

9. Water Environment

9.1. Introduction

9.1.1. This Chapter has been prepared by PJA and reports the likely significance of effects of the Proposed Development on the Water Environment in the context of the Site and surrounding area. In particular it considers the likely significance of effects on the local hydrology, drainage and flood risk as well as surface and ground water quality within both the construction and operational phases of the Proposed Development.

9.1.2. This chapter describes the assessment methodology, the baseline conditions currently present within the study area, the likely significant environmental effects, the mitigation measures required to prevent, reduce or offset any adverse effects and the likely residual effects after these measures have been employed.

9.1.3. This Chapter (and its associated figures and appendices) is not intended to be read as a standalone assessment and reference should be made to the front end of this ES (Chapters 1 – 4), as well as the chapter, 'Proposed Mitigation and Residual Effects' (Chapter 14).

9.2. Assessment criteria & methodology

Scope of the Assessment

9.2.1. A desk-based assessment has been carried out in order to establish key water receptors and the potential effects that the Proposed Development might have on those receptors during the construction and operational phases. The assessment will comprise:

- Determination of Site geology and hydrogeology;
- Review of existing sources of data relating to the water regime (including discharge consents, abstraction licenses, etc.);
- Review of flood risk and drainage related constraints;
- Consideration of the historic uses, drainage regime and the soils and contamination status of the Site and surrounding area in order to determine the existing water quality and regime;
- Consideration of environmental design and management measures to minimise flood risk, such as the use of sustainable drainage systems (SuDS), water efficiency methods and consideration of best practice guidance; and
- Investigation of appropriate mitigation measures to avoid where possible, or minimise, any negative effects on water quality, drainage and flood risk during the construction and operational phases that remain following the implementation of environmental design and management measures.

Extent of the Study Area

- 9.2.2. As a minimum the study area includes the Site itself (approximately 131ha of land at Coed Darcy as outlined in Figure 1.1) and controlled waters that have the potential to be affected by the Proposed Development (as set out in Table 9.6). The study area is defined according to the extent and distance of the receptors identified (i.e. designated site or local sewerage system and/or water supply and the water resources involved in this process).

Consultation Undertaken to Date

- 9.2.3. Table 9.1 provides a summary of the consultation activities undertaken in support of the preparation of this Chapter. Copies of relevant correspondence are provided within the supporting Flood Consequence Assessment and Drainage Strategy Report (Appendix 9.1).

Table 9.1: Summary of Consultation Undertaken to Date

Organisation	Consultation Date	Summary of Outcome of Discussion
Neath Port Talbot SuDS Approval Body (SAB)	27 th April 2021	Surface water drainage strategy for the Proposed Development were discussed and the general principles of surface water management on the Site were agreed.
Neath Port Talbot SuDS Approval Body (SAB)	16 th September 2021	Principles for surface water management within the Proposed Development were agreed, including proposed discharge locations, discharge rates and principal conveyance corridors. Given the outline nature of this planning application, it has been agreed with Neath Port Talbot Council, in their role as SAB, that it is not appropriate to submit a SAB application at this stage and that the principles set out within the 'Flood Consequence Assessment and Drainage Strategy (Ref. 05474 FCA 001, October 2021)' are sufficient to support the outline planning application. Site wide and/or individual SAB applications will be made in due course, at an appropriate stage of design.
Natural Resources Wales (NRW)	23 rd June 2021, 12 th July 2021, 3 rd August 2021 and 5 th August 2021	While a pre-application meeting was requested, this was not undertaken at the time of writing this chapter.
Dŵr Cymru Welsh Water (DCWW)	17 th August 2021	DCWW were consulted with regards to any historic sewer flood records and confirmed they hold no records of flooding for the Site
Dŵr Cymru Welsh Water (DCWW)	18 th August 2021	A pre-development enquiry was also received from DCWW which required a need for a Hydraulic Model Assessment (HMA) of the sewer network to confirm any upgrades required to the sewer system to enable a foul connection.

Organisation	Consultation Date	Summary of Outcome of Discussion
Dŵr Cymru Welsh Water (DCWW)	21 st September 2021	DCWW agreed that foul water may discharge to the existing DCWW assets to the north east of the site, with all offsite upgrades to be provided by DCWW. DCWW confirmed that a surface water discharge into the existing DCWW surface water sewer (Bridge House Outfall) is acceptable in principle, with the proposed maximum peak discharge rate to be no greater than the previously agreed maximum peak discharge rate of 583l/s, and should be reduced from this rate as far as reasonably practicable.

Assessment Methodology

- 9.2.4. The methodology adopted in this assessment has focused on the identification and evaluation of key sensitive receptors and then focussing specifically on identifying impact 'types' and risks which have the potential to have a beneficial or adverse impact on a sensitive receptor. The level of any predicted effect has been determined using the three stage process outlined below. The methodology and significance criteria adopted for assessing various aspects of the water environment have been developed with reference to a variety of relevant legislative drivers and guidance/best practice documents.
- 9.2.5. The assessment of potential impacts and significant effects should be an iterative process where the results of the assessment process should input into the design of the Proposed Development and the development of mitigation measures.

Stage 1: Value/Sensitivity of the Receptor

- 9.2.6. The value and sensitivity of each identified receptor/resource is qualitatively determined using the criteria set out in Table 9.2.

Table 9.2: Sensitivity Matrix

Sensitivity	Criteria
High	- A waterbody which is of high or good ecological status and highly sensitive to change. - A waterbody of high amenity value, including areas of bathing and where water immersion sports are regularly practiced. - Sites with international and European nature conservation designations with water-dependent ecosystems: e.g. Special Protection Area (SPA), Special Area of Conservation (SAC), Ramsar Site and EC designated freshwater fisheries. Also includes all nature conservation sites of national importance designated by

Sensitivity	Criteria
	statute including Sites of Special Scientific Interest (SSSI) and National Nature Reserves. ▪ A waterbody constituting a valuable resource because of high quality and yield, extensive exploitation for public, private domestic, agricultural and/or industrial supply, or designated sites of nature conservation are dependent on groundwater. ▪ A floodplain or flood storage area necessary to protect highly vulnerable development and valued resources from flooding.
Medium	▪ A waterbody of moderate ecological status and moderately sensitive to change. ▪ A waterbody of moderate amenity value including public parks, boating, navigable watercourses, watercourses flowing through residential developments and town centres. ▪ Non-statutory sites of regional or local importance designated for water dependent ecosystems. ▪ A waterbody of limited value because its quality does not allow potable or other quality-sensitive uses (but which may be used for agricultural or industrial purposes) and where exploitation is not extensive, or where local areas of nature conservation are known to be sensitive to groundwater quality. ▪ A floodplain or flood storage area protecting development and resources which are classified to be of medium vulnerability.
Low	▪ A waterbody of poor ecological status with little sensitivity to change. ▪ A waterbody of low yield and quality that makes exploitation as a water resource unfeasible, or where changes to waterbody in terms of abstraction are not expected to have an impact on local ecology. ▪ Non-statutory wetland or waterbody of local interest. ▪ A floodplain or flood storage area with limited flood protection value.
Very low	▪ A water resource of little or no interest.

Stage 2: Nature and Magnitude of Impacts

9.2.7. Once the sensitivity of the identified receptor has been determined, the magnitude of the impact is determined. The nature and characteristics of impacts have been described to enable their magnitude to be determined. The nature of the impacts has first been expressed as:

- Adverse – detrimental or negative impacts on an environmental resource or receptor;
- Beneficial – advantageous or positive impact on an environmental resource or receptor; or
- Negligible – an impact on a resource/receptor of insufficient magnitude to affect the use/integrity.

9.2.8. Where adverse or beneficial impacts have been identified, their magnitude has been assessed using the criteria set out in Table 9.3.

