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Cardiff Council Strategic Flood Consequences Assessment - Land at Wentloog Avenue (83)

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Contract

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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. Ella Courtney of JBA Consulting carried out this work.

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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 to 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.

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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 'Land at Wentloog Avenue', 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	Land at Wentloog Avenue
Site ID	83
Site area (ha)	15.03
Existing land use	Brownfield land
Purpose of development	Residential
OS NGR	ST 24369 79575
Access location	Access from Wentloog Avenue



Figure 2-1 Proposed Development Site

2.1 Development proposals

The proposed development is for residential use. Residential development is classed as Highly Vulnerable development. The site is classified as greenfield.

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.

Ground levels across the site are variable and display a patchy distribution, with no clearly defined single direction of fall. Levels across the site range from approximately 4.43 mAOD to 8.02 mAOD. The highest ground levels are typically located along the northern and southern boundaries of the site, including an elevated corridor to the north, whilst lower lying areas are more centrally located.

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

The topography is characterised by a series of shallow depressions and linear features, representing a network of channels and reens extending through the site. These features locally influence ground levels, resulting in a straight surface profile and localised low points. The presence of these drainage features reflects the managed lowland character of the site, and the Gwent Levels on which it is situated, and indicates areas where surface water routing and storage may occur.

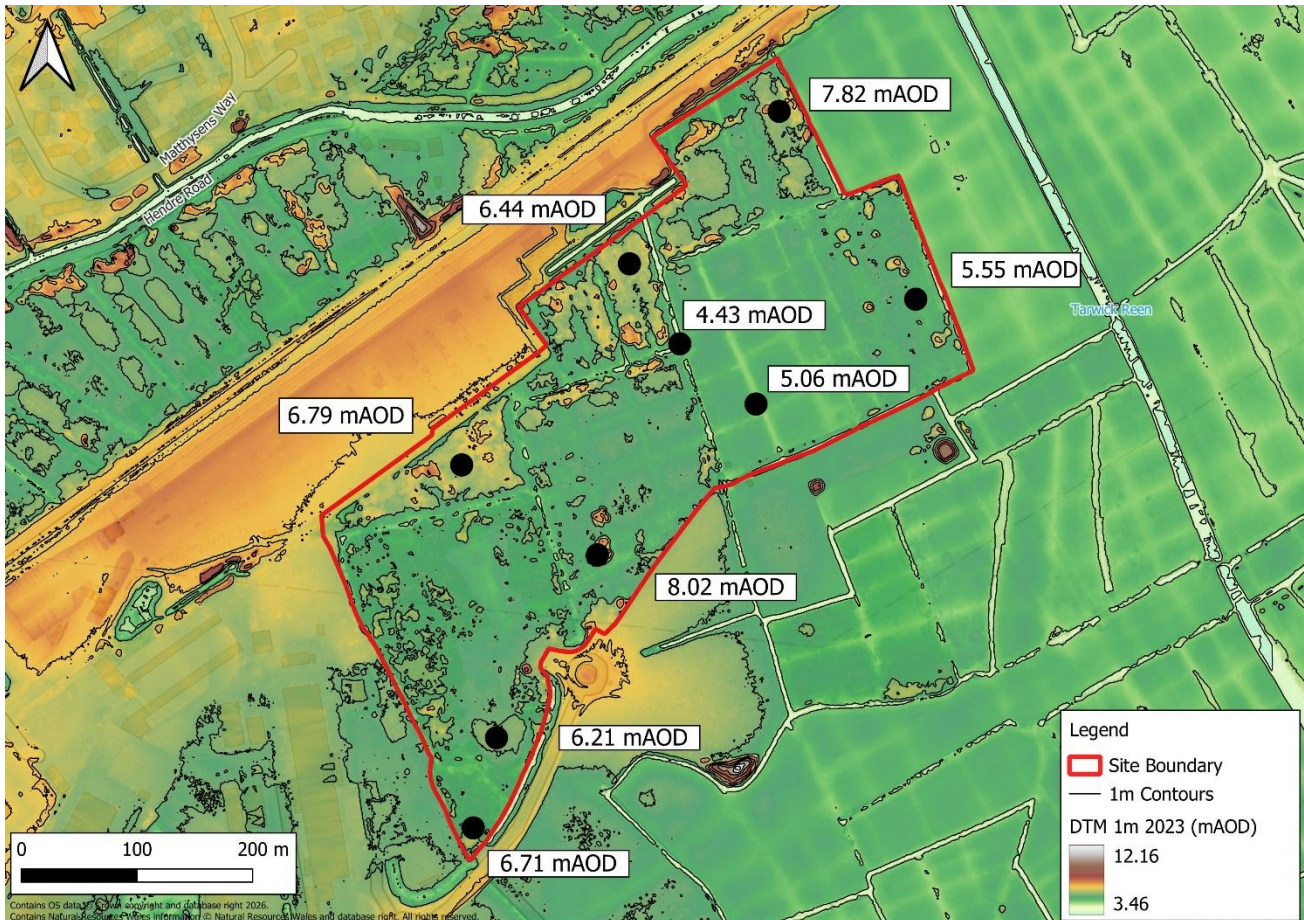


Figure 2-2 1m LiDAR

2.3 Watercourses and Flood Defences

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

A network of ordinary watercourses crosses the proposed development site. Tarwick Reen, an NRW Main River, is located approximately 0.1km to the east of the development site. Tabbs Gout and Back Ditch NRW Main Rivers are located 1.1km to the south of the development site.

The Severn Estuary is located approximately 1.4km to the south of the site.

The site is located within an area that benefits from flood defences for the sea, by formal coastal embankments owned and maintained by NRW.

