



St Modwen Developments Ltd.

**Coed Darcy North Site Reservoir
Discontinuance FCA**

Flood Consequence Assessment

April 2023

Project Code: 04020

Document Ref: 04020-R-01-A NSR FCA

PJA
Park Point
17 High Street
Longbridge
B31 2UQ
UK
pja.co.uk



Version Control and Approval

Version	Date	Main Contributor	Checked by	Approved by
A	28 April 2023	Charlotte Turner	Phoebe Ryding	Alison Caldwell

Purpose

This document has been prepared for St Modwen Developments Ltd.

PJA Civil Engineering Ltd. accepts no responsibility or liability for any use that is made of this document other than by the St Modwen Developments Ltd for the purposes for which it was originally commissioned and prepared.

The conclusions and recommendations contained herein are limited by the availability of background information and the planned use for the Site.

Third party information has been used in the preparation of this report, 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.

PJA Civil Engineering Ltd. has no liability regarding the use of this report except to St Modwen Developments Ltd.

CDM

The revised Construction (Design and Management) Regulations 2015 (CDM Regulations) came into force in April 2015 to update certain duties on all parties involved in a construction project, including those promoting the development. One of the designer's responsibilities under clause 9 (1) is to ensure that the client organisation, in this instance St Modwen Developments Ltd, is made aware of their duties under the CDM Regulations.

Copyright

© PJA Civil Engineering Ltd 2023.

Contents

Section	Page
1 Executive Summary	1
2 Introduction.....	2
3 Site Details.....	3
4 Planning Context.....	11
5 Assessment of Flood Risk	13
6 Conclusion & Recommendations.....	20



Appendices

Appendix A Topographic Survey.....

Appendix B Bathymetric Survey

Appendix C Proposed Site Layout

I Executive Summary

- 1.1.1 PJA were commissioned by St Modwen Developments Ltd to prepare a Flood Consequence Assessment (FCA) to support a full planning application for the discontinuance of the North Site Reservoir (NSR) and restoration of a pre-existing watercourse at Coed Darcy, Llandarcy.
- 1.1.2 An existing watercourse was previously situated to the north of Coed Darcy, where the NSR is currently located. This historic watercourse was impounded to form the NSR. Prior to this, the watercourse conveyed flows in a south westerly direction from the north east to the Crymlyn Bog.

Table 1-1: Executive Summary Table

Overview	
Site Location	North Site Reservoir (NSR), Coed Darcy, Llandarcy, Skewen, Neath
Development Proposal	The discontinuance of the NSR and reinstatement of the previous ordinary watercourse.
Development Advice Mapping Zone(s)	The NSR lies within DAM Zone A within the Development Advice Mapping extents.
Fluvial Flood Risk	Low
Tidal Flood Risk	Low
Surface Water Flood Risk	Low
Groundwater Flood Risk	Low
Sewer Flood Risk	Low
Artificial Flood Risk	Low



2 Introduction

2.1 Terms of Reference

- 2.1.1 PJA were commissioned by St Modwen Developments Ltd to prepare a Flood Consequence Assessment (FCA) for the discontinuance of the North Site Reservoir (NSR) and restoration of the pre-existing watercourse at *Coed Darcy, Llandarcy* (herein referred to as 'the Site').
- 2.1.2 An existing ordinary watercourse was historically impounded to form the NSR which formed strategic infrastructure for the former BP Oil Refinery which was located south of the NSR. This historic watercourse conveyed flows in a south westerly direction from the north east to the Crymlyn Bog.

2.2 Scope of works

Flood Consequence Assessment

- 2.2.1 This Flood Consequence Assessment (FCA) aims to provide information on the nature of identified potential flood risk at the Site and largely follows national guidance with regard to development and flood risk in line with Planning Policy Wales 11 and Technical Advice Note (TAN) 15: Development & Flood Risk.

2.3 Information Sources

- 2.3.1 This report comprises a review of readily available public information and other relevant information obtained from the following sources:
- Natural Resource Wales (NRW);
 - Lle – Geoportal for Wales;
 - British Geological Survey (BGS);
 - Cranfield Soil and Agrifood Institute Soilscales;
 - DEFRA Magic Mapping;
 - Technical Advice Note 15: Development and Flood Risk (TAN-15);
 - Neath Port Talbot County Borough Council – Stage 1 and Stage 2 Strategic Flood Consequence Assessment; and
 - Neath Port Talbot County Borough Council Local Flood Risk Management Strategy.



3 Site Details

3.1 Site Description

3.1.1 The Site, which is the focus of this FCA, comprises the NSR, which covers an area of approximately 10.2ha. The NSR was constructed solely as a facility for the operation of the former Llandarcy Oil Refinery and acted as a fire fighting reservoir as well as a drainage catchment area for wider site storm drainage.

3.1.2 The Site lies to the west of Junction 43 of the M4 Motorway and to the north-east of the Crymlyn Bog. The Site is bound by Heol Crymlyn to the north, beyond which lies existing residential development. To the south of the NSR lies the Coed Darcy development site, which is currently seeking outline planning permission (under planning ref. P2021/1193) be utilised for a new mixed-use development for

“Outline planning application, with all matters reserved except for strategic access, for residential uses (C2 & C3 use class), including land For education (D1 use class) with associated public open space, commercial uses (A1, A2, A3, B1, D1 & D2), commercial/employment (B2 & B8) uses, public open space, highway works, sustainable drainage, ecological mitigation and enhancement, landscaping, ground remediation, and associated engineering and infrastructure works”

3.1.3 The NSR is being drawn down via pumps which discharge via an existing permit to the River Neath. A spillway is located on the north-western extent of the reservoir which directs flows towards a culvert under the existing railway, west of the reservoir and, into the Crymlyn Bog.

