ferr www.jbaconsulting.com

Cardiff Council Strategic Flood Consequences Assessment - Former Gas Works Ferry Road (16)

Version 1

Prepared for
Cardiff Council

Date
May 2026

Document Status

Issue date	May 2026
Issued to	Cardiff Council
BIM reference	RSX-JBA-XX-XX-RP-HM-0016-S3-P01-Former_Gas_Works_Ferry_Road
Revision	S3-P01
Prepared by	Bethany Adams (BSc Hons) Assistant Analyst
Reviewed by	Faye Tomalin BSc (Hons) MSc MCIWEM C.WEM Principal Consultant
Authorised by	Charlotte Lickman BSc (Hons) PG Cert MCIWEM C.WEM Project Manager

Carbon Footprint

The format of this report is optimised for reading digitally in pdf format. Paper consumption produces substantial carbon emissions and other environmental impacts through the extraction, production and transportation of paper. Printing also generates emissions and impacts from the manufacture of printers and inks and from the energy used to power a printer. Please consider the environment before printing.

Accessibility

JBA aims to align with governmental guidelines on accessible documents and WGAG 2.2 AA standards, so that most people can read this document without having to employ special adaptation measures. This document is also optimised for use with assistive technology, such as screen reading software.

Contract

JBA Project Manager	Charlotte Lickman
Address	8 High Street, Kings Chambers, Newport, NP20 1FQ
JBA Project Code	2026s0106

This report describes work commissioned by Cardiff Council, by an instruction dated 23/01/2026. The Client's representative for the contract was Stuart Williams of Cardiff Council. Bethany of JBA Consulting carried out this work.

Purpose and Disclaimer

Jeremy Benn Associates Limited ("JBA") has prepared this Report for the sole use of Cardiff Council and its appointed agents in accordance with the Agreement under which our services were performed.

JBA has no liability for any use that is made of this Report except to Cardiff Council for the purposes for which it was originally commissioned and prepared.

No other warranty, expressed or implied, is made as to the professional advice included in this Report or any other services provided by JBA. This Report cannot be relied upon by any other party without the prior and express written agreement of JBA.

JBA disclaims any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to JBA's attention after the date of the Report.

The methodology adopted and the sources of information used by JBA in providing its services are outlined in this Report. The work described in this Report was undertaken between January and May 2026 and is based on the conditions encountered and the information available during the said period. The scope of this Report and the services are accordingly factually limited by these circumstances.

The conclusions and recommendations contained in this Report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by JBA has not been independently verified by JBA, unless otherwise stated in the Report.

Copyright

Contents

List of Figures

List of Tables

1 Introduction

JBA Consulting has been commissioned by Cardiff Council to prepare an independent Flood Risk Appraisal as part of a Stage 2 Strategic Flood Consequences Assessment (SFCA) for sites considered for allocation in its Replacement Local Development Plan.

This assessment will evaluate the risk of flooding from all sources to 'Former Gas Works, Ferry Road', the proposed development site, as well as the appropriateness of development at the site in accordance with Welsh Government policy, as outlined in Technical Advice Note 15 (TAN-15). Furthermore, recommendations will be provided, where appropriate, to mitigate the risk of flooding at the proposed development site as well as recommendations for further works.

2 Site Description

The key characteristics of the site are summarised in Table 2-1 and the location and site boundary are shown in Figure 2-1.

Table 2-1 Site Summary

Site name	Former Gas Works, Ferry Road
Site ID	16
Site area (ha)	9.95
Existing land use	Brownfield land
OS NGR	ST 17357 74125
Access location	Ffordd y Rhaffau, connected to Ferry Road

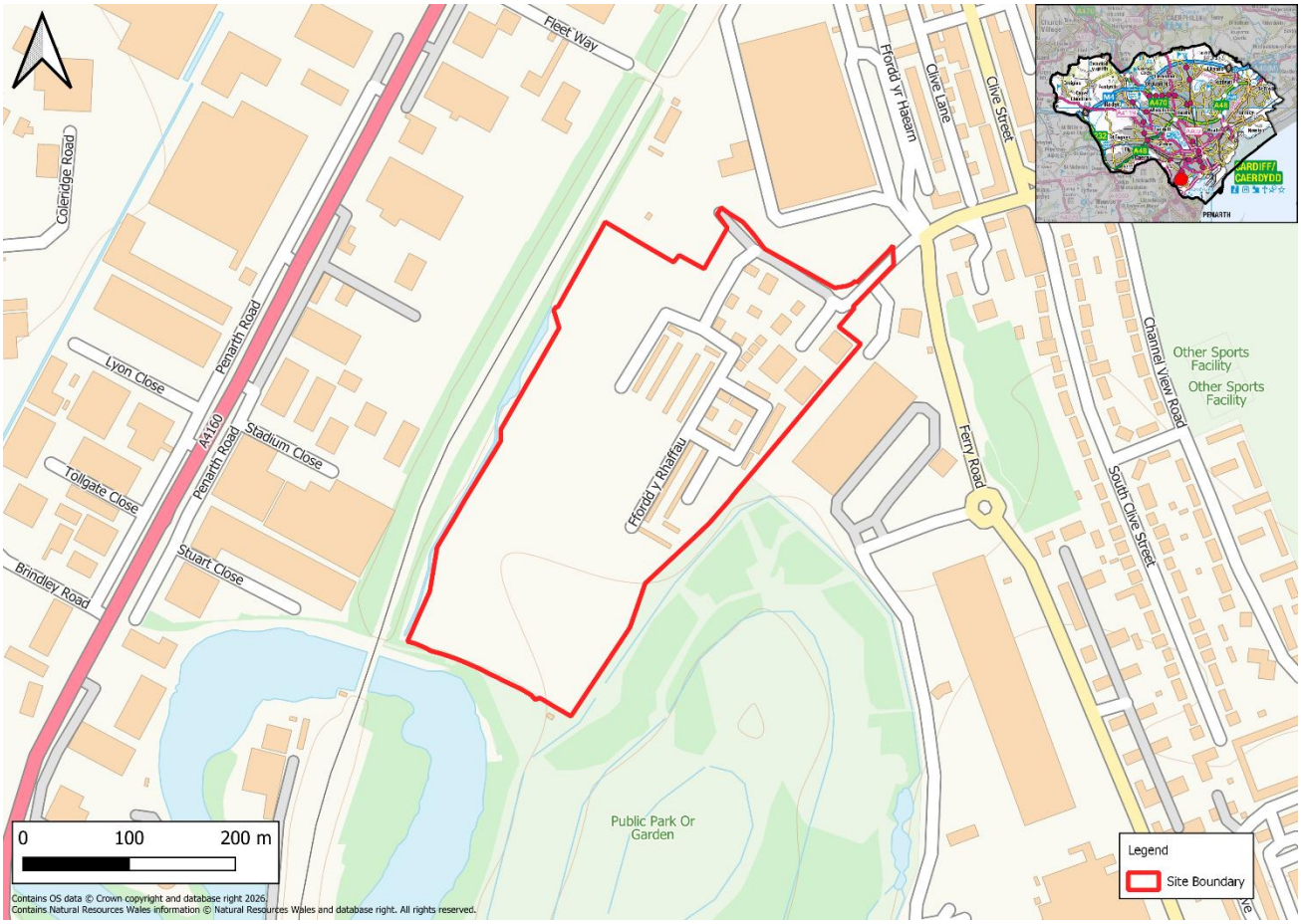


Figure 2-1: Proposed development site

2.1 Development proposals

The proposals at this site are for residential development and is classified as a Highly Vulnerable Development. The site is located on brownfield land, formerly used as a gas works. The gas works has since been cleared and currently sites modular homes.

No proposed site layout has been provided to inform this appraisal.

2.2 Topography

The Natural Resources Wales (NRW) Open Source 1m Light Detection and Ranging (LiDAR) data[1] across the site has been reviewed and is shown in Figure 2-2.

Levels across the site generally fall in a northerly direction. The highest ground level is 9.85mAOD, located in the south-western part of the site. The lowest ground level of 7.01mAOD is found in the north of the site along Ferry Road.

There are several isolated areas of raised ground and topographic depressions within the site, likely a remnant of the site's former usage as a gas works and landfill site.

1 https://datamap.gov.wales/maps/lidar-data-download/

Within the wider vicinity of the site, there are two areas of raised ground to the west and east of the site. The western site boundary is adjacent to a railway embankment for the Vale of Glamorgan railway line, with an average height of over 13.5mAOD. Grangemoor Park, adjacent to the eastern site boundary, rises approximately 20m higher than the maximum elevation within the site.

Along the Ffordd y Rhaffau access road, ground levels slope in an easterly direction, with the lowest ground level shown at 7.42mAOD. Ffordd y Rhaffau provides a direct connection to Ferry Road.

