

FLOOD RISK STATEMENT

JBA Project Code	2023s1482
Contract	Llanelli Traveller Site FRS
Client	Carmarthenshire County Council
Date	December 2023
Author	Erica Skinner BSc (Hons)
Reviewer	George Baker BEng AEMA CEnv IEng MCIWEM C.WEM
Subject	Llanelli Traveller Site FRS

1 Terms of Reference

JBA Consulting (JBA) were commissioned by Carmarthenshire County Council to prepare a Flood Risk Statement (FRS) detailing the flood risk to a proposed gypsy and traveller site in Llanelli, Carmarthenshire. The proposal development has been put forward for consideration as part of the Carmarthenshire County Council's revised LDP.

2 The Site

2.1 Site Description

The proposed development site is a greenfield site located west of the B4304 (Heol Trostre) in Llanelli, Carmarthenshire, as shown in Figure 2-1.

The site is approximately 3.67ha, with vehicular access from an unnamed access road connected to the the B4304 to the east. Surrounding the site are a number of residential properties in the west, Maes Y Morfa Primary Community School and a train line in the southeast, Trostre Industrial Park to the east and a small patch of greenfield land in the north.

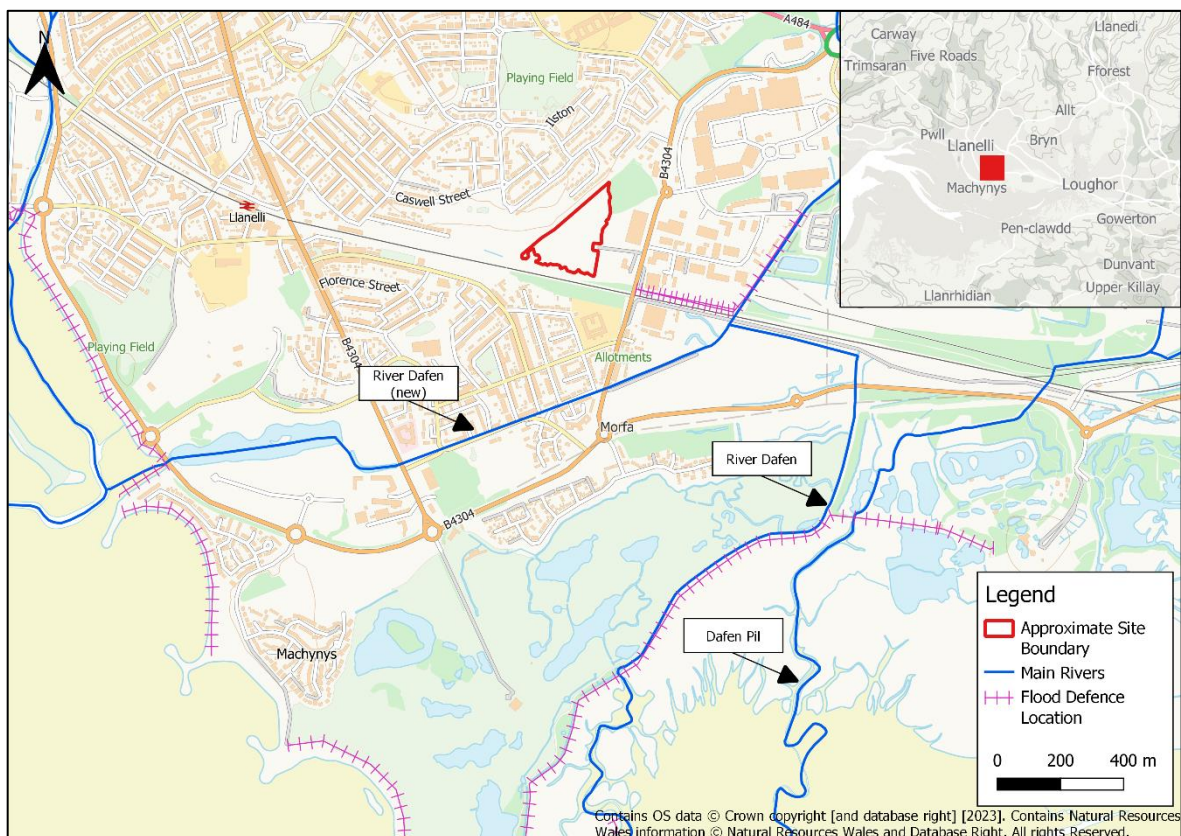


Figure 2-1 Site Location

An NRW Main River (the River Dafen) flows in a south-westerly direction approximately 350m southeast of the site. To the east of the site the River Dafen is split into two channels, with the old channel flowing east and then in a southerly direction along the railway line, and the newer channel culverted under Llanelli until its outfall into the

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Loughor Estuary. Flood defences are present along the channel of the River Dafen 150m to the east of the site.

The site is also located approximately 1.5km northeast of the coastline, where there are a number of coastal flood defences.