3.1.4 The Site’s OS co-ordinates are: 271501 , 196583.

3.1.5 A Site location plan and summary table are available in Figure 3-1 and Table 3-1, respectively.

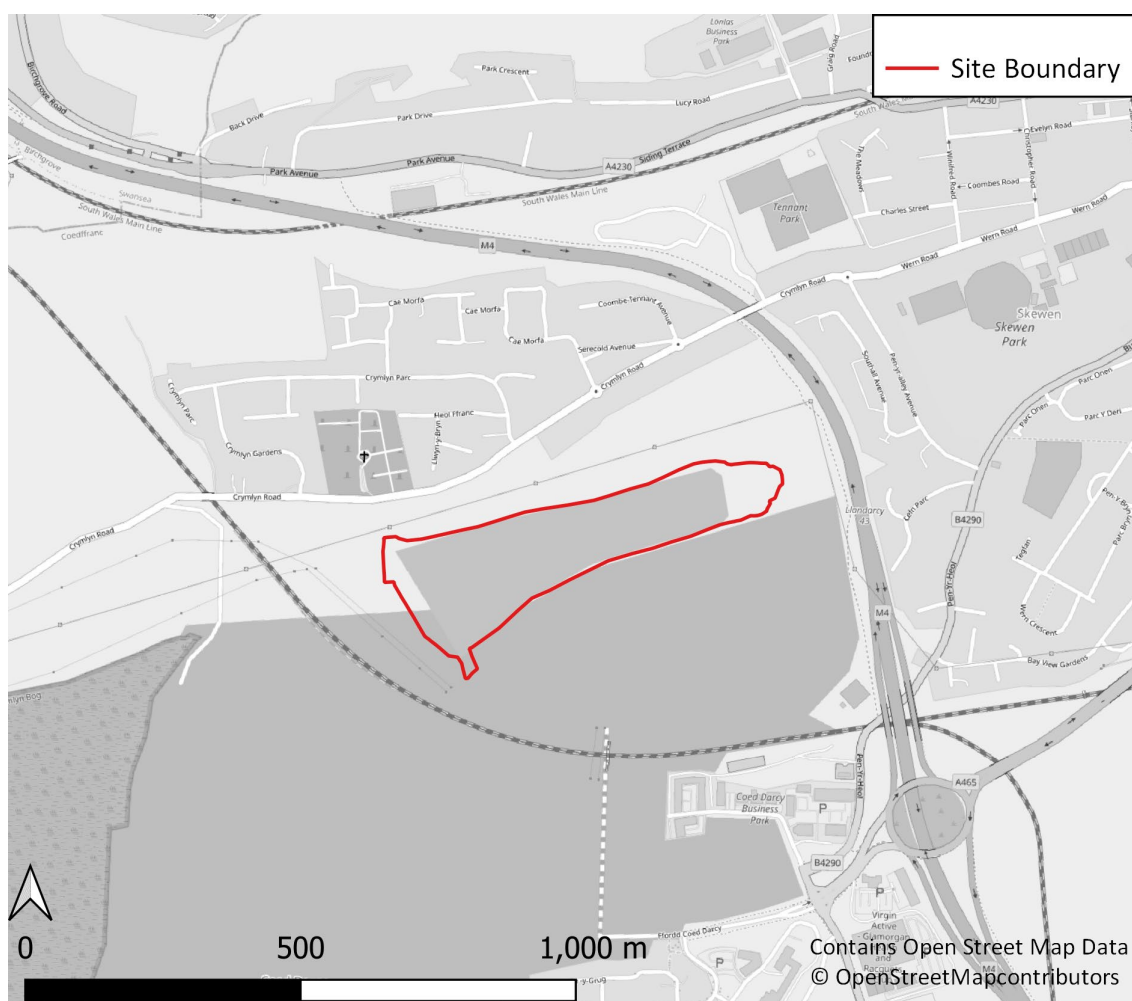


Figure 3-1: Site Location Plan

Table 3-1: Summary of Site

Site Address	North Site Reservoir (NSR), Coed Darcy, Llandarcy, Skewen, Neath
Existing Land use	Reservoir
Proposed Development Type	Discontinuance of the NSR and the restoration of the historic watercourse
Site Area	Circa. 10.2ha
OS Co-ordinates	271501 , 196583
County	Neath Port Talbot
Local Planning Authority	Neath Port Talbot Council (NPTC)
Lead Local Flood Authority	Neath Port Talbot Council (NPTC)
Local Water Authority	Dwr Cymru Welsh Water (DCWW)



3.2 Site Topography

- 3.2.1 The existing topography of the Site has been reviewed utilising publicly available 2m DTM LiDAR, the existing topographic survey (provided by Precision Design, dated November 2020 and contained within Appendix A) and the existing bathymetric survey of the NSR (provided by Reservoir and Water, dated March 2021 and contained within Appendix B).
- 3.2.2 The 2m DTM LiDAR demonstrates that the surrounding topography slopes towards the NSR from the north, east and south.
- 3.2.3 To the west of the Site, the topographic survey has captured the topographic levels of the impounding embankment and associated infrastructure of the reservoir. The highest level identified on the topographic survey of the impounding embankment is approximately 31.82mAOD and is situated to the south-west. The lowest level identified on the topographic survey of the reservoir is approximately 23.8mAOD and is situated to the centre of the impounding embankment.
- 3.2.4 Furthermore, to understand the bed levels of the NSR, a bathymetric survey was undertaken to map the underlying topography of the NSR. The survey shows the highest bed level to be approximately 29.2mAOD, situated towards the southern bank of the reservoir. The lowest bed level is approximately 18.85mAOD and is situated within the centre of the NSR.
- 3.2.5 An extract of the 2m DTM LiDAR is available in Figure 3-2.