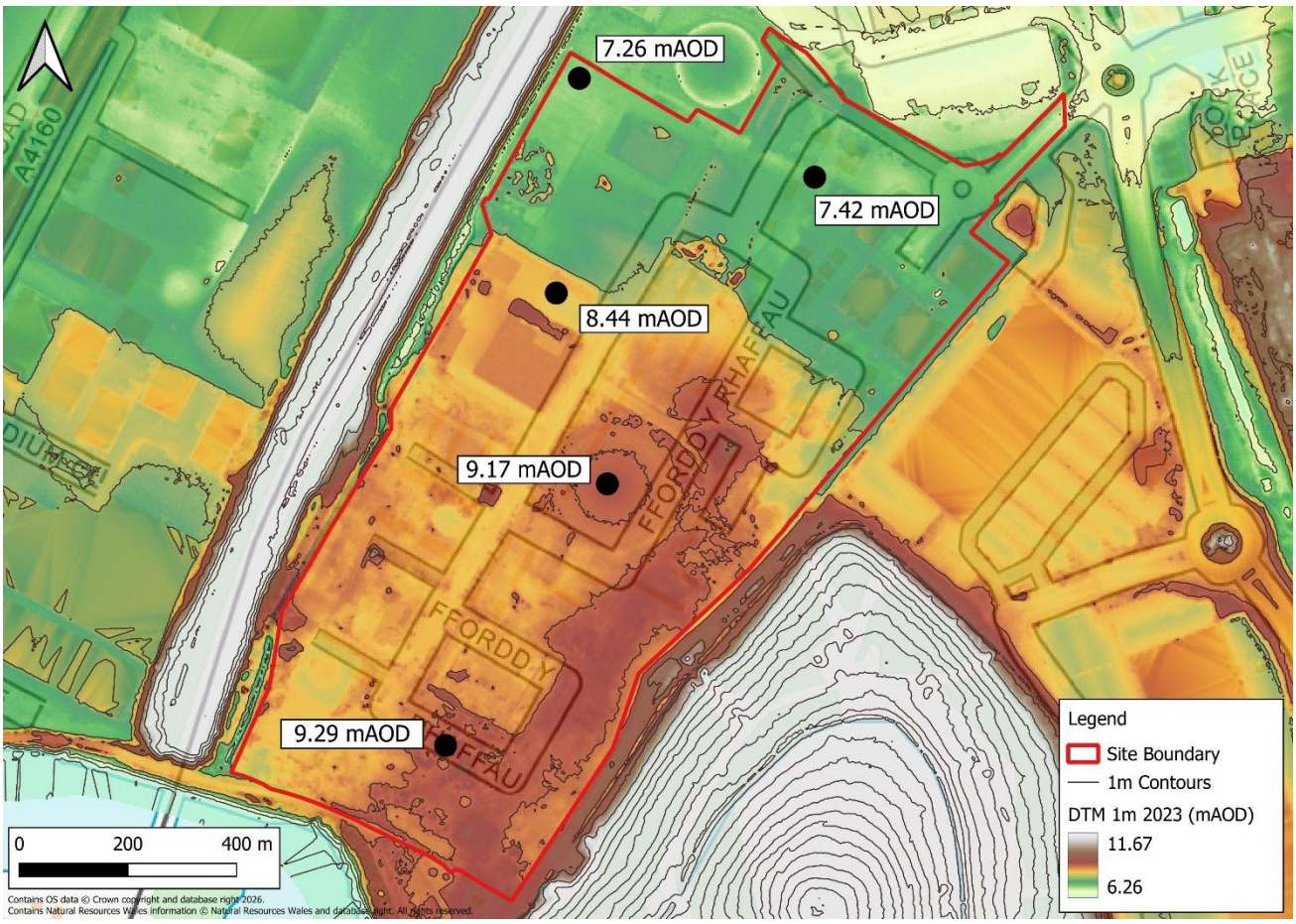


Figure 2-2: 1m Lidar

2.3 Watercourses and Flood Defences

Figure 2-3 shows the locations of the nearest NRW Main Rivers and ordinary watercourses to the site.

The River Ely flows in a south-easterly direction approximately 15m south of the site. Additionally, the River Taff flows in a southerly direction approximately 580m east of the site. Both the River Ely and River Taff are designated as NRW Main Rivers and discharge into Cardiff Bay.

An unnamed drainage channel flows in a south-westerly direction along the western site boundary. An additional drainage channel flows adjacent to the eastern site boundary within Grangemoor Park. These drainage channels are likely culverted beneath the footpath to the south of the site, before discharging into the River Ely.

The site partially benefits from both fluvial and coastal flood defences. To the north and north-east of the site, a number of NRW-designated fluvial flood defences run along the River Taff, including embankments, high ground and a flood defence wall. The site is also protected by the Cardiff Bay Tidal Barrage, located approximately 2.15km south-east of the site. The Barrage creates a 2km^2 freshwater waterbody, protecting the bay and central areas of Cardiff from tidal flooding.

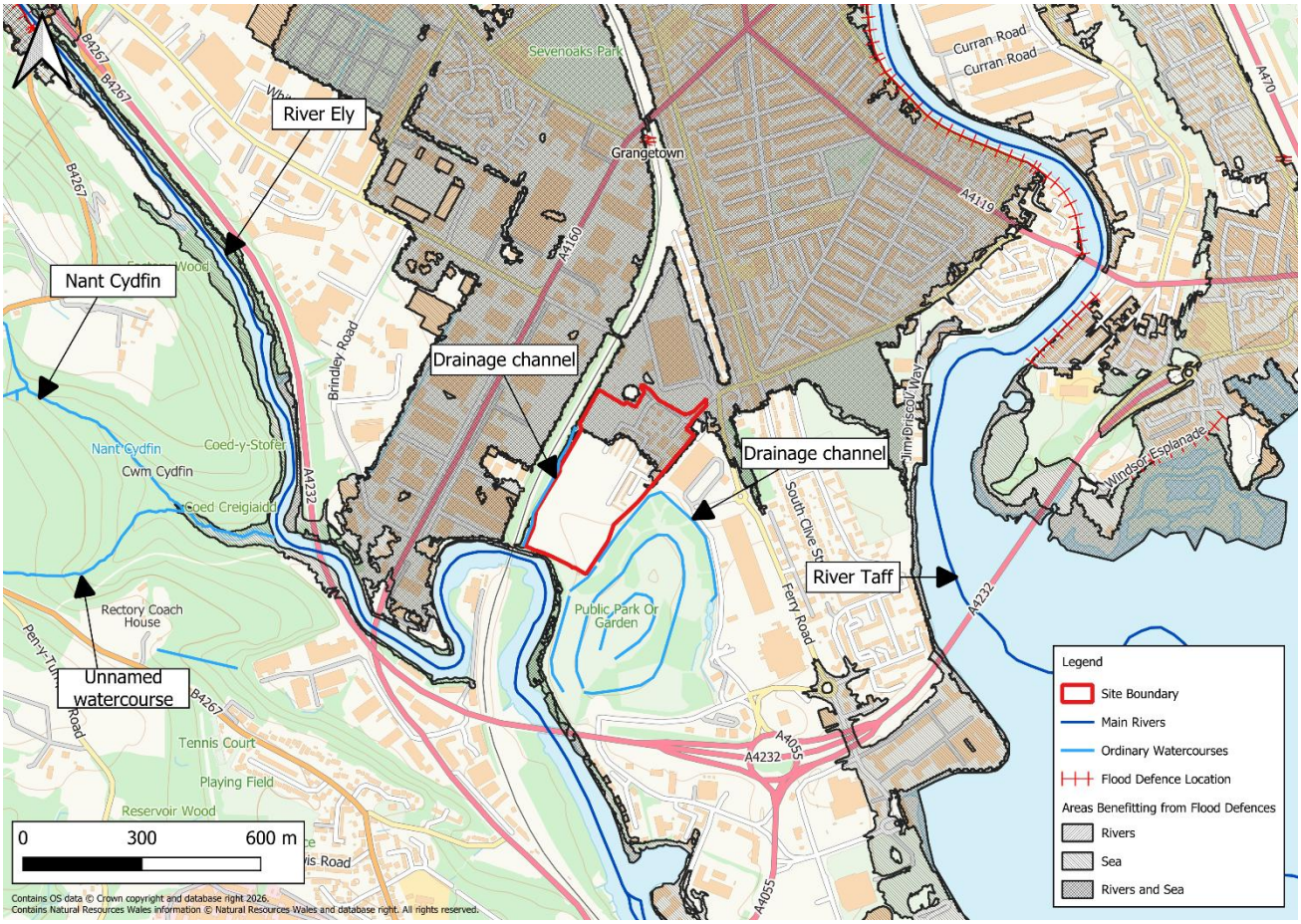


Figure 2-3: Watercourses and Defences

3 Planning Policy and Flood Risk

TAN-15 provides a framework within which flood risk arising from rivers, the sea and surface water can be assessed. TAN-15 adopts a risk-based approach, which emphasises the ability to avoid or minimise risk depending on the type of development proposed.

The following table identifies the form of development, vulnerability classification and Flood Map for Planning classification (as defined in TAN-15) for the proposed development site.

Table 3-1 TAN-15 Development Classification Summary

TAN-15 Classification	Classification
Development Proposal	Residential
Form of Development	Redevelopment
Vulnerability Classification	Highly Vulnerable
Flood Map for Planning - Rivers	Flood Zones 2 and 3 (Figure 3-1)
Flood Map for Planning - Sea	Flood Zones 2 and 3 (Figure 3-2)
Flood Map for Planning - Surface Water and Small Watercourses	Flood Zones 2 and 3 (Figure 3-3)

