigations

D Greenfield Runoff Rates

E Outline Drainage Strategy

F Water Quality Plan

G COMAH Compliance Plan

H Temporary Site Facilities

I CDM Regs (2015) File

J DCWW Developer Enquiry

Offices at

Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Haywards Heath
Isle of Man
Limerick
Newcastle upon Tyne
Newport
Peterborough
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Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
1 Broughton Park
Old Lane North
Broughton
SKIPTON
North Yorkshire
BD23 3FD
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
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