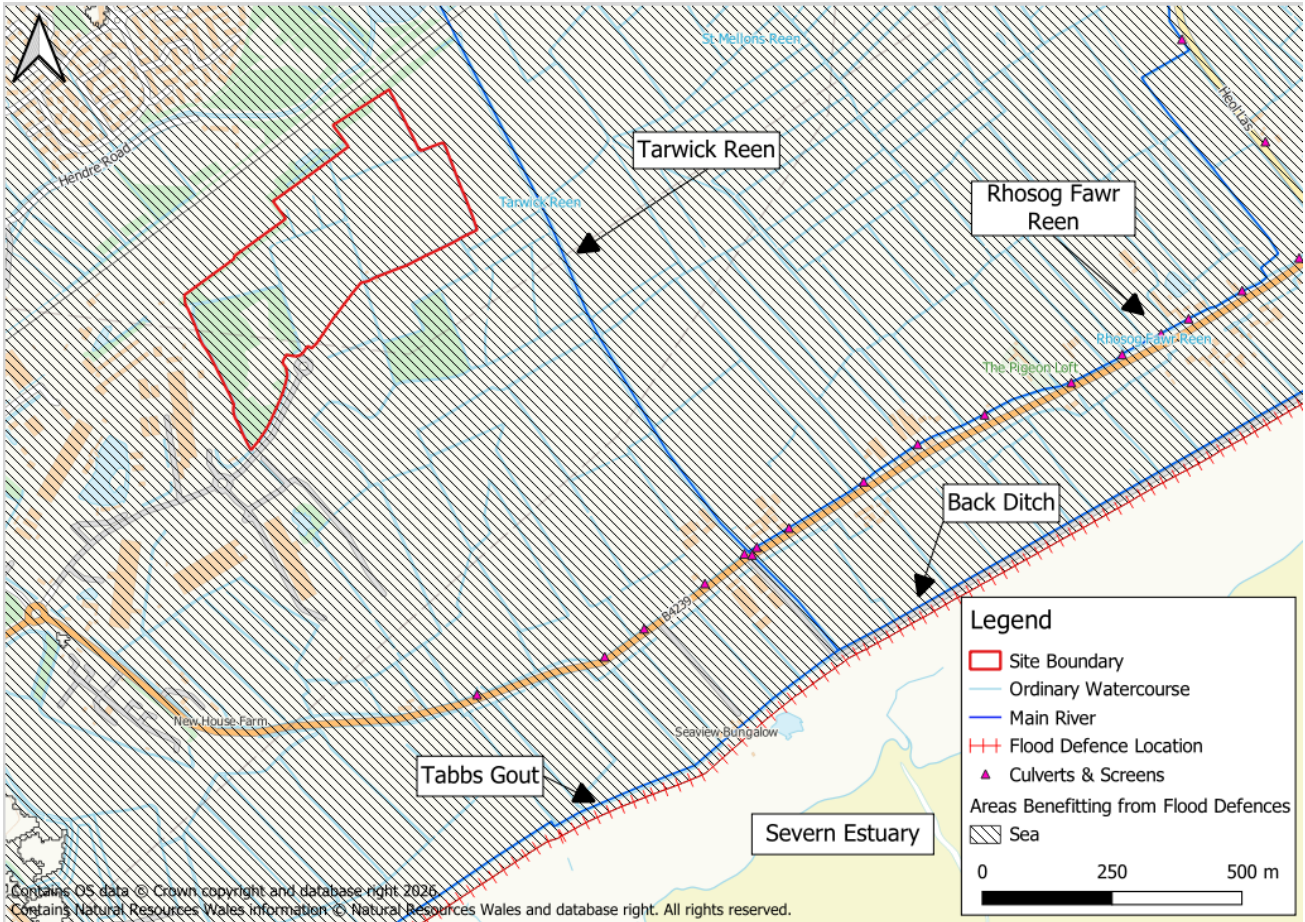


Figure 2-3 Watercourses and Flood Defences

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	Residential
Form of Development	New Development
Vulnerability Classification	Highly Vulnerable
Flood Map for Planning - Rivers	Flood Zone 2 - shown in Figure 3-1
Flood Map for Planning - Sea	Flood Zone 3 - shown in Figure 3-2
Flood Map for Planning - Surface Water and Small Watercourses	Flood Zone 2 and 3 - shown in Figure 3-3.