Table 9.3: Magnitude of impacts

Sensitivity	Criteria
High	▪ Results in loss of an attribute and likely to cause failure to meet statutory objectives under and/or breaches of legislation. ▪ Results in a major shift away from the baseline conditions. ▪ Effects that result in a fundamental change to water quality and ecology either by a relatively high amount over a long-term period or by a very high amount over an episode such that a waterbody is greatly changed from the baseline situation. ▪ For groundwater, a major permanent or long-term change to groundwater quality or available yield. Existing resource use is irreparably affected. Changes to quality or groundwater level that have a major impact on local ecology, or water availability is increased as a result of the development. ▪ For floodplains, a major loss of flood storage capacity or change to risk of flooding.
Medium	▪ Results in an impact on integrity of attribute or loss of part of attribute possibly with/without failure to meet statutory objectives or with/without breaches in legislation. ▪ Effects that may be long-term or temporary. Effects that result in a change in the ecological status or productivity/commercial value of a water resource.

	- Changes to the local groundwater regime predicted to have a slight effect on resource use but not rule out any existing supplies. Minor impacts on local ecology may result. - For floodplains, a moderate loss of flood storage capacity or change to risk of flooding.
Low	- Results in a localised effect on a waterbody or a minor shift away from the baseline conditions. - Changes in water quality that are likely to be relatively small or be of a minor temporary nature such that the ecology or commercial value is slightly affected whether beneficial or adverse. Equivalent to minor but measurable change within a class. - Changes to groundwater quality, levels or yields that do not represent a risk or a benefit to existing resource use or ecology. - For floodplains, a minor loss of flood storage capacity or change to risk of flooding.
Very low	- Results in a very slight change from the baseline conditions such that no discernible effect on the water resources ecology results. - No change in status. - Very slightly change from groundwater baseline conditions approximately to a 'no change' situation.

9.2.9. In the context of the Proposed Development, short to medium term impacts are generally considered to be those associated with the construction phase of the development. Long-term impacts are those that will have a lasting effect once the development is completed and operational.

Stage 3: Significance of Effect

9.2.10. The assessment of significance is based on the nature and magnitude of the impact and the value/sensitivity of the receptors/resources. Having established the sensitivity/value of the resource/receptor in Stage 1 and the magnitude/nature of each impact in Stage 2, the matrix in Table 9.4 has been used with professional judgement, to determine the level of each potential effect by a competent specialist.

Table 9.4: Significance Matrix

Sensitivity of Receptor	Magnitude of Impact			
	High	Medium	Low	Very Low
High	Major	Moderate	Minor	None

Medium	Moderate	Moderate	Minor	None
Low	Minor	Minor	None	None
Very Low	Minor	None	None	None

Significance Criteria

- 9.2.11. The level of each effect is measured through a qualitative assessment of the sensitivity of the resources and the magnitude of the effect. The extent of the potential impacts is assessed using a seven-point scale from 'major adverse' to 'major beneficial', as presented in Table 9.5.

9.5 Description of Significance Criteria

Level of Effect	Criteria
Major adverse	Results in a complete loss of resource or receptor
Moderate adverse	Results in an impact on resources or loss of part of resource or receptor
Minor adverse	Results in an impact on resource or receptor
Negligible	Results in an impact on the resource or receptor but not significant enough to affect its use or integrity
Minor beneficial	Results in a beneficial impact on the resource or receptor
Moderate beneficial	Results in a beneficial impact on resources or receptors by increasing or improving it
Major beneficial	Results in a significant beneficial impact on resource or receptor increasing or improving it substantially

- 9.2.12. Effects that are deemed to be significant for the purposes of this assessment are those that are described as being moderate or major adverse/beneficial.

Preventative & Mitigation Measures

- 9.2.13. Many of the long term potential impacts of the Proposed Development on the water environment can be avoided or prevented through the implementation of effective and sustainable design proposals and solutions and as such do not require mitigation measures. The predicted effects and the significance of each potential impact relating to the short-term construction activities and the long term operation of the Proposed Development has been determined in addition to an appropriate and germane level of mitigation. Mitigation measures aim to prevent adverse effects from occurring and to ensure that those that do occur are within an acceptable level governed by objectives and targets set out within relevant legislative and policy drivers.
- 9.2.14. Opportunities for impact mitigation have occurred throughout the planning process and detailed design of the Proposed Development with the objectives of:
- finding better alternatives and methods of construction and site operation;
 - enhancing the environmental and social benefits of a proposal;
 - avoiding, minimising or removing adverse impacts; and

- ensuring that residual adverse impacts are kept within acceptable levels.

9.2.15. If an impact with an adverse significant effect cannot be prevented or mitigated within an acceptable level then potentially there is a residual impact on the receptor where the receptor is altered. Residual impacts have been determined on a qualitative basis.

9.3. Baseline environment

9.3.1. The following sets out the baseline conditions that have been identified as part of this assessment.

Topography

9.3.2. The topography of the Site has been reviewed using publicly available Natural Resources Wales (NRW) 2m DTM LiDAR and indicates the Site to be relatively steep. The high point of the Site is identified immediately west of the existing residential development lying at approximately 77.0m AOD and falls from east to west towards the Crymlyn bog down to a level of approximately 9.0m AOD. Levels also fall from this high point to the railway to north, which is in a cutting, and towards the existing Coed Darcy Business Park where levels are approximately 29.0m AOD.

9.3.3. The topography north of the railway has a plateau through the centre, where levels are approximately 55.0m AOD falling away to approximately 40m AOD along the northern and southern boundaries and to approximately 25m AOD in the south-western corner of the Site.

