



Cardiff Council Strategic Flood Consequences Assessment - Porth Teigr and Alexandra Head (4)

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

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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 'Porth Teigr and Alexandra Head', 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 (TAN15). Furthermore, recommendations will be provided 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 below.

Table 2-1 Site Summary

Site name	Porth Teigr and Alexandra Head
Site ID	4
Site area (ha)	32.6
Existing land use	Brownfield
Purpose of development	Mixed use - residential and commercial
OS NGR	ST 19630 74012
Access location	Tyneside Road or Harbour Drive

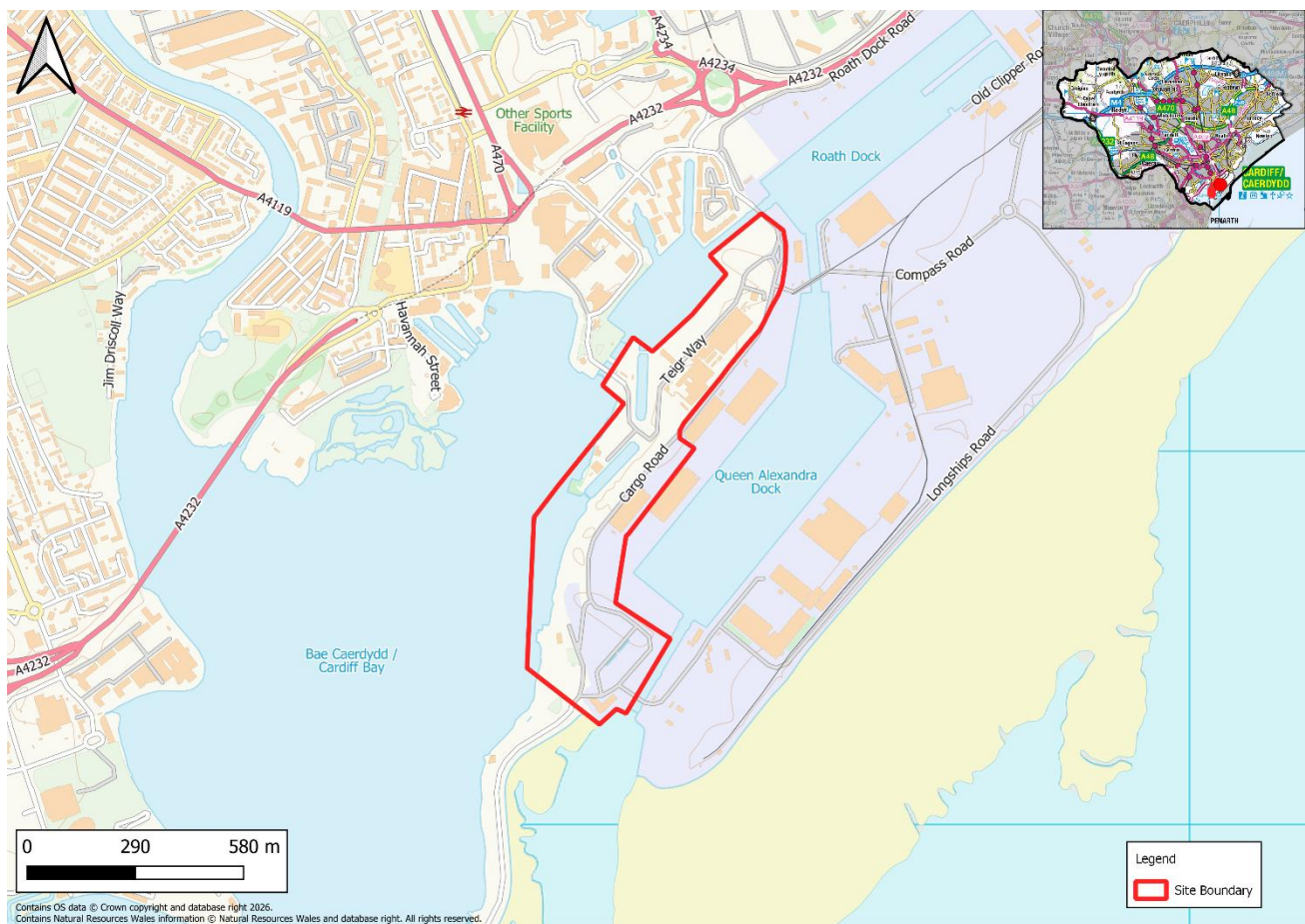


Figure 2-1 Proposed Development Site

2.1 Development proposals

The proposed development is for mixed use development comprising commercial and residential development. Residential uses are classed as Highly Vulnerable Development, with other uses classed as Less Vulnerable Development. The site is classified as brownfield.

No indicative site layout is available for this assessment.

2.2 Topography

The Natural Resources Wales (NRW) Open Source 1m Light Detection and Ranging (LiDAR) data¹ across the site has been reviewed and is shown in Figure 2-2.

The LiDAR data shows that the site is generally flat, with site level mainly ranging between 9.0-10.3mAOD. Areas of lower elevation are shown adjacent to the docks, to a minimum level of approximately 8.10mAOD. Additionally, some localised areas are shown to be at a higher level of up to 12.58mAOD.

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

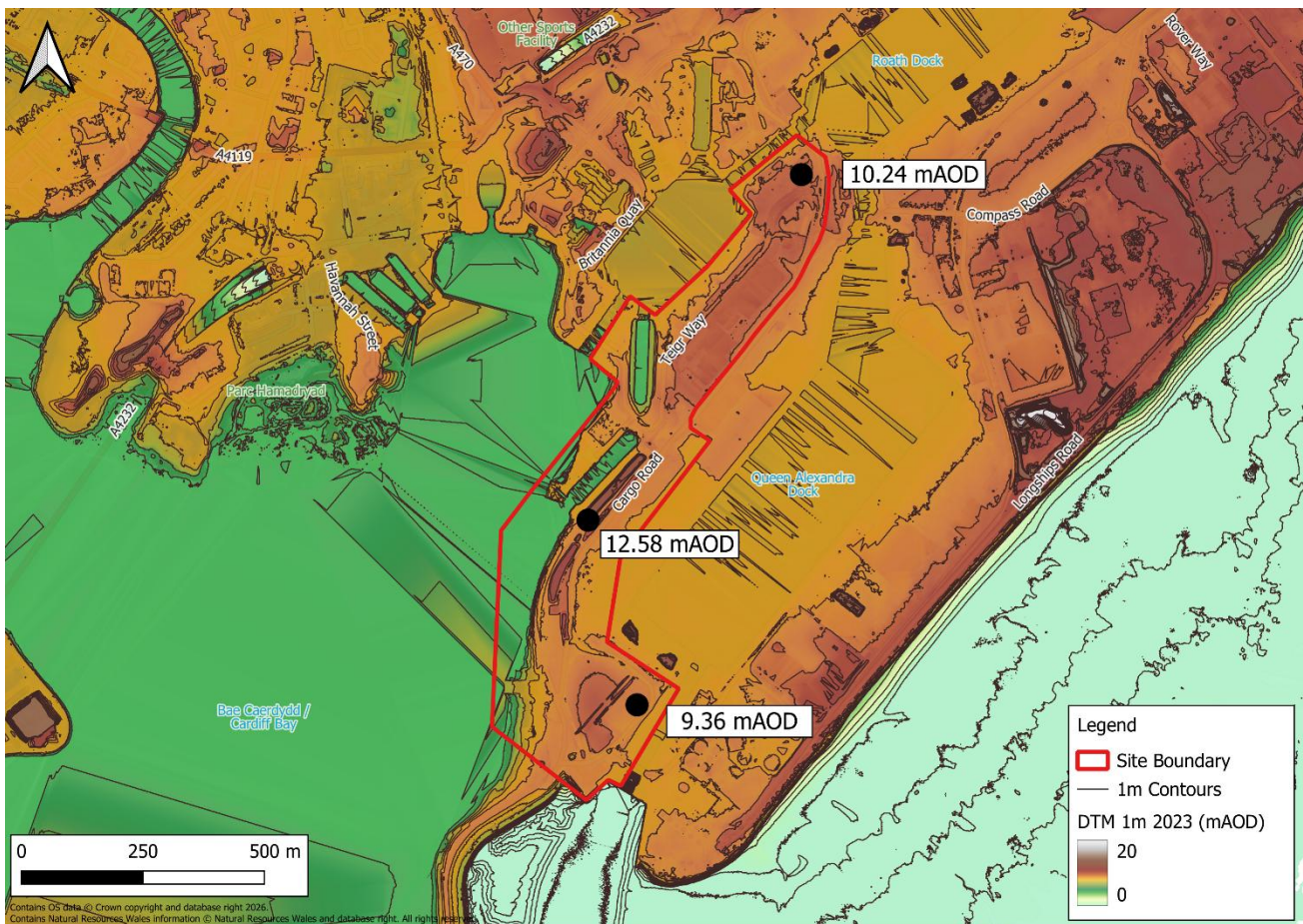


Figure 2-2 1m LiDAR

2.3 Watercourses and Flood Defences

Figure 2-3 shows the locations of the nearest waterbodies and watercourses to the site.