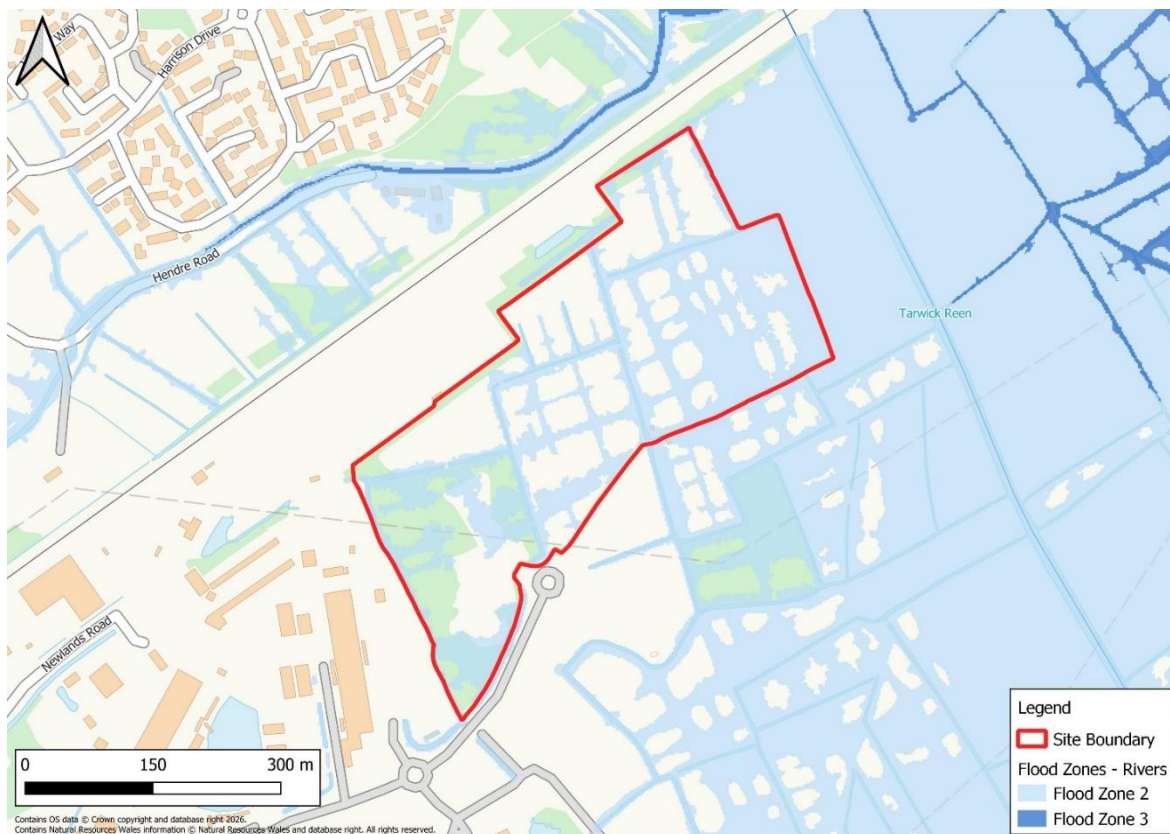


Figure 3-1 Flood Map for Planning - Rivers

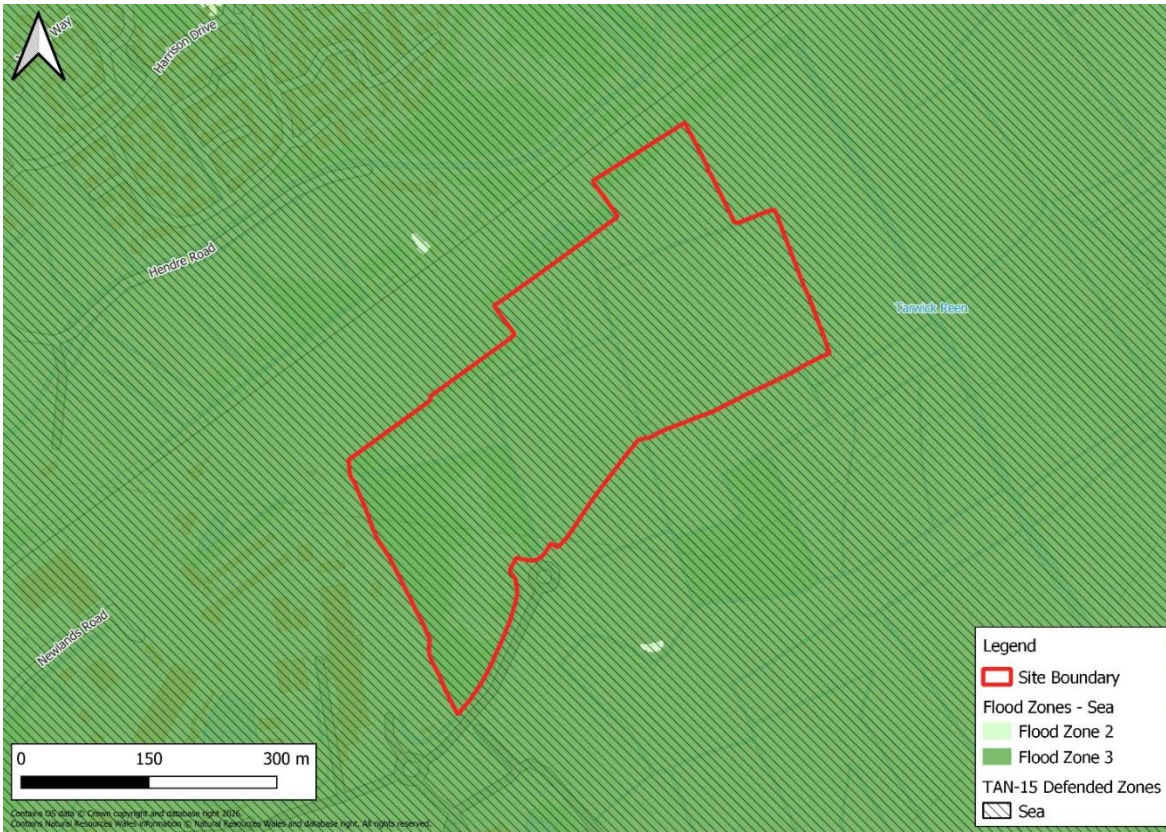


Figure 3-2 Flood Map for Planning - Sea

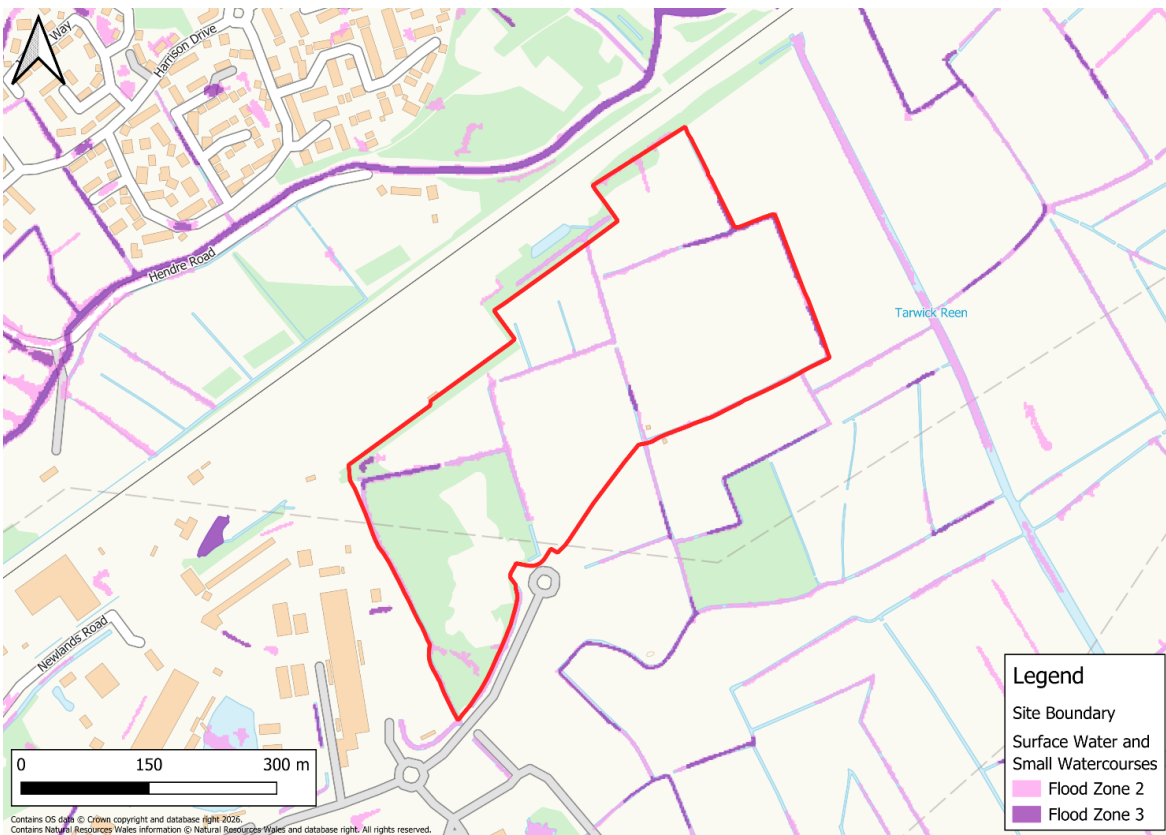


Figure 3-3 Flood Map for Planning - Surface Water and Small Watercourses

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 to moderate risk of flooding from fluvial sources and is further assessed in Section 4.2.1
Flood Risk from the Sea	✓	The site is at moderate risk of flooding from the sea and is further assessed in Section 4.1.
Flood Risk from Surface Water and Small Watercourses	✓	The site is at low to moderate risk of surface water flooding has been further assessed in Section 0.
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 not located within an area at risk of reservoir flooding. Therefore, it is concluded that the risk of flooding is very low .
Flood Risk from Sewers	✓	The Cardiff SFCA has identified there to be 2 historic flood incidents within the Trowbridge Electoral District. However, the site is greenfield and is unlikely to have any sewerage infrastructure which could overflow and cause sewer flooding. Therefore, it is concluded that the risk of flooding is very low .

4.1 Flood Risk from Rivers

The FMfP - Flood Risk from Rivers (Figure 3-1) indicates that the site is partially located within Flood Zone 2 for this flood source.

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 fluvial flood risk to the site. The NFHM is used to define the FMfP Fluvial 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, the development site is flood free, and therefore a figure hasn't been provided.

During the 0.1% AEP plus climate change event, flood extents are shown to fill the on-site reens, with some overtopping resulting in shallow flooding across adjacent areas to depths of approximately 200mm in the west of the site, as shown in Figure 4-1.