9.3.4. An extract of the 2m DTM LiDAR is available in Figure 9.2

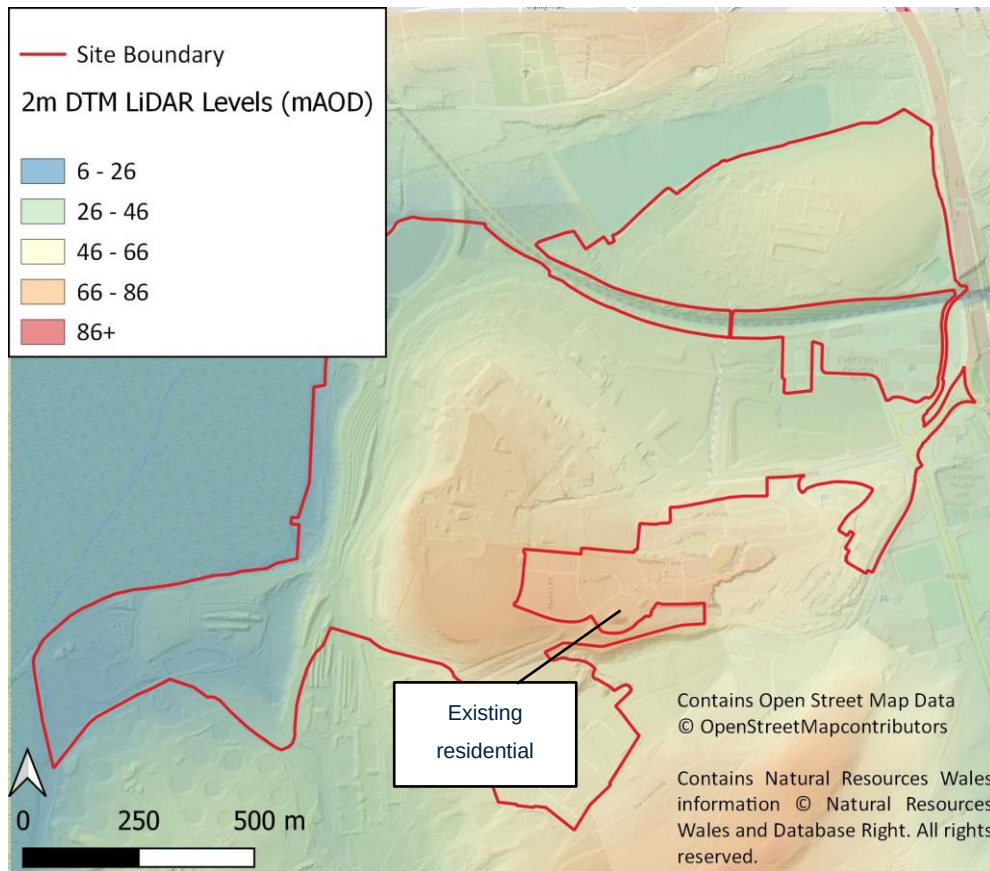


Figure 9.2 – 2m DTM LiDAR Extract Mapping

Water Receptors

9.3.5. The primary water receptors for the Site are;

- The 'North Site Reservoir' (NSR) which forms the northern boundary of the Site. It is our understanding that this currently receives surface water flows from the existing residential development to the south. Water stored within the NSR is then pumped to the Dwr Cymru Welsh Water (DCWW) sewers east of the Site (via the Bridge House outfall) which eventually discharge to the River Neath.
- The 'South Site Reservoir' (SSR) which lies within the north eastern extents of the Site. Flows from this currently discharges unregulated from the reservoir to the Crymlyn Bog.
- The River Neath lies approximately 650m east of the Site and currently receives surface water runoff from the Site which is pumped from the North Site Reservoir via the DCWW sewer system.
- The Crymlyn Bog lies immediately west of the Site and has a number of ditch courses running through the area. Given the existing Site topography, surface water flows are understood to discharge to the Crymlyn Bog at present and it is our understanding that previously, the oil refinery

also used to discharge surface water flows to the bog through the SSR and a number of settlement lagoons.

- A number of DCWW sewers cross the Site boundary, including a combined sewer system (which is present in the north-east of the Site) and an existing foul drainage network which serves the existing residential development and Coed Darcy Business Park. A DCWW surface water sewer also leaves the Site from the north east and discharges to the River Neath from the north-east of the Site (known as the Bridge House outfall).

Fluvial Flooding

- 9.3.6. The River Neath lies approximately 80m east of the Site and the Crymlyn Bog Lies immediately west of the Site in which lies a number of small watercourses.
- 9.3.7. From review of the NRW Flood Map for Planning Rivers and Seas, the Site is identified to lie outside the maximum flood extents from Rivers and Seas, an extract of this mapping is available in Figure 9.3.
- 9.3.8. This mapping represents the new mapping which was set to be bought into effect in December 2021 through Technical Advice Note (TAN) 15: Development, Flooding and Coastal Erosion which has now been postponed until June 2023, however Figure 9.4 also references the existing Development Advice Mapping (DAM).

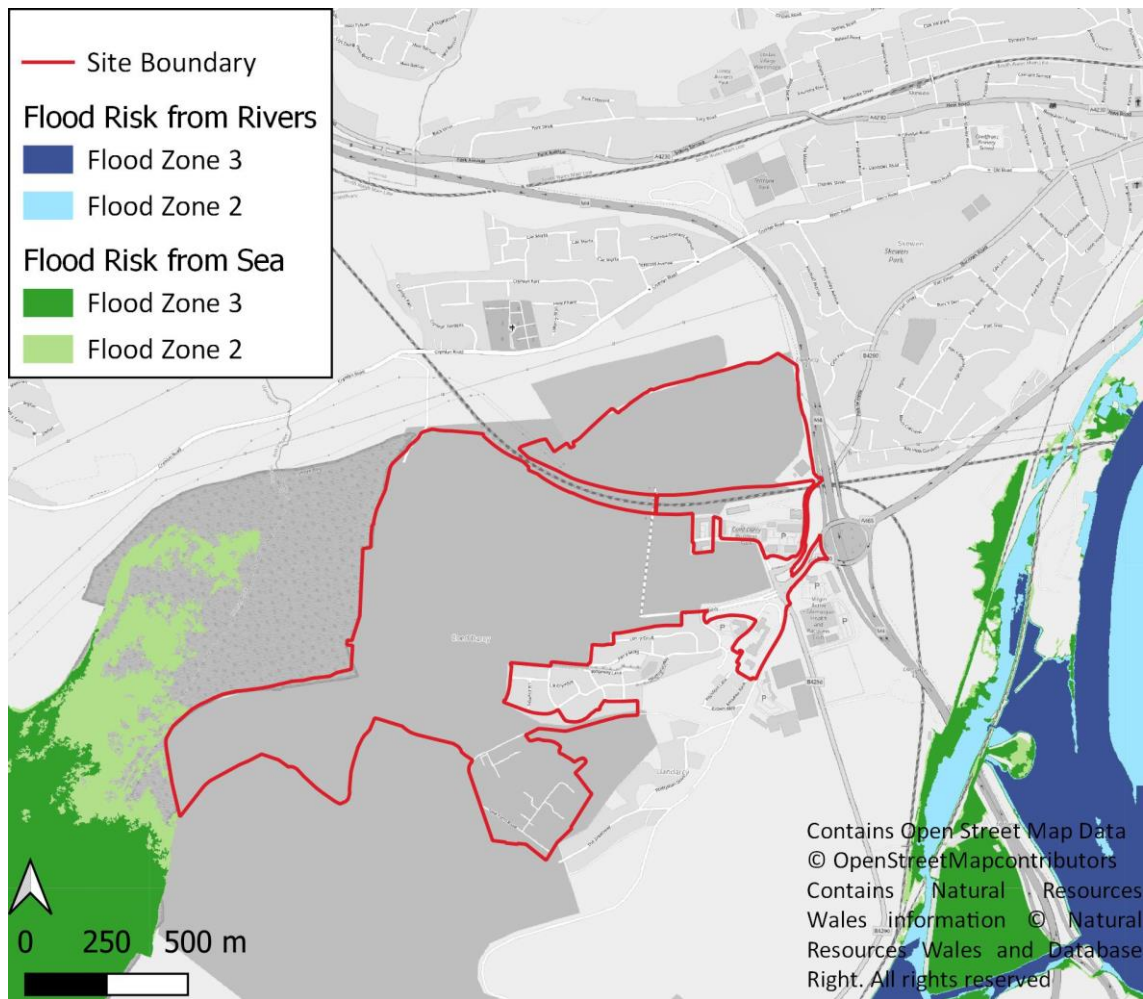


Figure 9.3 – NRW Flood Map for Planning Rivers and Seas Mapping Extract

- 9.3.9. The DAM mapping, published as part of the TAN 15 (2004) has also been reviewed. This identifies that the majority of the Site lies within Zone A of the Development Advice Mapping (DAM) which is considered the most appropriate area for development with regards to flood risk. A relatively small area to the south-west of the Site is identified in DAM Zone C2, which is defined in TAN 15 as “Areas of the floodplain without significant flood defence infrastructure”. An extract of the DAM is contained in Figure 9.4. The area within the Site which is located within Zone C2 of the DAM appears to be on account of the flows from the Crymlyn Bog. No development is proposed within the area of C2.