2.2 Site Topography

Natural Resources Wales (NRW) 1m LiDAR data has been used to understand and illustrate the topography of the site, as shown in Figure 2-2.

The LiDAR data shows that the site is relatively flat, with a moderate slope from the north with a maximum level of 8.90mAOD, down to the southwest at a minimum of 4.00mAOD. Offsite, ground level rises rapidly to the northwest and falls to the east.

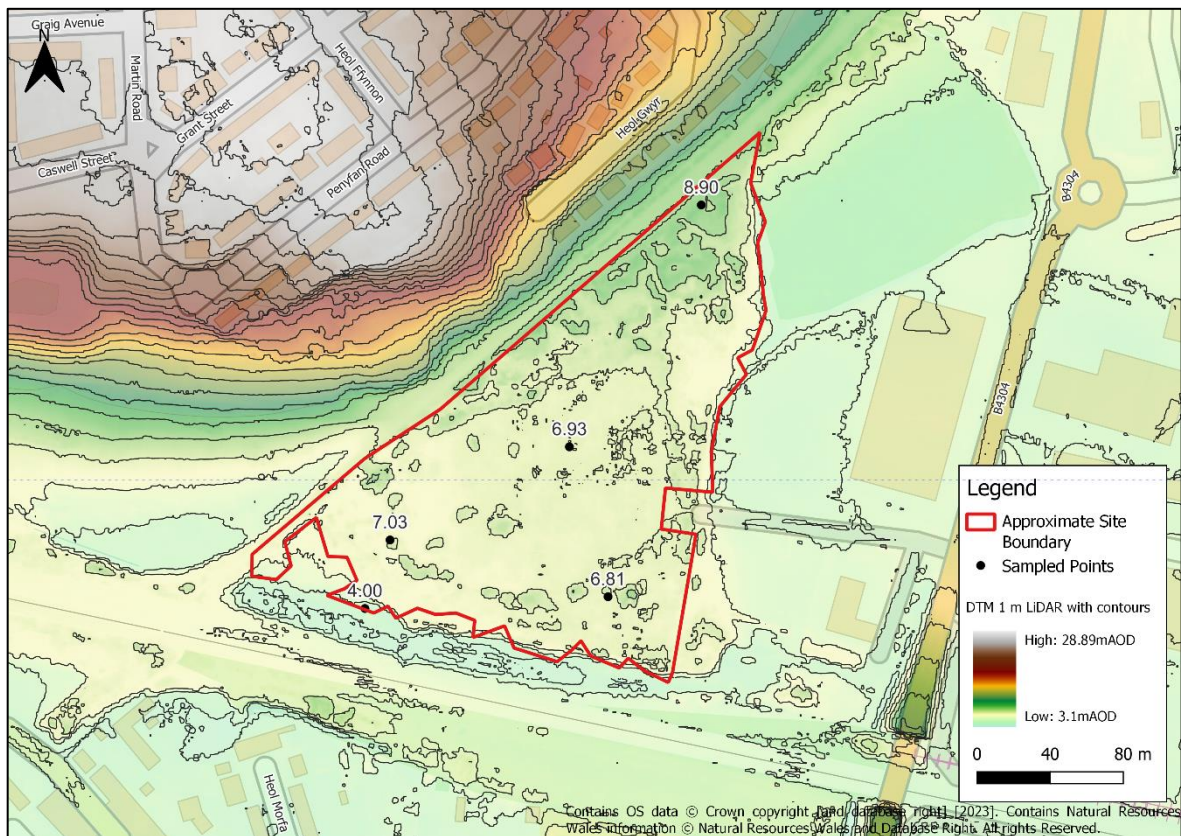


Figure 2-2 LiDAR Topographic data from NRW (1m resolution) with sample points

FLOOD RISK STATEMENT

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3 Current TAN-15 Planning Policy Overview

The following section provides a summarised overview of the requirements of the current TAN-15. An update for TAN-15 was released in October 2021 and was due to come into force on the 1st June 2023. However, Welsh Government subsequently suspended the implementation of the new TAN-15, and it is uncertain as to when this shall now come into force. Therefore, the current TAN-15 continues to apply to decision making.

Further guidance on the latest consultation draft of the new TAN-15 is provided in Section 4.

3.1 Planning Context

TAN-15 reflects the core principles of the National Strategy for Flood and Coastal Erosion Risk Management in Wales to adopt a risk-based approach in respect of new development in areas at risk of flooding and coastal erosion. TAN-15 comprises technical guidance related to development planning and flood risk and provides a framework within which the flood risks arising from rivers, the sea and surface water, and the risk of coastal erosion can be assessed.

The initial requirement of TAN-15 is to identify the flood zones and vulnerability classification relevant to the proposed development, based on an assessment of current and future conditions. An indicative sequence to negotiating the various elements of TAN-15 is provided below in Figure 3-1.