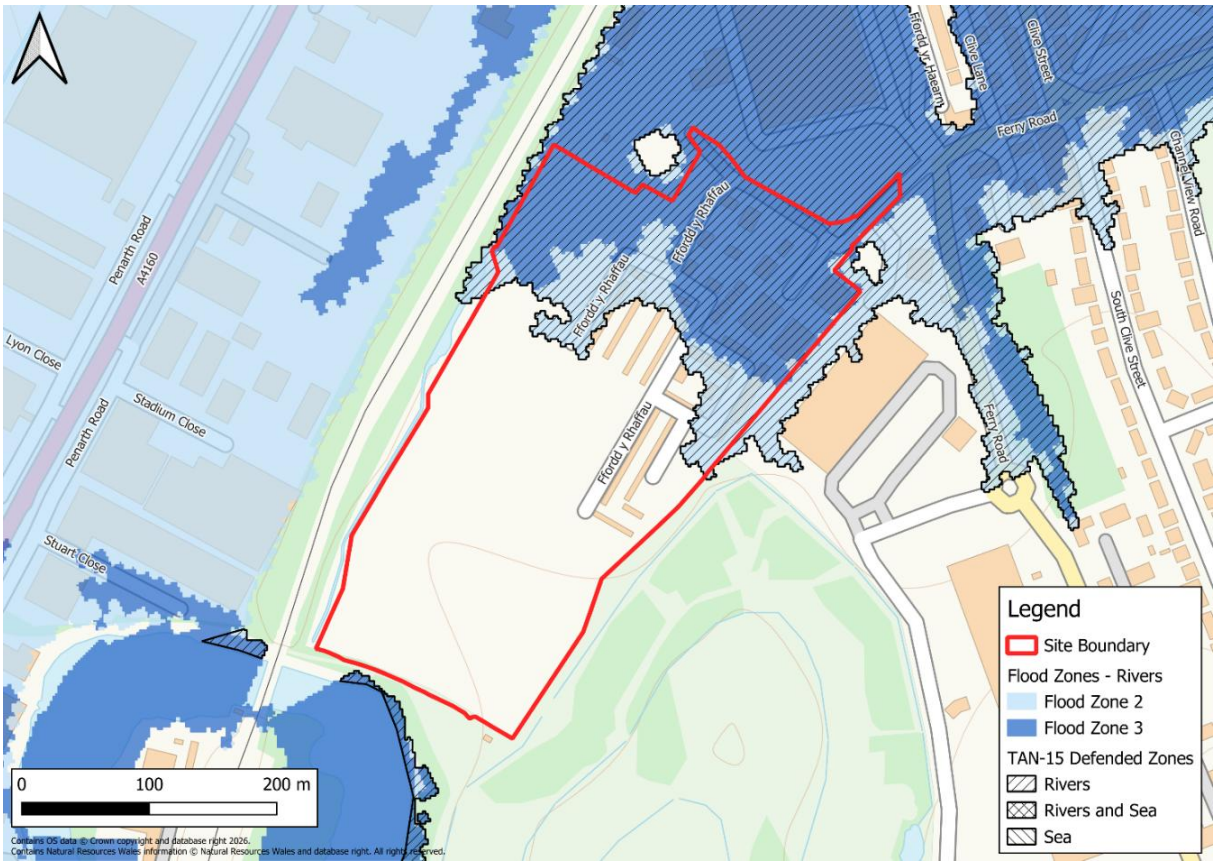


Figure 3-1: Flood Map for Planning - Rivers

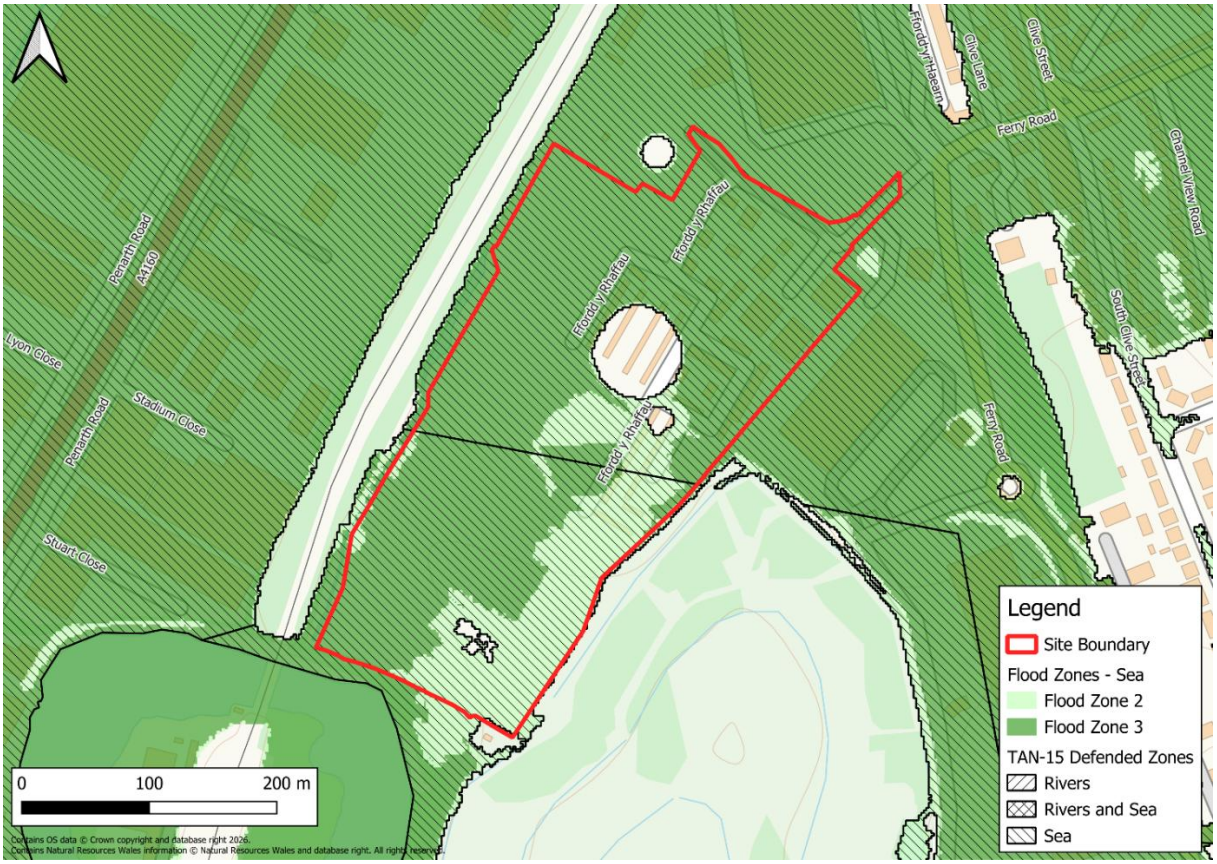


Figure 3-2: Flood Map for Planning - Sea

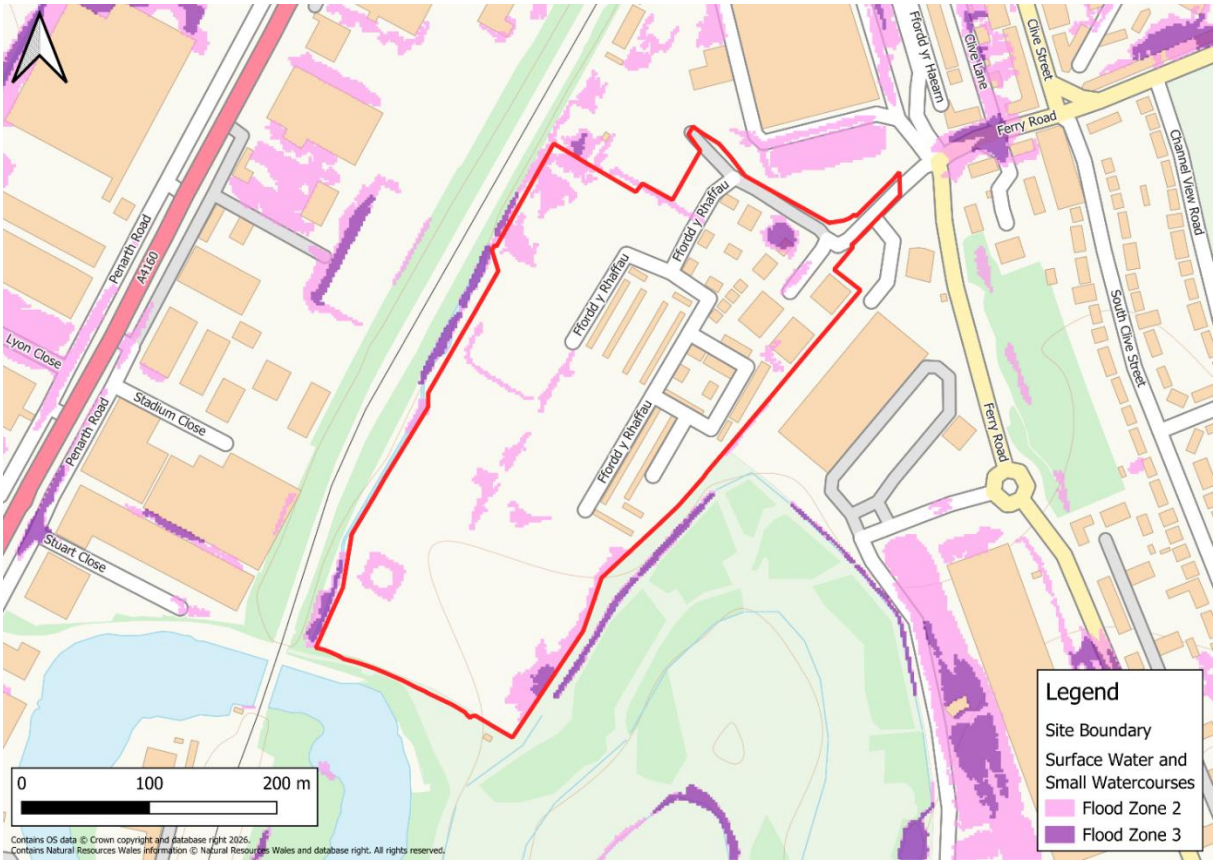


Figure 3-3: Flood Map for Planning - Surface Water and Small Watercourses

4 Assessment of Flood Risk

The latest available information on flood risk at the site, published by Natural Resources Wales (NRW) and datasets used in the SFCA is summarised in Table 4-1 below.