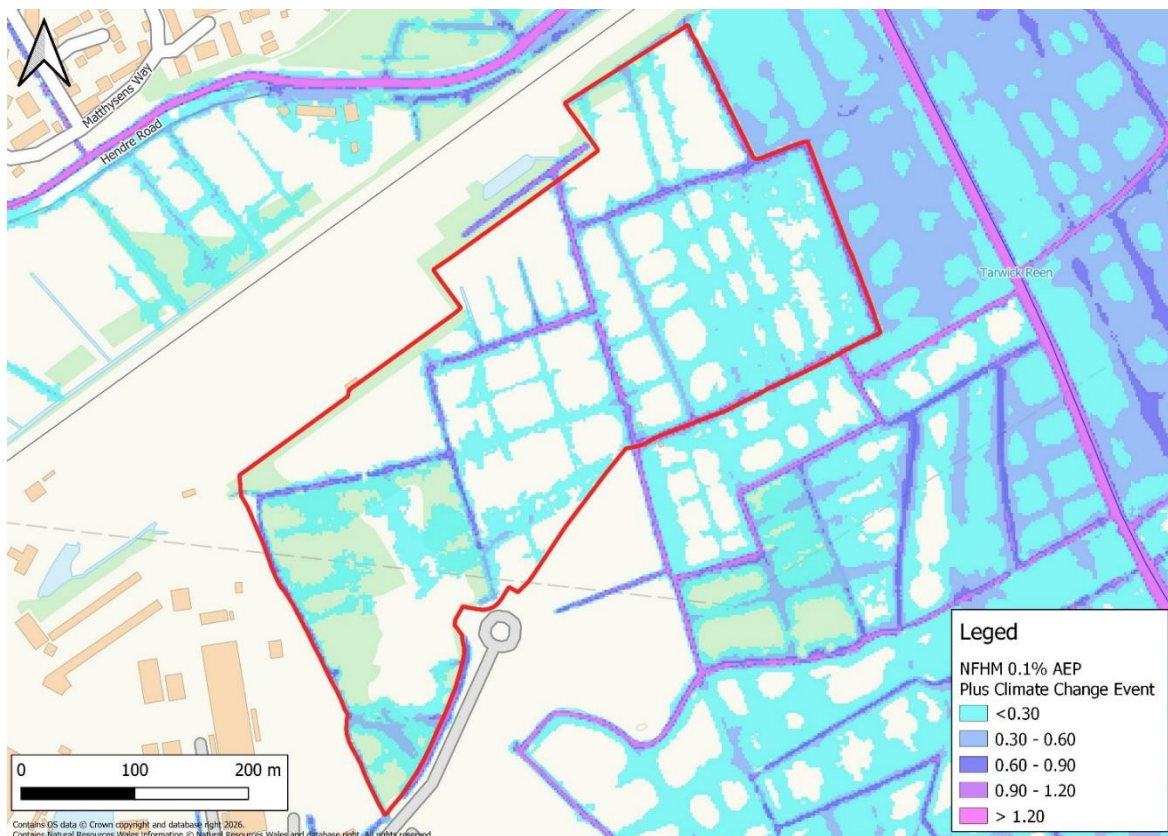


Figure 4-1 NFHM 0.1% AEP Plus Climate Change Event

4.2 Flood Risk from the Sea

4.2.1 Baseline flood risk

The Flood Map for Planning - Flood Risk from the Sea (Figure 3-1) indicates that the development site is entirely located within the TAN-15 Defended Zone for the Sea. The site is located within a TAN-15 Defended Zone due to the area being protected from tidal flooding by the current coastal defences located across the Wentloog Levels, as detailed in Section 2.3.

The proposed development site is located within an area covered by the Caldicot and Wentloog hydraulic model, initially prepared by HR Wallingford in 2015, and further updated by JBA, most recently on behalf of Cardiff Council, in March 2022. The March 2022 updates included:

- Updated climate change allowances to align with Welsh Government Guidance
- Updated extreme sea level predictions
- Utilisation of the most recent modelling software and modelling approaches

This site assessment utilises the 2022 baseline model to represent the flood risk in the 2122 0.5% AEP and 2122 0.1% AEP events, accounting for a 100-year lifetime of development. Whilst the modelling used does not provide outputs for exactly 100 years from now (2126), the 2122 scenario is the closest available modelled epoch to the end of the development lifetime and is therefore considered an appropriate and representative output. Furthermore, the four-year difference between the latest modelling and 2126 is negligible within the context of the future multi-decadal climate change projections.

It is noted that Welsh Government published updated climate change guidance in March 2026, but these did not result in significant changes in relation to sea level rise.

The detailed Caldicot and Wentloog hydraulic model shows that during the 2122 0.5% AEP Plus Climate Change Event the development is predominantly flood free with shallow flood depths of up to 300mm, as shown in Figure 4-2. These flood depths are shown to follow the current site topography and onsite drainage channels/reens.

During the 2122 0.1% AEP Event, the flood extent and depths largely increase covering most of the site, with flood depths of up to 1.33m in the southwest of the site as shown in Figure 4-3.