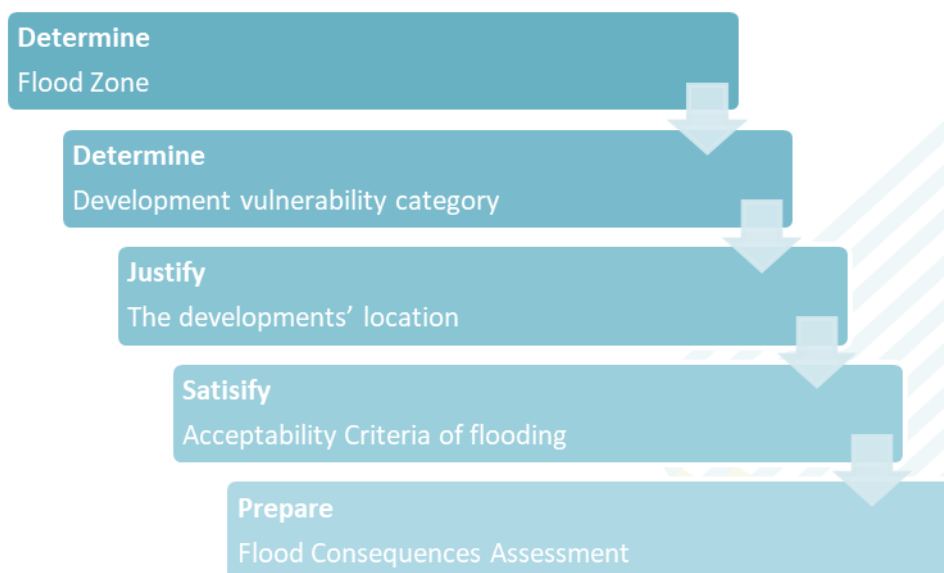


Figure 3-1 Navigating TAN-15

3.2 Development Advice Map

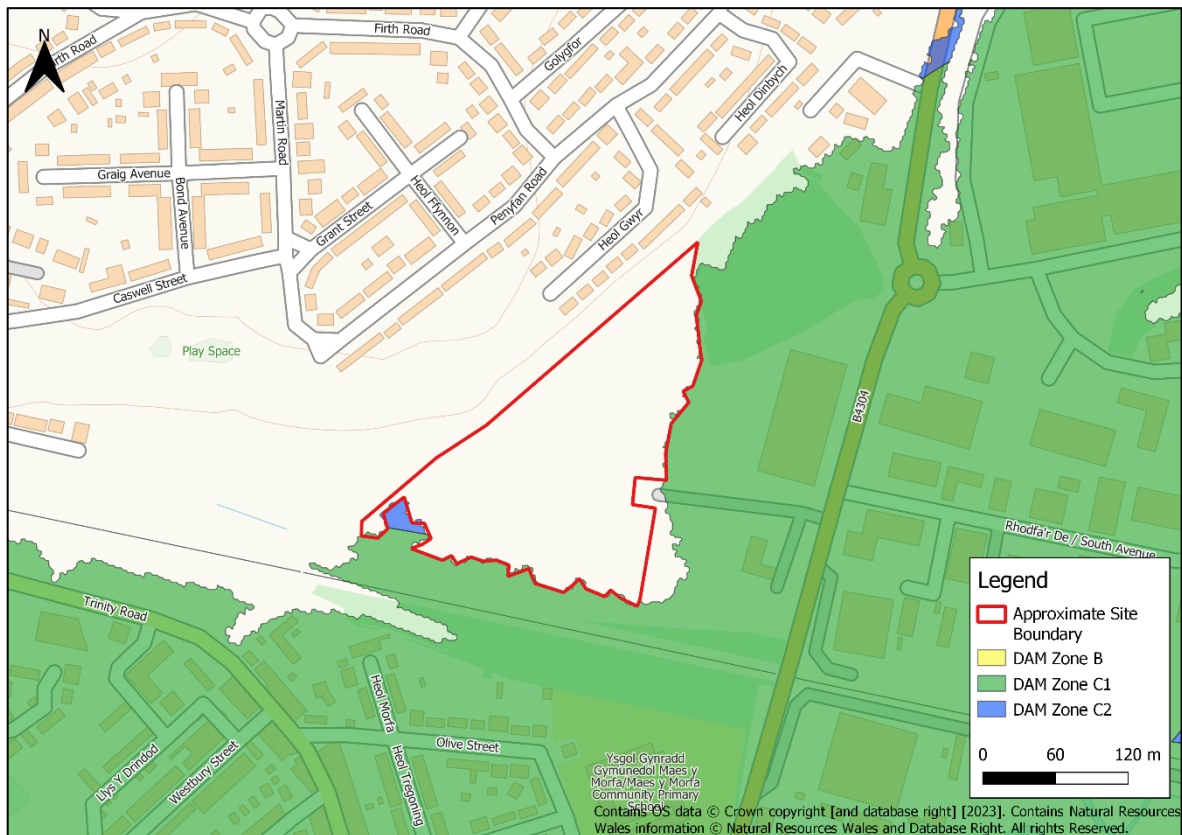
The Development Advice Map (DAM) published by Natural Resources Wales is used to trigger different planning actions based on a precautionary assessment of flood risk. As shown in Figure 3-2, the site is entirely located within DAM Zone A.