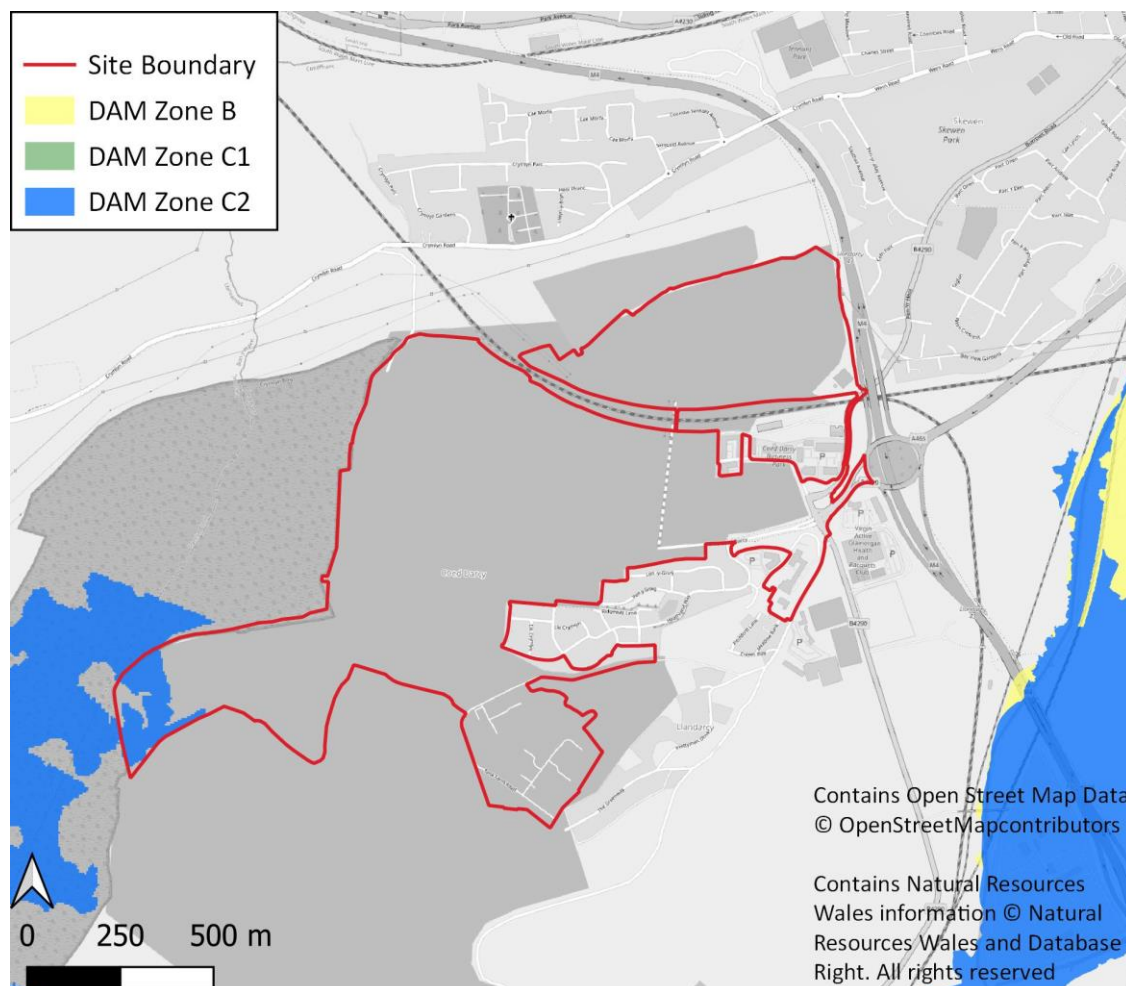


Figure 9.4 – NRW DAM Map Extract

Tidal Flooding

- 9.3.10. Swansea Bay lies approximately 3km south of the Site. As shown in Figure 9.3, the NRW Flood Map for Planning Rivers and Seas identifies the Site to lie outside the maximum flood extents from Rivers and Seas.

Reservoir Flooding

- 9.3.11. The SSR is located within the north western corner of the Site, whilst the NSR borders the Site to the very north. The NRW Flood Risk from Reservoirs mapping identifies that the majority of the Site lies outside the maximum extent of flooding from this source and all development proposed will be located outside the maximum reservoir flood risk extents. This mapping has been reprinted in Figure 9.5. Other sources of flood risk have been assessed as part of the FCA in Appendix 9.1.

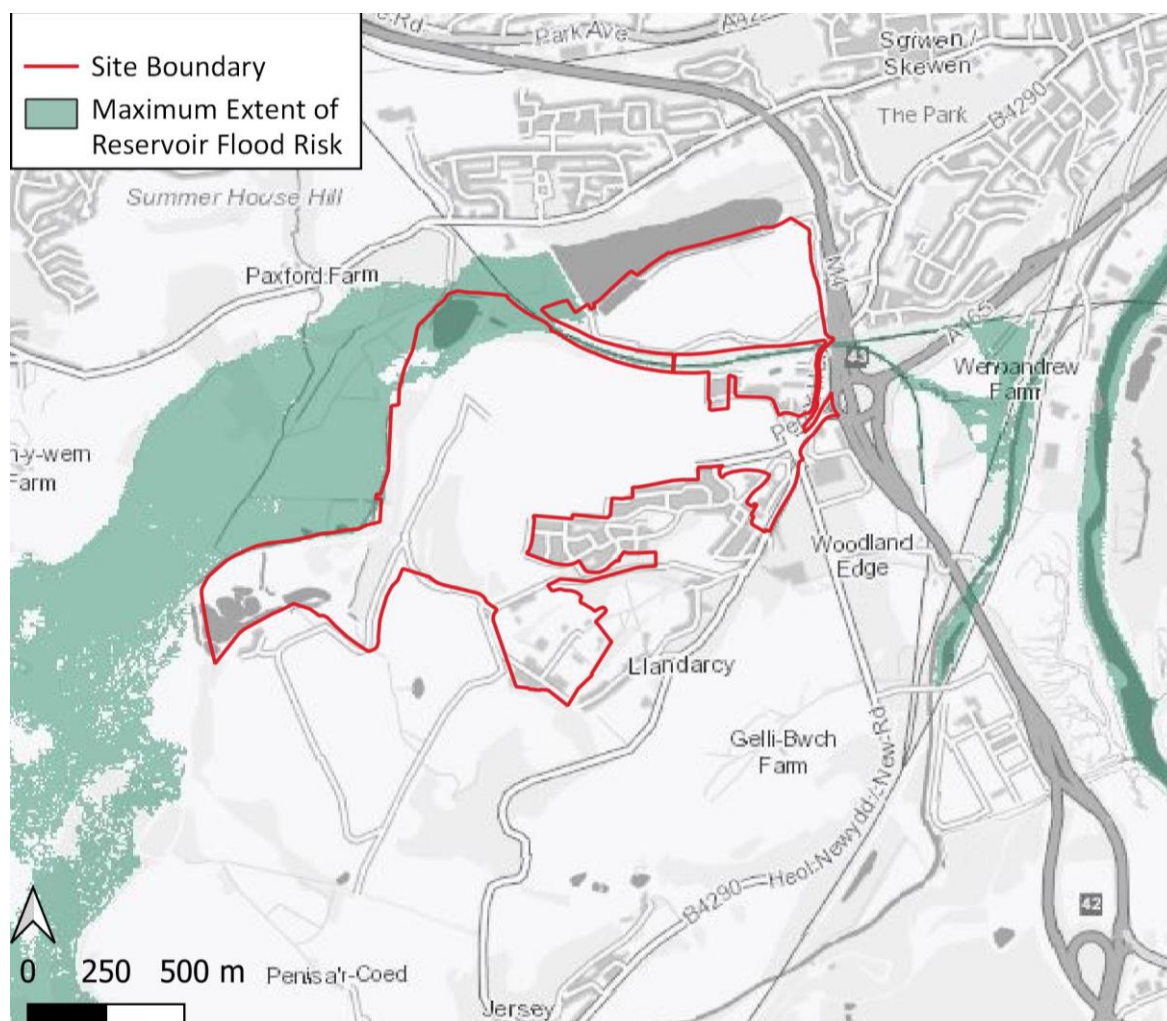


Figure 9.5 - Flood Risk from Reservoir Extract

Geology

- 9.3.12. The British Geological Survey (BGS) Mapping¹ indicates that the majority of the Site is underlain by Sandstone bedrock comprising Hughes Member. A band of Mudstone, Siltstone and Sandstone from the Hughes Member is identified bisecting the centre and south of the Site from west to east. A small area within the south of the Site which is identified to be underlain by a bedrock Mudstone, Siltstone and Sandstone of the Brithdir Member.
- 9.3.13. The Superficial Deposits BGS Geology Mapping has also been reviewed which identifies the majority of the Site to be underlain with Till Devensian – Diamicton and the east of the Site, in proximity to the Crymlyn Bog, is identified to be underlain with superficial deposits of Peat.
- 9.3.14. Ground contamination is likely to be identified on Site through ground investigation works given the Site's former use as a BP Oil Refinery. Existing drainage and services from this former use has been

¹ <https://mapapps2.bgs.ac.uk/geoindex/home.html>

identified throughout the Site including, but not limited to; the NSR, the SSR and a number of existing settlement lagoons. Existing ground and groundwater contamination have been assessed in more detail as part of the Soils, Hydrogeology and Ground Conditions Chapter (Chapter 9).