Table 4-1 Summary of Flood Risk

Source of Flooding	Onsite Presence	Description
Flood Risk from Rivers	✓	The site's partial location within the TAN-15 Defended Zone of the FMfP for Rivers indicates that the site is at a **moderate to high** risk of flooding from this source. **Fluvial flood risk is further assessed in Section 4-1**.
Flood Risk from the Sea	✓	The site's location within the TAN-15 Defended Zone indicates that the site is at a **low** risk of flooding from this source. **Tidal flood risk is further assessed in Section 4-2**.
Flood Risk from Surface Water and Small Watercourses	✓	The site's partial location within Flood Zones 2 and 3 of the FMfP for Surface Water and Small Watercourses indicates that the site is predominantly at very low risk, with isolated areas at a **moderate to high** risk of flooding from this source. **Surface Water and Small Watercourse flood risk is further assessed in Section 4-3**.
Flood Risk from Groundwater	×	JBA's Groundwater risk of emergence map shows that the site is located in an area of 'Very Low' risk of groundwater emergence.
Flood Risk from Reservoirs	✓	The NRW Flood Map for Planning shows that the site is located in an area at risk of reservoir flooding. **Reservoir flood risk is further assessed in Section 4-4**.
Flood Risk from Sewers	×	The Cardiff SFCA has identified there to be no historic sewer flood incidents within the Grangetown electoral ward. Therefore, it is concluded that the risk of flooding is **low.**

4.1 Flood Risk from Rivers

4.1.1 Baseline flood risk

The Flood Map for Planning - Flood Risk from Rivers (Figure 3-1) indicates that the northern extent of the development site is located within the TAN-15 Defended Zone.

The proposed development site is located within an area covered by the River Taff and Ely hydraulic model. The baseline model was initially prepared by Mott MacDonald in 2013 and has been updated by JBA for a series of site-specific assessments, most recently in 2024.

Figure 4-1 shows that the site is predicted to be flood free during the 1% AEP plus climate change event. During this event, floodwater is generally confined within the banks of the River Ely and River Taff.

During the 0.1% AEP plus climate change event, the northern extent of the site is predicted to flood, as illustrated in Figure 4-2. The source of fluvial flooding is the River Taff overtopping its banks north of the South Wales railway line in Cardiff City Centre. Flood water flows towards the site from a northerly direction. The River Ely to the south of the site largely remains in bank during this scenario.

In the extreme event, flood depths reach a maximum of 1.32m. The highest depths correspond to the areas of lower topography in the north of the site, particularly along the Ferry Road access. Access and egress during the extreme scenario should be carefully considered to facilitate flood free movements in the event of a flood. The maximum water level on site during this scenario is 8.46mAOD.

The southern extent of the site remains flood free during all events.

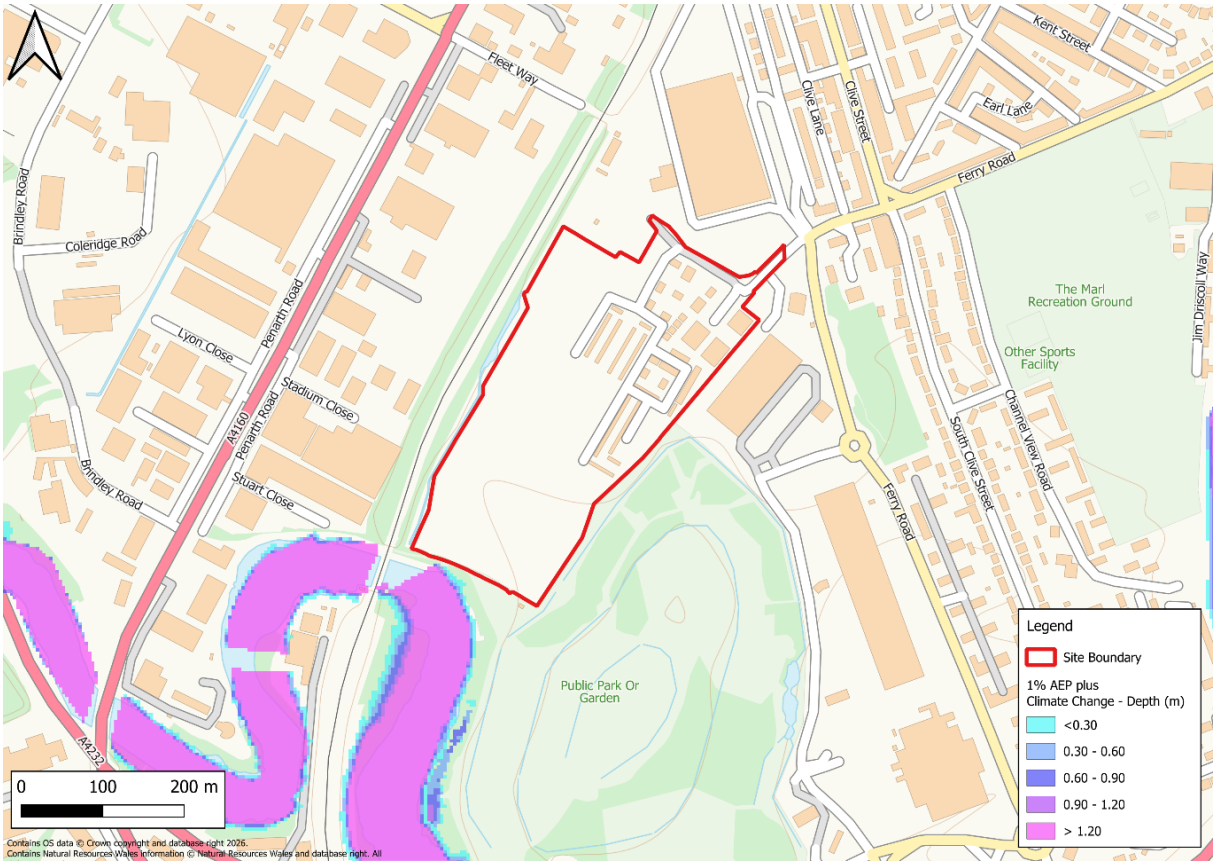


Figure 4-1: 1% AEP plus Climate Change - Flood depths - River Taff and Ely Model

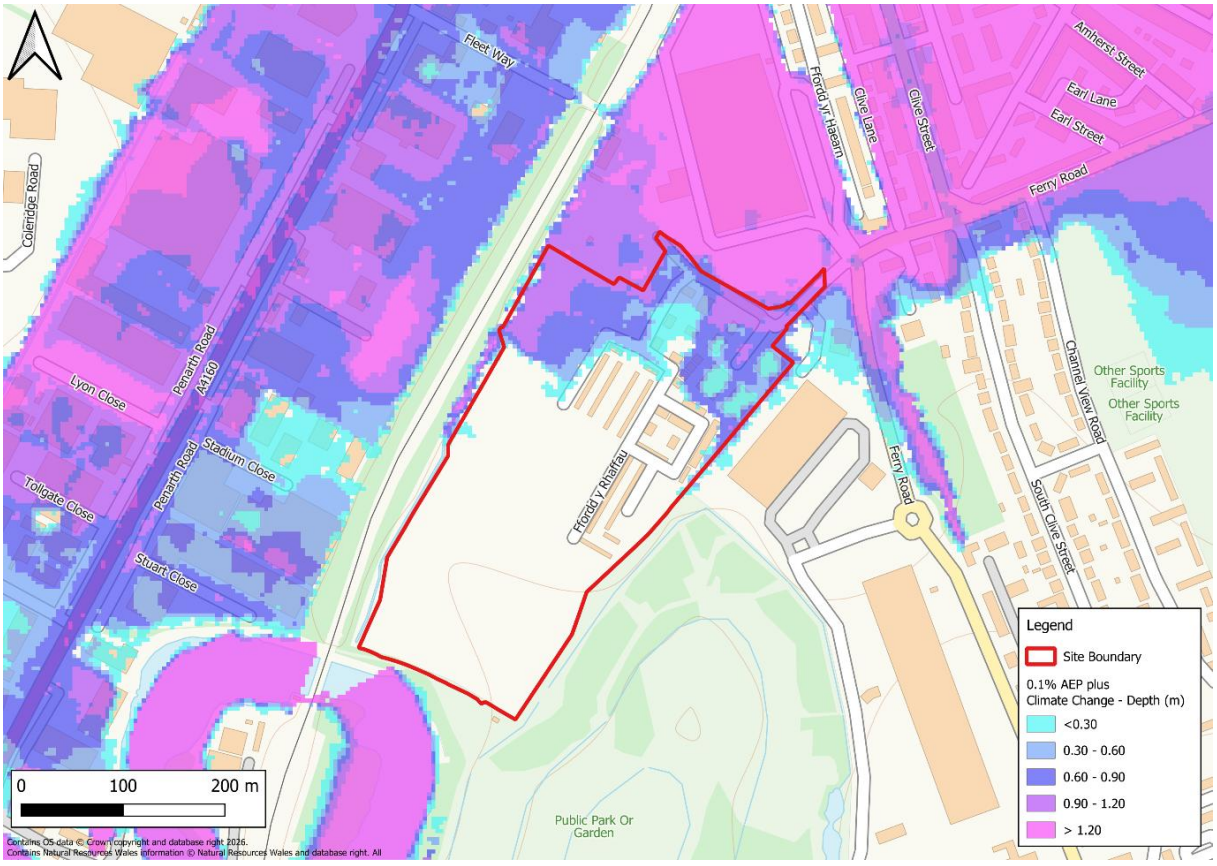


Figure 4-2: 0.1% AEP plus Climate Change - Flood depths - River Taff and Ely Model

4.1.2 Breach flood risk

As the site currently benefits from being in a TAN-15 Defended Zone, breach modelling has been undertaken in accordance with Section 10.26 of TAN-15 to consider the residual risk of failure in the NRW flood defences.