Areas in DAM Zone A are considered to be at little or no risk of fluvial or tidal/coastal flooding. The Justification Test does not apply to development within DAM Zone A and

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there are no constraints relating to river or coastal flooding, other than to avoid increasing risk elsewhere.



3.3 Vulnerability Classification

TAN-15 assigns one of three flood risk vulnerabilities to development as shown in Table 3-1. It is proposed to allocate for site for a Gypsy and Traveller site and will therefore be used for residential purposes. Consequently, the development is classified as Highly Vulnerable.

FLOOD RISK STATEMENT

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Table 3-1 Development categories as defined by TAN-15

Development category	Type
Emergency services	Hospitals, ambulance stations, fire stations, police stations, coastguard stations command centres, emergency depots and buildings used to provide emergency shelter in time of flood.
Highly vulnerable development	All residential premises (including hotels and caravan parks), public buildings (e.g. schools, libraries, leisure centres), especially vulnerable industrial (e.g. power stations, chemical plants, incinerators) and waste disposal sites.
Less vulnerable development	General industrial, employment, commercial and retail development, transport and utilities infrastructure, car parks, mineral extraction sites and associated processing facilities, excluding waste disposal sites.

3.4 Lifetime of development

The Welsh Government latest technical guidance for climate change states:

When considering new development proposals, Technical Advice Note 15: Development, Flooding and Coastal Erosion (TAN-15) states that it is necessary to take account of the potential impact of climate change over the lifetime of development. A rule of thumb is that residential development has a lifetime of 100 years while a lifetime of 75 years is assumed for all other developments.

As the proposals are for residential use, a 100-year lifetime of development must be considered.

3.5 Justification Test

The Justification Test is required for development within Zones C1 and C2. The Justification Test not applicable to development in DAM Zone A, as is the case with this site.

3.6 Acceptability Criteria

As the site is located within DAM Zone A, the acceptability criteria simply requires that development on the site should not increase flooding elsewhere.

3.7 Summary of policy position

Based on NRW's DAM map, the proposed development site is located within Zone A, which is considered to be at little or no risk of flooding. Highly vulnerable development is permissible in Zone A providing it satisfies the requirements of the Acceptability Criteria by not increasing flood risk elsewhere.

An assessment of flood risk is contained in Section 0.

FLOOD RISK STATEMENT

JBA Project Code	2023s1482
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4 Consultation draft of new TAN-15

The following section provides a summarised overview of the requirements set out in the consultation draft of the revised TAN-15, published January 2023. Whilst this policy has not been finalised or enacted it provides an indication as to whether development of the site could occur in the future under the new TAN-15 when implemented. Furthermore, Welsh Government, have advised that "When plans are reviewed, the flood risk considerations that feed into the settlement strategy and site allocations must be in accordance with the new TAN 15 and the Flood Map for Planning." Therefore, for the purposes of supporting this candidate site the draft policy should be given primary consideration.

4.1 Flood Map for Planning

The initial requirement of TAN-15 is to identify the flood zones and vulnerability classification relevant to the proposed development. Table 4-1 summarises the flood zones and their definitions.

Table 4-1 TAN-15 definition of FMfP flood zones

Zone	Flooding from rivers	Flooding from the sea	Flooding from surface water and small watercourses
1	Less than 1 in 1000 (0.1%) (plus climate change) chance of flooding in a given year.		
2	Less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.	Less than 1 in 200 (0.5%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.	Less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.
3	A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change.	A greater than 1 in 200 (0.5%) chance of flooding in a given year, including climate change.	A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change.
TAN-15 Defended Zone	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from rivers of 1:100 (plus climate change and freeboard)	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from the sea of 1:200 (plus climate change and freeboard)	Not applicable.

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4.1 Flood Map for Planning - Rivers

The Flood Map for Planning – Flood Risk from Rivers identifies that the site is located within Flood Zone 1, as shown in Figure 4-1. Flood Zone 1 defines areas with a less than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.

The site is also located just outside of a TAN-15 Defended Zone for Rivers, which is associated with the flood defences on the River Dafen.