Located within the historic dock area of Cardiff, the site is predominantly surrounded by artificial waterbodies, as shown in Figure 2-3. To the north-east is Roath Dock and to the south is the Queen Alexandra Dock. Roath Basin is immediately west of the proposed development site and further west is Cardiff Bay. The docks are interconnected via channels, and a number of small dock basins.

Roath Basin and Roath Dock are fed by the dock feeder watercourse, flowing from the north. The levels within the Roath Basin, Roath Dock and Queen Alexandra Dock waterbodies are managed by Associated British Ports (ABP) through lock gates situated at the entrance to Roath Basin and Queen Alexandra Dock. These are located on the seaward side of the barrage and are therefore independent to water level changes as a result of the Cardiff Bay barrage.

The water levels within Cardiff Bay are managed by the Cardiff Bay Barrage which provides substantial tidal flood risk protection to Cardiff. The barrage has a standard of protection greater than the 0.1% AEP plus climate change event.

The nearest Main River to the proposed development site is the River Taff, located approximately 1.5km to the west of the site. The River Taff flows in a southerly direction through Cardiff and into Cardiff Bay. Cardiff Bay also receives flows from the River Ely, which flows through the west of Cardiff.

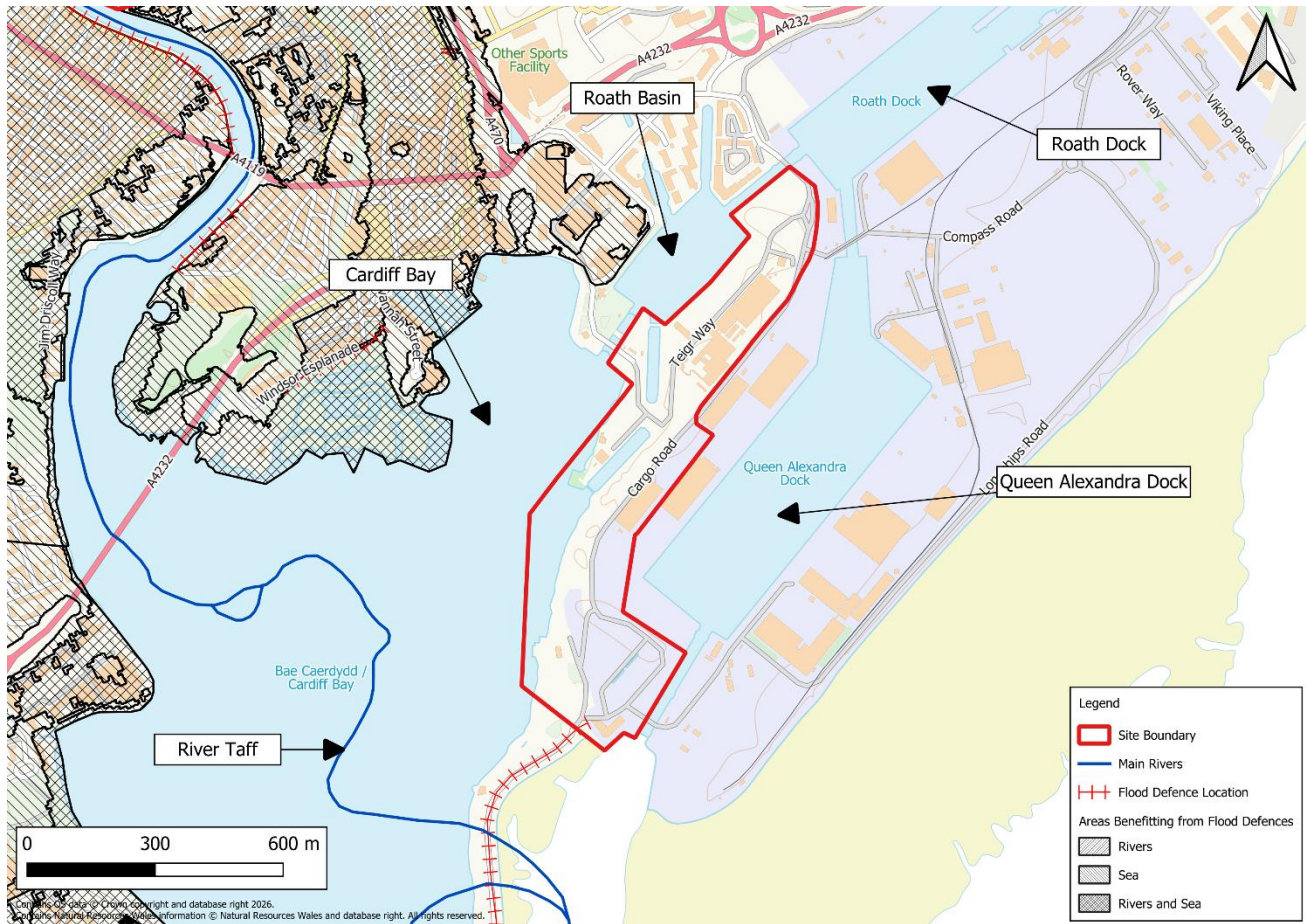


Figure 2-3 Watercourses and Flood Defences

3 Planning Policy and Flood Risk

TAN-15 provides a framework within which flood risk arising from rivers, the sea, and surface water, as well as the risk of coastal erosion, 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 (FMfP) 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	Mixed use - residential and commercial
Form of Development	Redevelopment
Vulnerability Classification	Highly Vulnerable and Less Vulnerable Development
Flood Map for Planning - Rivers	Flood Zone 3 - shown in Figure 3-1
Flood Map for Planning - Sea	Flood Zone 2 and 3 - shown in Figure 3-2
Flood Map for Planning - Surface Water and Small Watercourses	Flood Zone 2 - shown in Figure 3-3.