To understand the residual risk of breaching the fluvial defences on the banks of the River Taff, three breach locations have been assessed. These have been modelled separately, and these locations were chosen as the model results identified that these are some of the first defence locations that are susceptible to overtopping and therefore may be most prone to failure. The breach locations have been discussed and agreed with NRW to inform this site appraisal. The breach locations are shown in Figure 4-3.

The model results demonstrate that for all 3 breach scenarios, the site and access road remain flood-free during the 1% AEP plus climate change event and have therefore not been presented graphically.

Figure 4-4 shows the peak flood depths for the Breach 1 0.1% AEP plus climate change scenario. Breach 1 is located on the left bank of the River Taff, approximately 4.3km north of the site. The flood extent is broadly similar to the baseline scenario, with flooding confined to the northern extent of the site. Maximum flood depths decrease to 1.30m and the maximum water level on site decreases to 8.41mAOD. Breach 1 allows some flow to be diverted onto the left bank of the River Taff, increasing flooding within the Gabalfa district of Cardiff. Therefore, the volume of water overtopping the right bank and propagating towards the site is marginally reduced, leading to slightly lower peak water levels at the site compared to the baseline scenario.

Maximum flood depths for the Breach 2 0.1% AEP plus climate change scenario is presented in Figure 4-5. Breach 2 is located on the right bank of the River Taff, approximately 4.0km north of the site. Flooding occurs in the north of the site to a maximum depth of 1.31m, while the southern extent remains flood-free. The maximum water level on site during this scenario is 8.46mAOD.

Figure 4-6 shows the peak flood depths for the Breach 3 scenario during the 0.1% AEP plus climate change event. Breach 3 is located on the right bank of the River Taff, approximately 2.9km north of the site. The results are similar to the Breach 2 scenario, with peak flood depths reaching 1.35m and a maximum flood level of 8.46mAOD.