- 9.3.15. Extensive ground investigation has been undertaken at the Site in two main phases between 1998 and 2016.
- 9.3.16. Varying concentrations of residual contamination were encountered at the Site associated with historical operation of the oil refinery. Contamination in Made Ground and superficial deposits included petroleum hydrocarbons, polycyclic aromatic hydrocarbons, metals and asbestos with localised pockets of gross contamination in the form of oil-saturated soils and free phase hydrocarbons. Residual free phase hydrocarbons are typically present in bedrock fractures, but rarely in sufficient quantities to enable recovery. Chlorinated solvent contamination is present in the north of Central Site, specific to a refining process that was undertaken in this area of the site. Further information is available in the Soils, Hydrogeology and Ground Conditions Chapter (Chapter 8) and the supporting 'Coed Darcy Phase 1 Geo-environmental Desk Study, PJA, October 2021.'

Water Quality

- 9.3.17. The Site falls within the Western Wales River Basin District which extends across the entire western half of Wales from the Vale of Glamorgan in the South, to Denbighshire in the North². From review of the NRW Water Watch Wales mapping³, the Site falls within the Tawe to Cadoxton Management Catchment and the waterbody *Crymlyn Brook - HW to conf with Tennant Canal* (name of waterbody).
- 9.3.18. NRW employs a method for assessing the environmental conditions or the 'status' of a water body according to the objectives set out in the Water Framework Directive (WFD). To achieve the purposes of the Directive of protecting all waterbodies, NRW has set out a number of Environmental Objectives. These Environmental Objectives are reported for each waterbody which NRW operates in six year cycles. The target of the Environmental Objectives is dependent upon the current Ecological Status, which is assessed as High, Good, Moderate, Poor or Bad.
- 9.3.19. As noted previously, the Site falls into the Crymlyn Brook - HW to conf with Tennant Canal (name of the waterbody). This waterbody was classified overall as Moderate, according to the NRW Water Watch Wales mapping.
- 9.3.20. NRW have also published the Core Management Plan for the Crymlyn Bog⁴ which identifies the habitat and vegetation which have been visioned for the Crymlyn Bog.
- 9.3.21. NRW's Water Watch Wales mapping identifies the underlying groundwater body as *Swansea Carboniferous Coal Measures* which covers an area of 758.38km² and has an overall classification of 'Poor'.

² <https://cdn.naturalresources.wales/media/674895/ww-rbmp.pdf?mode=pad>

³ [Water Watch Wales \(naturalresources.wales.gov.uk\)](https://naturalresources.wales.gov.uk)

⁴ [Crymlyn Bog SAC Core Management Plan ENGLISH \(naturalresources.wales\)](https://naturalresources.wales.gov.uk)

- 9.3.22. NRW's Water Watch Wales includes the River Neath at the location of the Bridge House Outfall as 'Neath and Tennant Canal' with an overall waterbody status of 'Moderate'

Water Resources & Availability

- 9.3.23. The Site falls within NRW's Swansea Bay Abstraction Licensing Strategy area. NRW's licensing strategy for this area sets out the level of water available for abstraction from natural resources (i.e. ground and surface waters) within this catchment and how these resources are managed for abstraction purposes.
- 9.3.24. This has identified that the Site lies in an area where the "Groundwater unit balance shows groundwater available for licensing. New licences can be considered depending on impacts on other abstractors and on surface water".
- 9.3.25. The license strategy document also states that "it is recognised that there will be significant social and economic benefits from potential development within the lower Neath catchment. Therefore water will be made available to support such development, providing it is in balance with the environment and its socio-economic value."
- 9.3.26. The Proposed Development will seek to implement a sustainable water management system, where water efficient technology and Sustainable Drainage Systems (SuDS) will be integrated throughout the development to minimise the dependency and usage of a potable mains supply.

Designated Sites

- 9.3.27. According to Magic Maps (DEFRA's environment information mapping service) there are no designated sites within the Site boundary however, the Site is adjacent to the Crymlyn Bog Special Scientific Interest (SSSI) and Crymlyn Bog Special Areas of Conservation (SAC). The Crymlyn Bog is also designated internationally as a Ramsar site as well as being identified as a National Nature Reserve (NNR).

NSR & SSR

- 9.3.28. The 'North Site Reservoir' (NSR) which forms the northern boundary of the Site. currently receives surface water flows from the existing residential development to the south. These flows are stored within the NSR then pumped to the Dwr Cymru Welsh Water (DCWW) sewers east of the Site (via the Bridge House outfall) which eventually discharge to the River Neath. Within the Proposed Development, the surface water flows from the existing development will be sustainably managed through the site wide sustainable surface water drainage strategy and will ultimately discharge, attenuated, to the Crymlyn Bog.
- 9.3.29. It is understood that there are plans to decommission the NSR which will comprise draining down of the existing reservoir and naturalising the area where it is currently located. The NSR is outside of the Site and the decommissioning of the NSR is outside the remit of this outline planning application. It is understood this will form part of a separate study which will be carried out in consultation with NRW to ensure that potential impacts to the surrounding area are suitably managed.
- 9.3.30. The 'South Site Reservoir' (SSR) lies within the north eastern area of the Site, currently discharging uncontrolled and unregulated into the Crymlyn Bog via the Tal-y-wedu.

Sensitive Receptors

- 9.3.31. With consideration to all the aforementioned baseline conditions, the following key receptors have been identified and the value and sensitivity of each receptor has been determined in accordance with the criteria set out in Table 9.6.

Table 9.6: Identified Receptors

Receptor	Value/ Sensitivity	Reason
Crymlyn Bog	High	- The Crymlyn Bog is adjacent to the Site and is identified as both a SSSI, NNR, RAMSAR Site and a SAC. It is also recognised as an internationally important area. - The Crymlyn Bog lies within the waterbody 'Crymlyn Brook - HW to conf with Tennant Canal' which is classified as having Moderate Status. However given its designated status and high biodiversity value, the Crymlyn Bog is considered to be of high value.
River Neath	Medium	NRW's Water Watch Wales includes the River Neath at the location of the Bridge House Outfall as 'Neath and Tennant Canal' with an overall waterbody status of 'Moderate'
Secondary A bedrock aquifer	Medium	- A waterbody of limited value because its quality does not allow potable or other quality-sensitive uses (but which may be used for agricultural or industrial purposes) and where exploitation is not extensive. May support baseflows to local watercourses. - This aquifer also form part of the groundwater body Swansea Carboniferous Coal Measures which is classified as having a Poor Status.
Secondary Undifferentiated superficial aquifer;	Low	- A waterbody of low yield and quality that makes exploitation as a water resource unfeasible, or where changes to waterbody in terms of abstraction are not expected to have an impact on local ecology. - This aquifer also form part of the groundwater body Swansea Carboniferous Coal Measures which is classified as having a Poor Status.

North Reservoir (NSR)	Site Low	- These features are not used for water supply purposes nor do they provide a recreational area or amenity value. - The surface water flows from the existing development that currently discharge to the NSR will be captured and sustainably managed through the site wide sustainable surface water drainage strategy and will ultimately discharge, attenuated, to the Crymlyn Bog. - Furthermore, it is understood that there are plans to decommission the NSR which will comprise draining down of the existing reservoir and naturalising the area where it is currently located. The NSR is outside of the Site and the decommissioning of the NSR is outside the remit of this outline planning application. It is understood this will form part of a separate study which will be carried out in consultation with NRW to ensure that potential impacts to the surrounding area are suitably managed. - As such the NSR is considered to be of Low value.
South Reservoir (SSR)	Site Medium	- This features is not used for water supply purposes nor does it currently provide a recreational area or amenity value. - It is proposed to enhance the biodiversity and amenity value of this reservoir as part of the Proposed Development. - As such the SSR is considered to be of Medium value.