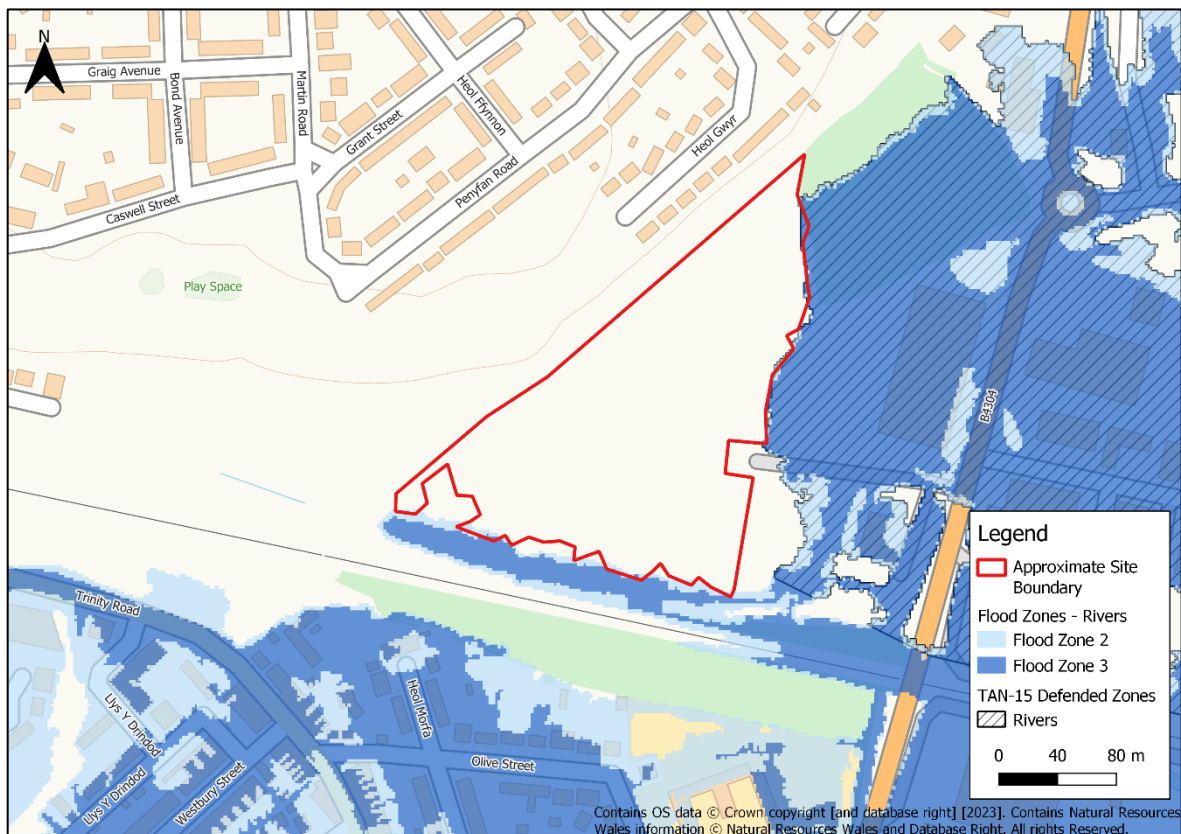


Figure 4-1 Flood Map for Planning - Rivers

4.2 Flood Map for Planning - Sea

As shown in Figure 4-2, a small part of the candidate site in the north and southeast is located within Flood Zone 1 of the Flood Map for Planning for the Sea. Flood Zone 1 identifies areas which have less than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.

However, the majority of the site is located within Flood Zone 3, and to all lesser extent Flood Zone 2. Flood Zone 2 represents areas which have less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change. Flood Zone 3 represents an area greater than 1 in 100 (1%) chance of flooding in a given year, including climate change.

The site is also almost entirely located within a TAN-15 Defended Zone for Sea, due to the presence of coastal defences along the Loughor Estuary.

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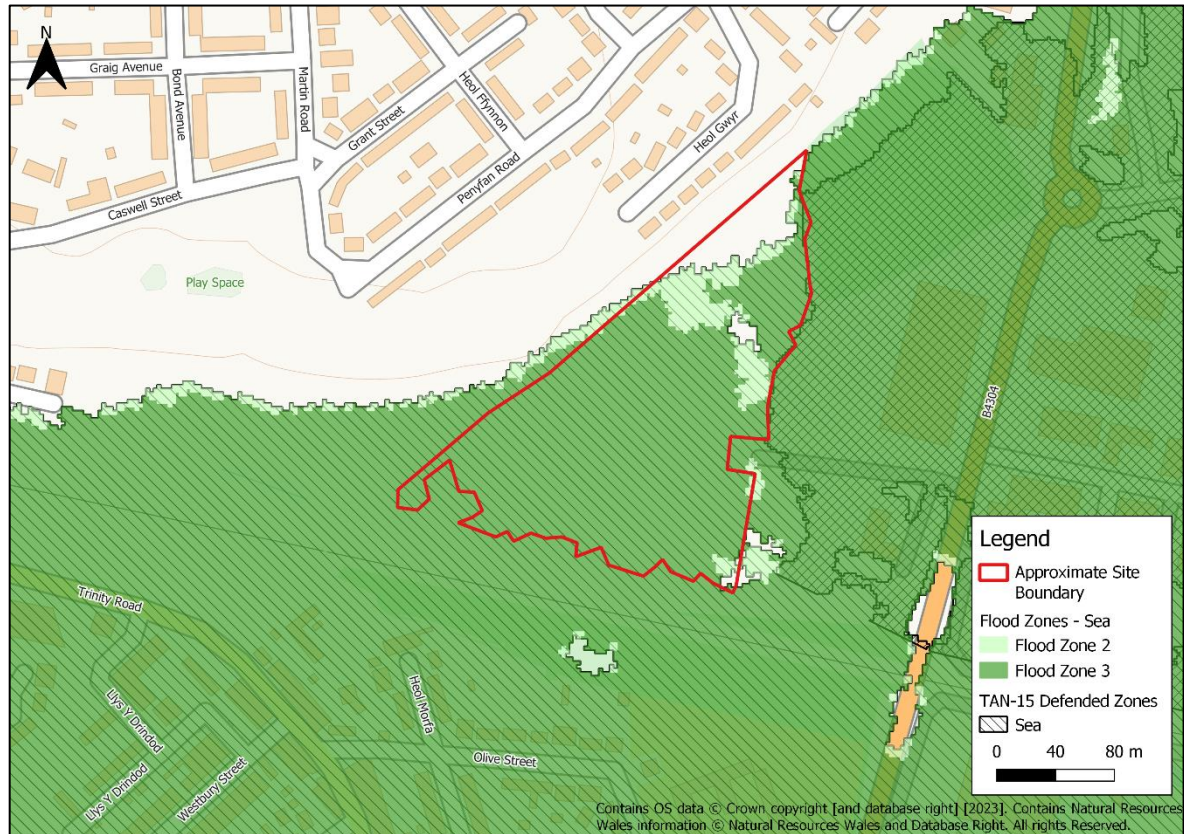