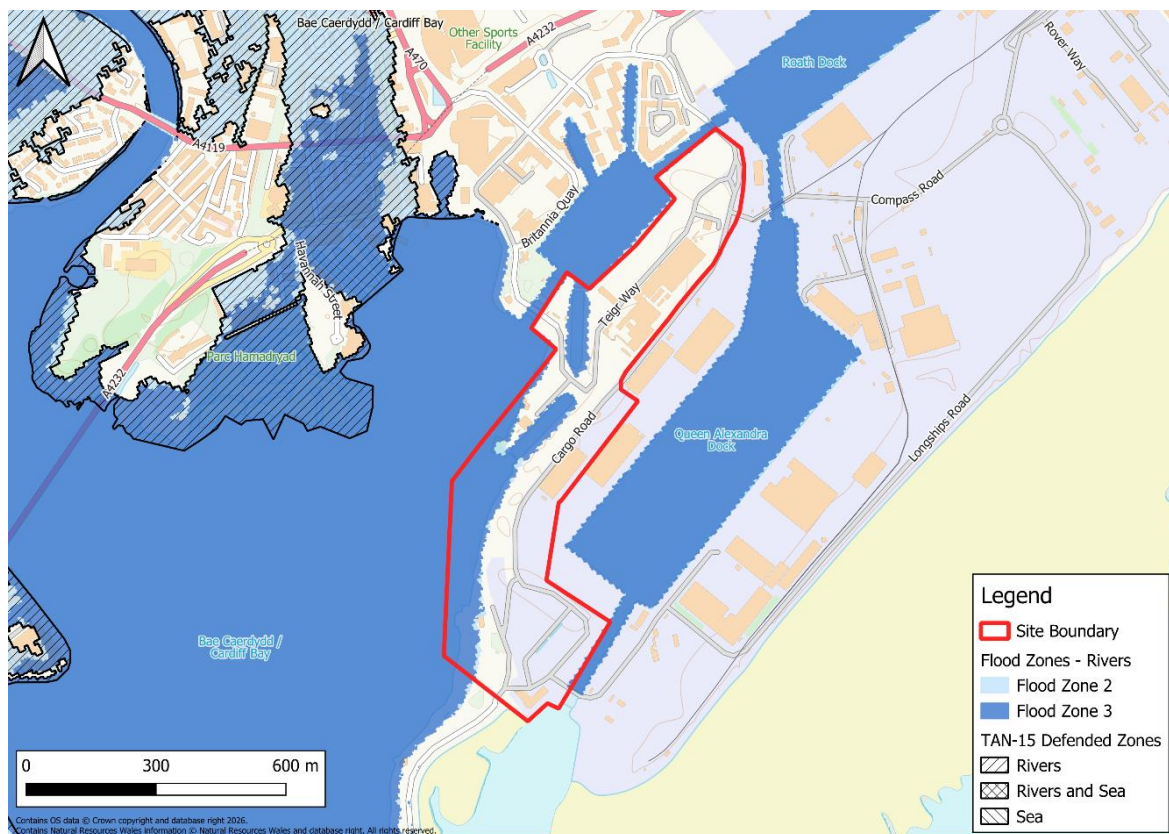


Figure 3-1 Flood Map for Planning - Rivers

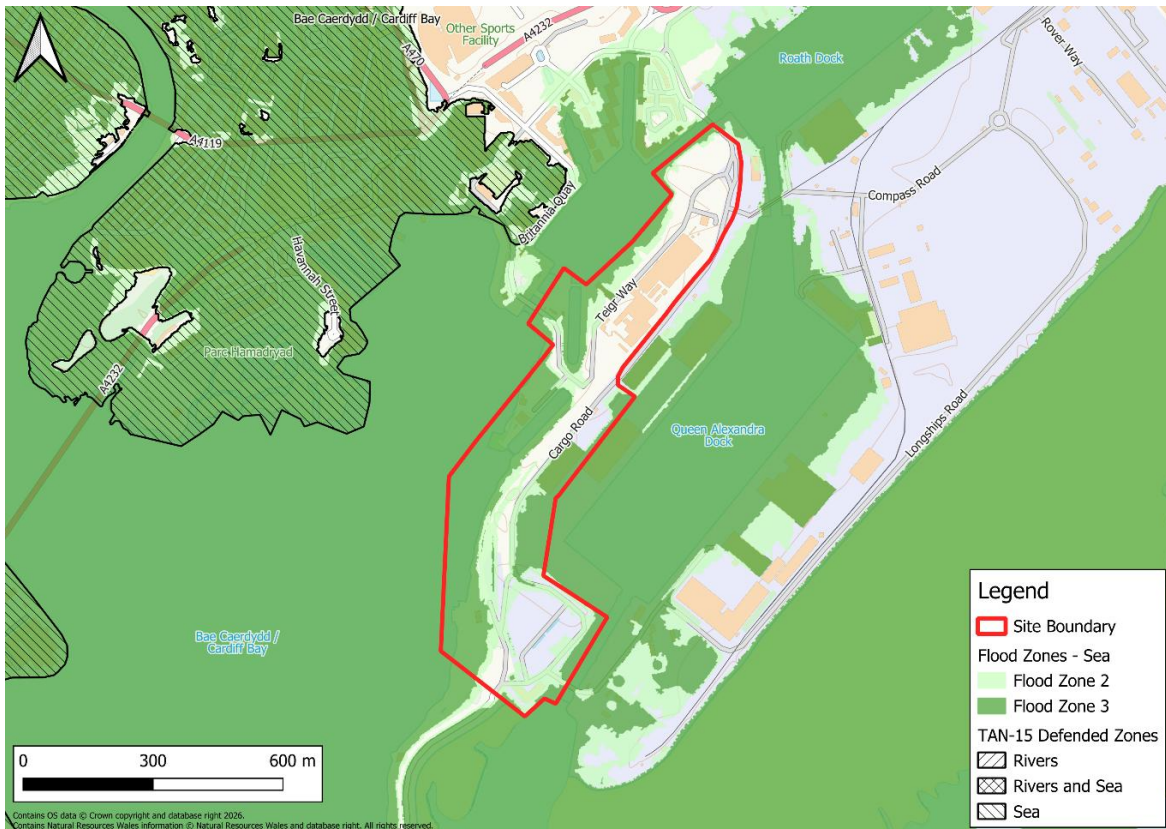


Figure 3-2 Flood Map for Planning - Sea

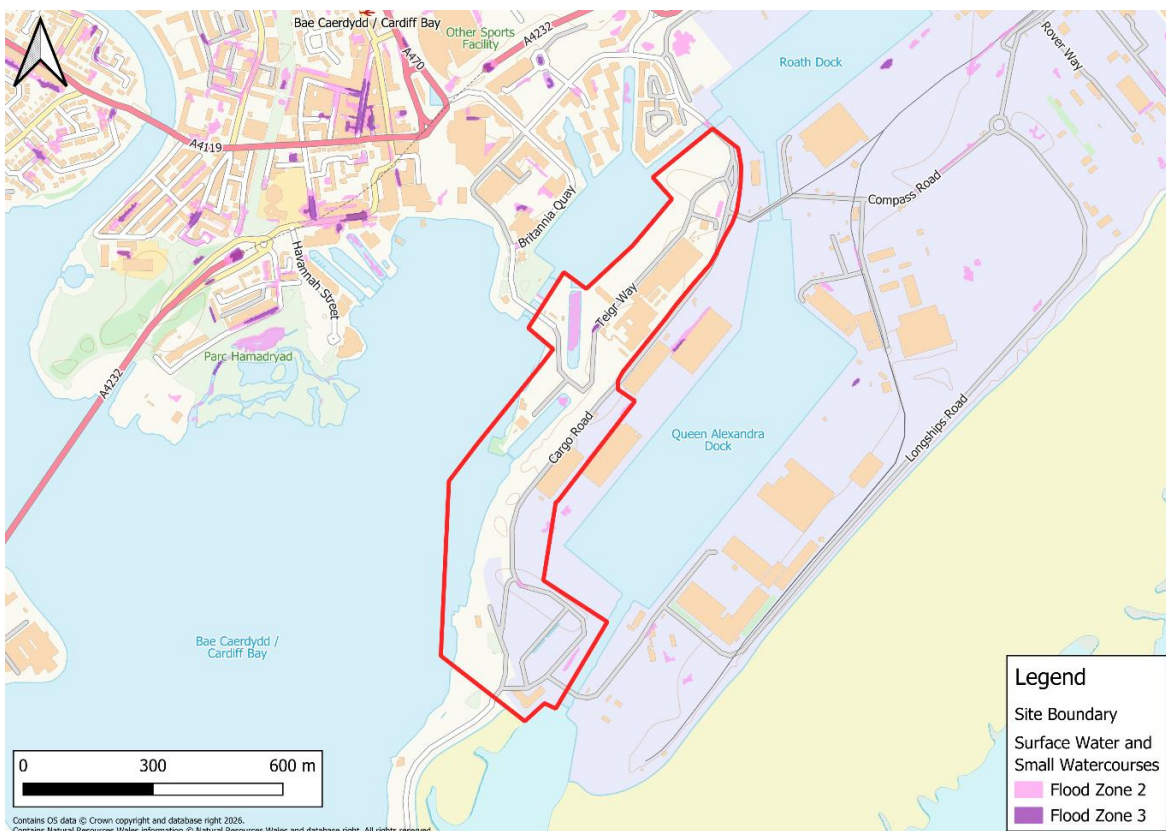


Figure 3-3 Flood Map for Planning - Surface Water and Small Watercourses

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 is at low risk of flooding from fluvial sources and is further assessed in Section 4.1
Flood Risk from the Sea	✓	The site is at moderate risk of flooding from the sea and is further assessed in Section 4.2
Flood Risk from Surface Water and Small Watercourses	✓	The site is at low risk of surface water flooding has been further assessed in Section 4.3
Flood Risk from Groundwater	✗	The Cardiff SFCA includes JBA's Groundwater risk of emergence map as part of the assessment. The groundwater depth map showed the site to be of very low risk, and there are no nearby groundwater incidents. Therefore, it is concluded that the risk of flooding is very low .
Flood Risk from Reservoirs	✗	The NRW Flood Map for Planning shows that the site is partially at risk of flooding from reservoir failure. However, the areas at risk are those close to the existing waterways and dock features within the site boundary. Given the site's location in central Cardiff, it is unlikely that the risk categorisation of the reservoir would be re-categorised as a result of the proposals. Therefore, it is concluded that the risk of flooding is very low .
Flood Risk from Sewers	✓	The Cardiff SFCA has identified no incidents of sewer flooding within the Butetown ward, in which this proposed candidate site is located. It is assumed that there will be existing foul sewers connecting the area to the wider DCWW system, with surface water likely to drain into the existing docks via a mixture of public and private sewers. This would need to be assessed further prior to any construction at the site. Therefore, it is concluded that there is a low to medium risk of sewer flooding.