Limitations

- 9.3.32. The conclusions and recommendations contained herein are limited by the availability of background information and the planned use for the Site.
- 9.3.33. Third party information has been used in the preparation of this report, as referenced within the Report and appended FCA, available in Appendix 9.1, which PJA Civil Engineering Ltd, by necessity assumes is correct at the time of writing. Whilst all reasonable checks have been made on data sources and the accuracy of the data, PJA Civil Engineering Ltd accepts no liability for same.

9.4. Inherent design mitigation

- 9.4.1. As required by both national and local policy, the FCA and accompanying drainage strategy (Appendix 9.1) demonstrate that flood risk is not exacerbated and off-Site flood risk is not increased by the Proposed Development.

9.5. Potential environmental impacts & effects

- 9.5.1. This section of the Chapter reviews the impact potential impacts of the Proposed Development on the receptors identified within Section 9.3 of this Chapter. The assessment is undertaken on the basis that there are no mitigation measures in place and as such the impacts may appear severe. However, the assessment is used to identify the nature and scope of measures that should be present and proportionate to mitigate any adverse impacts, resulting in a negligible effect.

- 9.5.2. The Proposed Development will modify the existing characteristics of the Site in two distinct phases:

- Short-term impacts related to the physical works and plant operations during site clearance and the construction phases of the Proposed Development; and
- Long-term impacts related to the operations of the Proposed Development, in particular the results of developing in the floodplain and drainage of the Site.

- 9.5.3. However, it should be noted that both the FCA and Drainage Strategy (Appendix 9.1) have been designed to specifically address and mitigate where necessary the long-term impacts associated with Site wide drainage and flood risk and as such this Chapter provides a summary of those impacts and measures.

Construction

- 9.5.4. According to the CIRIA guidance on Control of Water Pollution from construction sites, the most common instance of water pollution from construction sites is from suspended solids/sediments. Possible sources of suspended solids from the construction of the Proposed Development include:

- Excavations;
- Exposed ground or stockpiles;
- Plant and wheel washing;
- Build-up of dust and mud on site roads;
- Pumping of contaminated surface water and/or groundwater accumulated on the development Site; and
- Disturbance of watercourses adjacent to the Site.

- 9.5.5. Sediment pollution is the primary pollutant in rainwater runoff from construction sites, largely arising from the erosion and stockpiling of exposed soils⁵. During the reprofiling of the Site, excavated material will be disturbed and relocated. Subsequently, suspended solids from construction work could adversely affect extensive reaches of watercourses during rainfall events.
- 9.5.6. Oil, diesel and petrol are common on construction sites. The consequence of a spillage or leakage from construction traffic or machinery could have a large impact on the nearby watercourses and groundwater. Surface water runoff from the Site compound may also mobilise silt, oil and other chemicals. In addition, oils, fuels and/or chemicals may be mobilised during vehicle wash down activities. The formation of hydrocarbons has the ability to enter the local watercourse system and lead to the build-up of a film on the surface water. This has the potential to reduce the amount of oxygen in the water and could pose a significant effect to any potential aquatic ecosystems.
- 9.5.7. Further pollution hazards may come from the uncontrolled release of substances such as refuse, solvents, cleaning agents, paints and other chemicals. Bulk quantities of these substances would not be present on the development Site, therefore reducing the effect of their release. However, toxicity of such substances could be higher, therefore increasing any potential effects.
- 9.5.8. Whilst the earthworks are being undertaken, areas of previously covered fill materials in the ground beneath the Site will be exposed and hence surface water runoff passing over this material may result in minor amounts of leaching of possible contaminants present in the fill materials.
- 9.5.9. The effects of earthworks and construction works on the Site are likely to result in a short-term disruption to the rate of infiltration. The movement of construction traffic may also disturb the upper portions of the ground surface within the construction site. Subsequent compacting may further alter the degree of surface water infiltration and runoff.
- 9.5.10. Site runoff may also adversely impact any SuDS in place at the Site if the SuDS are not protected during works.
- 9.5.11. Prior to mitigation, the potential impacts are considered to be medium on the small ordinary watercourse in the north eastern corner of the site. Therefore, based on Table 9.5 the likely potential effect is **minor adverse**.

Site Compound

- 9.5.12. The Site compound at the Proposed Development will be secured as far as is reasonably practicable against illegal entry and vandalism. The Site is currently secured however, a breach in the security of the Site compound may lead to a potential risk of vandalism of the Site compound containing plant and materials. This could cause pollution from oil, fuel, concrete and other chemicals that may be stored.
- 9.5.13. Whilst materials will be stored correctly, any poor storage of materials and fuel could lead to leaks or accidental spillages. If this risk was to occur, prior to mitigation, the potential impacts are considered to

⁵ CIRIA C648 – Control of Water Pollution from Linear Construction Projects (Pg.129)

be medium on resources classified as having a low to medium importance. Therefore, the potential effect is considered to be ***moderate adverse*** according to Table 9.5.

Foundations

- 9.5.14. If piling is required for building foundations at the Site, it has the potential to create pathways for the migration of possible pollutants from the construction activities to enter the underlying secondary aquifers. Under the WFD Groundwater Daughter Directive (2006/118/EC) all groundwater should be offered an appropriate level of protection. The Proposed Development is not located within a groundwater SPZ and does not support any known groundwater abstractions within 500m of the Site (as per the Envirocheck Report search buffer, the Envirocheck Report is appended to the Desk Study (Appendix 8.1)), however, it is in Natural Resources Wales Swansea Bay Abstraction Licensing Strategy area. Prior to mitigation, the potential impacts are considered to be medium on the underlying superficial deposits and bedrock, in addition to the ordinary watercourse to the north-east of the site, resources classified as having a low importance. Therefore, based on Table 9.5, the likely potential effect is ***moderate adverse***.

Dewatering Operations, Over-Pumping and Excavations

- 9.5.15. Any excavations made during earthworks and construction could potentially occur below the water table and dewatering may be required. Dewatering activities may reduce the groundwater table, baseflow to local watercourses and waterbodies. Contamination of groundwater may also occur from leaking submersible pumps, construction plant and vehicles. Shallow groundwater may also provide a preferential pathway to the underlying and surrounding aquifers and associated surface water features.
- 9.5.16. Any deterioration in water quality and water supply may have an associated impact on aquatic ecology, fish stocks, human health and a potential loss of business. Prior to mitigation, the potential impacts are considered to be medium on all receptors identified within Table 9.6, which are classified as having a low or medium importance. Therefore, based on Table 9.5, the likely potential impact is ***moderate adverse***.

Operation

- 9.5.17. Long-term impacts principally relate to a change in land use resulting in potential impacts on water demand, waste water drainage and the water quality of the key receptors identified. However, these impacts will be prevented from occurring through the incorporation of effective design parameters, as discussed previously within this Chapter.

Surface water runoff

- 9.5.18. The Proposed Development will comprise large areas of hardstanding, i.e. impermeable surfaces. The increase in impermeable ground across the Site will significantly reduce the ability for rainfall to infiltrate into the underlying strata, increasing the rate and volume of surface water runoff from the area. This additional volume and increase in surface water runoff can reduce the capacity of local watercourses and the drainage network, causing inundation of systems and ultimately flooding.

9.5.19. Similarly, pollutants can originate in the runoff from car parking and hardstanding areas. The majority of pollution is washed off urban surfaces at the beginning of a rainfall event which is known as the first flush. In this regard, sloping roof surfaces make the most significant contribution to the first discharges within the drainage system, but the later contributions from the paved surfaces deliver the more significant pollution contribution. Soluble and insoluble contaminants associated with highway and car parking runoff can become mobilised in surface water runoff, which can either enter surface water bodies or infiltrate into the ground.