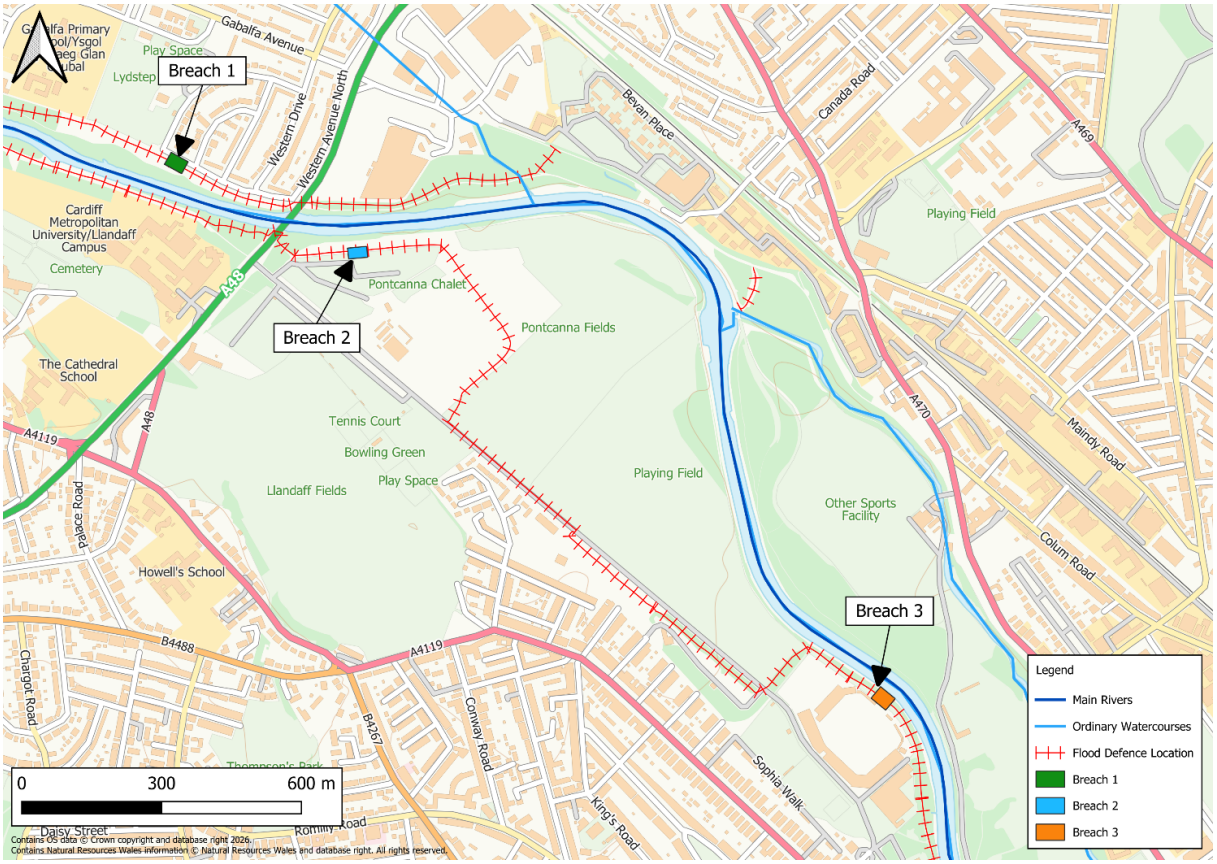


Figure 4-3: River Taff and Ely model breach locations

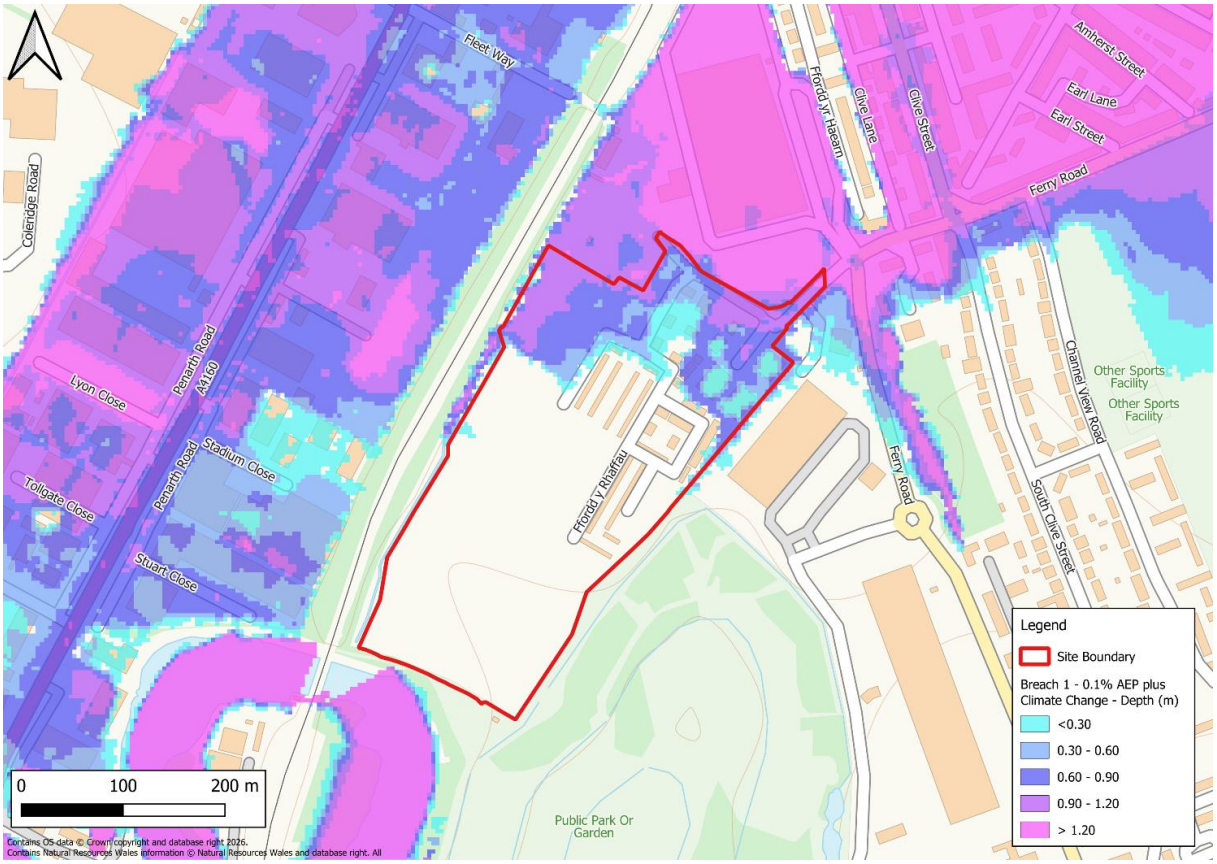


Figure 4-4: Breach 1 0.1% AEP plus Climate Change event

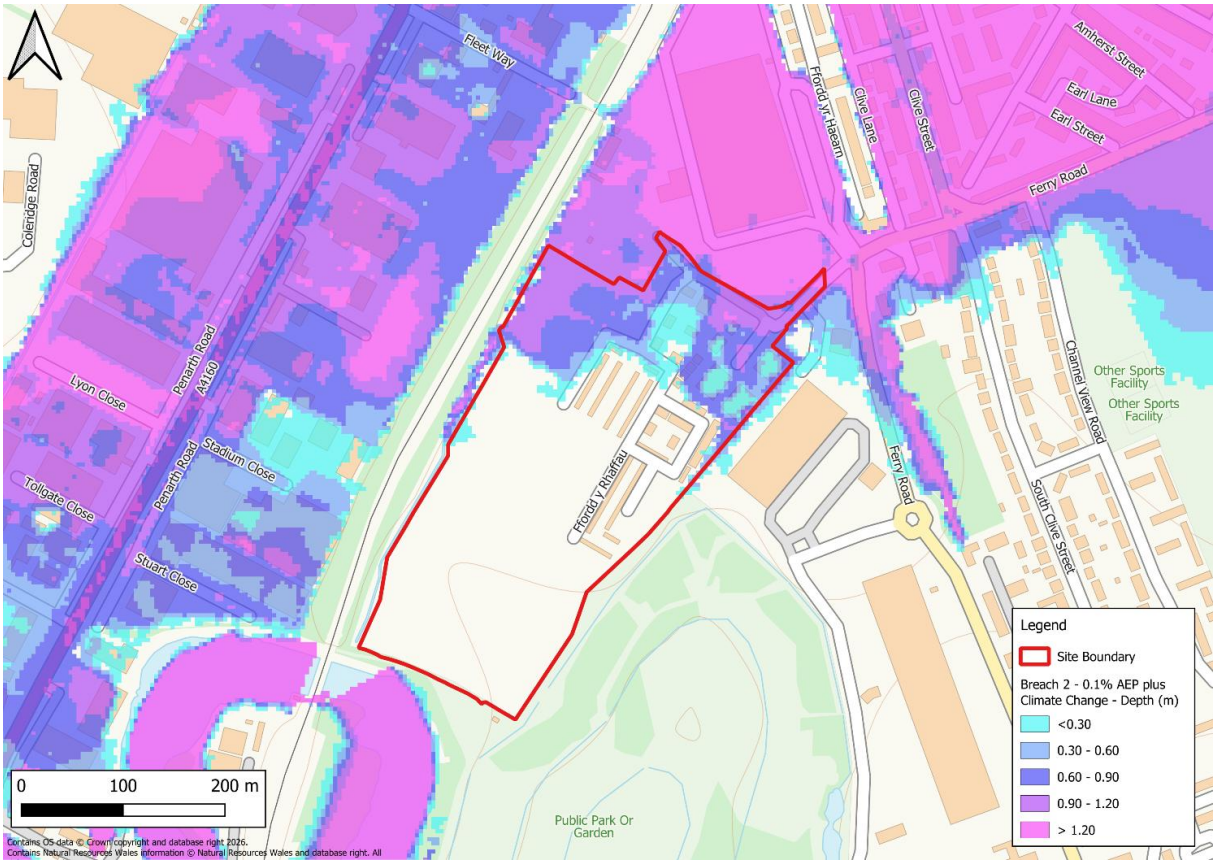


Figure 4-5: Breach 2 0.1% AEP plus Climate Change event

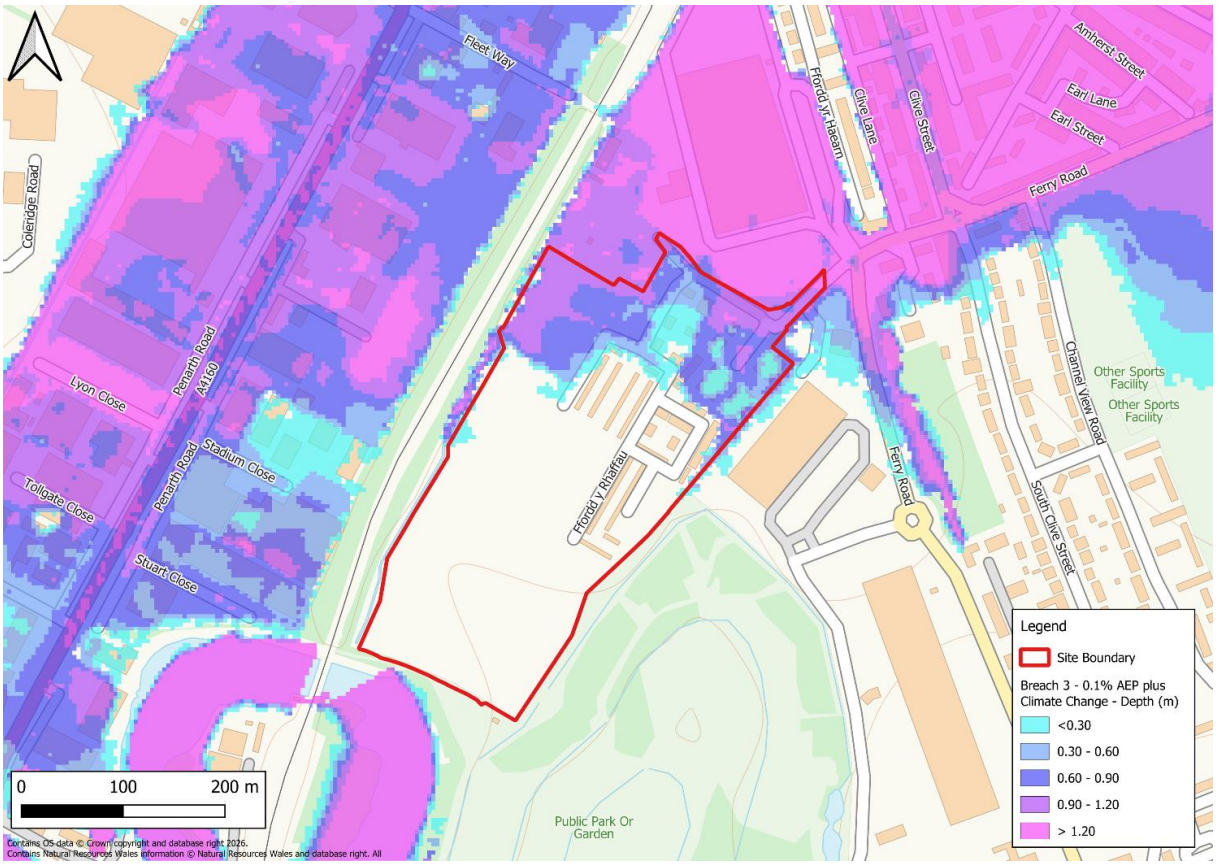


Figure 4-6: Breach 3 0.1% AEP plus Climate Change event

4.2 Flood Risk from the Sea

The Flood Map for Planning - Flood Risk from the Sea (Figure 3-2) indicates that the development site is located within the TAN-15 Defended Zone for the Sea and Flood Zone 3. The site is located within a TAN-15 Defended Zone due to the area being protected from the Cardiff Bay tidal barrage, as detailed in Section 2.3. The Cardiff Bay Barrage provides substantial tidal protection to Cardiff with a standard of protection greater than that required to protect against the 0.1% AEP plus climate change event. As such no further assessment is considered necessary and the tidal flood risk to the site is concluded to be very low.

4.3 Flood Risk from Surface Water

The Flood Map for Planning - Surface Water and Small Watercourses (Figure 3-3) indicates that the development site is predominantly located within Flood Zone 1, associated with a very low risk of flooding from surface water and small watercourses. Localised areas of the site are located within Flood Zones 2 and 3, associated with isolated topographic depressions.

In the absence of detailed hydraulic modelling of the site, the NRW National Flood Hazard Mapping (NFHM) has been used to provide a further assessment of surface water and small watercourse flood risk to the site. The NFHM is used to define the FMfP surface water and small watercourses Flood Zones, but inspection of the NFHM data provides additional information on flood depth, velocities and hazard, and provides greater insight into the mechanisms and accuracy of the flood mapping.

During the 1% AEP plus climate change event, there are two isolated areas of surface water ponding within the site, illustrated in Figure 4-7. The deepest area of ponding is found in the north of the site, reaching a maximum depth of 277mm during this event. A shallow area of ponding is also shown along the south-eastern boundary, reaching 205mm.

During the 0.1% AEP plus climate change event, additional areas of surface water ponding are shown within topographic depressions and adjacent to the unnamed drainage channels (Figure 4-8). However, flooding is generally shallow, reaching a maximum of 344mm.

As surface water flood risk is relatively minor, it is considered that areas of ponding can be adequately managed through the implementation of Sustainable Drainage Systems (SuDS). The existing drainage channels along the western and eastern site boundaries should be retained on site. This may provide opportunities for enhancement through placement of blue-green infrastructure and SuDS in the vicinity of the watercourses.

The main access and egress road is Ffordd y Rhaffau which is shown to be flood-free during the 1% AEP plus climate change event and is predicted to flood to shallow depths <200mm in the extreme event, viable for access for pedestrians and high-sided vehicles. Ffordd y Rhaffau provides a direct connection to Hendre Road. The western extent of Hendre Road is flood-free during the 1% AEP plus climate change event and is predicted to flood to shallow depths <160mm in the extreme event, viable for access for pedestrians and high-sided vehicles.

