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# Cardiff Council Strategic Flood Consequences Assessment - International Sports Village

**Version 1**

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Cardiff Council

Date  
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## Document Status

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# Contract

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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.

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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.

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# 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 the 'International Sports Village', 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	International Sports Village
Site ID	19
Site area (ha)	6.07
Existing land use	Brownfield land
OS NGR	ST 318192,172942
Access location	Ferry Road and Empire Way



Figure 2-1: Proposed development site

## 2.1 Development proposals

The proposals at this site are for residential development and are classified as a Highly Vulnerable Development. The site is located on brownfield land and comprises the former docklands of Cardiff Bay. The site has since been cleared to facilitate regeneration works to the area associated with the International Sports Village, with only the carpark in the western extent of the site remaining.

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<sup>1</sup> across the site has been reviewed and is shown in Figure 2-2.

Levels across the site are mostly flat. Elevations across the north of the site gently slope from west to east from approximately 8.38mAOD to 7.76mAOD. The south of the site comprises of open space with an elevation of 7.80mAOD

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

There are isolated areas of raised ground and topographic depressions within the site, likely associated with the site's redevelopment and landscaping works. Located along the site's eastern and southeastern boundary are areas of raised ground reaching elevations of 9.42m AOD.

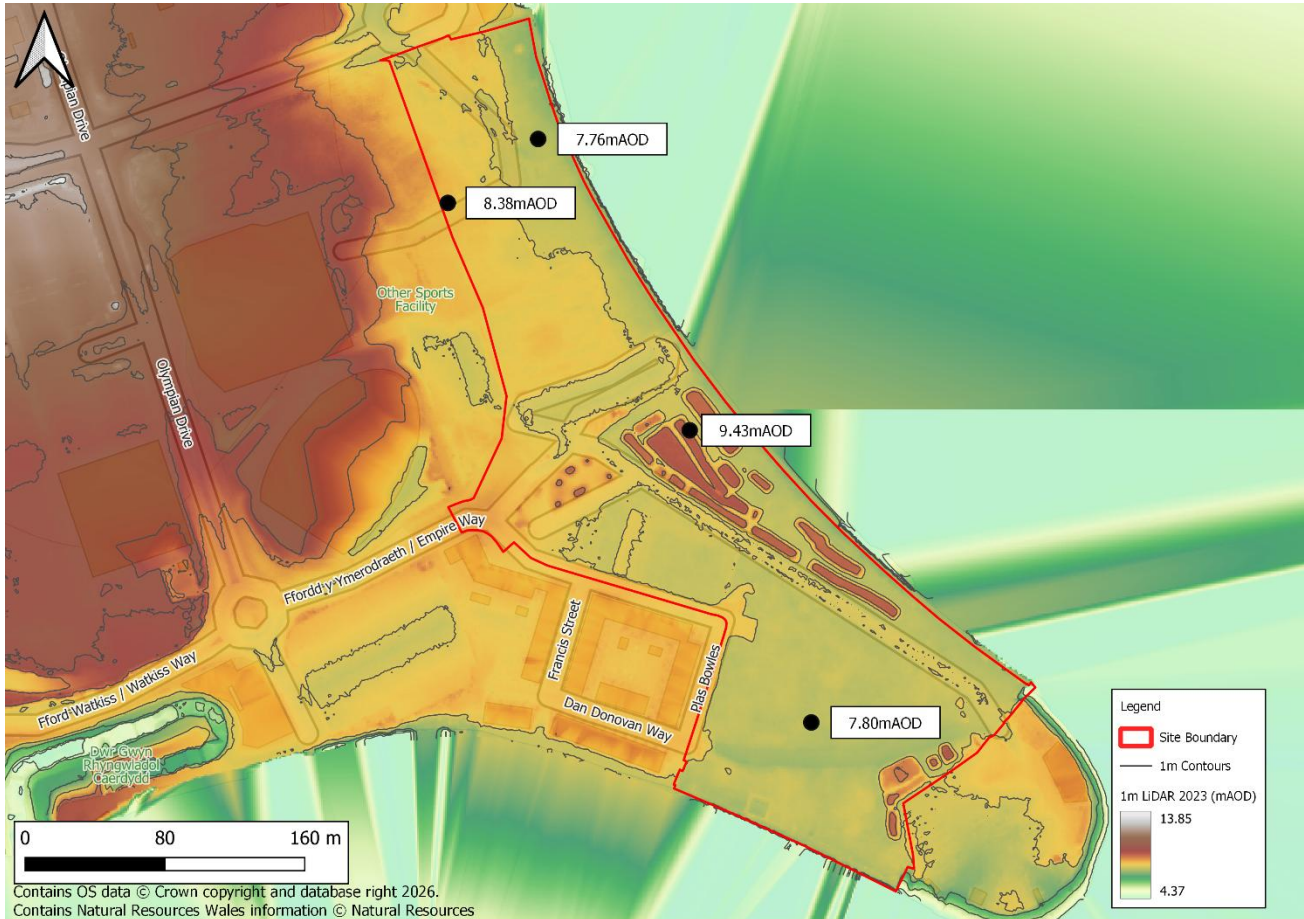


Figure 2-2 1m LiDAR

### 2.3 Watercourses and Flood Defences

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

The River Ely is an NRW Main River that flows in an easterly direction along the southern boundary of the site, before discharging into Cardiff Bay. The River Taff, an NRW Main River, flows in a southerly direction before out falling into Cardiff Bay approximately 0.5km north of the site.

The site is located at Cardiff Bay and partially benefits from both coastal and fluvial flood defences. A number of NRW-designated fluvial flood defences run along the River Taff and River Ely, including embankments, high ground and a flood defence wall. The site is also protected by the Cardiff Bay Tidal Barrage, located approximately 0.6km south-east of the site. The Barrage creates a 2km<sup>2</sup> freshwater waterbody, protecting the bay and central areas of Cardiff from tidal flooding.