9.5.20. Prior to mitigation, the potential impacts are considered to be high on resources such as the Crymlyn Bog to the west of the Site which is classified as having a high sensitivity and the underlying principal aquifer as having low sensitivity. Therefore, based on Table 9.5 the likely potential effect is ***moderate adverse***.

Foul Drainage

9.5.21. The introduction of development on Site will increase the quantity and rate of foul flows discharged to the public foul sewerage system compared to the existing situation.

9.5.22. Dwr Cymru Welsh Water (DCWW) were consulted with regard to the foul water and confirmed that an outfall to the existing DCWW combined sewer is acceptable in principle. It is understood that network reinforcements may be required to enable the development to convey foul flows to the existing network; however these works will be undertaken by DCWW.

9.5.23. Therefore the proposed impact is considered ***not significant***.

9.6. Additional mitigation, compensation & enhancement measures

9.6.1. A fundamental part of the FCA, Drainage Strategy (Appendix 9.1) formulation and EIA process is the feedback of the emerging results into the design and decision-making process. The most cost-effective method of applying mitigation is by designing it into the project. As potentially significant adverse effects were identified, the appropriate mitigation measures have been fed into the design process so that where possible, residual effects are deemed to be negligible or as low as reasonably practicable.

9.6.2. The determination of what is '*reasonably practicable*' takes into consideration factors such as safety, feasibility and operability. In defining an impact and its mitigation measure, the proportionality of the cost to the benefit must be given due consideration.

Construction

9.6.3. To mitigate short-term impacts relating to the construction phase of the development, a Construction Environmental Management Plan (CEMP) will be prepared by the Principal Contractor and the environmental manager. This will be developed in consultation with Natural Resources Wales (NRW) and Local Planning Authority (Neath Port Talbot Council). The CEMP will form an overarching planning and guidance document where the contractor must demonstrate how best environmental practice will be implemented and how adverse impacts to the surrounding environment and local community will be minimised.

- 9.6.4. The CEMP will include a detailed plan for monitoring. This would include, but will not be limited to, air, noise, dust, surface water and groundwater to establish the background conditions. An action plan will be established with trigger levels and this will be agreed with the regulators. The action plan will define the monitoring requirements and works, and the results will be reviewed throughout the works to confirm that no unacceptable emissions from the Site occur. Should an exceedance occur, the action plan will define what remedial actions must be taken.
- 9.6.5. The contractor should be required to demonstrate that all site managers, supervisors, foremen and operatives together with security staff will be provided with the relevant training and awareness of site procedures and best construction practice. Appropriate equipment such as booms and absorption mats in the event of an accidental spillage or pollution incident will also be made available and easily accessible. Site signage should be erected showing who to contact in the event of a spillage or emergency. NRW should be informed of all pollution incidents and action taken.
- 9.6.6. The following section details measures required to mitigate the key short-term impacts identified earlier in this Chapter. The CEMP will provide the framework for the following mitigation measures.

Surface Water Runoff and Sediment Control

- 9.6.7. It is essential that runoff and sediment controls are planned well in advance of works on Site. The preparation of an erosion and sediment control plan will be prepared by the Principal Contractor as part of the CEMP and will address activities such as vehicle washing, works in or near water, storage of construction equipment and materials, waste management and water use and disposal. Control measures need to be inspected regularly, particularly after rainfall events. It is recommended that an inspection and maintenance checklist of control measures is to be developed. Erosion and sediment controls need to work effectively until disturbed soils are stabilised (i.e. through vegetation and not just until the end of construction).
- 9.6.8. The phasing of the development will be undertaken to ensure that the sustainable drainage features or temporary surface water drainage facilities are constructed prior to the development of the relevant phase thereby minimising the potential risk of surface water flooding during construction. A Phasing Plan has been produced by Powell Dobson (drawing no. 21009(05) 203. Additional mitigation measures (e.g. temporary protection measures) may be implemented where deemed necessary.
- 9.6.9. During the initial set-up of the Site there should be a designated wheel washing facility and all vehicles will pass through a wheel wash before exiting the Site. The arrangements of which, including the location, are to be agreed with both the Applicant and Neath port Talbot Council.
- 9.6.10. As one of the main sources of suspended solids is from the erosion of exposed soil (including the erosion of stockpiled material) any large areas of exposed soil should be kept covered or contained where possible.
- 9.6.11. Due to heavy machinery being used around the Site during the construction phase, further compaction of soil is likely. This can reduce infiltration rates further and can lead to excess runoff across the Site. The effects from this can be reduced by restricting movements of larger vehicles around the Site or creating a pathway to follow, therefore reducing the area which is affected.

- 9.6.12. During the infrastructure construction period, haul roads will be kept clear of mud deposits and pedestrian routes will be set up and maintained. Haul roads will be damped down during dry and windy periods to minimise dust. A road sweeper will be employed at regular intervals to keep the public roads clear of mud.
- 9.6.13. Water from dewatering operations (if required) should pass through a settling basin to allow suspended solids to settle out. The likelihood of any residual impacts following the implementation of the mitigation measures highlighted above is likely to be **not significant**.

Site Compound

- 9.6.14. The overall design of the construction site layout, location of site offices, temporary services and other facilities, security measures and plant operational areas will be substantially completed before mobilisation. The design of the site compound will ensure that stockpiling areas, fuel and plant stores, vehicle cleaning, waste disposal points and refuelling areas are located where they are least likely to affect the water environment and enter the surface water drainage system.
- 9.6.15. The site compound at the Proposed Development will be secured as far as is reasonably practicable against illegal entry and vandalism. Fuels will be stored in a dedicated bunded area within water tight containers to prevent leakage and away from identified sensitive receptors, where possible. All refuelling of plant and machinery on Site will be carried out from an agreed central refuelling point. Where refuelling at a central refuelling point proves impractical, bowsers complete with spill kits will be deployed and operated by a trained person or team. Where there is a risk that plant or vehicles could collide with or damage a fuel storage area, the installation of heavy-duty barriers between the fuel storage tank and areas where plant and vehicles operate will be considered. Plant will also be regularly inspected to avoid fuels leaks and potential pollution of groundwater. The likelihood of any residual impacts following the implementation of the mitigation measures highlighted above is likely to be **not significant**.

Foundation Solutions

- 9.6.16. If piling is required, then the proposed technique and foundation design will take into account the potential impact of creating source receptor pathways to the secondary aquifer beneath the Site. Where technically and economically acceptable, the foundation type will be selected to minimise this risk. Further details on the proposed strategy for earth movements and foundations are provided in Chapter 8: 'Ground Conditions'.

Dewatering Operations, Over-pumping and Excavations

- 9.6.17. If excavation and dewatering activities are required, then advice from the NRW should be sought as to whether a transfer licence is required for the dewatering and disposal of dewatered water. The first priority in controlled dewatering is to minimise the water ingress into the excavation by using sheet piles, diaphragm walls and other groundwater exclusion techniques.
- 9.6.18. Boreholes can be used to monitor and observe changes in groundwater. However, this technique is intrusive and should be appropriately designed to collect accurate information. Any site investigation must be undertaken in such a way that protects human health and the natural and built environment and should also be carried out in accordance with BS5930:2015+A1:2020 – 'Code of practice for ground

investigations’ and BS10175:2011+A2:2017 ‘*Investigation of potentially contaminated sites*’. The disposal of silty abstracted water may require discharge consent from the NRW. Advice from the NRW should be sought at an early stage to establish whether this is required. Pumped water should be disposed of into grassed land, infiltration/settlement basin, or soakaway. Pumping needs to be at a slow rate to allow water to infiltrate and prevent scouring. Dewatering pumps should be mounted on a tray to catch fuel and drained regularly. Drip trays should be sized to hold 19% of the plant’s fuel capacity. Mats should also be available to be used in the event of a spillage in order to mop up excess diesel on the surface or groundwater.