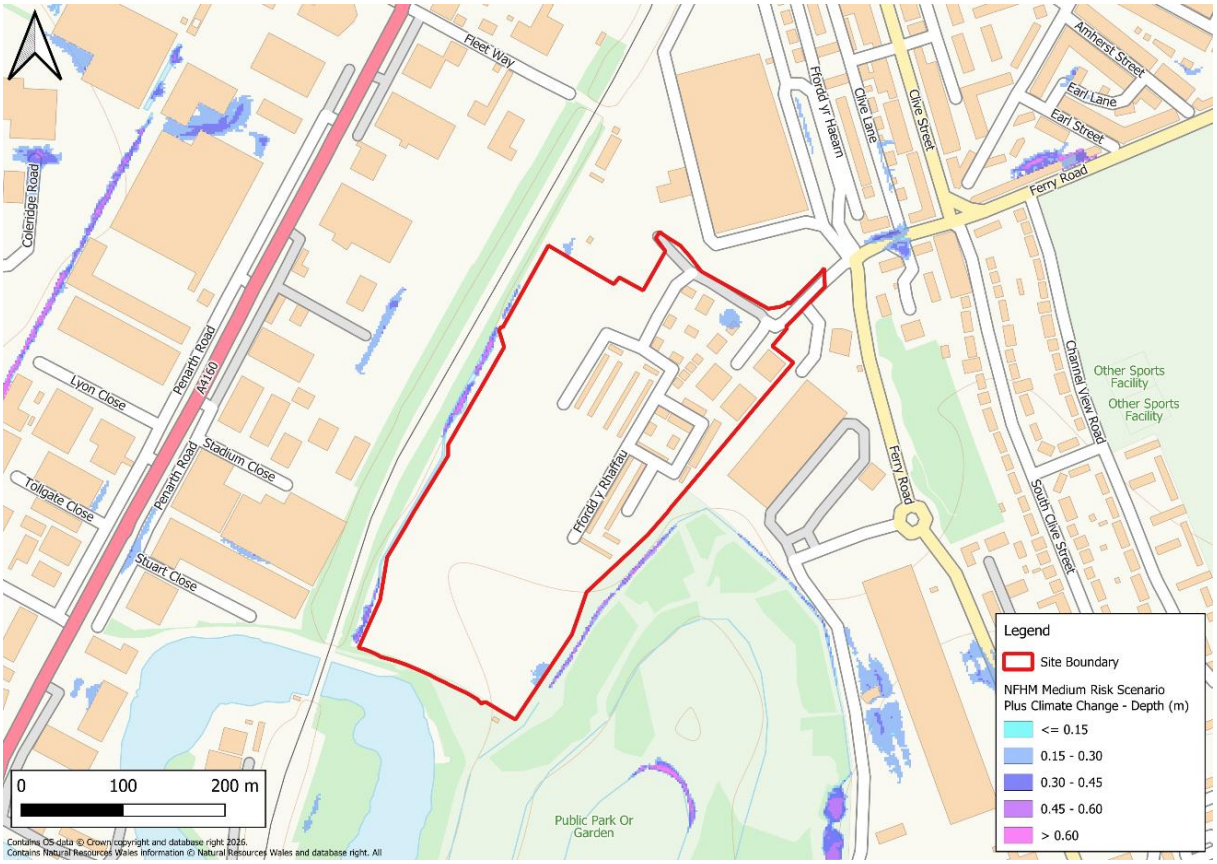


Figure 4-7: Flood Risk from Surface Water - 1% AEP + Climate Change - Flood depths

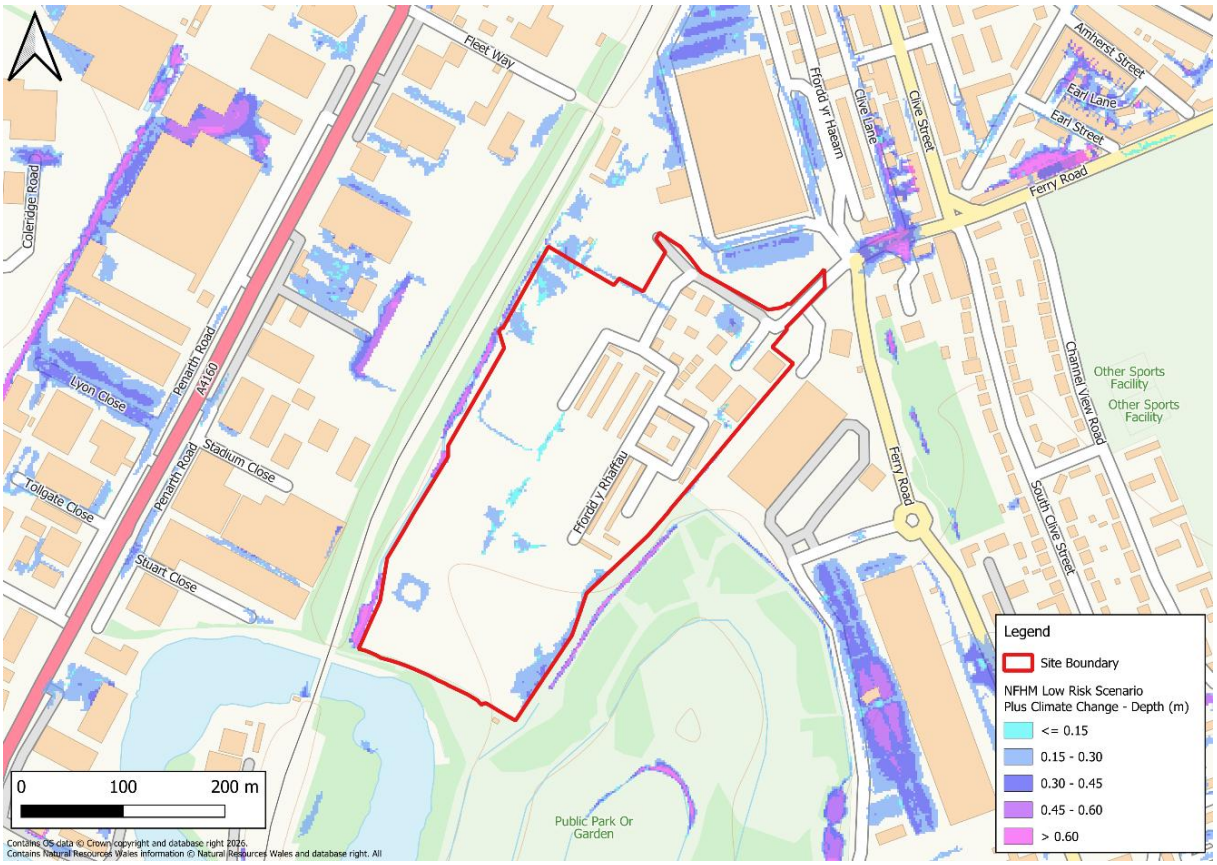


Figure 4-8: Flood Risk from Surface Water - 0.1% AEP + Climate Change - Flood depths

4.4 Flood Risk from Reservoirs

Figure 4-9 below shows the reservoir flood extent within the site. This indicates that the northern extent of the site is at risk of reservoir flooding from the Beacons, Cantref, Pontsticill and Llwyn-On reservoirs. Flood risk from the Pontsticill reservoir is shown to extend across the site, impacting most of the western extent.

However, the regulated nature of reservoir management means that a failure event is very unlikely. It should also be noted that reservoir failures are rare and there has been no loss of life in the UK from reservoir flooding since 1925.

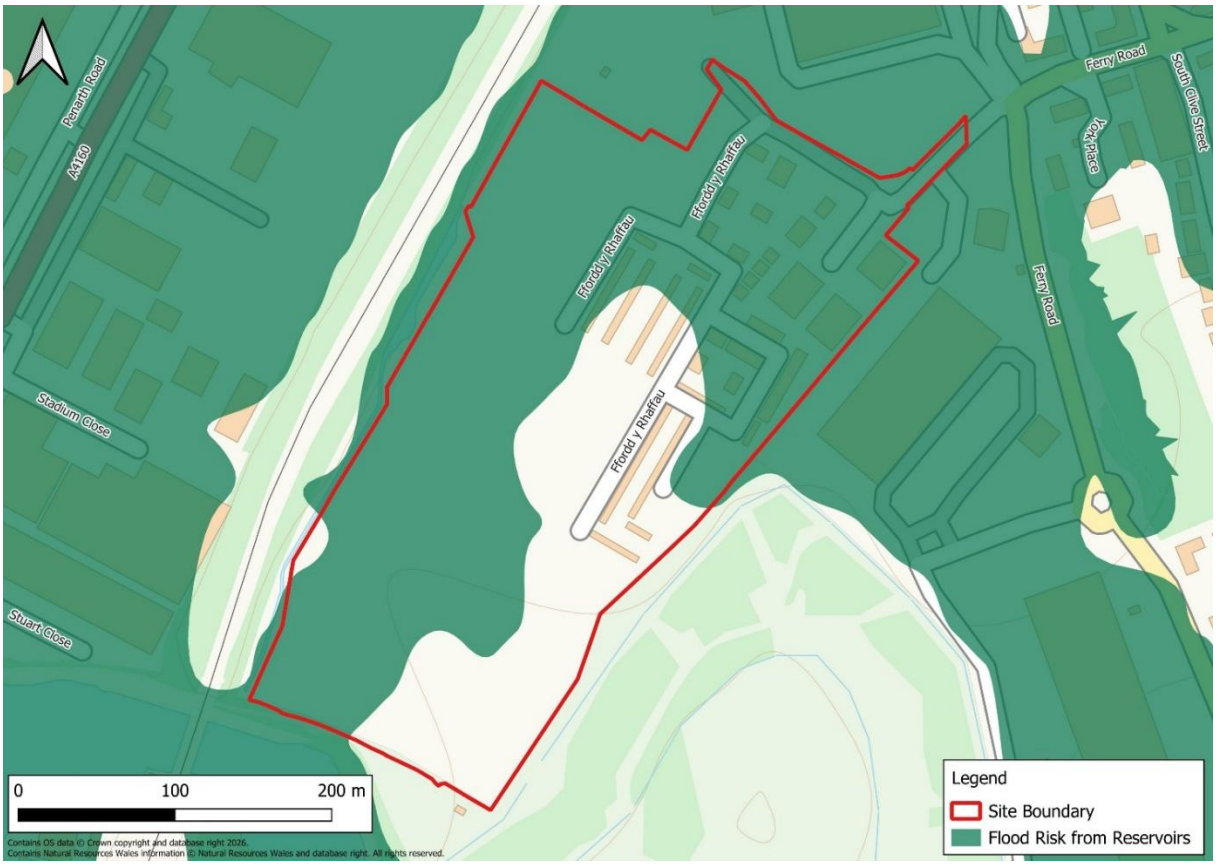


Figure 4-9: Reservoir flood extent

5 Application of Flood Zones to Development Management Decisions

5.1 Flood Risk from Rivers

When considering a site for development, Sections 10 and 11 of TAN-15 outline the requirements for the type of development permitted in any given flood zone.