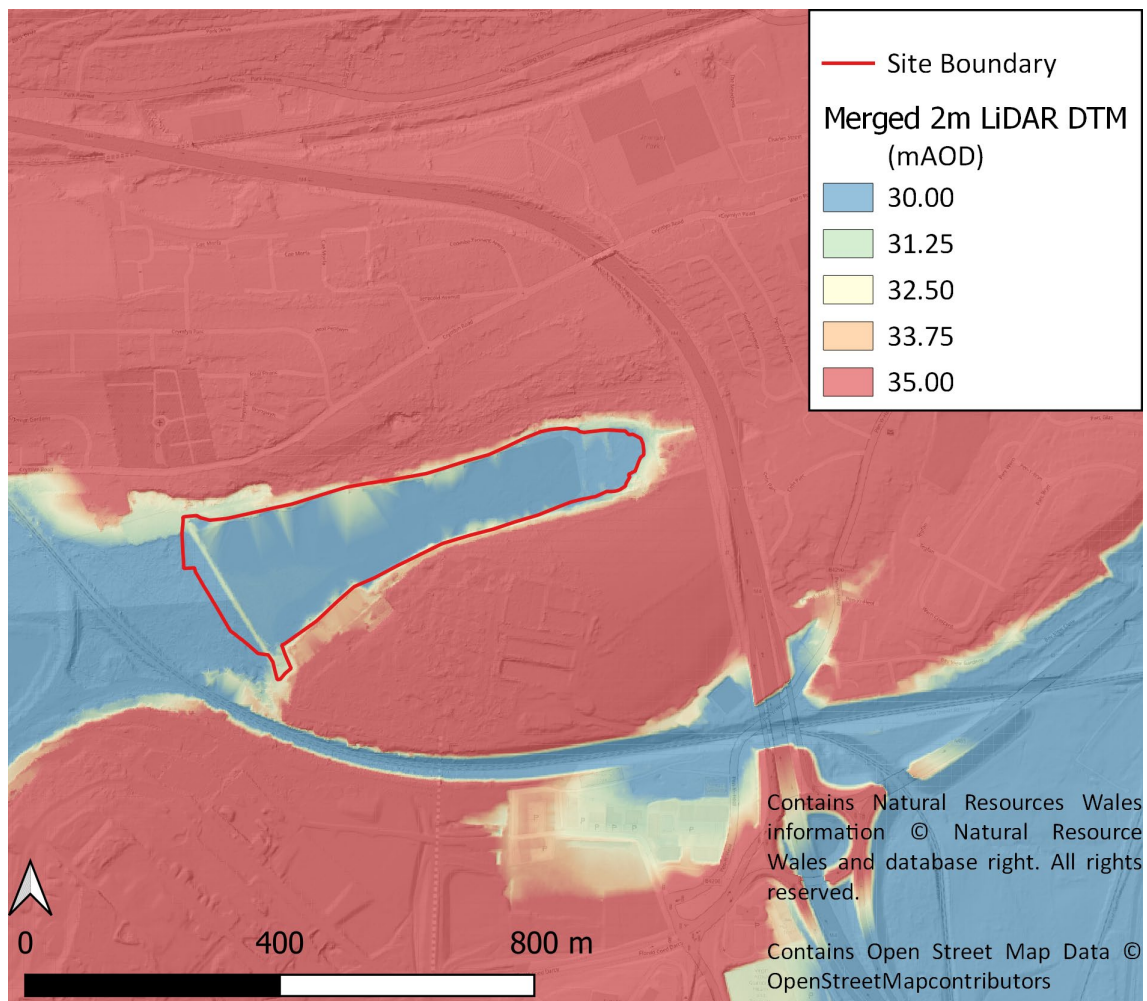


Figure 3-2: Natural Resources Wales (NRW) 2m DTM LiDAR Extract

3.3 Ground Conditions

BGS Mapping

- 3.3.1 From a review of the publicly available British Geological Survey (BGS) mapping¹, the Site is wholly underlain by a bedrock geology of the Hughes Member Sandstone.
- 3.3.2 Furthermore, the Superficial Deposits BGS Geology Mapping was reviewed and identifies that the Site is wholly underlain with Till Devensian – Diamicton.

¹ British Geological Survey. Geology of Britain Viewer.
<https://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>



Cranfield Soilscape Viewer

- 3.3.3 The Cranfield University Soilscape viewer² describes the soils as “*Slowly permeable seasonally wet acid loamy and clayey soils*”, it also identifies that the underlying soils are likely to have impeded drainage.

Hydrogeology

- 3.3.4 From review of the publicly available DEFRA Magic Mapping³ Aquifer Designation Map (Bedrock), the Site is underlain by a Secondary A Aquifer which is defined as “*An aquifer comprising of permeable layers that can support local water supplies, and may form an important source of base flow to rivers.*”
- 3.3.5 From review of the publicly available NRW Interactive Mapping 3, Aquifer Designation Map⁴ (Superficial Drift), the Site is underlain by a Secondary (undifferentiated) Aquifer which is defined as “*Aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value.*”
- 3.3.6 It is also identified that the Site is not underlain by a Source Protection Zone.

3.4 Existing Drainage Assets

- 3.4.1 The Site and area south of the NSR comprise land which forms part of the former BP oil refinery and as such, a number of existing drainage assets associated with this previous land use remain.
- 3.4.2 Investigations to date identify that this currently receives surface water flows principally from the following:
- Three culverts from the M4, allowing surface water from the motorway and its upstream catchment to drain into the reservoir.
 - The former refinery catchment. This currently includes flow from both the topographic catchment to the south of the NSR and also parts of the former refinery lying to the south. This is conveyed by remnant infrastructure in various states of repair.
- 3.4.3 These incoming flows are stored within the NSR. Historically the NSR overflowed into the Crymlyn Bog catchment via a spillway. The NSR spillway (approximately 1.85m (W) x 0.2m (H)) is located within the north western corner of the NSR. In the latter stages of refinery operation water levels in the NSR were managed by consented pumping operation to the Dwr Cymru Welsh Water

²Cranfield Soil and Agrifood Institute. Soilscape Viewer. <http://www.landis.org.uk/soilscales/>

³ DEFRA Magic Map <https://magic.defra.gov.uk/MagicMap.aspx>

⁴ NRW Interactive Mapping [Geocortex Viewer for HTML5 \(cyfoethnaturiolcymru.gov.uk\)](http://geocortex.naturiolcymru.gov.uk/)



(DCWW) sewers east of the Site via the Bridge House Outfall before eventually discharging to the River Neath (this arrangement is shown in Figure 3-3). This arrangement continues to this day.

- 3.4.4 The northern catchment of the NSR which includes residential developments in Skewan does not discharge into the NSR. Flows are understood to be intercepted via estate drainage and discharged to a point immediately down-stream of the NSR embankment.
- 3.4.5 Down stream of the NSR embankment water is conveyed through a series of ditches and through two brick culverts under an existing and former railway embankment (1.5m diameter). Beyond the second culvert flows are conveyed to the Crymlyn Bog in open ditches.
- 3.4.6 To the south-west of the Site, lies the South Site Reservoir (SSR). Previously SSR accepted refinery flows although flows, including those from the NSR catchment by-pass the SSR on its northern side and discharge into the Crymlyn Bog via the Tal-y-Wedu watercourse. The Tal-y-Wedu remains a consented discharge point associated with former oil refinery operations.
- 3.4.7 The Crymlyn Bog is situated to the west of the proposed Site and has a number of watercourses running through the area. Previously, the former BP oil refinery also used to discharge surface water flows to the bog through the SSR and a number of settlement lagoons. Much of this infrastructure is now removed or disrupted.
- 3.4.8 The key existing drainage features have been represented in Figure 3-3.