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 site is predominantly located within Flood Zone 1. Areas of Flood Zones 2 and 3 are confined to the artificial waterbodies within the site.

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.

Figures 4-1 and 4-2 show the peak flood depths for the 1% AEP and 0.1% AEP plus climate change events respectively. In both events, all floodwater within the site boundary is contained to Cardiff Bay and the docks and no overtopping is predicted.

In both the 1% AEP and 0.1% AEP plus climate change events, the site and access roads along Tyneside Road and Harbour Drive are flood free from fluvial sources.

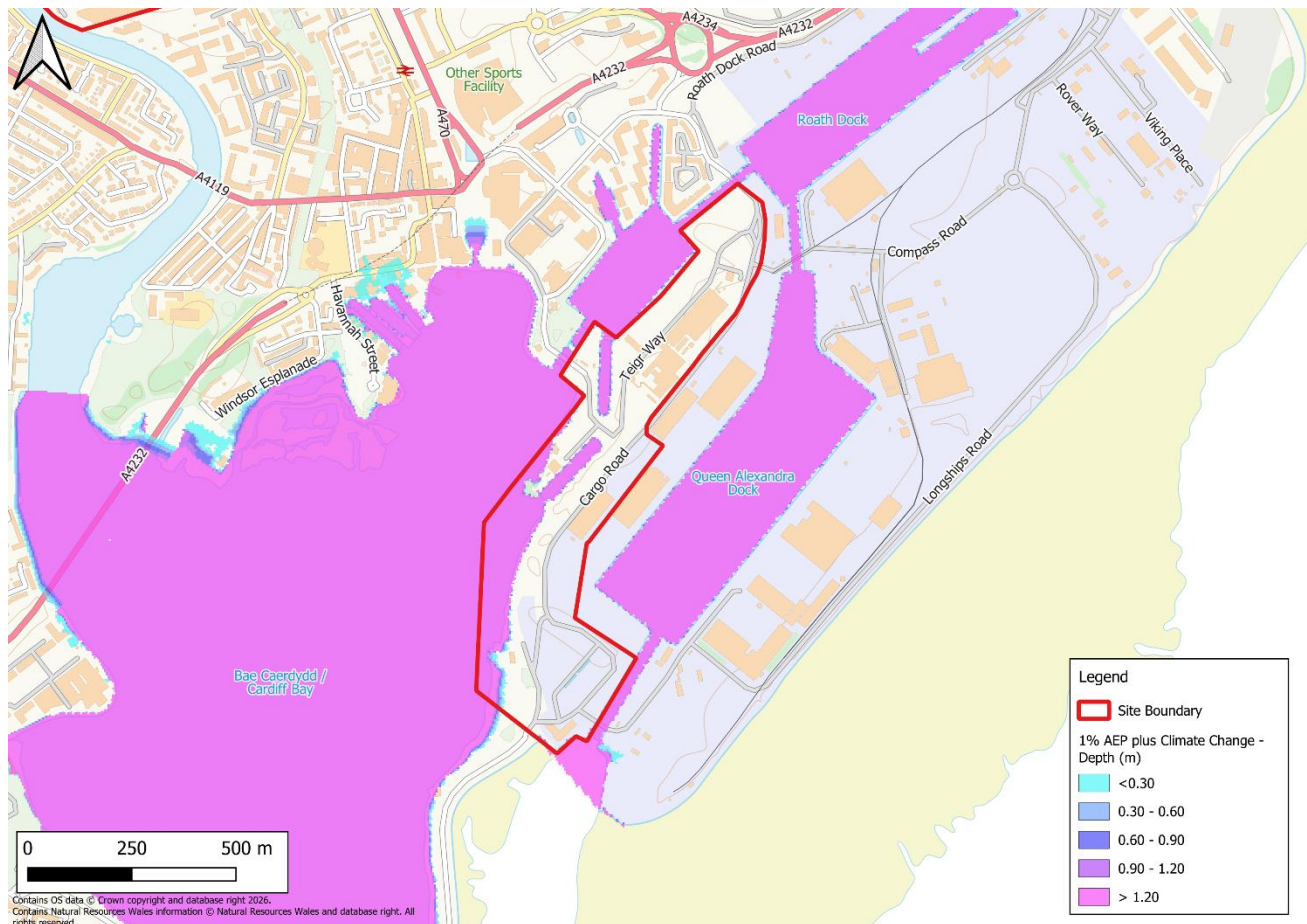


Figure 4-1: 1% AEP plus Climate Change - Flood depths - River Taff and Ely Model

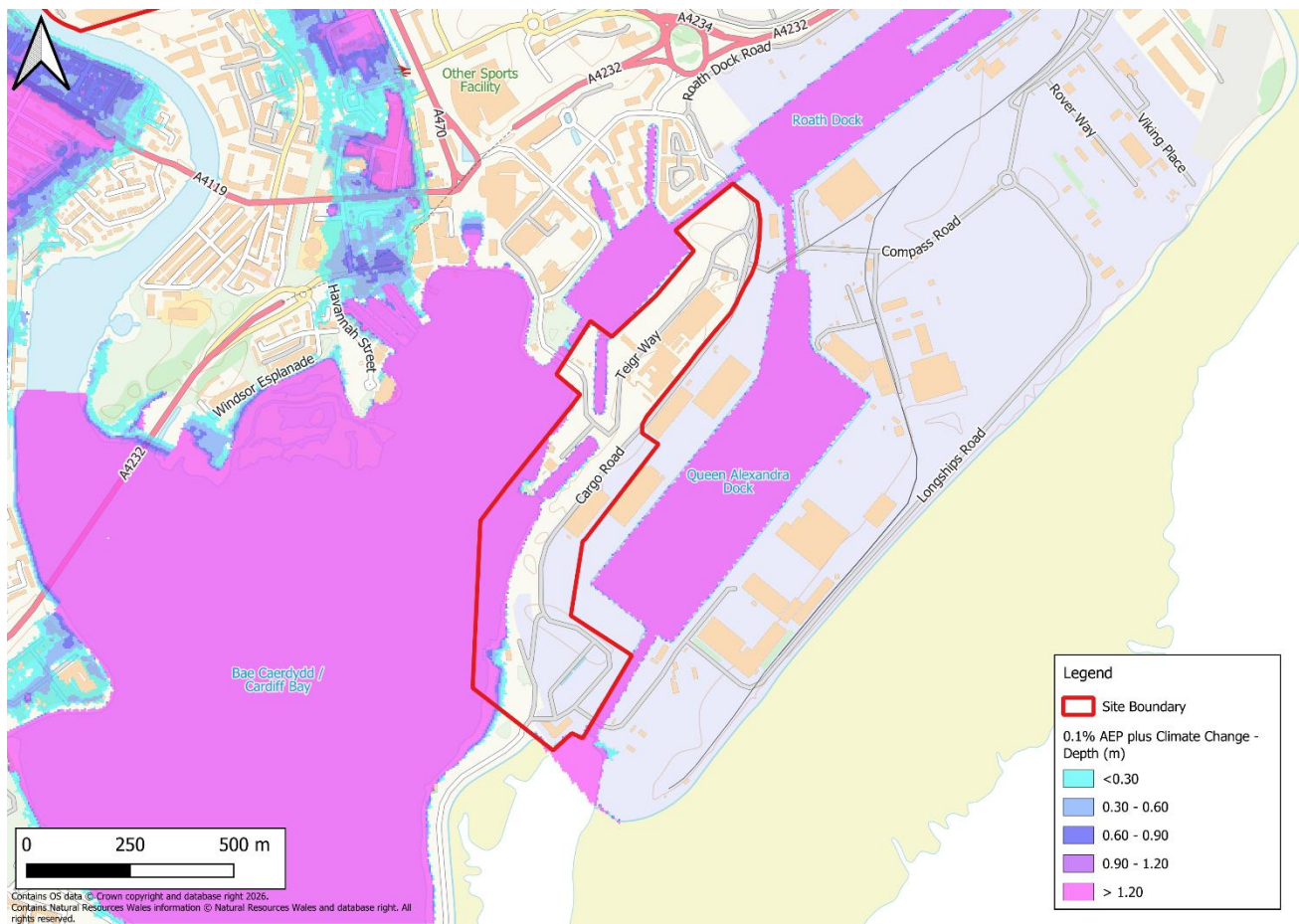


Figure 4-2: 0.1% AEP plus Climate Change - Flood depths - River Taff and Ely Model

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.

Figures 4-4, 4-5 and 4-6 present the peak flood depths for the Breach 1, Breach 2 and Breach 3 scenarios in the 0.1% AEP events respectively. Similarly to the baseline scenario, all floodwater within the site boundary is contained to waterbodies, with no overtopping predicted.