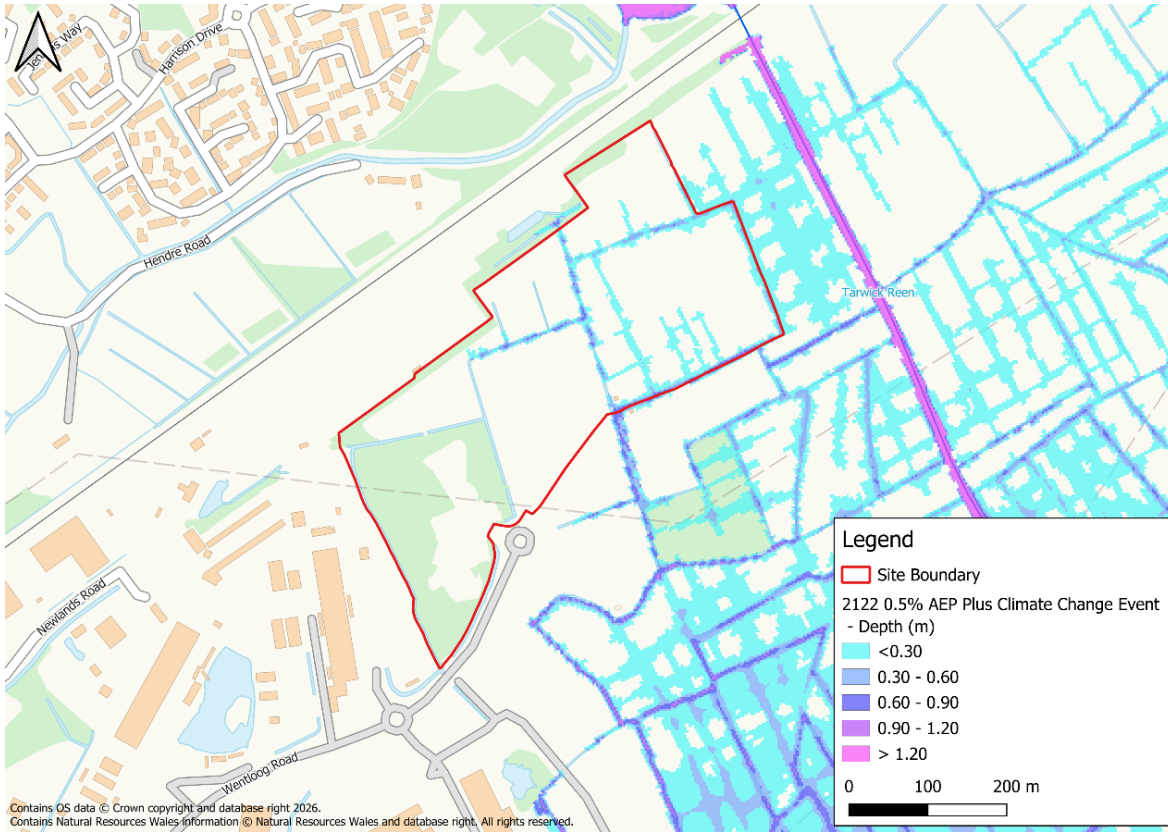


Figure 4-2 2122 0.5% AEP plus Climate Change - Flood Depths

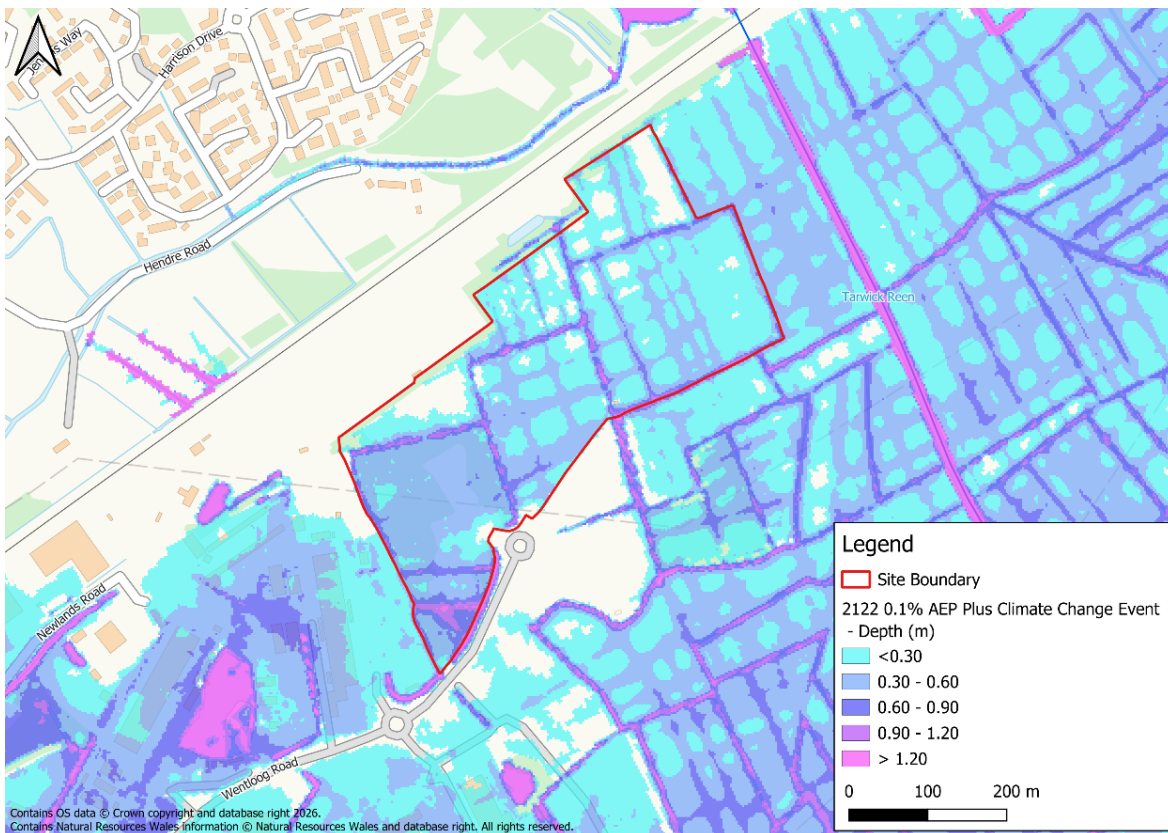


Figure 4-3 2122 0.1% AEP plus Climate Change - Flood Depths

4.2.2 Breach

As the site currently benefits from being in a TAN-15 Defended Zone from the sea, 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.

The 2022 JBA update to the Wentloog model included the consideration of breach to the coastal defences. The model simulated a breach along the Wentloog levels with a total of 8 breach locations. This approach is considered appropriate as due to the inherently low probability of a breach occurring, there is no single point along an embankment that can be identified as 'most likely' to fail. Embankments tend to have long continuous sections with a uniform construction and ground conditions. In theory, a breach could occur at multiple locations.

Simulating multiple breach scenarios ensures a conservative assessment of the residual risk and captures a range of flood pathways and hazard outcomes that could occur in the unlikely event that a breach should occur. Breach scenario 'B6' of the Wentloog model has therefore been used as a conservative approach to assessing the risk at this location.

In 2026, JBA further updated the breach scenario in the Wentloog model with updated extreme sea level predictions, accounting for exactly a 100-year lifetime of development (2126). Therefore, the 2126 0.5% and 0.1% AEP breach events have been used to inform this assessment.

During the 0.5% AEP Plus Climate Change Event flood depths of up to 1.29m are predicted in the southwest of the development site as shown in Figure 4-4.

During the 0.1% AEP Plus Climate Change Event flood depths across the Wentloog levels extensive, and flood depths of up to 1.75m are predicted in the southwestern area of the development.

The risk of flooding across the Wentloog levels is widespread during this event, however due to regular inspections and scheduled maintenance of flood defences, a breach is regarded as very unlikely.