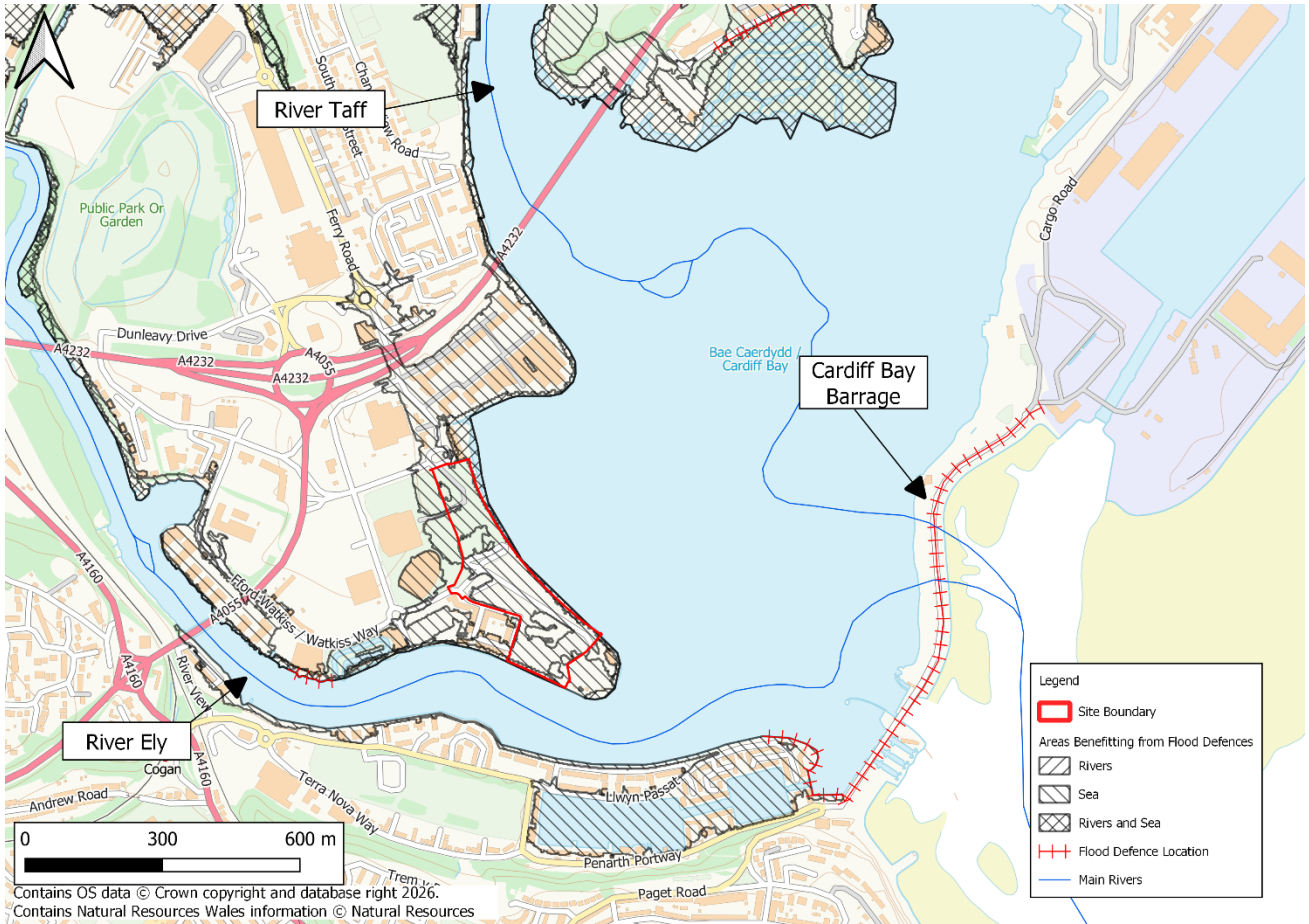


Figure 2-3 Watercourses and Flood Defences

### 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	TAN-15 Defended Zone (Figure 3-1)
Flood Map for Planning - Sea	TAN-15 Defended Zone (Figure 3-2)
Flood Map for Planning - Surface Water and Small Watercourses	Flood Zones 1, 2 and 3 (Figure 3-3)