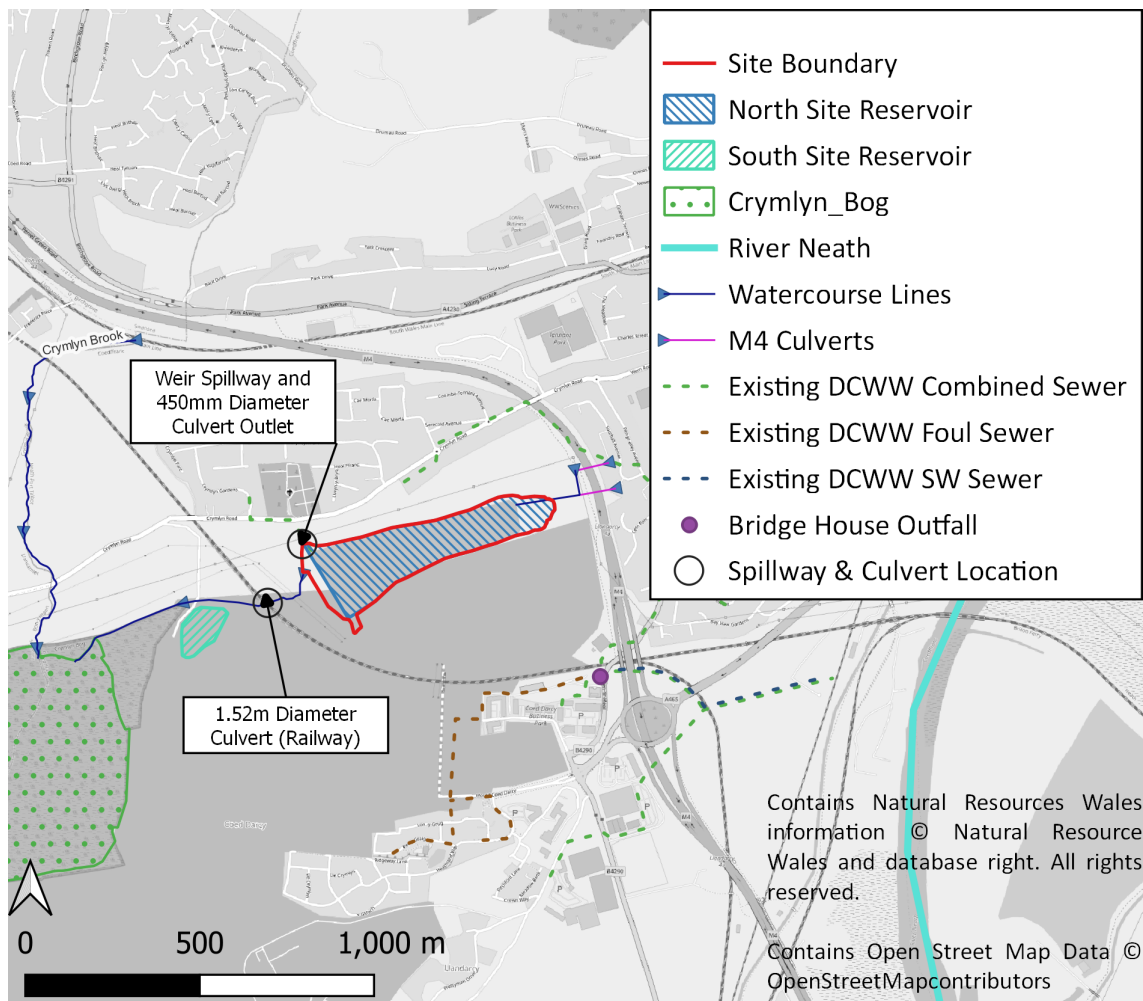
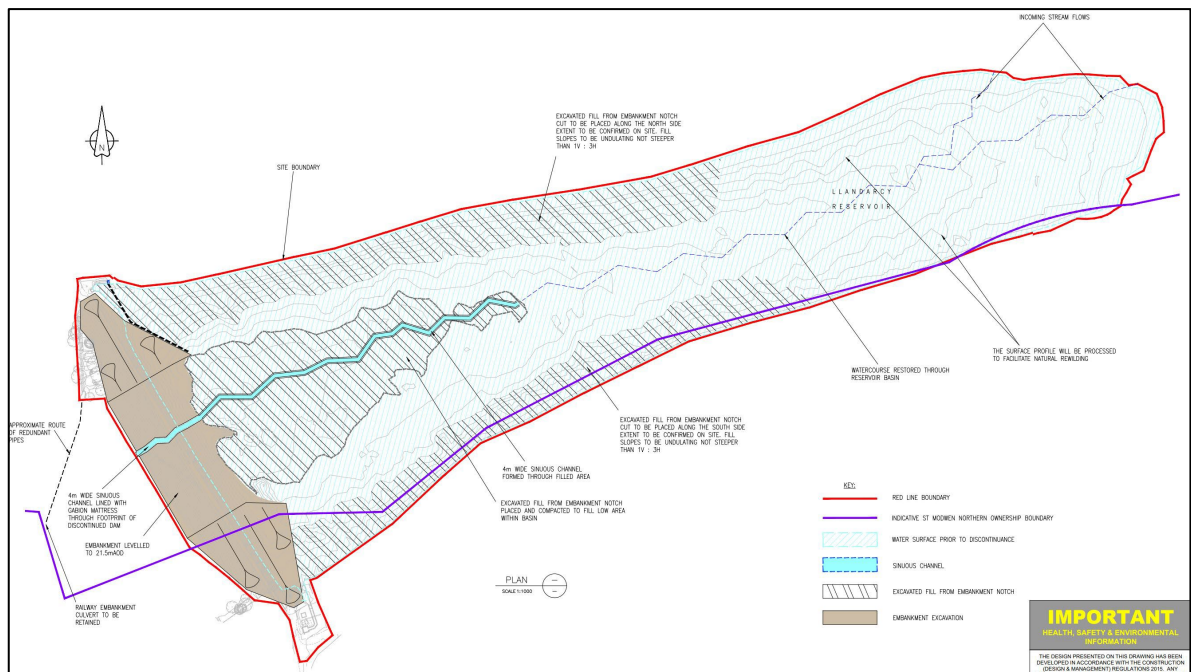


Figure 3-3: Existing Drainage Features



3.5 Site Proposals

- 3.5.1 It is proposed to discontinue the NSR, returning the area to its previous natural state before the NSR was built and the historic watercourse was impounded.
- 3.5.2 It is proposed to restore the historic watercourse to a naturalised channel within the existing reservoir location. The restored watercourse will take incoming flows from the M4 culverts to the east and existing surface water drainage from residential development to the north and south to the outfall in the west.
- 3.5.3 An indicative Site Layout (P2146-807) is available in Appendix C and an extract is shown in Figure 3-4 .