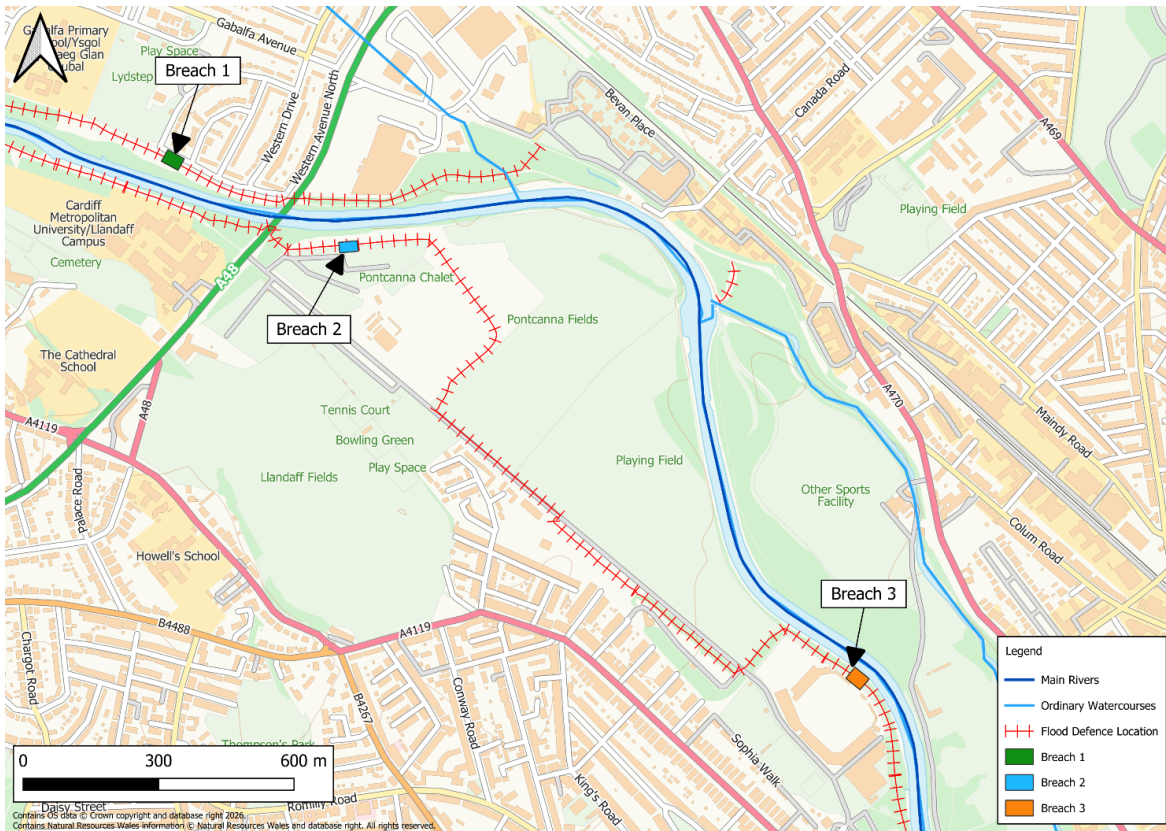


Figure 4-3: River Taff and Ely model breach locations

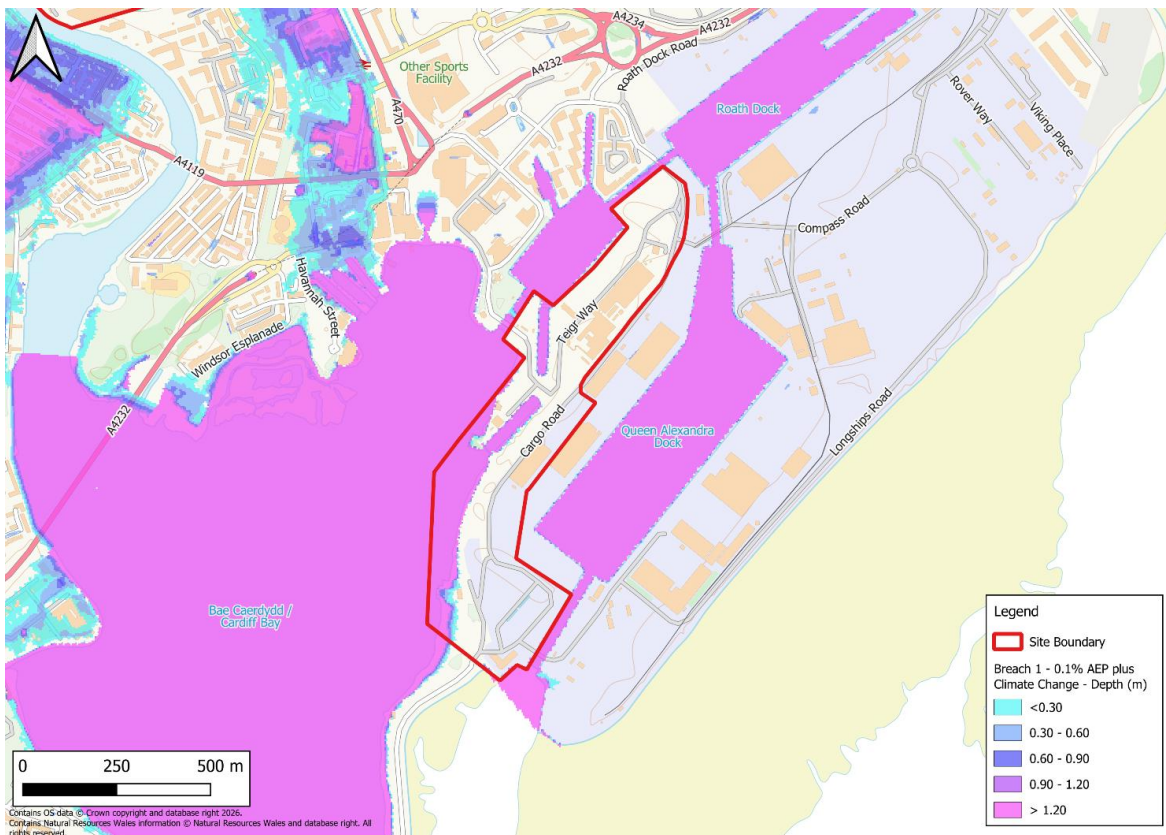


Figure 4-4: Breach 1 0.1% AEP plus Climate Change - Flood depths - Taff and Ely Model

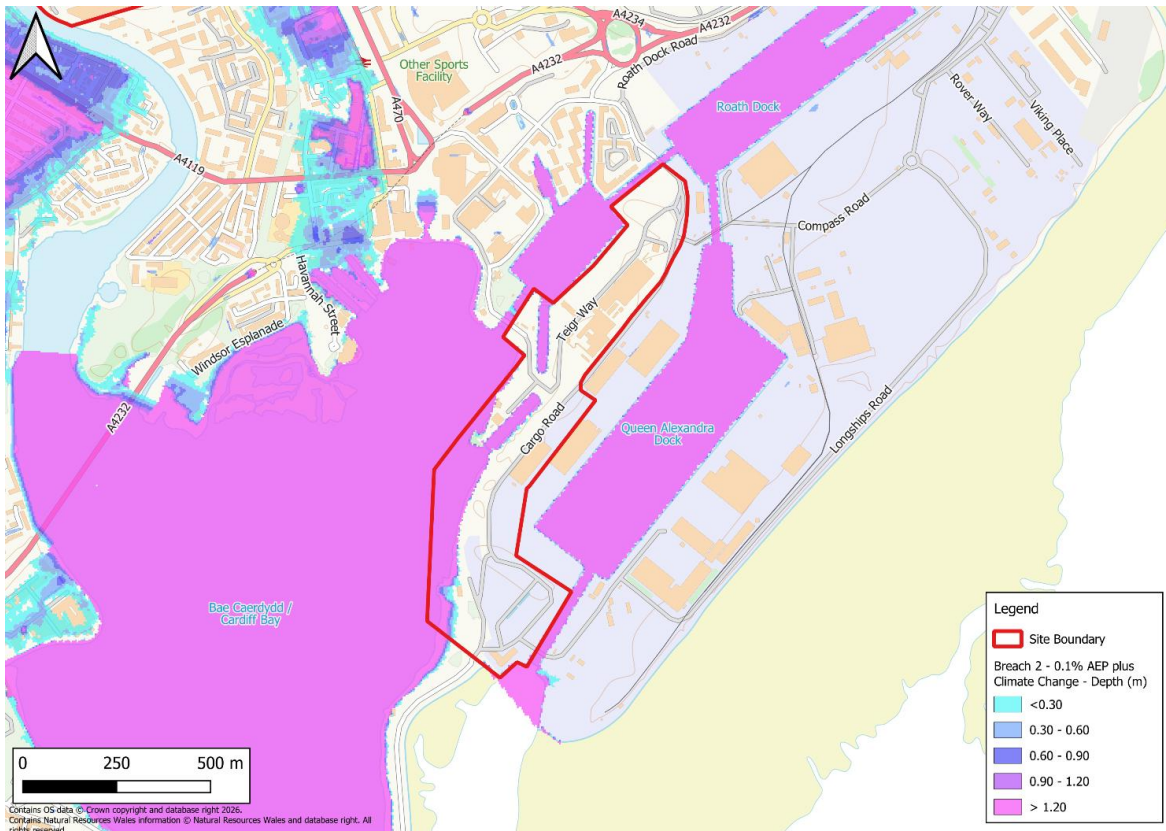


Figure 4-5: Breach 2 0.1% AEP plus Climate Change - Flood depths - Taff and Ely Model