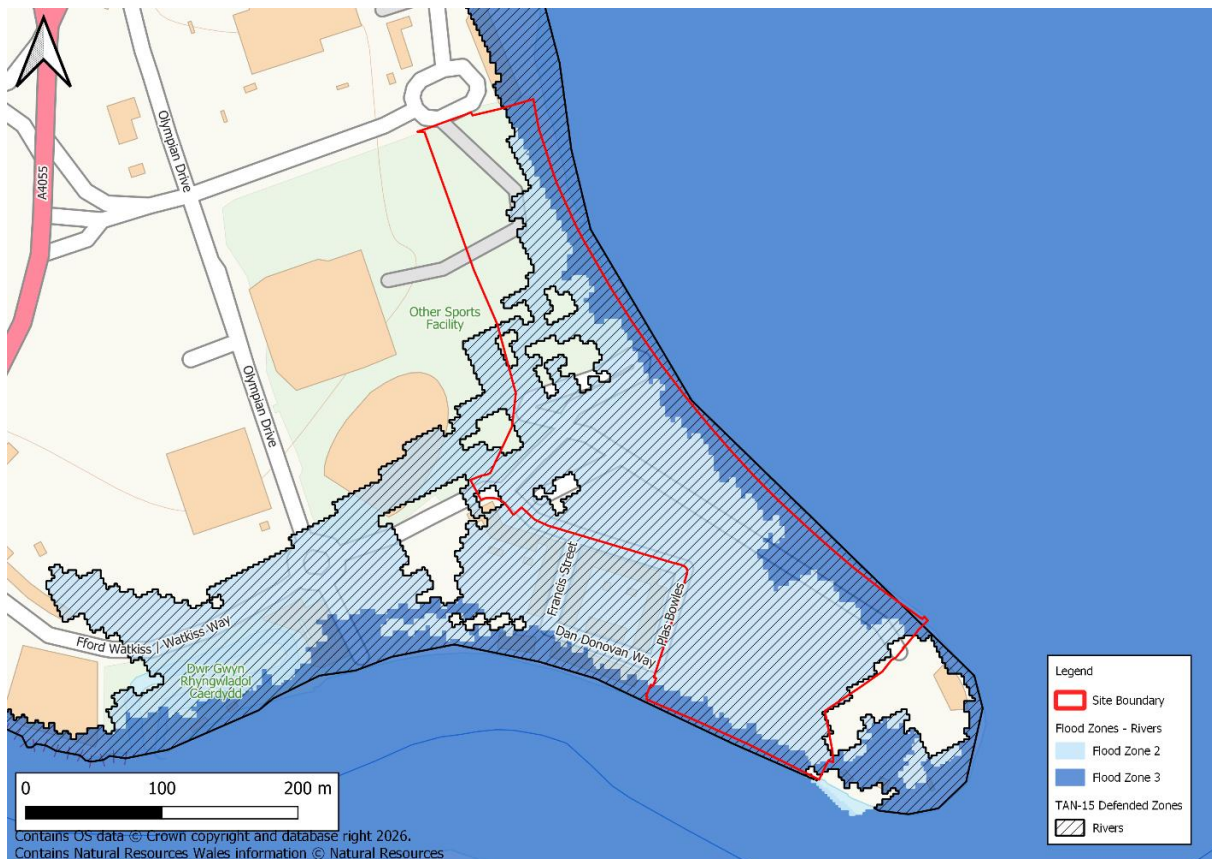


Figure 3-1: Flood Map for Planning - Rivers

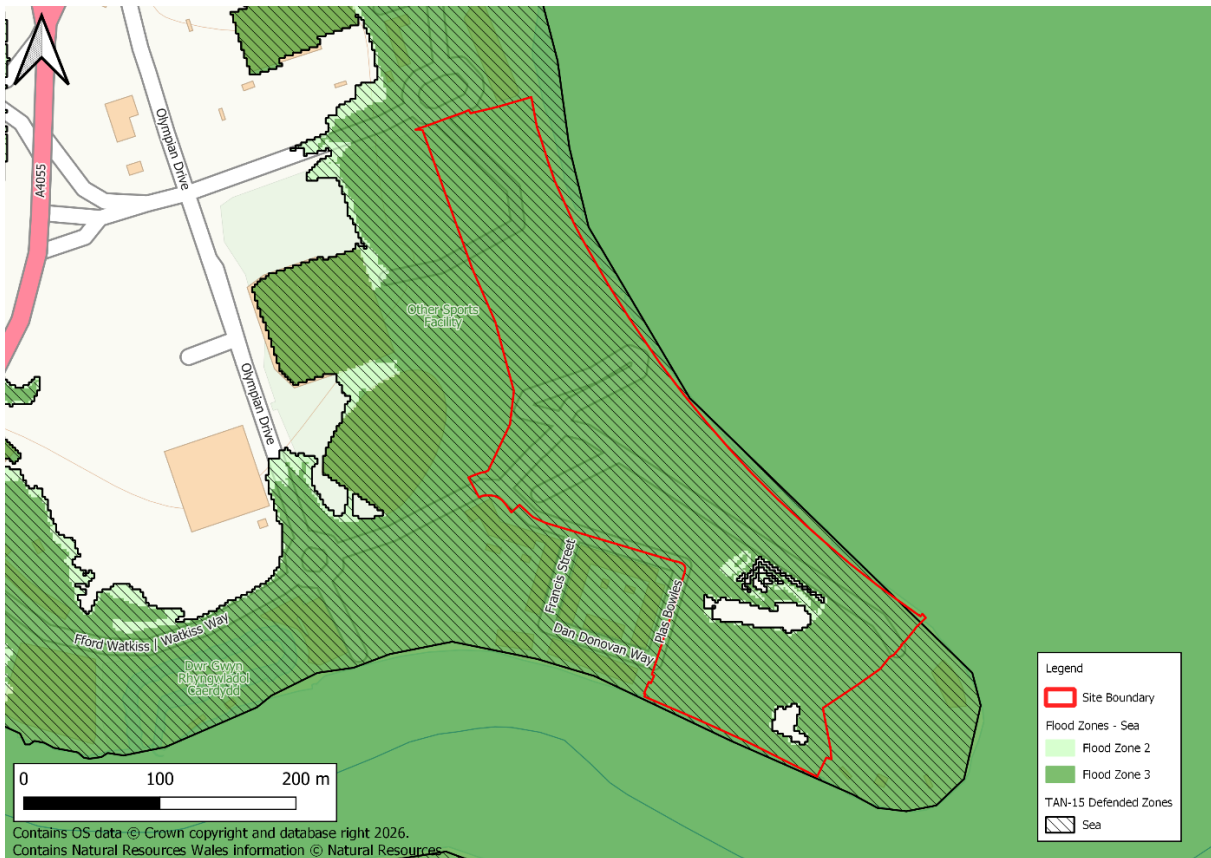


Figure 3-2: Flood Map for Planning - Sea



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 location within the within the TAN-15 Defended Zone and Flood Zones 2 and 3 of the FMfP for Rivers indicates that the site is at a <b>moderate</b> risk of flooding from this source. <b>Fluvial flood risk is further assessed in Section 4-1.</b>
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. <b>Tidal flood risk is further assessed in Section 4-2.</b>
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. <b>Surface Water and Small Watercourse flood risk is further assessed in Section 4-3.</b>
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. <b>Reservoir flood risk is further assessed in Section 4-4.</b>
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 <b>low</b> .

## 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 development site is predominantly located within the TAN-15 Defended Zone, with a small extent to the north located in Flood Zone 1.

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, flows are confined within the banks of the River Ely and Cardiff Bay.

During the 0.1% AEP plus climate change event, the site is predominantly flood free, as illustrated in Figure 4-2. Shallow flooding up to 290mm is shown along the eastern boundary due to overtopping from Cardiff Bay. The River Ely to the south of the site largely remains in bank during this scenario. The maximum water level on site is 7.80m AOD.

Flood free access and egress are possible during the extreme event via Empire Way along the eastern boundary and Ferry Road along the northern boundary.