Figure 4-2 Flood Map for Planning - Sea

4.3 Flood Map for Planning - Surface Water and Small Watercourses

Figure 4-3 shows that a small portion of the southwest of the site is located within Flood Zone 2 and 3 of the Flood Map for Planning for Surface Water and Small Watercourses.

Flood Zone 2 represents areas which have less than a 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.

Flood Zone 3 represents areas which have greater than a 1 in 100 (1%) chance of flooding in a given year, including climate change.

FLOOD RISK STATEMENT

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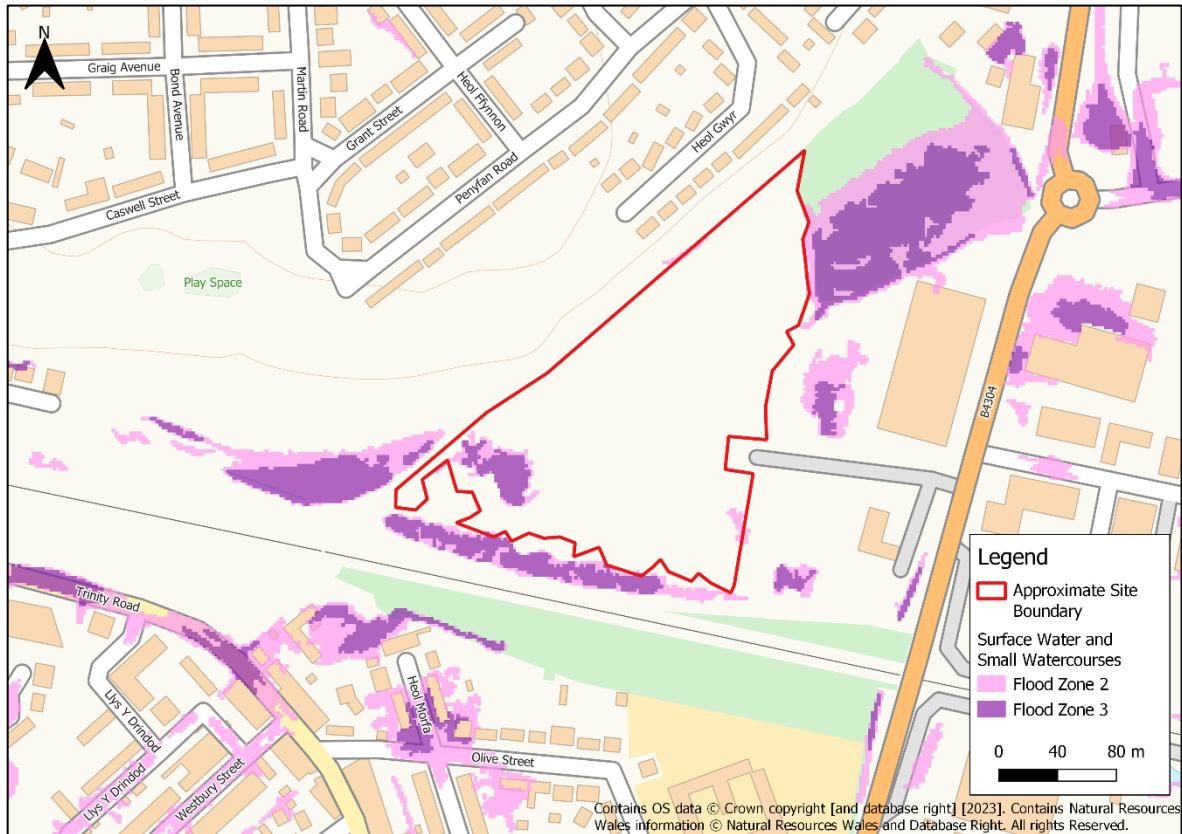


Figure 4-3 Flood Map for Planning - Surface Water and Small Watercourses

4.4 Vulnerability to Flooding

Under the consultation draft of the revised TAN-15, one of three flood risk vulnerability classifications can be assigned to a development. As the proposed use for the site is for residential purposes, it is classified as Highly Vulnerable development.