4 Planning Context

4.1 Planning Policy Wales (PPW) Edition 11 (2021)

- 4.1.1 Section 6.6 of PPW Edition 11 discusses Water and Flood Risk, this notes that any development over 100m² will require a SuDS Approval Body (SAB) application and notes that the provision of Sustainable Drainage Systems (SuDS) should be integral to any development.
- 4.1.2 PPW also notes that the Development Advice Mapping (DAM) enable Local Authorities to consider a strategic approach to flood risk. It also notes *“Planning authorities should be aware of the risk of surface water flooding, usually caused by heavy rainfall, and ensure developments are designed and planned to minimise potential impacts”*.
- 4.1.3 As such, existing potential flood risk will be reviewed and assessed within this document in relation to the discontinuance of the NSR and the restoration of the historic watercourse.

4.2 Technical Advice Note (TAN) 15: Development, Flooding and Coastal Erosion

- 4.2.1 Technical Advice Note (TAN) 15 relating to Development and Flood Risk was first published in July 2004 and was most recently updated and released in January 2023. The adoption of the updated TAN-15 has been suspended until further notice, therefore the following Sections refer to the 2004 version of TAN-15 as directed by Welsh Government.
- 4.2.2 The updated TAN-15 reflected the core principles of the National Strategy for Flood and Coastal Erosion Risk Management in Wales to adopt a risk-based approach in respect of new development in areas at risk of flooding and coastal erosion. This is in contrast to the more precautionary approach presented within TAN-15 (2004).
- 4.2.3 The overarching aim when considering new development in relation to TAN-15 (2004) is to prevent exposure to risk, by making sequential decisions in the following order of preference:
- To direct new development away from those areas which are at high risk of flooding, and
 - Where development has to be considered in high-risk areas (Zone C) only those developments which can be justified on the basis of the test outlined in section 6 and section 7 of TAN 15 are located within such areas.
- 4.2.4 Given the nature of the proposed restoration of a historic watercourse, the proposals are identified as suitable in accordance with TAN15.



4.3 Local Policy & Guidance

Neath Port Talbot Local Development Plan (2011-2026)

- 4.3.1 The Neath Port Talbot Local Development Plan was adopted in January 2016 and guides the future development of the area. The plan provides developers and the public with certainty about the planning framework for Neath Port Talbot and offers evidence in relation to a variety of challenges within the area.
- 4.3.2 Within the local plan, Policy SRA 1 refers to the proposed development south of the NSR at Coed Darcy; however, the policy does not state anything in relation to the reservoir or flood risk and drainage.
- 4.3.3 The Neath Port Talbot Local Development Plan states in Section 3 *“New developments will be expected to avoid unnecessary flood risk and to meet the requirements of TAN 15: Development and Flood Risk”*. As such, this FCA will demonstrate that the proposed development avoids any unnecessary flood risk and meets the requirements of TAN 15.”
- 4.3.4 As such, this FCA will demonstrate that the proposals avoid unnecessary flood risk and meet the requirements of TAN-15 (2004).

Neath Port Talbot Local Flood Risk Management Strategy (2013)

- 4.3.5 The Neath Port Talbot Local Flood Risk Management Strategy was adopted in June 2013 and determines the locally significant flood risk for the area. The report focuses mainly on flooding from surface water, groundwater and ordinary watercourses, aiming to provide evidence and guidance to everyone affected by flood risk.
- 4.3.6 The report identifies the local stakeholders regarding flood risk within the Neath Port Talbot area and does not identify that the area within the vicinity of the Site is within a *flood risk community*.
- 4.3.7 The document refers to the Local Development Plan mentioned above in Section 4.3.1. for further advice.

5 Assessment of Flood Risk

- 5.1.1 The flood risk to and from the Site has been assessed based on a review of publicly available information (e.g., Natural Resources Wales flood data). A summary of the flood risk at the Site is provided in Table 5-1 and discussed in more detail in the chapter below.

Table 5-1: Potential Sources of Flood Risk

Source of Flooding	On Site Presence
Fluvial & Tidal	✗
Surface Water	✗
Groundwater	✗
Sewers	✗
Reservoirs	✗
Canal	✗

5.2 Historic Flooding

- 5.2.1 After reviewing the Neath Port Talbot Preliminary Flood Risk Assessment (PFRA) (March 2011), no historic flooding events are recorded within the vicinity of the NSR.
- 5.2.2 The Neath Port Talbot Local Flood Risk Management Strategy does not mention any historic events in relation to the NSR.
- 5.2.3 The Site is not identified to fall within the Natural Resources Wales Recorded Flood Extents mapping outlines.

5.3 Fluvial and Tidal Sources

- 5.3.1 The Site is situated within an area associated with multiple sources of flood risk and drainage assets. The River Neath lies approximately 1.2km to the east of the development, whilst to the west of the development lies the Tal-y-Wedu and the Crymlyn Bog.
- 5.3.2 From a review of the Natural Resources Wales Flood Map for Planning, the Site is identified to lie outside of the maximum flood extents from Rivers and Seas.
- 5.3.3 An extract of this mapping is available in Figure 5-1.