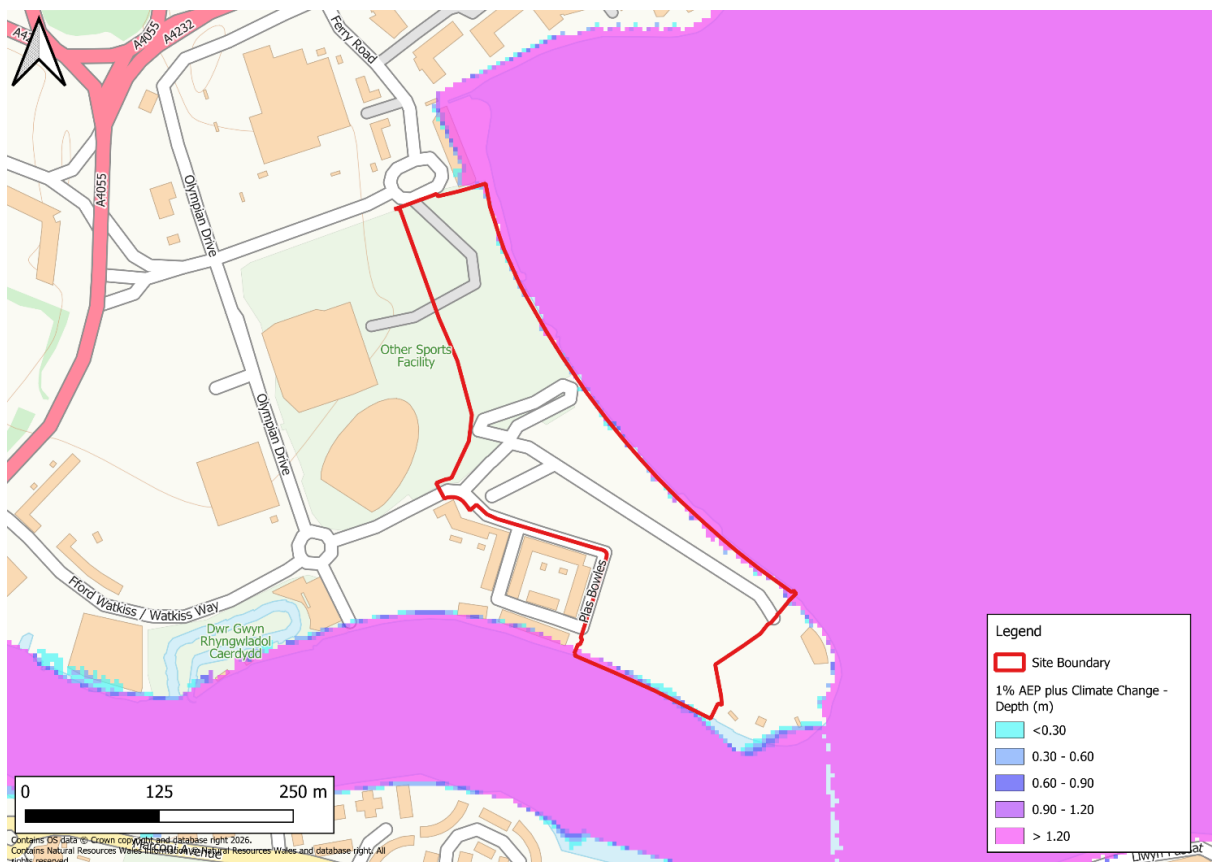


Figure 4-1: 1% AEP plus Climate Change - Flood depths - River Taff and Ely Model

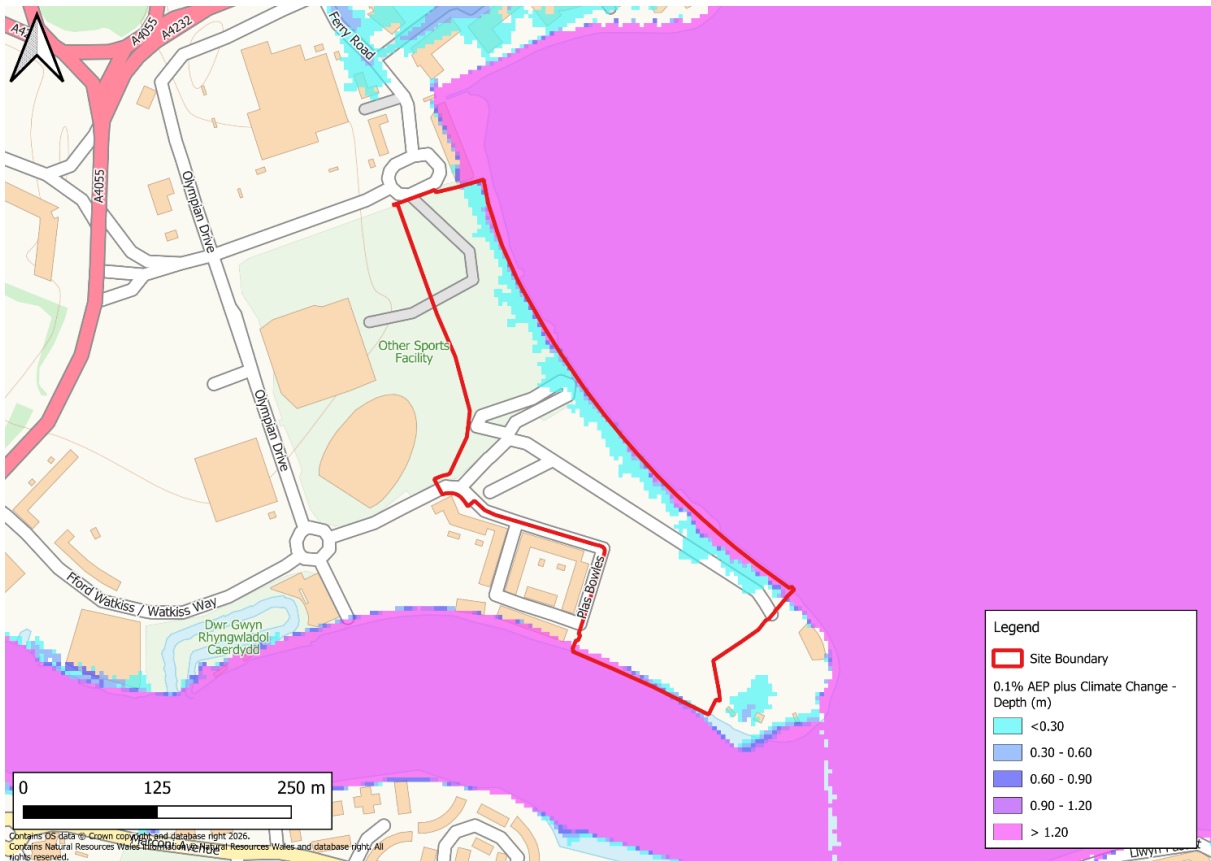


Figure 4-2: 0.1% AEP plus Climate Change - Flood depths - River Taff and Ely Model

#### 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 6.5km north of the site. The flood extent is similar to the baseline scenario, with the site predominantly flood free, and shallow flooding of less than 290mm shown along the eastern boundary of the site. The maximum water level on site remains 7.80mAOD.