The site is predominantly located in Flood Zone 1. All forms of development are permissible in Flood Zone 1. The northern extent of the site is located within the TAN-15 Defended Zone for Rivers.

The site is located on brownfield land and is therefore considered as redevelopment.

For a proposed redevelopment site within a TAN-15 Defended Zone, Section 10.17 of TAN15 states:

"On brownfield sites redevelopment proposals should not over intensify use neither should they reduce the area's ability to absorb flood water nor cause problems with flooding elsewhere. All applications should consider opportunities to incorporate flood resilient design as appropriate and any proposal involving highly vulnerable development must be compliant with the tolerable conditions set out in section 11."

Across the site, a sequential approach to development should be applied, locating the majority of built form development within Flood Zone 1, and the TAN-15 Defended Zone where tolerable depths of flooding can be achieved in the extreme event. This sequential approach to development is supported within Section 15.5 of TAN-15:

"Where a site falls into two or more flood zones the planning authority must make an assessment of the proposal, taking into account each of its proposed land uses, against each of the flood zones to which it applies, in accordance with the criteria requirements of this TAN."

Risks associated with fluvial flooding in the north of the site are significant for the most extreme event, exceeding indicative depths of acceptable flooding during the 0.1% AEP plus climate change breach and baseline scenarios. In accordance with TAN15 'redevelopment' proposals may be considered with more flexibility to meet the frequency thresholds and tolerable conditions of Figures 5 and 6. The site may therefore be considered more favourably given the site location, and the opportunities to increase the resilience of existing infrastructure in this area. Proposals should avoid an intensification of development or increase in risk across the site.

In order for the site to be deemed appropriate for residential purposes, mitigation measures are likely to be needed to be considered and supported by detailed flood modelling, presented in a site specific FCA for any future redevelopment proposals. It shall be for the LPA and NRW to determine if proposals are acceptable, and the degree to which the flexibility offered by TAN-15 to redevelopment proposals can be applied.

Access and Egress is a key consideration for proposed developments under TAN-15. Ffordd y Rhaffau and Ferry Road are both expected to flood during the 0.1% AEP plus climate change event. This will require careful consideration during the planning process.

5.2 Flood Risk from the Sea

When considering a site for development, Sections 10 and 11 of TAN-15 outline the requirements for the type of development permitted in any given flood zone.

The proposed development is located within a TAN-15 Defended Zone for the Sea. For a proposed redevelopment site within a TAN-15 Defended Zone, Section 10.17 of TAN15 states:

"On brownfield sites redevelopment proposals should not over intensify use neither should they reduce the area's ability to absorb flood water nor cause problems with flooding elsewhere. All applications should consider opportunities to incorporate flood resilient design as appropriate and any proposal involving highly vulnerable development must be compliant with the tolerable conditions set out in section 11."

Sites within the TAN-15 Defended Zone should also meet the acceptability criteria, as set out in Section 11 of TAN-15. The site is considered to be at low risk of tidal flooding due to protection from the Cardiff Bay Tidal Barrage. The Cardiff Bay Barrage provides substantial tidal protection to Cardiff with a standard of protection greater than that required to protect against the 0.1% AEP plus climate change event. As such no further assessment in the form of breach is considered necessary and the tidal flood risk to the site is not expected to be a constraint to development.

5.3 Flood Risk from Surface Water and Small Watercourses

The site is predominantly located within Flood Zone 1 of the FMfP for surface water and small watercourses, where all forms of development are permissible.

Localised areas of surface water ponding on the site are located within Flood Zones 2 and 3 of the FMfP.

Sections 10 and 11 of TAN-15 do not explicitly apply to the surface water and small watercourse zones in which this proposed development site lies. Instead, it is for the applicant to demonstrate alignment with the risk-based principles of TAN15 and the general acceptability criteria of Section 11.4.

It is considered that surface water ponding can be managed through the implementation of SuDS in line with the Statutory Standards for SuDS in Wales. The existing drainage channels along the western and eastern site boundaries should be retained on site. This may provide opportunities for enhancement through placement of blue-green infrastructure and SuDS in the vicinity of the watercourses.

Access and egress are key considerations within TAN-15. Access and egress are possible during the extreme event via Ffordd y Rhaffau connected to the western extent of Ferry Road, where flooding is shallow (<340mm) and viable for access for high-sided vehicles.

6 Summary and recommendations

The site is at low to very low risk of groundwater and sewer flooding.

The site is located within the TAN-15 Defended Zone for the Sea 3. The site is protected from tidal flooding by the Cardiff Bay Tidal Barrage; therefore, the risk of tidal flooding is low.

The site is predominantly within Flood Zone 1 for surface water and small watercourses, with only small, localised areas located within Flood Zones 2 and 3, associated with topographic depressions.

The site is also partially located within the TAN-15 Defended Zone for Rivers, with flood risk predominantly associated with overtopping of the flood defences along the River Taff.

Consequently, any planning application will require a Flood Consequences Assessment (FCA) to comprehensively assess the flood risk from all sources. However, the extent and severity of flooding within the site is likely to be manageable by directing development away from the areas at risk and following the requirements of TAN-15.

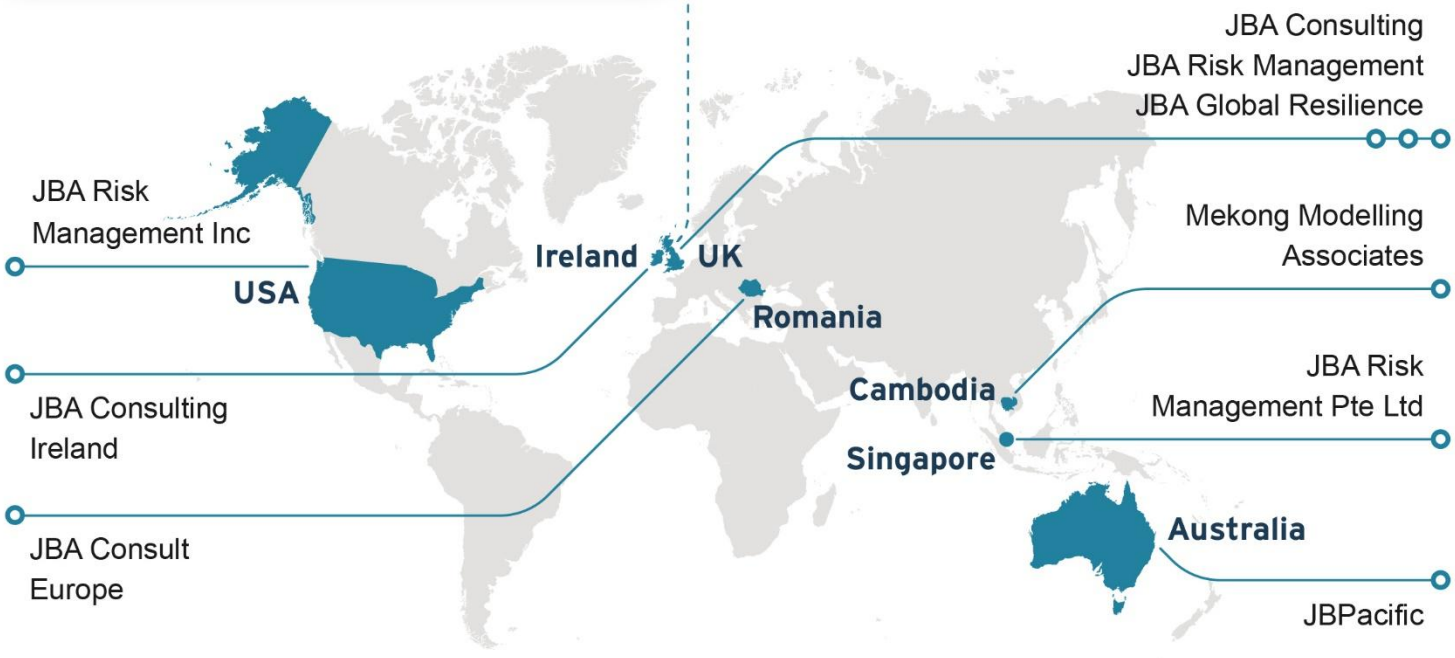
It is therefore considered that this site is likely to satisfy the requirements of TAN-15, subject to the following recommendations:

- Any planning application for the site should be accompanied by a site-specific FCA which demonstrates how the proposals meet the requirements of TAN-15.
- A sequential approach to masterplanning is required to direct development towards those areas in Flood Zone 1. Any development within areas of the TAN-15 Defended Zones are likely to require a detailed hydraulic assessment demonstrating the impact of proposals on both the site, and third parties.
- Surface water flood risk on the site should be managed via SuDS techniques, which are implemented in line with the Statutory Standards for SuDS in Wales. A Drainage Statement shall be required demonstrating how surface water shall be managed on site, in line with the Statutory Standards for SuDS in Wales, and TAN-15.
- Drainage channels should be retained as open channels wherever possible. It is recommended that options are explored to enhance the existing watercourse corridors by implementing Blue Green infrastructure and retaining the drainage channels in areas of public open space so that they can be accessed and maintained.
- Access and egress in all fluvial design events will need to be carefully considered to facilitate flood free movement in the event of a flood.

www.jbaconsulting.com

Our Offices

Bristol
Coleshill
Cork
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Leeds
Limerick
Newcastle
Newport
Peterborough
Portsmouth
Saltaire
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

Follow us on

Jeremy Benn
Associates Limited
Registered in
England
3246693

JBA Group Ltd is
certified to
ISO 9001:2015
ISO 14001:2015
ISO 27001:2022
ISO 45001:2018