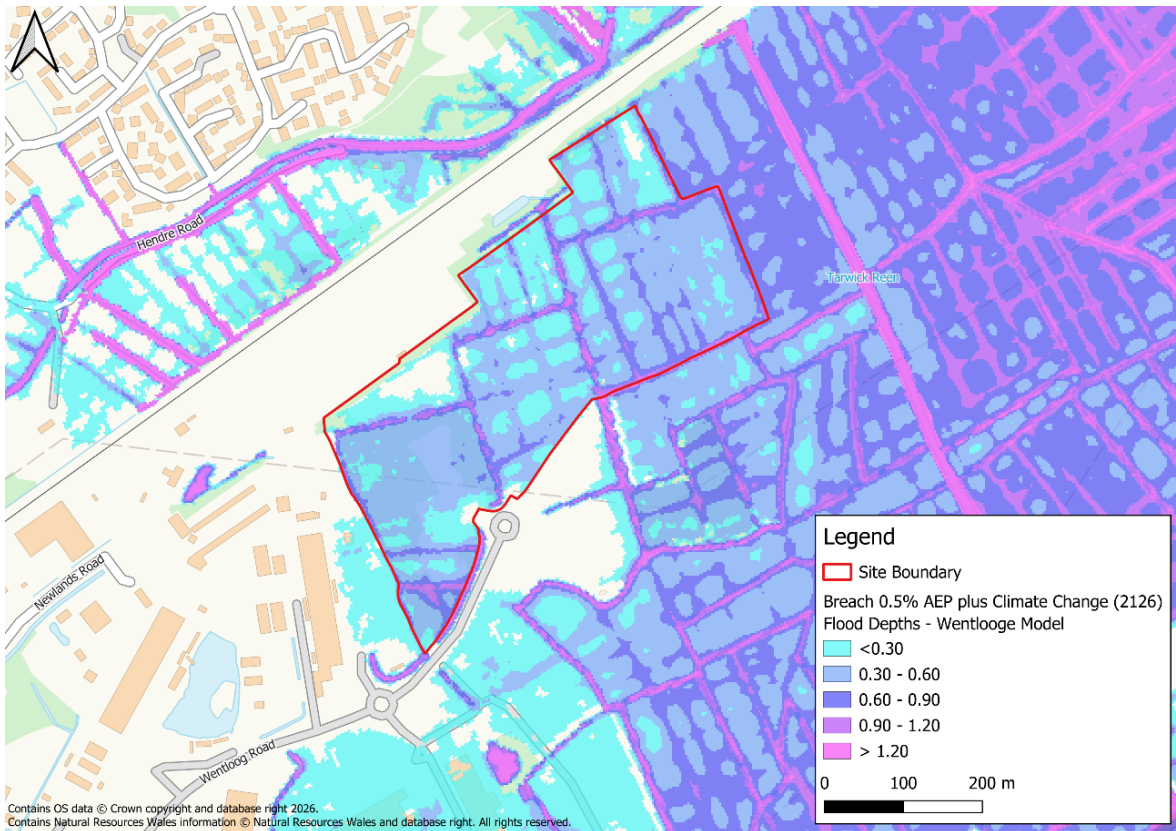


Figure 4-4 Breach 2126 0.5% AEP plus Climate Change - Flood Depths

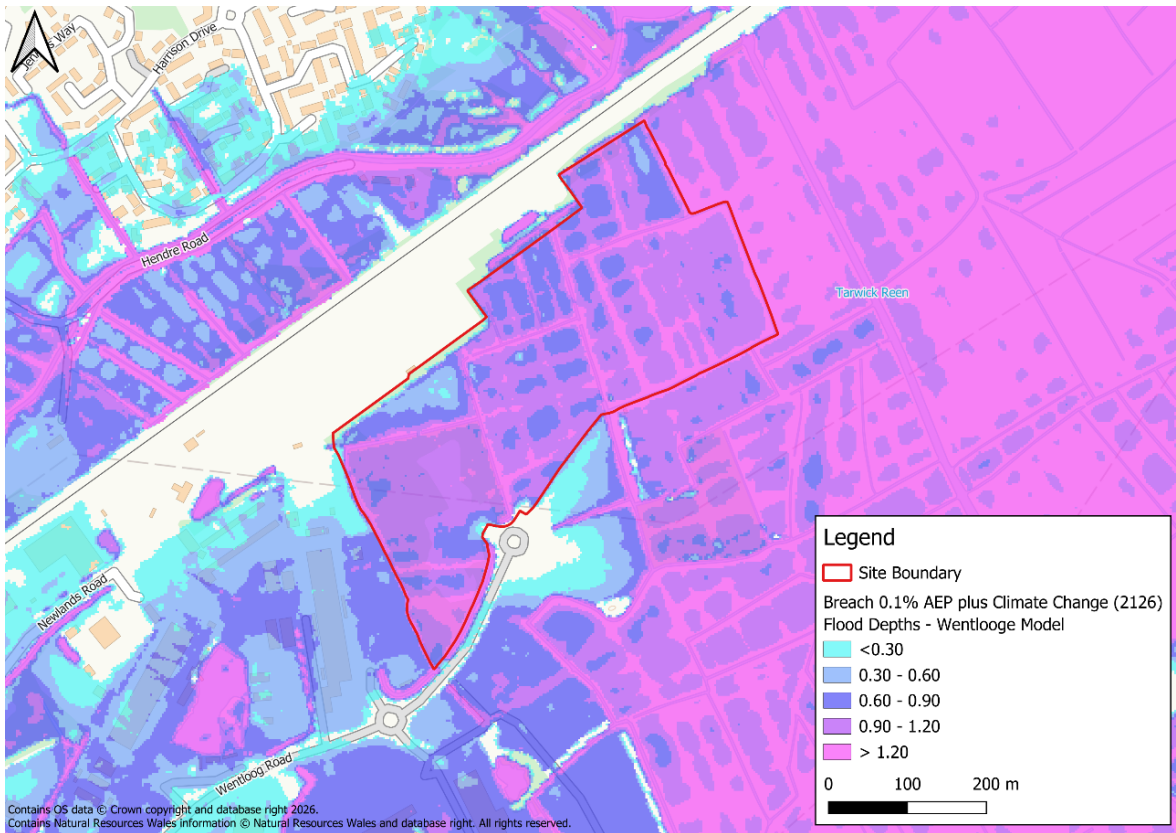


Figure 4-5 Breach 2126 0.1% AEP plus Climate Change - Flood Depths -

4.3 Flood Risk from Surface Water and Small Watercourses

As shown in Figure 3-3, the FMfP for Surface Water and Small Watercourses indicates that the site is predominantly located within Flood Zone 1. Localised areas fall within Flood Zones 2 and 3, associated with onsite drainage channels and reens.

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.

During the 1% AEP Plus Climate Change event, shown in Figure 4-6, most of the development site is predicted to be flood free. During this event, flood depths are confined to the onsite channels and is not shown to overtop.

Figure 4-7 shows that during the 0.1% AEP plus climate change event, similar to the 1% AEP Plus Climate Change Event much of entire site remains flood free. The flood extent has increased to further follow the onsite on-site reens demonstrating effective land drainage across the site.