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 6.2km north of the site. Similarly to the baseline, shallow flooding occurs along the eastern site boundary from Cardiff Bay, whilst the site is predominantly flood free. The maximum water level on site remains 7.80mAOD.

Figure 4-6 shows the peak flood depths for the Breach 3 0.1% AEP plus climate change scenario. Breach 3 is located on the right bank of the River Taff, approximately 4.3km north of the site. The flood extent is similar to the baseline scenario, with shallow flooding less than 290mm shown along the eastern boundary of the site, and the site remaining predominantly flood free. The maximum water level on site remains 7.80mAOD.

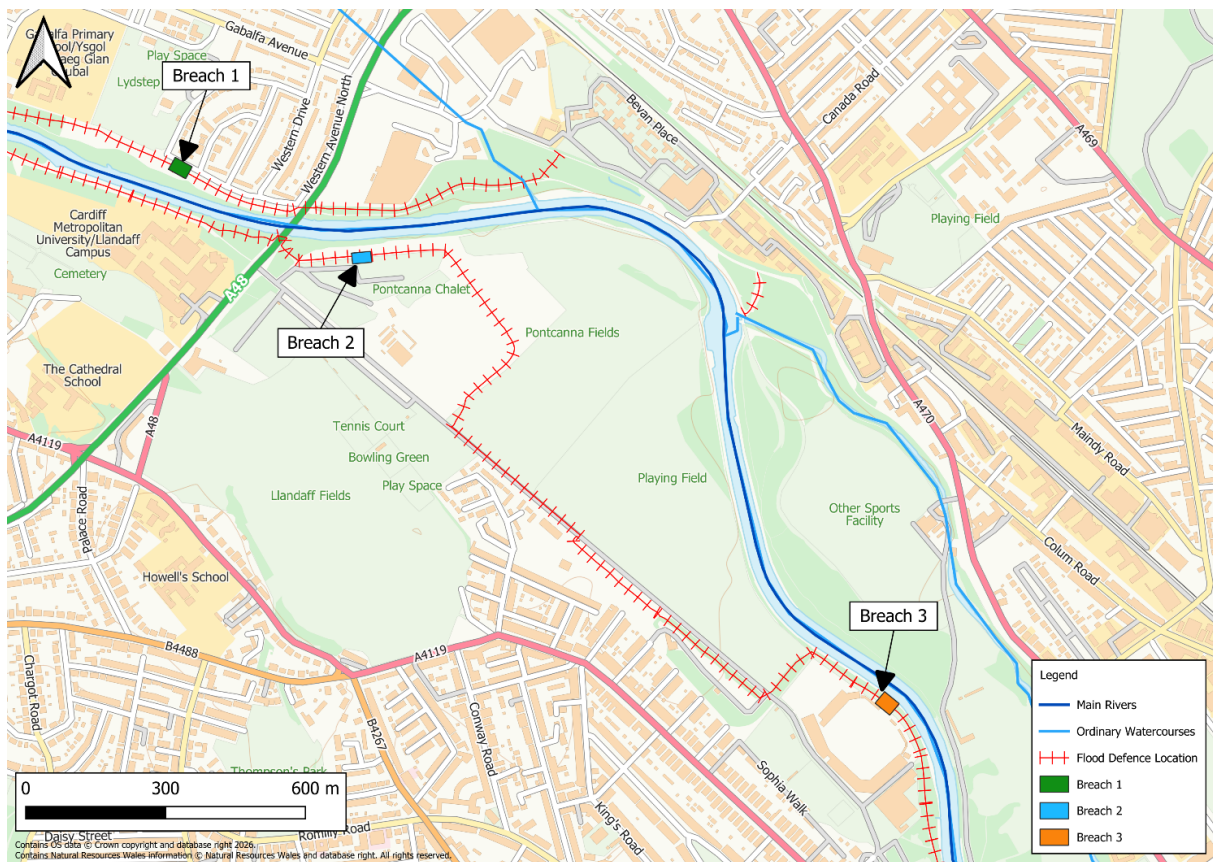


Figure 4-3: River Taff and Ely model breach locations

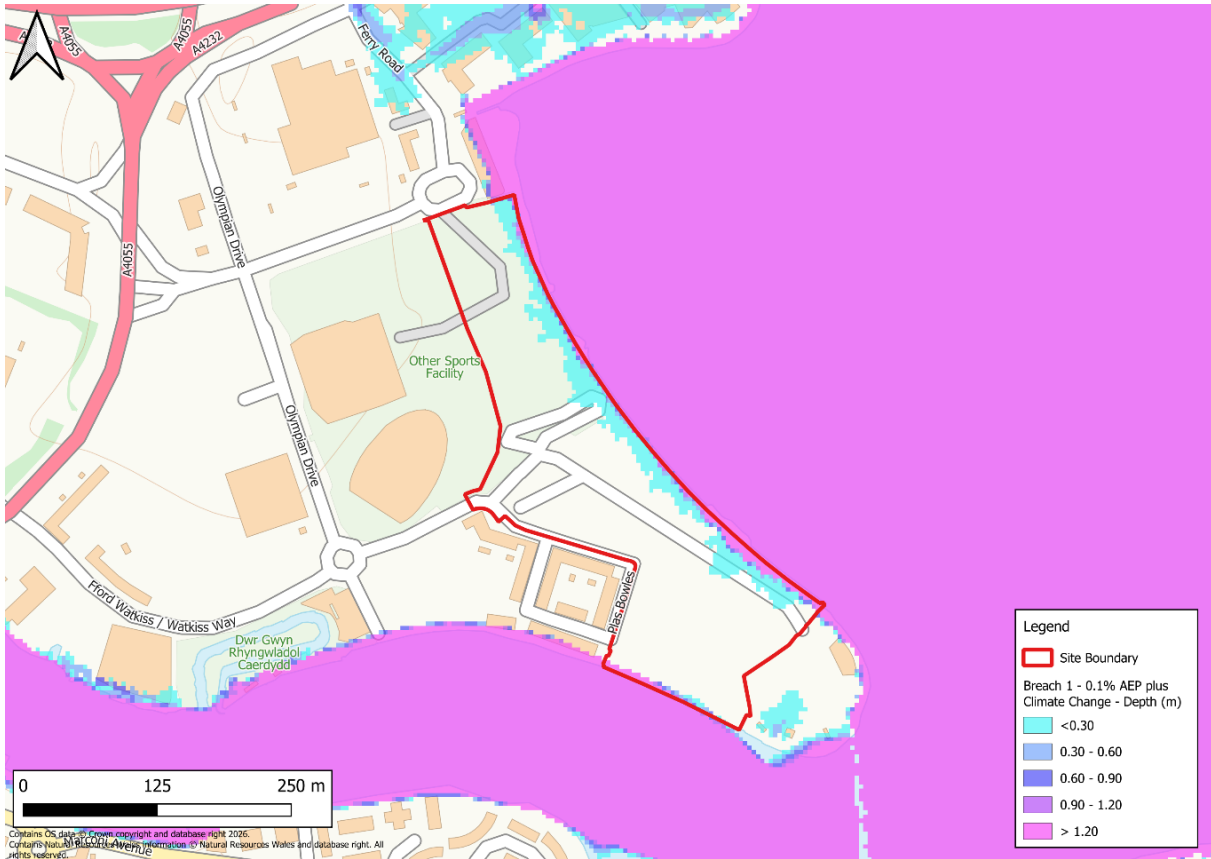


Figure 4-4: Breach 1 0.1% AEP plus Climate Change event

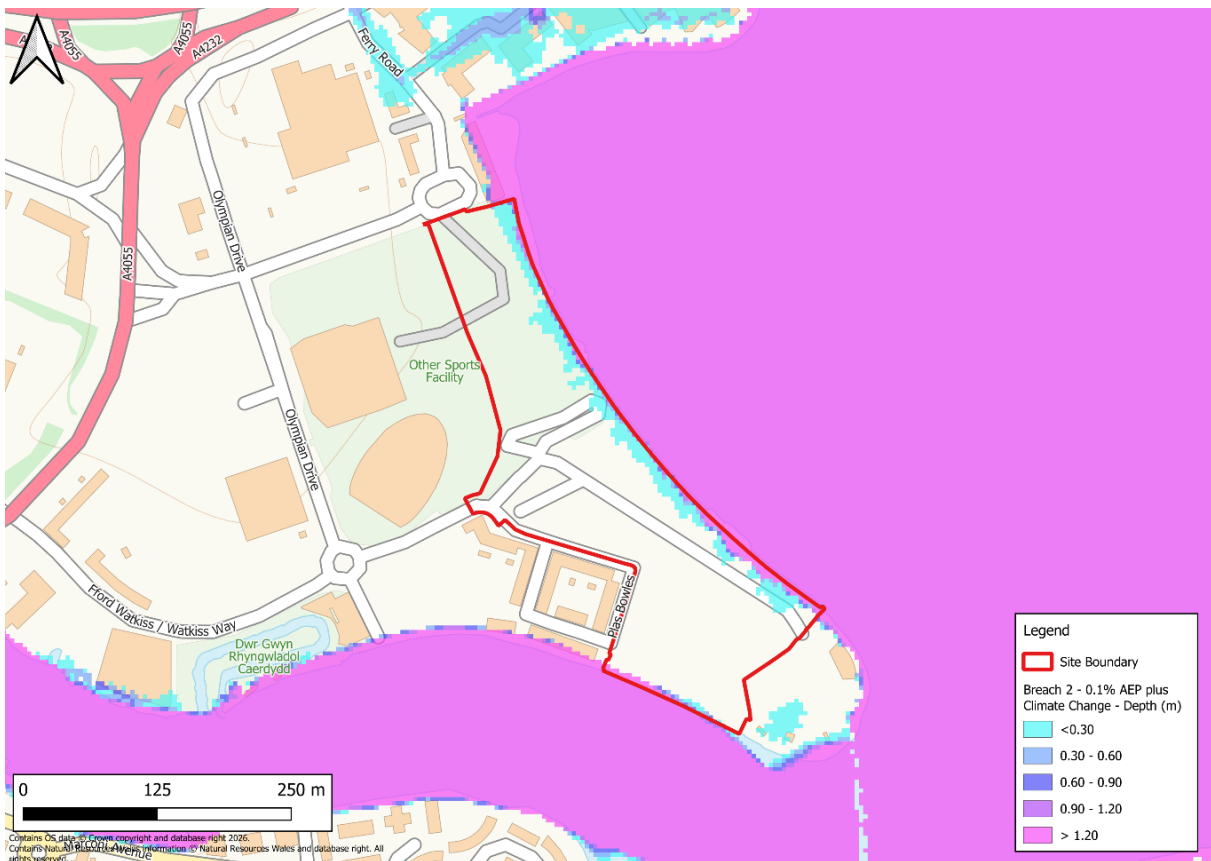


Figure 4-5: Breach 2 0.1% AEP plus Climate Change event

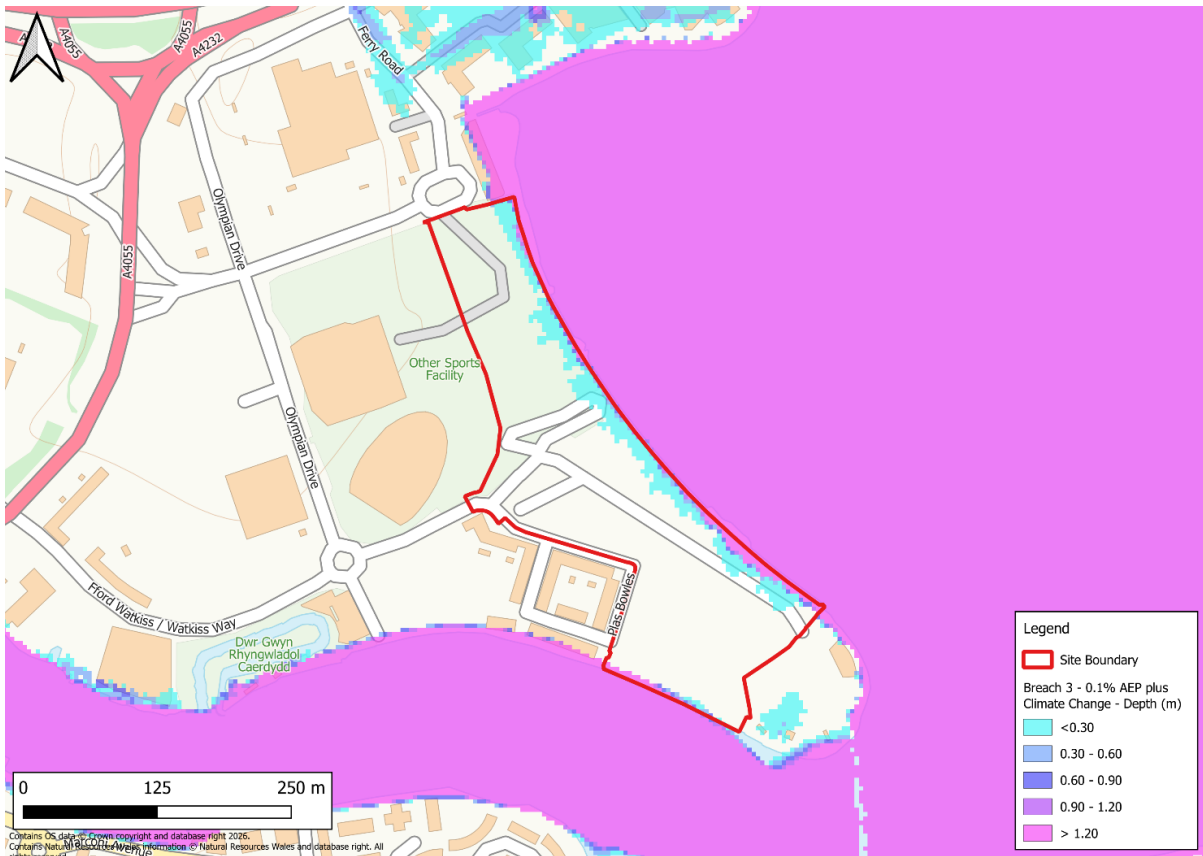