4.5 Justification Test

TAN-15 states that the Local Planning Authority will need to be satisfied that a development's location is justified. This is determined through the application of the Justification Test, dependent on the flood zone and type of development. The requirements of the Justification Test are summarised in Table 4-2. As the site is located within a TAN-15 Defended Zone, the criteria for this test will apply and these tests have been highlighted by blue shading on the table.

FLOOD RISK STATEMENT

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Table 4-2 Justification Test

Zone 1	TAN-15 Defended Zone	Zone 2 (Rivers and Sea)	Zone 3 (Rivers and Sea)
All types of development are acceptable in principle. Planning authorities should develop locally specific planning policies for localised areas at risk of flooding.	Development will be justified in the TAN-15 Defended Zones:	Development will be justified in Zone 2 if:	Development will be justified in Zone 3 if:
	Where there is an agreed Community Adaptation and Resilience Plan in place supporting development forming part of a strategic regeneration scheme Or	It will assist, or be part of, a strategy supported by the Development Plan to regenerate an existing settlement of achieve key economic or environmental objectives; And	There are exceptional circumstances that require its location in Zone 3, such as the interests of national security, energy security, public health, or to mitigate the impacts of climate change; And
		Its location meets the definition of previously developed land; And	Its location meets the definition of previously developed land; And
	The potential consequences of a flooding event for the particular type of development have been considered and found to be acceptable in accordance with the criteria contained in Section 11 of TAN-15.		

4.6 Acceptability Criteria

If the planning authority is satisfied that the proposed development is justified in a flood risk area, it must next be considered if the risks and consequences of flooding can be managed safely which can be demonstrated through the 'Acceptability Criteria'. As with the current TAN-15, there are three principal aspects to the Acceptability Criteria:

- Flood frequency requirements.** The frequency at which flooding is regarded to be acceptable, depending on the primary source of flooding (Table 4-3).
- Tolerable conditions.** The flood conditions that are regarded to be acceptable during an extreme flood event, depending on the type of development (Table 4-4).
- Avoidance of third-party impacts.** Development must not cause or exacerbate the nature and frequency of flood risk elsewhere.

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Table 4-3 Flood frequency requirements

Vulnerability categories		Flood event types	
		Rivers	Sea
Highly Vulnerable development	Emergency services (command centres and hubs)	0.1% +CC (1 in 1000)	0.1% +CC (1 in 1000)
	All other types	1% +CC (1 in 100)	0.5% +CC (1 in 200)
Less Vulnerable development Water compatible development (limited to those built elements that may be occupied by people)		1% +CC (1 in 100)	0.5% +CC (1 in 200)

Table 4-4 Tolerable conditions in extreme flood event

Type of development	Maximum depth of flooding (mm)	Maximum velocity of flood waters (m/s)
Highly Vulnerable development	600	0.15
Less Vulnerable development Infrastructure associated with highly vulnerable development e.g. car parks, access, paths, and roads. Water compatible development (limited to those built elements of development that may be occupied by people)	600	0.3

4.7 Summary of Policy Position

The site located within Flood Zone 1 of the Flood Map for Planning for Rivers and is predominantly located within Flood Zone 1 of the Flood Map for Planning for Surface Water and Small Watercourses. The site is almost entirely located within Flood Zone 3 for the Sea and an associated TAN-15 Defended Zone. Consequently, any development must satisfy the relevant requirements of the Justification Test and Acceptability Criteria.

Other than the Justification Test, as there is currently no 'Community Adaptation and Resilience Plan' for the area the proposals will need to fully satisfy the requirements of the Acceptability Criteria.

FLOOD RISK STATEMENT

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5 Assessment of Flood Risk

A review of the existing data on flood risk from all sources has been undertaken based on publicly available data and is summarised below.

5.1 Flood Risk from Rivers

NRW's Flood Risk Assessment Wales (FRAW) flood mapping shown in Figure 5-1 indicates that the site is located within an area at **very low** risk of flooding in the Flood Risk from Rivers mapping. Areas at very low risk have less than 1 in 1000 (0.1%) chance of flooding in a given year.

To understand the impact of climate change on the risk of fluvial flooding, refer to the Flood Map for Planning – River, Section 4.1. This also confirms that the site is not at flood risk, including with allowance for climate change.