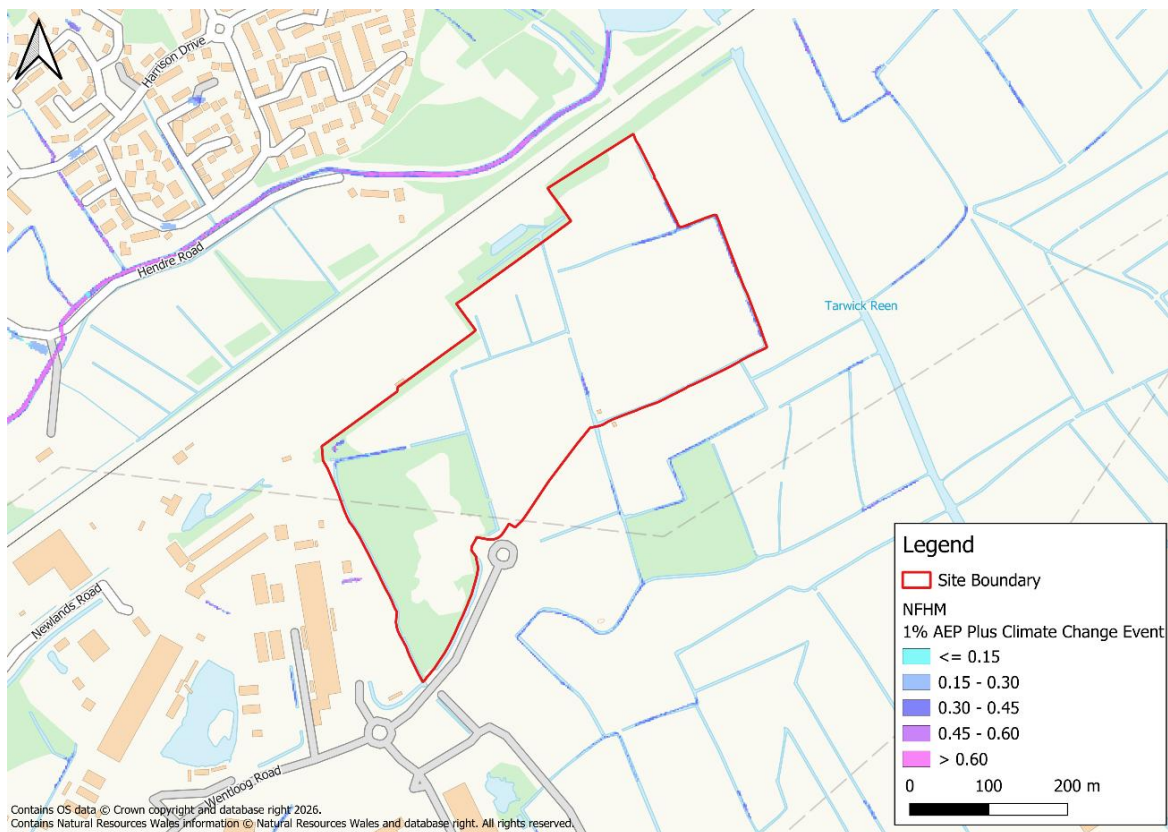


Figure 4-6 Flood Risk from Surface Water - 1% AEP + Climate Change - Depths

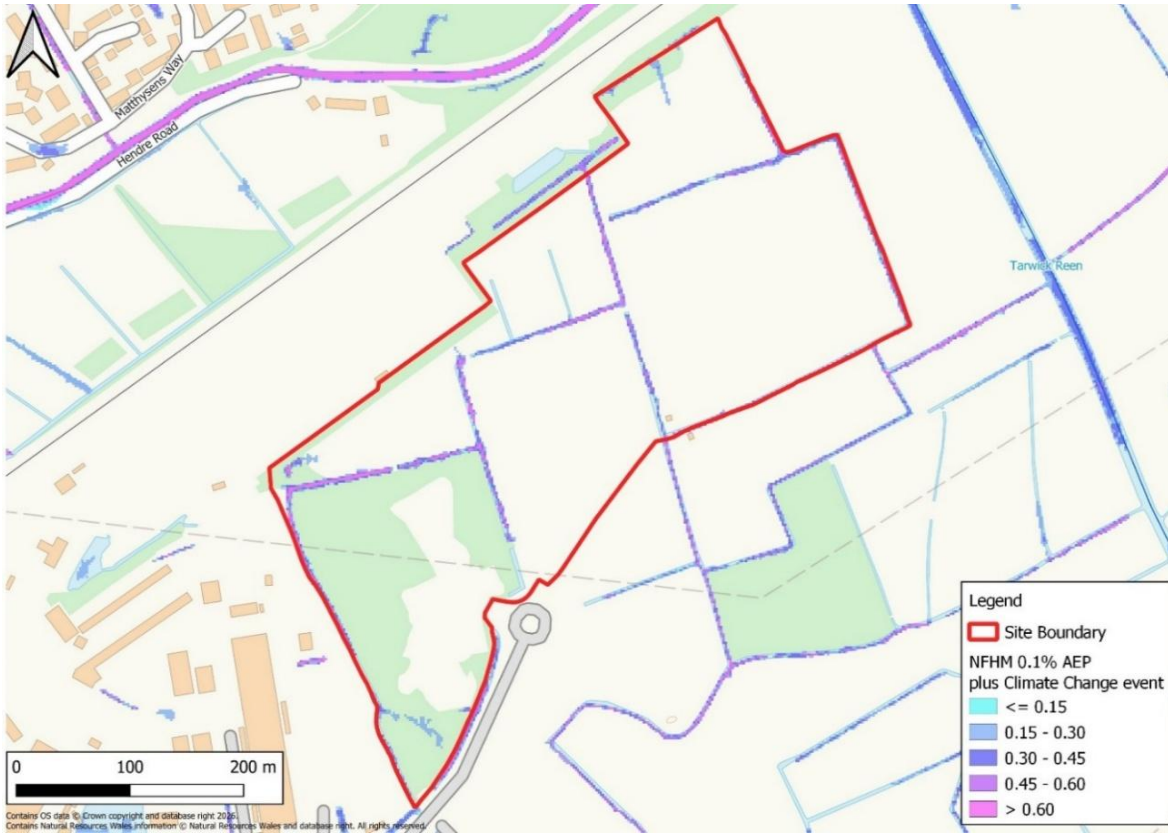


Figure 4-7 Flood Risk from Surface Water - 0.1% AEP + Climate Change - Depths

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. 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.

5.1 Flood Risk from Rivers

Areas across the development site are located in Flood Zone 2 of the FMfP for Rivers. 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."

Further analysis using the NFHM has shown the development site is flood-free during the 1% AEP plus climate change event, and during the 0.1% AEP plus climate change event the flood extent is shown to correlate with onsite topography and drainage channels. Predicted flood depths are shallow, and within the tolerable conditions of Figure 6 of TAN-15.

As the proposed use for the site is of a new, residential development. It is envisioned that the site will be raised and levelled, significantly reducing the appearance of onsite topographic depressions likely caused by agricultural processes. This will significantly reduce the flood extent, along with opportunities to widen and enhance onsite drainage channels. Any works should ensure that there is no impact to flood risk to third parties as a result of the proposals.

5.2 Flood Risk from the Sea

The proposed development is located within a TAN-15 Defended Zone for the Sea, with a standard protection of up to present day 1 in 200-year event provided.

When considering a site for allocation with the LDP, TAN-15 sets out the requirements for the form of development in any given flood zone. For 'New Development' on Greenfield land within a TAN-15 Defended Zone, Section 10.15 of TAN-15 states:

"As a general principle LDPs should seek to avoid intensification of uses in Defended Zones and replacement buildings or redevelopment schemes should be broadly the same scale as existing uses. Greenfield sites can provide important flood attenuation opportunities and have the ability to store a manage water in the event of flooding, they should not be built on unless they are replaced by suitable alternative sites which clearly contribute to flood management enhancement."