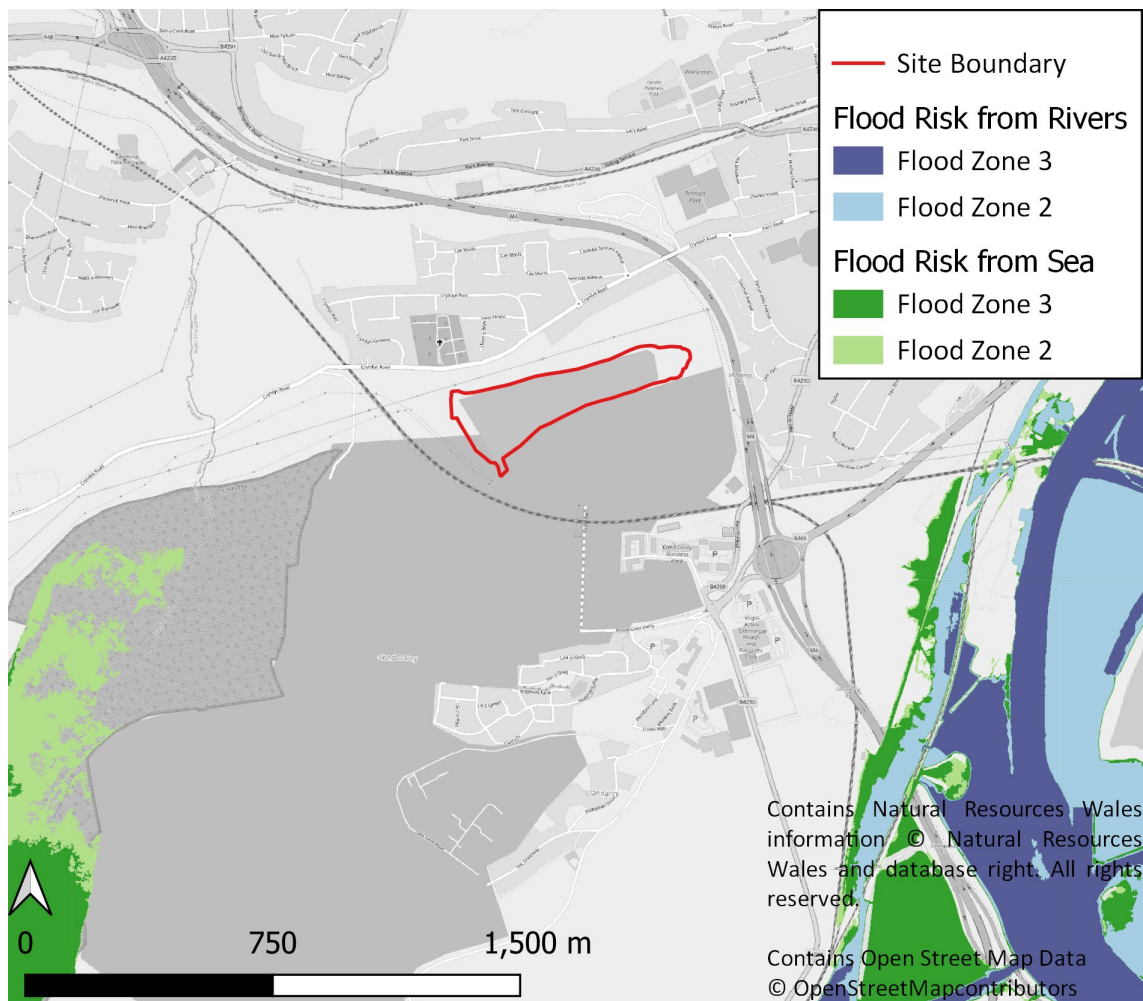


Figure 5-1: NRW Flood Map for Planning Rivers and Seas Mapping Extract

- 5.3.4 Furthermore, the Site is situated wholly within Zone A of the Development Advice Mapping (DAM) extents which is considered to be the most appropriate area for development with regard to flood risk.
- 5.3.5 An extract of the DAM Mapping is contained in Figure 5-2.

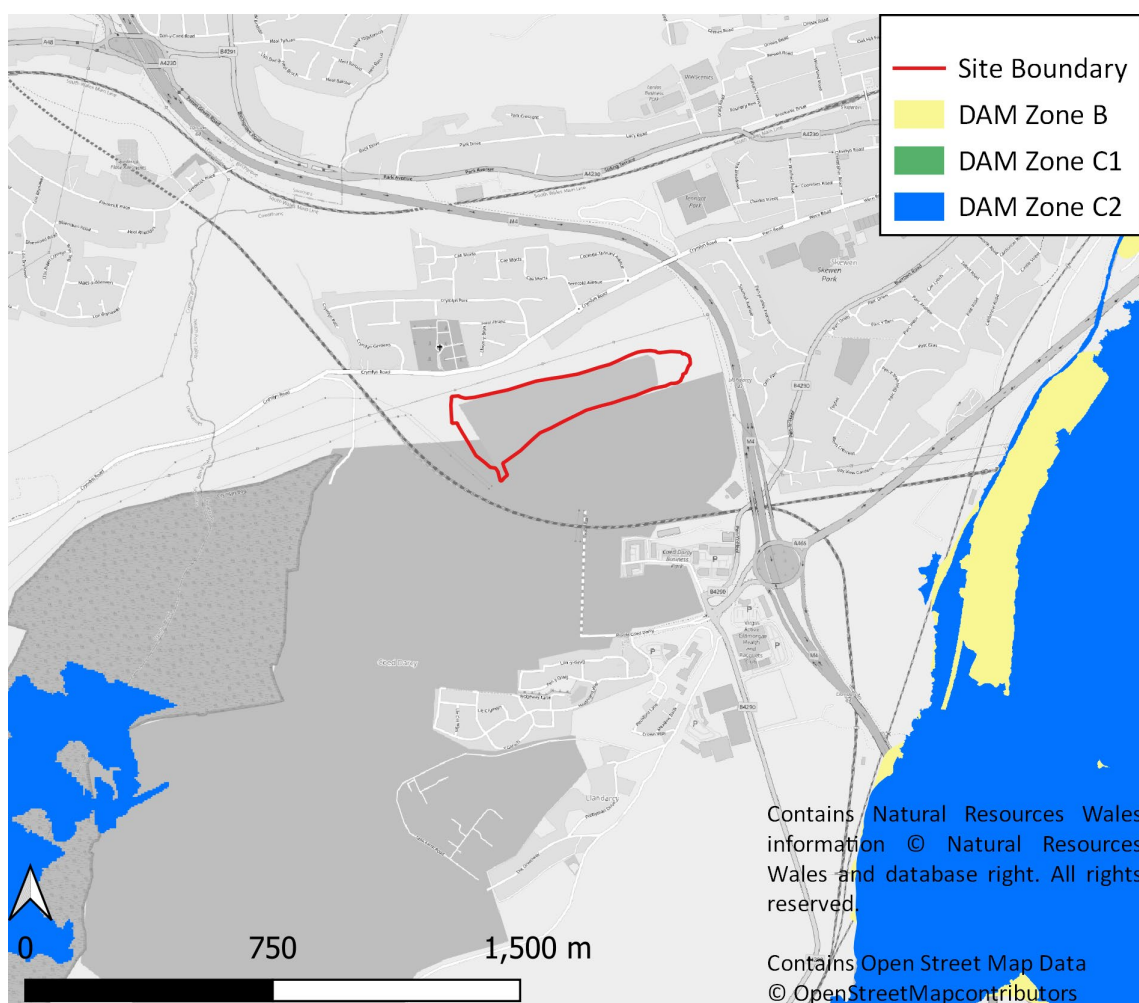


Figure 5-2: NRW DAM Mapping Extract

5.3.6 As such, potential flood risk from fluvial and tidal sources is considered low.

5.4 Surface Water Sources

5.4.1 The Natural Resources Wales Flood Map for Planning, Surface Water and Small Watercourses Mapping identifies large extents of surface water ponding within the Site, assumed to be associated with the NSR.