- 9.6.19. The likelihood of any residual impacts following the implementation of the mitigation measures highlighted above is expected to be **not significant**.

Operational

- 9.6.20. As previously mentioned, the mitigation of long-term effects relating to flood risk and the quality of ground and surface water receptors has already been incorporated as part of the development design proposals set out in detail within the FCA and Drainage Strategy (Appendix 9.1). These mitigation measures are summarised below.

Flood Risk

- 9.6.21. The majority of the Site is located within DAM Zone A and is located wholly outside the maximum flood extents identified on the NRW Flood Risk from Sea Mapping and Flood Risk from Rivers Mapping. The development would therefore be at a low risk of flooding from fluvial sources and there would be no loss of floodplain storage as a result of the development. Therefore, based on Table 9.5 the likely effect of such an impact is of **no significance**.

Surface Water Runoff

- 9.6.22. The amount of hardstanding will increase as a consequence of the Proposed Development. Neath Port Talbot Council require that all development proposals are required to manage surface water through Sustainable Drainage Systems (SuDS) (where appropriate), to minimise flood risk, improve water quality and enhance biodiversity overall as stated in the Statutory Standards for Sustainable Drainage Systems – Designing, Constructing, Operating and Maintaining Surface Water Drainage Systems (Welsh Government, 2018).
- 9.6.23. As such development proposals will include the management of surface water runoff through SuDS (where appropriate), to minimise flood risk, improve water quality and enhance biodiversity as set out in the Drainage Strategy (refer to Appendix 9.1).
- 9.6.24. In summary the Drainage Strategy proposes that a range of SuDS techniques are employed as part of the Proposed Development including open attenuation features i.e. basins etc. The implementation of SuDS components acts as a treatment process to reduce contaminations levels in runoff to acceptable levels, delivering gradual improvement to water quality and providing an environmental buffer for accidental spills or unexpected high pollutant loadings from the Site.

- 9.6.25. Other types of SuDS (such as bioretention features) will also be considered during the detailed design stage. This arrangement will not only attenuate flows back to greenfield conditions but improve the quality of surface water before being discharged into the receiving local watercourse network.
- 9.6.26. Given there are no existing SuDS identified on Site, the use of SuDS to provide water quality or quantity control, the proposed SuDS strategy will benefit in providing treatment before surface water discharges off Site and an eventual point of discharge at the Crymlyn Bog or Bridge House Outfall.
- 9.6.27. Therefore, it is considered that the development will have a very low impact on the key water receptors identified as having a low value within the Site, resulting in ***no significant effect***.

Foul Drainage

- 9.6.28. It is proposed that foul drainage is discharged to the public sewer network. Through the developer enquiry process and further correspondence, DCWW has confirmed that they will need to undertake a hydraulic modelling study to confirm the network upgrades required to enable the development to connect. Discussions are still ongoing with DCWW to confirm the exact nature of these requirements which are likely to be undertaken before the development comes forward to enable it to connect to the foul network.
- 9.6.29. The Proposed Development will therefore not have an adverse impact on the public foul network and the impact will be negligible on all receptors identified in Table 9.6 as low value, resulting in ***no significant effect***.

9.7. Residual environment impacts & effects

- 9.7.1. The above assessment demonstrates how impacts may persist post mitigation and how these may be beneficial/adverse when compared to the existing situation.
- 9.7.2. Generally, as the construction period of a development is short when compared to the overall lifetime of a development, any impact (including pollution of a watercourse through an increase in suspended solids, fuel, cement etc. and subsequent change to water quality) would be considered short-term.
- 9.7.3. The operational period in its nature is long term and as such any impacts post-mitigation should be of beneficial or negligible significance. On this basis it can be concluded that any potential impacts likely to arise as part of the construction and operational phase of the development should be negligible or neutral in nature once mitigation measures have been incorporated into the development.
- 9.7.4. However, there is always a residual effect or an impact that cannot be fully mitigated. In terms of flooding and drainage, a storm can exceed the design standards of the development. For example where the intensity of rainfall is so great that it cannot physically enter the drainage system, surface water ponding is generated and can potentially flood the Site and flow onto neighbouring properties. To mitigate this residual impact as best as practicable, the Site layout will be profiled and designed to channel excess surface water via the highway infrastructure, away from buildings and toward landscaped or green/blue areas. Steps to mitigate this type of residual flood risk is set out in further detail as part of the FCA & Drainage Strategy in Appendix 9.1, which if adopted as part of the development design and layout, should result in ***no significant effect***.

9.8. Cumulative Effects

- 9.8.1. No significant cumulative effects have been identified in either the construction or operational phases of the Proposed Development and no significant cumulative effects are likely to occur.
- 9.8.2. It is expected that any nearby development should be brought forwards to the same local and national standards as this development and as such, there should be no cumulative effects.
- 9.8.3. Overall, it is anticipated that implementation of current guidance, such as the Planning Policy Wales (PPW) Edition 11 (2021), Technical Advice Note (TAN) 15: Development, Flooding and Coastal Erosion (2014) and the Statutory Standards for Sustainable Drainage Systems – Designing, Constructing, Operating and Maintaining Surface Water Drainage Systems (Welsh Government, 2018), will ensure that all proposed developments in the area achieve the minimum baseline standard for dealing with water resources and flood risk. As such there should be **no cumulative significant effect** as a result of this development being brought forward with other local development.

9.9. Assessment Summary

- 9.9.1. This assessment of the development Site in relation to flood risk, drainage, groundwater and surface water quality issues has been undertaken as a desktop study in line with current best practice guidance.
- 9.9.2. All potential impacts have been highlighted in this Chapter, most of which can be avoided or mitigated providing best practice techniques are adhered to, implementing sustainable drainage and flood risk mitigation solutions in line with the development proposals.
- 9.9.3. There are residual flood risks associated with any extreme storm event. However, these have been mitigated for as far as reasonably practicable.
- 9.9.4. Providing the mitigation measures identified in this assessment and supporting FCA & Drainage Strategy (Appendix 9.2) are adhered to, the Proposed Development is anticipated to have No Significant Effect on Water Resource receptors within the study area. The implementation of SuDS will have a net beneficial impact on water quality and quantity on the local watercourse system in the long term.
- 9.9.5. Therefore, in accordance with the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017, the Proposed Development provides significant betterment to the surrounding area in terms of fluvial flood risk and should be considered appropriate for development with regard to water resources, drainage and flood risk.

Topic	Mitigation measures	Designed into the Proposed Development	Delivery condition (outline/RM)	Delivery via legal obligation	Paragraph reference in the ES	Proposed Monitoring Arrangement
Pollution Hazards during Construction	CEMP	Yes – SuDS should be constructed	Yes		9.5.4	To be monitored by Site workers

Environmental Statement

Coed Darcy



Topic	Mitigation measures	Designed into the Proposed Development	Delivery condition (outline/RM)	Delivery via legal obligation	Paragraph reference in the ES	Proposed Monitoring Arrangement
		prior to development				throughout construction
Site Compound	To be secure with adequate security	No	No	CDM Regulations 2015	9.5.12	Site compound to be monitored by Site Manager and Contractors through the construction phase
Piling for Foundations	CEMP	No	No	No	9.5.13	To be monitored by Site workers throughout construction
De-watering, Overpumping and Excavations	CEMP	No	No		9.5.14	To be monitored by Site workers throughout construction
Surface Water Runoff	Proposed SuDS Design	Yes – SuDS proposed	Yes	Suds Approval Body (SAB) Approval required	9.5.17	Operation, management and maintenance plan required through SAB process.
Foul Drainage	Proposed foul drainage design and network upgrades	Yes – Foul drainage network proposed. Liaison ongoing with DCWW.	Yes	Yes	9.5.18	N/A