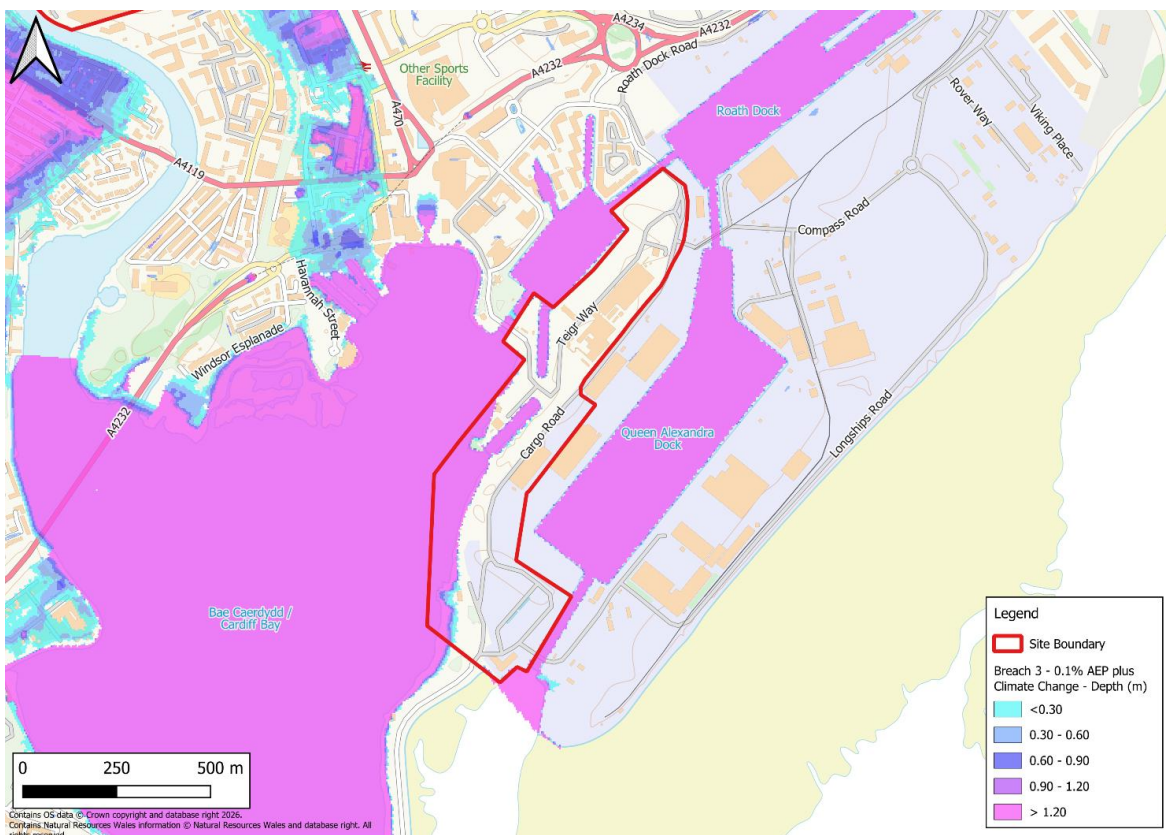


Figure 4-6: Breach 3 0.1% AEP plus Climate Change - Flood depths - Taff and Ely Model

4.2 Flood Risk from the Sea

The Flood Map for Planning - Flood Risk from the Sea (Figure 3-1) indicates that the development site is predominantly located within Flood Zone 1 for the Sea.

Parts of the site are located in Flood Zones 2 and 3. These areas are mainly focused on the existing waterbodies, including Roath Basin in the north and the areas closest to Cardiff Bay. However, an area of Flood Zone 3 extends from Queen Alexandra Basin in the south to Cargo Road, with an area in Flood Zone 2 extending further north. An area of Flood Zone 2 in the northeast extends to Teigr Way.

It is unclear why part of the site is not located within the TAN-15 Defended Zone given the wide-ranging protection from the Cardiff Bay 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 from this waterbody.

However, the water levels in Roath Dock, Roath Basin and Queen Alexandra Dock are managed through lock gates controlled by ABP. Due to the tidal nature of the area, there is limited modelling which shows the risk of flooding from the sea. Consequently, to better understand the risk of tidal flooding to the site from this source, and the potential implications of climate change, further assessment using extreme sea level estimates has been undertaken below.

4.2.1 Extreme Sea Level Estimates

Extreme sea level estimates have been taken from the Environment Agency Coastal Flood Boundary Conditions for UK Mainlands and Islands; Design Sea Levels (ref. SC060064). Extreme sea level predictions are provided at node locations at approximately 2km spacing along the coastline. Extreme sea levels have been used to indicate levels from the Queen Alexandra Dock, which is managed by the ABP via a lock gate, which could be overtopped during an extreme flood event.

For this assessment, the closest extreme sea level node is Node 412 located to the west of the coastline, approximately 3.5km from the site. The extreme sea level estimates for this node are shown in Table 4-2.

Table 4-2 Extreme Sea Level Estimates (present day)

Event	Predicted sea level (mAOD)
0.5% AEP (1 in 200)	7.79
0.1% AEP (1 in 1000)	8.16

For all coastal locations, future sea level rise is a major consideration and should be applied to the extreme sea level estimates. The Welsh Government Guidance on Climate Change Allowances for Planning Purposes suggests that a lifetime of 100 years should be assumed for residential developments and for other developments it is considered to be 75 years. As such, extreme sea level estimates have been uplifted to include sea level rise to 2101 to

represent 75-year lifetime of development, and 2126 to represent a 100-year lifetime of development.

The UKCP18 User Interface² has been used per Welsh Government Guidance on Climate Change Allowances for Planning Purposes (March 2026)³ to provide climate change uplifts. The cumulative increase in sea level has been calculated between 2017 and 2026 to uplift extreme sea-level estimates to the present day, and then furthermore to 2101 and 2126. The climate change uplifts applied to the extreme sea level estimates are shown in Table 4-3. Using the extreme sea level estimates and climate change uplifts, predicted tidal still water levels are provided in Table 4-4.

Table 4-3 Cumulative Sea Level Rise

Period	Cumulative sea level rise (m increase)
2017-2026	0.05
2017-2126	1.10

Table 4-4 Predicted tidal flood levels

Event (AEP)	2026 Still Water Level (mAOD)	2101 Still Water Level (mAOD)	2126 Still Water Level (mAOD)
0.5%	7.84	8.56	8.89
0.1%	8.21	8.93	9.26

When considering the lifetime of development of 75 years (the 2101 event) the predicted flood level is lower than ground level across the development site in all design events.

Accounting for a 100-year lifetime of development, land-based areas within the site boundary are predicted to remain flood-free during the 0.5% AEP plus climate change (2126) event. During the 0.1% AEP plus climate change (2126) event, a flood level of 9.26mAOD may result in flooding to the land-based areas of the site.

Areas adjacent to the docks, where ground levels reach a minimum of around 8.1mAOD, are predicted to experience flood depths of up to 1.16m in the extreme event. However, ground levels across most of the site exceed 9.0mAOD. As a result, the maximum flood depth expected across the majority of the site is approximately 260mm in the 0.1% AEP plus climate change event. This is well within the 600mm threshold for tolerable conditions set out in TAN-15 for residential development in this assessment period.

Mitigation may be applied to the site in the form of ground raising, resulting in the site being flood free in all design events. Due to the infinite volume of the sea, it is unlikely that flood waters shall be displaced by the proposed development.

² UK Climate Projections User Interface. <https://ukclimateprojections-ui.metoffice.gov.uk/ui/home>.