Figure 4-6: Breach 3 0.1% AEP plus Climate Change event

## 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 this source. Localised areas of the site are located within Flood Zones 2 and 3, associated with areas of lower elevations.

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, a surface water flow path originates within the site boundary along the unnamed track in the southern extent of the site (Figure 4-7). The overland flow path travels along the track, remaining confined to this area of lower topography. Flooding along the flow path is shallow, reaching a maximum depth of 230mm in the 1% AEP plus climate change event. During the 0.1% AEP event, peak flood depths increase to 317mm along the flow path, as shown in Figure 4-8. This flow path derives from the access track sitting at a lower elevation to surrounding ground levels, with surface water unable to drain away. It is envisaged that the surface water overland flow path can be managed through good site layout design and should be retained on site.

A small area of ponding is shown adjacent to the existing carpark in the western extent of the site in the 1% AEP plus climate change event. The ponding occurs within a topographic depression, up to shallow depths of 204mm. In the 0.1% AEP event, the extent of ponding adjacent to the carpark increases, although flood depths remain shallow (<260mm).

Surface water flood risk within the rest of site is predominantly associated with ponding in topographic depressions. Ponding within the site can likely be managed through the implementation of SuDS in line with the Statutory Standards for SuDS in Wales.

Access and egress are possible via Empire Way in the 0.1% AEP plus climate change event, where flood depths are shallow (<250mm) and viable for access for pedestrians and high-sided vehicles. Empire Way provides a direct connection to Olympian Drive, which leads to the A4055.

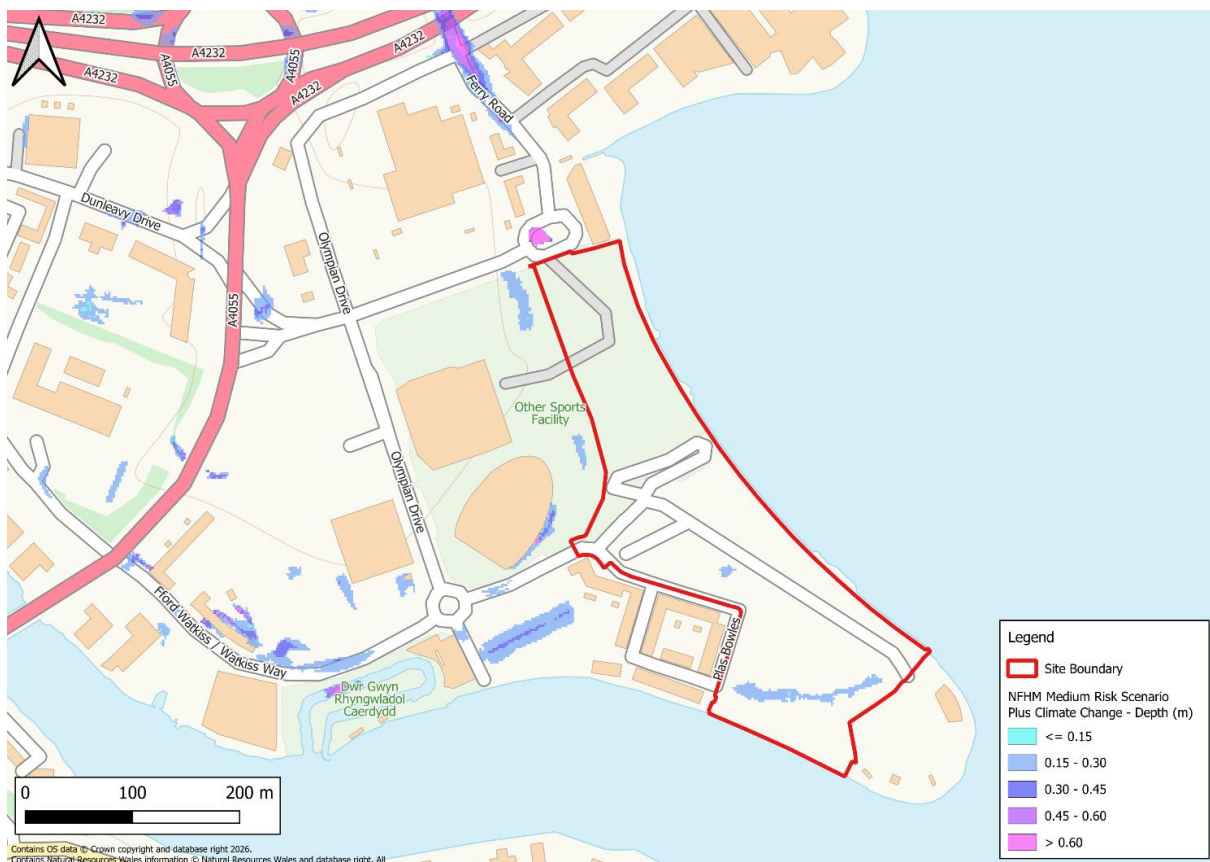


Figure 4-7: Flood Risk from Surface Water - 1% AEP + Climate Change - Flood depths