5.4.2 The production of this mapping has been undertaken at a national scale to provide the first publicly available generation of surface water flood risk mapping. The two previous generations were primarily developed for regulator use as the approach and risk was refined. For example, the first did not include any allowance for sewers, whilst the second incorporated a national loss coefficient.

5.4.3 Although this generation incorporates local estimates of the sewer infiltration loss, it does not allow for local improvements to the underlying Digital Terrain Model (DTM). This means that local features such as the NSR and adjoining highways are represented as determined from the LiDAR

without any consideration to surface water drainage features such as culverts or small watercourses which typically provide the associated surface water drainage.

5.4.4 An extract of the mapping is available in Figure 5-3.

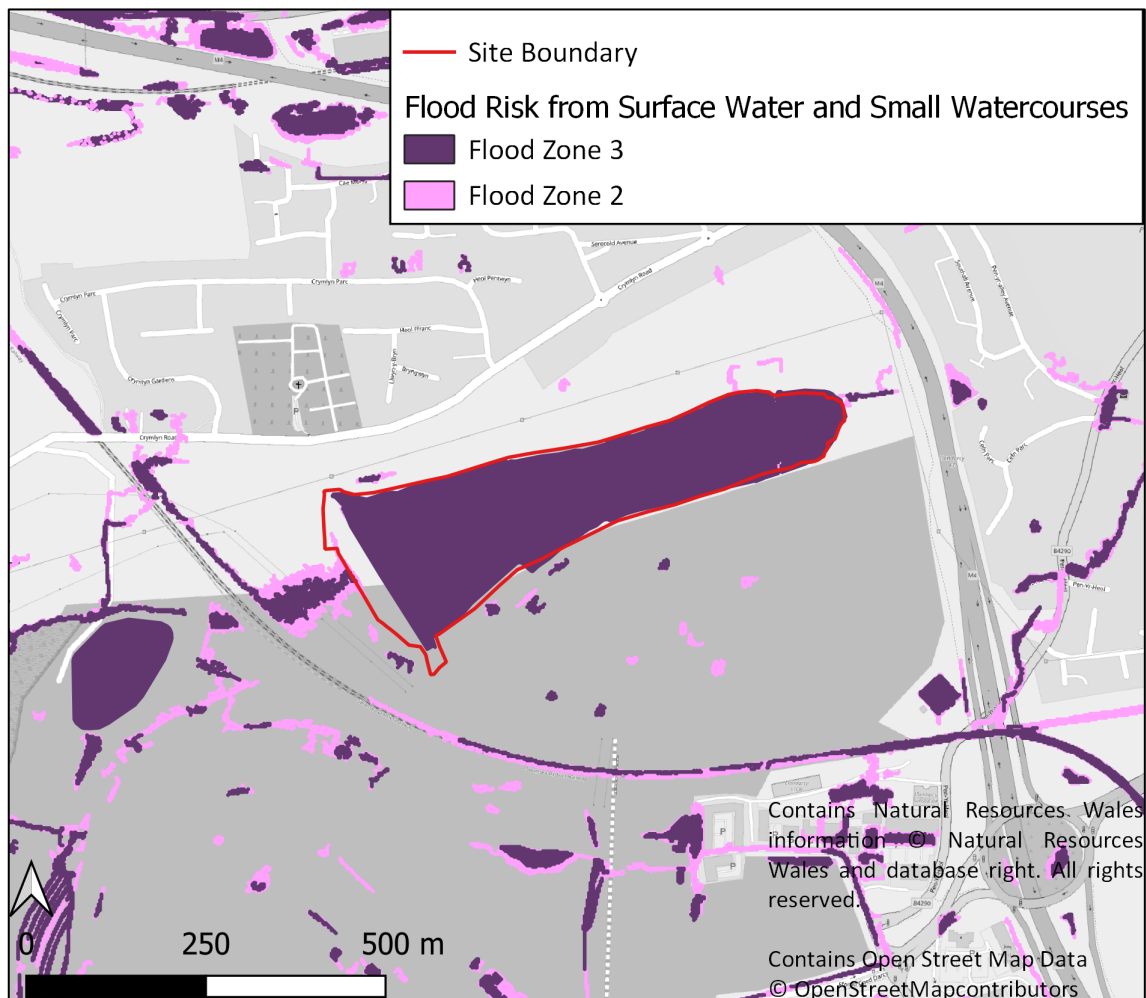


Figure 5-3: NRW Flood Map for Planning Surface Water and Small Watercourses Mapping Extract

5.4.5 It is proposed that the NSR will be discontinued to enable the restoration of the historic watercourse. Surface water flows will continue to be conveyed westerly, from the M4 motorway (east) to the Crymlyn Bog in the south-west, as they did before the NSR was constructed.

5.4.6 Given this, potential flood risk from surface water may be considered to be low.

5.5 Groundwater Sources

5.5.1 Groundwater flooding is typically caused by high groundwater levels. It occurs where excess water emerges at the ground surface via springs or within manmade structures such as basements. The

risk of groundwater flooding depends on the nature of the geological strata underlying the Site, as well as on the local topography.

- 5.5.2 Section 6.5 of the NPR Preliminary Flood Risk Assessment (PFRA) (2011) States *“There is no local information available which provides evidence on future groundwater flood risk in NPT and overall groundwater is not believed to be a major source of flooding in the County”*.
- 5.5.3 Figure 6.2 of the PFRA identifies that the Site is located in an area that is at $\geq 25\%$ to $< 50\%$ Susceptible to groundwater flooding.
- 5.5.4 The BGS Geoindex identifies the nearest borehole to the Site to be SS79NW171, situated to the east of the NSR near the M4 motorway. The borehole was dug to approximately 4.1m below ground level and shows seepage of water and oil at approximately 1.9m below ground level.
- 5.5.5 Given this, potential flood risk from groundwater may be considered low.

5.6 Sewer Sources

- 5.6.1 As set out in Section 3.4, no surface water or foul water sewers are situated within the Site boundary. Surface water, foul water and combined sewers are situated to the north and south of the Site, serving existing residential development.
- 5.6.2 The Neath Port Talbot Preliminary Flood Risk Assessment (2011) does not identify any records of sewer flooding within the vicinity of the Site.
- 5.6.3 Given this, the Site may be considered to be at low risk of potential sewer flooding.