Section 10.16 of TAN-15 states:

"Before allocating land in Defended Zones, Local Planning Authorities will have undertaken a full flood risk assessment through an SFCA, and other additional studies, if necessary, to understand the probability and potential consequences of flooding in the area. They must understand the risk from all sources including rivers, sea surface and ground water. Based on this evidence Authorities should seek to prioritise redevelopment in areas of lower flood risk."

The risks associated with tidal flooding across the site are significant for the most extreme event, greatly exceeding indicative depths of acceptable flooding during the 2122 0.1% AEP breach and baseline scenarios. In order for the site to be deemed appropriate for residential purposes, mitigation measures shall need to be considered and supported by detailed flood modelling, presented in a site specific FCA for any future redevelopment proposals. It is likely to be difficult to determine suitable mitigation measures for the site without resulting in detriment to third parties in relation to flood risk.

5.3 Flood Risk from Small Watercourses

The development site is predominantly located within Flood Zone 1 for surface water and small watercourses. A small area of the site is shown to be located within Flood Zones 2 and 3, associated with the presence of topographic depressions and drainage channels reens across central development site.

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. However, these sections do not strictly 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 to ensure the following conditions are met:

- No increase in flooding elsewhere
- Occupiers aware of flood risk
- Escape / evacuation routes present
- Flood emergency plans and procedures agreed and in place
- Flood resistant and resilient design

- Acceptable consequences for type of use (see guidance below)

It is recommended that watercourses within the site are retained, and that development within its associated floodplain is avoided. Any crossings over an ordinary watercourse will require Ordinary Watercourse Consent and should be designed to minimise the impact on the watercourse and risks associated with a potential blockage.

Given the nature of the risk associated with surface water and small watercourses across the site, it is considered that a full standalone FCA for this source of risk may not be required. Instead, surface water and small watercourse flood risk can be appropriately addressed through a comprehensive Flood Risk and Surface Water Drainage Strategy to support the planning application.

6 Summary and recommendations

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

The site is also located within Flood Zones 2 and 3 of the FMfP for Small Watercourses, and Flood Zone 2 of the FMfP for Rivers. These sources of flood risk are predominantly associated with the network of onsite reens and predicted flood risk is in line with the requirements of Figures 5 and 6 of TAN-15.

The site is located within a TAN-15 Defended Zone of the FMfP for the Sea.

Consequently, any planning application will require a Flood Consequences Assessment (FCA) to comprehensively assess the flood risk from all sources. Given the risk of tidal flooding to the site, proposals for residential development may be difficult. In order for the site to be deemed appropriate for residential purposes, mitigation measures shall need to be considered and supported by detailed flood modelling, presented in a site specific FCA for any future proposals. It shall need to be demonstrated that proposed mitigation measures do not impact on third parties, which may be difficult to achieve. It shall be for the LPA and NRW to determine if proposals are acceptable.

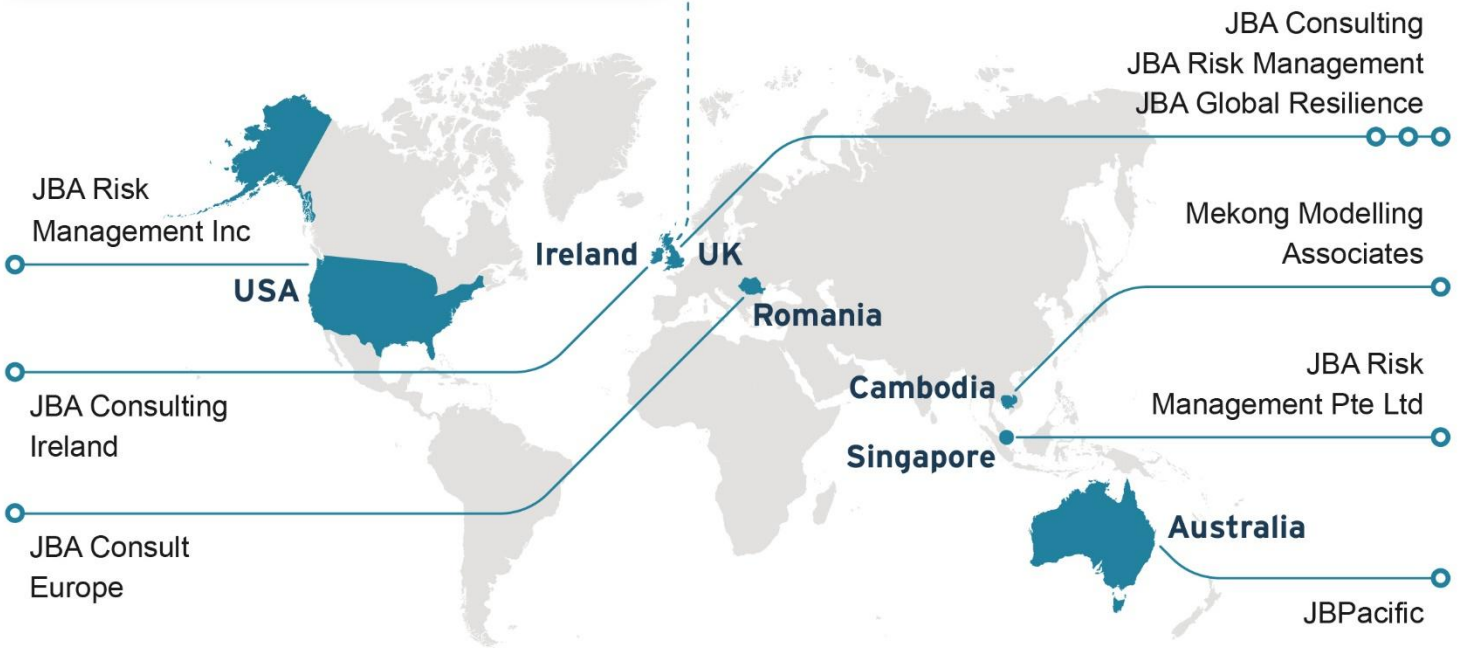
The following recommendations are made for the site:

- Any planning application for the site should be accompanied by an FCA which demonstrates how the proposals meet the requirements of TAN-15.
- Given the risk of tidal flooding to the site, development may be difficult. In order for the site to be deemed appropriate for residential purposes, mitigation measures shall need to be considered and supported by detailed flood modelling, presented in a site specific FCA for any future development proposals. It shall be for the LPA and NRW to determine if proposals are acceptable.
- The existing reen/drainage channel and flow path should be retained on site. It is recommended that options are explored to enhance the existing watercourse corridor and overland flow routes by implementing Blue Green infrastructure and retaining the watercourse and overland flow route pathway in areas of public open space so that it can be accessed and maintained.
- Any watercourse crossings to facilitate access from west to east on the development site shall require Ordinary Watercourse Consent under the Land Drainage Act 1991. Any such application should be accompanied by a hydraulic assessment which demonstrates sufficient capacity of such crossing to convey flood flow.



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