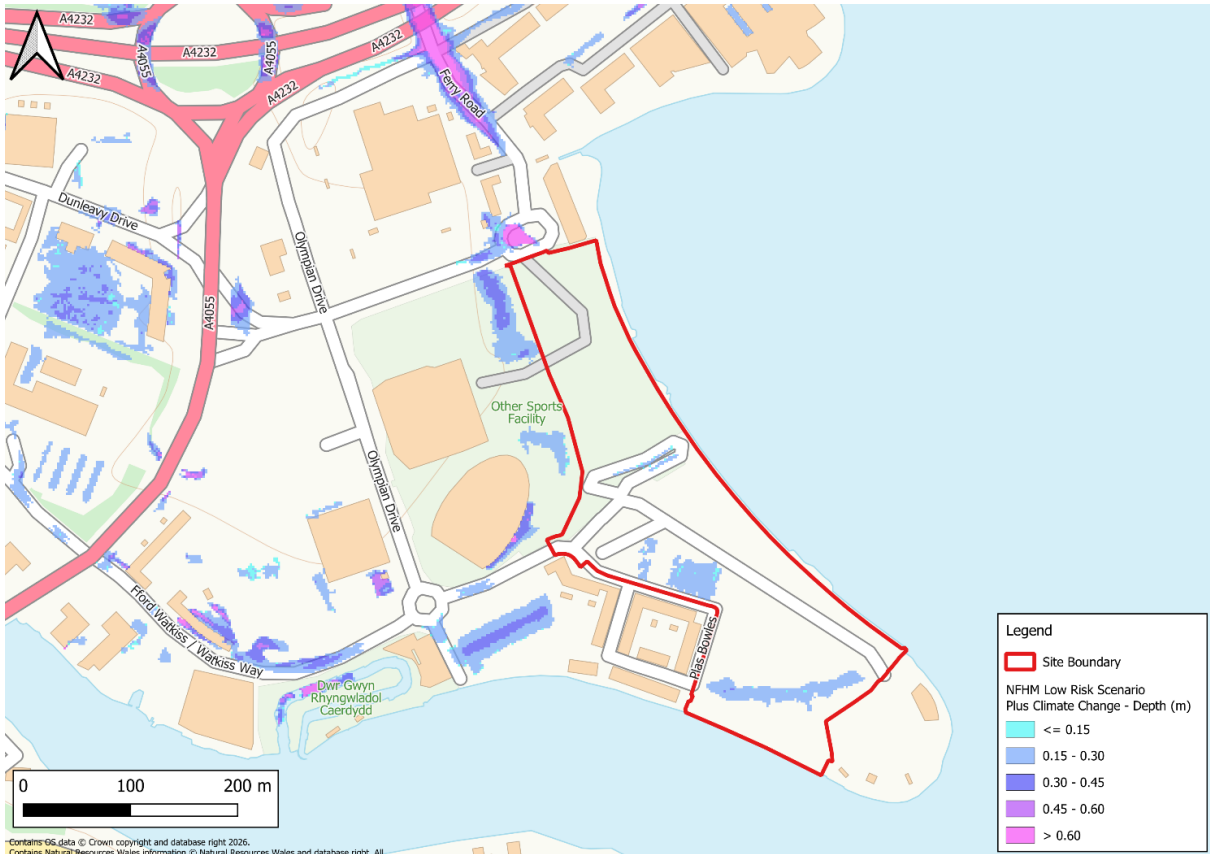


Figure 4-8: Flood Risk from Surface Water - 0.1% AEP + Climate Change - Flood depths

#### 4.4 Flood Risk from Reservoirs

Figure 4-9 below shows the reservoir flood extent within the site. This indicates that the entire site is at risk of reservoir flooding from the Pontsticill reservoir.

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

When considering a site for development, Section 10 (Flooding and the plan-led system) and Figures 5 (flood frequency) and 6 (tolerable conditions) of Section 11 of TAN-15 outline the requirements for the type of development permitted in any given flood zone.

The site is affected by flood risk from fluvial, tidal and surface water and small watercourse sources, which are reflected in the mapped Flood Zones across the site.

### 5.1 Flood Risk from Rivers

The proposed development is located within a TAN-15 Defended Zone for Rivers. The site is located on brownfield land and is therefore considered as redevelopment. The site is protected by fluvial defences along the River Taff and River Ely.

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."*

Detailed hydraulic modelling shows that the site is predominantly flood free in the 0.1% AEP plus climate change events, including the breach scenarios. Flooding is limited to the eastern boundary, associated with overtopping at Cardiff Bay, where flood depths comply with the tolerable conditions outlined in Figures 5 and 6 of TAN-15. Across the site, it is recommended it may be preferable to apply a sequential approach to development, locating the majority of built form development away from the eastern boundary with areas of open space located within areas at flood risk, to increase the site's resilience.

### 5.2 Flood Risk from the Sea

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 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.

Surface water flooding is predominantly associated with topographic depressions on site, with surface water unable to drain away. 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.

Access and egress are key considerations within TAN-15. Access and egress are possible during the extreme event via Empire Way, connected to Olympian Drive and the A4055, where flooding is shallow (<260mm) 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. The site is protected from tidal flooding by the Cardiff Bay Tidal Barrage; therefore, the risk of tidal flooding is low.

The site is also partially located within the TAN-15 Defended Zone for Rivers, with flood risk limited to the eastern boundary from overtopping of Cardiff Bay in the extreme event.

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.

As the site is located in the TAN-15 Defended Zone of the FMfP, it will require a Flood Consequences Assessment (FCA) to assess the risk to the development proposals.

The following recommendations are made for the site:

- 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.
- Surface water ponding 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.



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