5.7 Sources of Reservoir Failure

- 5.7.1 NRW state the following with regard to reservoir flood risk⁵:

“Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in Wales, we ensure that reservoirs are inspected regularly, and essential safety work is carried out. The reservoir flood maps do not indicate any likelihood of a flood occurring”.

⁵ <https://naturalresources.wales/flooding/managing-flood-risk/flood-risk-map-guidance/risk-of-flooding-from-reservoirs/?lang=en>

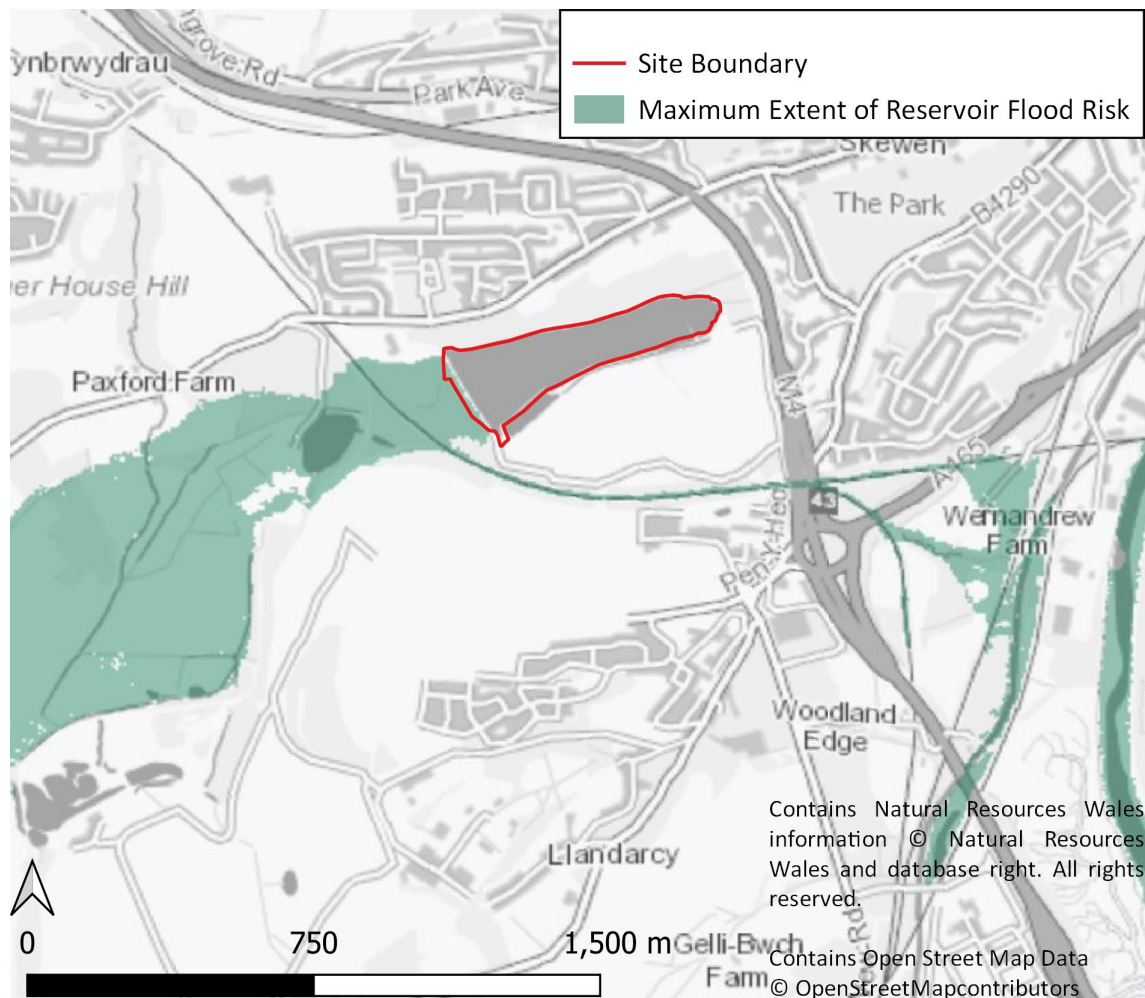


Figure 5-4: Long-Term Flood Map for Planning - Flood Risk from Reservoirs Mapping Extract

5.7.2 Figure 5-4 shows the maximum extent of reservoir flood risk associated with the NSR which is to be discontinued and is being drawn down. This reservoir flood risk mapping is therefore no longer considered to be an accurate representation of the current potential flood risk from the NSR and will be removed in its entirety following the discontinuance of the NSR.

5.7.3 Given this, potential flood risk from reservoir failure may be considered to be low.

5.8 Canal Sources

- 5.8.1 The nearest canal is the Tennant Canal which runs approximately 1km east of the Site. The topography within the vicinity of the Tennant Canal falls from west to east towards the River Neath and away from the Site.
- 5.8.2 Given this, potential flood risk from canals may be considered to be low.



6 Conclusion & Recommendations

6.1 Conclusion

- 6.1.1 PJA has been commissioned by St Modwen Developments Ltd to prepare a Flood Consequence Assessment (FCA) for the discontinuance of the North Site Reservoir (NSR) and restoration of a historic watercourse at *Coed Darcy, Llandarcy*.
- 6.1.2 The Site lies to the west of Junction 43 of the M4 Motorway and to the north-east of the Crymlyn Bog.
- 6.1.3 This FCA has been undertaken in accordance with current national and local flood risk policy requirements and concludes that the Site is considered to be at either very low or low risk of flooding from the sources assessed (fluvial, tidal, reservoirs, canals, surface water, groundwater and sewers).



Appendix A Topographic Survey

Rev	Date	Amendments	
 PRECISION LAND SURVEYS LTD 3 Killians Close Taunton Somerset TA1 3LD Tel: 01544295666 E-Mail: info@precisionlandsurveys.co.uk			
CLIENT:			
ST MODWEN DEVELOPMENTS LTD			
PARK POINT, 17 HIGH STREET NORTHBRIDGE, BIRMINGHAM			
TITLE:			
TOPOGRAPHICAL SURVEY NORTH RESERVOIR			
COED DARCY, SKEWEN, NEATH			
Drawing Number:		Revision:	
LST20060 - TS01		-	
Scale:	Survey Date:	Sheet:	
1:200	05-11-20	1 of 2	
Drawn:	Checked:		
JWH	PLS		