³ Welsh Government. Flood Consequences Assessment: Climate Change Allowances (2026)

<https://www.gov.wales/sites/default/files/publications/2026-03/climate-change-allowances-and-flood-consequence-assessments.pdf>

4.3 Flood Risk from Surface Water and Small Watercourses

The FMfP for Surface Water and Small Watercourses indicates that the site is predominantly located within Flood Zone 1. Two small areas are located in Flood Zone 2. However, one of these areas is associated with the dock north of Porth Teigr Way and is therefore not considered further. The second isolated area is associated with ponding of surface water in a localised topographic depression.

In the absence of detailed modelling, National Flood Hazard Mapping (NFHM) has been used to provide a further assessment of flood risk. 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.

Figure 4-7 shows that the site and access roads are predicted to be flood free during the 1% AEP plus climate change event.

As illustrated in Figure 4-8, small areas of shallow ponding (<280mm) are shown within topographic depressions on Teigr Way, Cargo Road and along the western site boundary. 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).

Access and egress are possible during both the 1% AEP and 0.1% AEP plus climate change events via Tyneside Road and Harbour Drive.

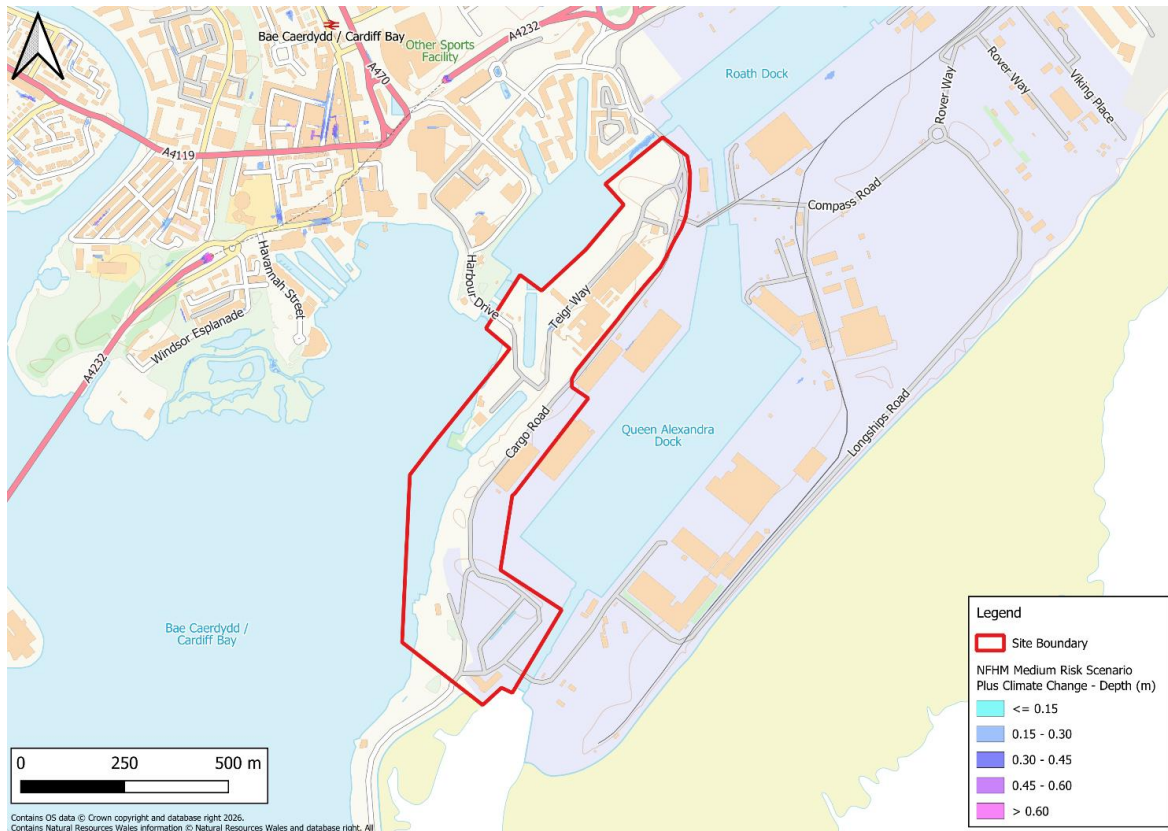


Figure 4-7: Flood Risk from Surface Water - 1% AEP + Climate Change - Depths

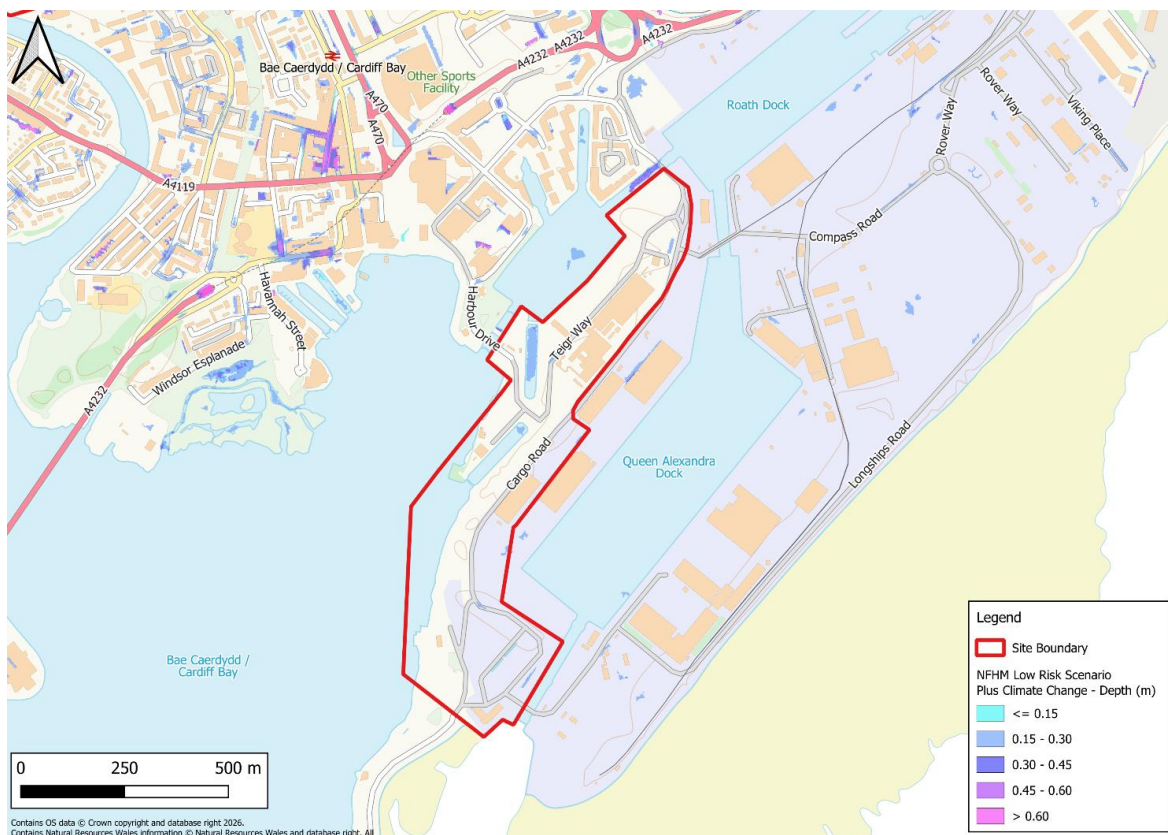


Figure 4-8 Flood Risk from Surface Water - 0.1% AEP + Climate Change - Depths

4.4 Flood Risk from Reservoirs

Figure 4-9 below shows that the site is partially at risk of flooding from reservoir failure of the Pontsticill and Beacon Reservoirs. The areas at risk are those close to the existing waterways and dock features on the site. However, it is worth noting that reservoir flooding is extremely unlikely to occur as all large reservoirs must be inspected and supervised by reservoir panel engineers under the Reservoirs Act 1975. Given the site's location in central Cardiff, it is unlikely that the risk categorisation of the reservoir would be re-categorised as a result of the proposals.

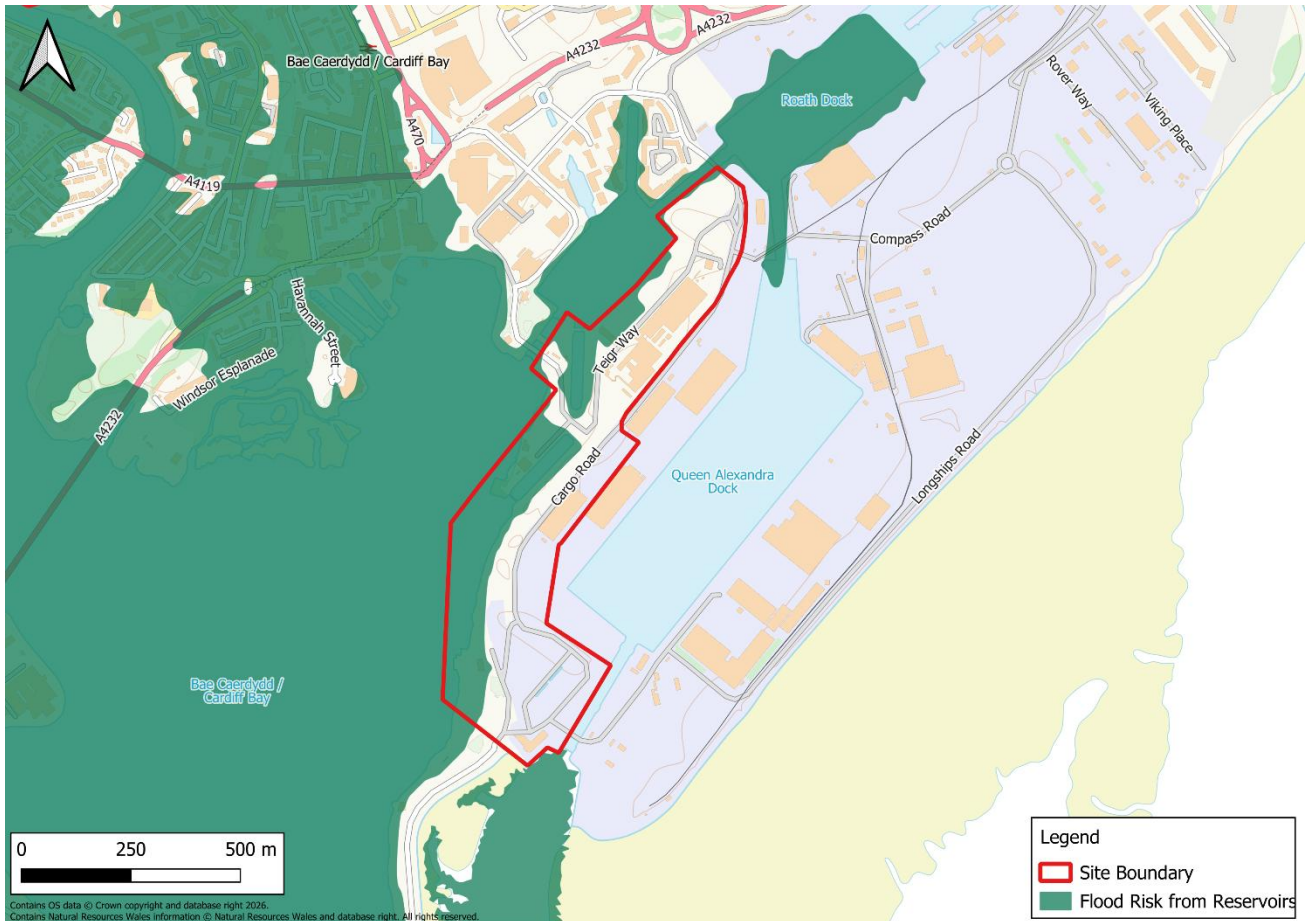


Figure 4-9: Reservoir flood extent

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 tidal, fluvial and surface water and small watercourse sources, which are reflected in the mapped Flood Zones across the site. 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 the TAN.

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 within Flood Zone 1 of the Flood Map for Planning. Areas of Flood Zones 2 and 3 are confined to the artificial waterbodies within the site, and it is currently understood that there are no proposals to modify the existing docks.

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

Applications and proposals should be considered against the flood zones in which they are proposed. 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."

All forms of development are permissible in Flood Zone 1.

Areas within Flood Zones 2 and 3 are considered suitable for water-compatible uses. Any built element of the water compatible development that may be occupied by people must meet the Acceptability Criteria as set out in Section 11 of TAN-15. Development of this site must be supported by a Flood Consequences Assessment.

5.2 Flood Risk from the Sea

The Flood Map for Planning - Flood Risk from the Sea indicates that the development site is predominantly located within Flood Zone 1 for the Sea. All forms of development are permissible in Flood Zone 1.

Parts of the site are located in Flood Zones 2 and 3. These areas are mainly focused on the existing waterbodies e.g. the Roath Basin in the north and the areas closest to Cardiff Bay.

However, an area of Flood Zone 3 extends from Queen Alexandra Basin in the south to Cargo Road with an area in Flood Zone 2 extending further north. An area of Flood Zone 2 in the northeast extends to Teigr Way.

It is possible to allocate sites within Flood Zone 2 where the proposals assist the implementation of the strategy of the LDP to regenerate or revitalise existing settlements or to achieve key economic or environmental objectives. Section 10.18 of TAN-15 states:

"In Zone 2 allocations may be made for new development and redevelopment of any vulnerability that is necessary to implement the strategy of an LDP, a strategy to regenerate or revitalise existing settlements or to achieve key economic or environmental objectives, provided that a Strategic Flood Consequences Assessment has identified an acceptable level of risk."

Where proposals for redevelopment include residential use, local authorities should ensure that such uses do not occur at ground floor level, they will also need to be compatible with the tolerable conditions set out in section 11 and exhibit resilient flood design as described in section 13. Other proposals will only be appropriate if they are essential to the Development Plan Strategy to regenerate an existing settlement or achieve key economic or environmental objectives.

For Redevelopment sites in Flood Zone 3, TAN-15 states the following:

Allocations for redevelopment in zone 3 should be avoided and may only be made in exceptional circumstances where it is essential to the strategy of an LDP or where it addresses national security or energy security needs, or public health or it mitigates the impacts of climate change. Planning authorities must not allocate sites for highly vulnerable redevelopment unless there is a clear commitment that flood mitigation measures will be provided to protect those sites.

Across the site, a sequential approach to development should be applied, locating the majority of built form development within Flood Zone 1 where all forms of development are acceptable in principle. Development should only be sited in areas of Flood Zone 2 where tolerable depths of flooding can be achieved in the extreme event. Areas of Flood Zone 3 may be viable for water compatible development. This sequential approach to development is supported within Section 15.5 of TAN-15.

Mitigation may be applied to the site in the form of ground raising, resulting in the site being flood free in all design events. Any such works should be fully detailed in a site specific FCA, considering the potential for detriment to third parties. It is for the LPA to determine if residential development shall be permitted at ground floor level where mitigation measures within areas of Flood Zone 2 result in a flood free development plateau.

With regard to Less Vulnerable development, the proposed development site is flood free in all design events, thereby meeting the requirements of Figures 5 and 6 of TAN15.

5.3 Flood Risk from Surface Water and Small Watercourses

The development site is predominantly located within Flood Zone 1 for surface water and small watercourses. Two small areas are located in Flood Zone 2. However, one of these areas is associated with the dock north of Porth Teigr Way. The second isolated area is associated with ponding of surface water in a localised topographic depression.

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 TAN-15 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.

Access and egress are key considerations within TAN-15. Access and egress are possible via Tyneside Road and Harbour Drive during both the 1% AEP and 0.1% AEP events.

Given the scale and nature of the surface water and small watercourse risk to the site, it is likely that a standalone FCA for surface water and small watercourses shall not be required. Instead, flood risk can be appropriately addressed through a comprehensive Flood Risk and Surface Water Drainage Strategy to support the planning application.

With respect to the subject site, it is likely that the proposals shall meet the aims and objectives of TAN-15 with regard to surface water and small watercourse risk.

6 Summary and recommendations

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

The site is predominantly located within Flood Zone 1 for flood risk from rivers, sea, and surface water and small watercourses.

Areas of Flood Zones 2 and 3 for rivers are confined to the artificial waterbodies within the site.

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 the docks and topographic depressions.

Parts of the site are located in Flood Zones 2 and 3 for the sea, mainly associated with existing waterbodies. An area of Flood Zone 3 extends from Queen Alexandra Basin in the south to Cargo Road with an area in Flood Zone 2 extending further north. An area of Flood Zone 2 in the northeast extends to Teigr Way.

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 good site design, and if required, the use of flood resilience measures.

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 an 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. It is advisable for residential development to be located in areas of Flood Zone 1. Less Vulnerable development may have a greater development extent due to the shorter lifetime of development to be considered. Areas of greater flood depths should be considered for water compatible uses, such as public open space.
- Measures such as ground raising may mitigate the risk of tidal flooding to the site. Such measures should be detailed, and the impact to third parties demonstrated, in a site specific FCA.
- 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.

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