Given the proximity of the flood risk from the River Dafen and potential influence of flood defences, the risk of river flooding is further appraised in Section 6.1.



Figure 5-1 FRAW map – Risk of flooding from Rivers

5.2 Flood Risk from the Sea

Figure 5-2 highlights that a small portion of the site along the eastern and southern boundary is located within an area at **low** risk of tidal flooding, with between a 1 in 1000 and 1 in 100 (0.1% - 1% AEP) chance of flooding in any given year.

The majority of the site is however located within an area at very low risk of flooding, with less than a 1 in 1000 a (0.1% AEP) chance of flooding in any given year.

FLOOD RISK STATEMENT

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To understand the impact of climate change on the risk of tidal flooding, refer to the Flood Map for Planning from the Sea, Section 4.2. The FMfP identifies an increases risk of flooding from climate change. Therefore, further assessment of this source of flooding, using modelled data, has been undertaken in Section 6.2.

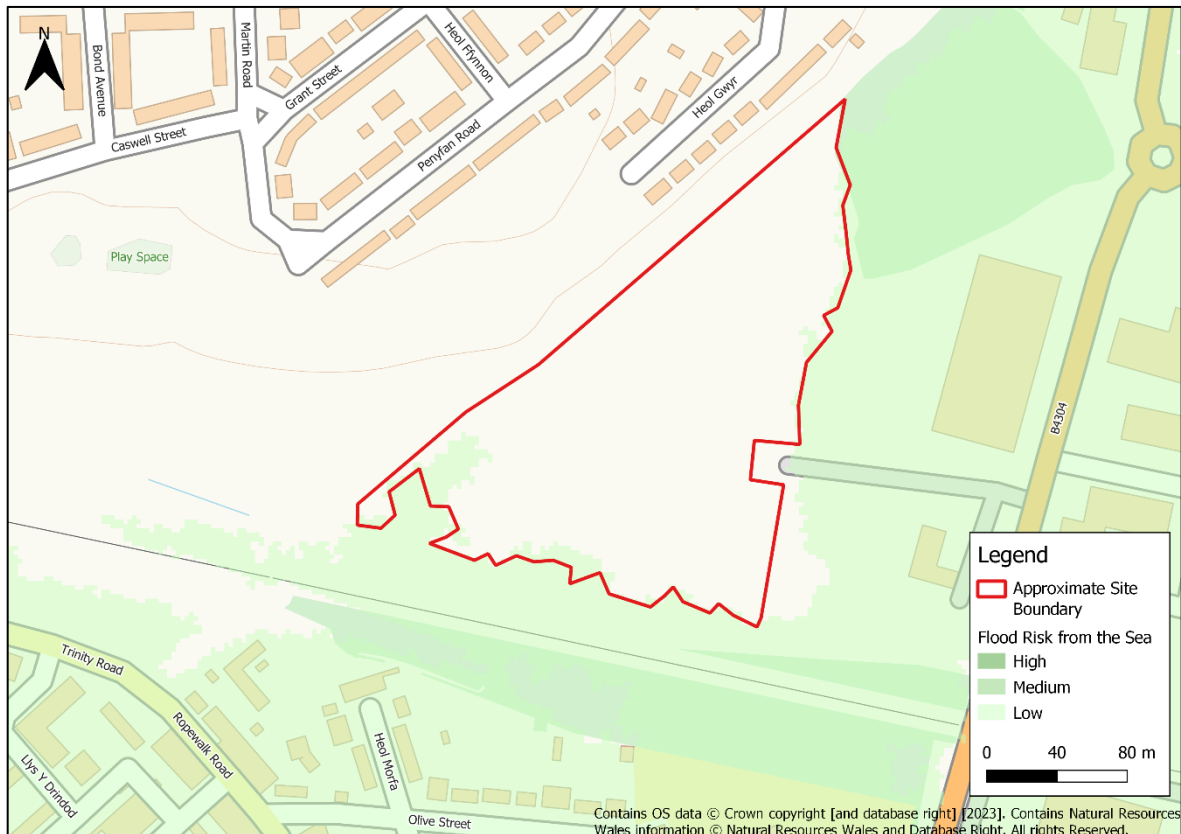


Figure 5-2 FRAW map – Risk of flooding from the Sea

5.3 Flood risk from Surface Water and Small Watercourses

The NRW FRAW Surface Water and Small Watercourse map shown in Figure 5-3 highlights that a small portion of the site is located within an area at **high to low** risk of flooding.

Areas at low risk of flooding from Surface Water and Small Watercourses have between a 1 in 1000 and 1 in 100 (0.1% - 1% AEP) chance of flooding in any given year.

Areas at medium risk of flooding from Surface Water and Small Watercourses have between 1 in 100 (1% AEP) and 1 in 30 (3.3% AEP) chance of flooding in any given year.

Areas at high risk of flooding from Surface Water and Small Watercourses have greater than a 1 in 30 (3.3% AEP) chance of flooding in any given year.

FLOOD RISK STATEMENT

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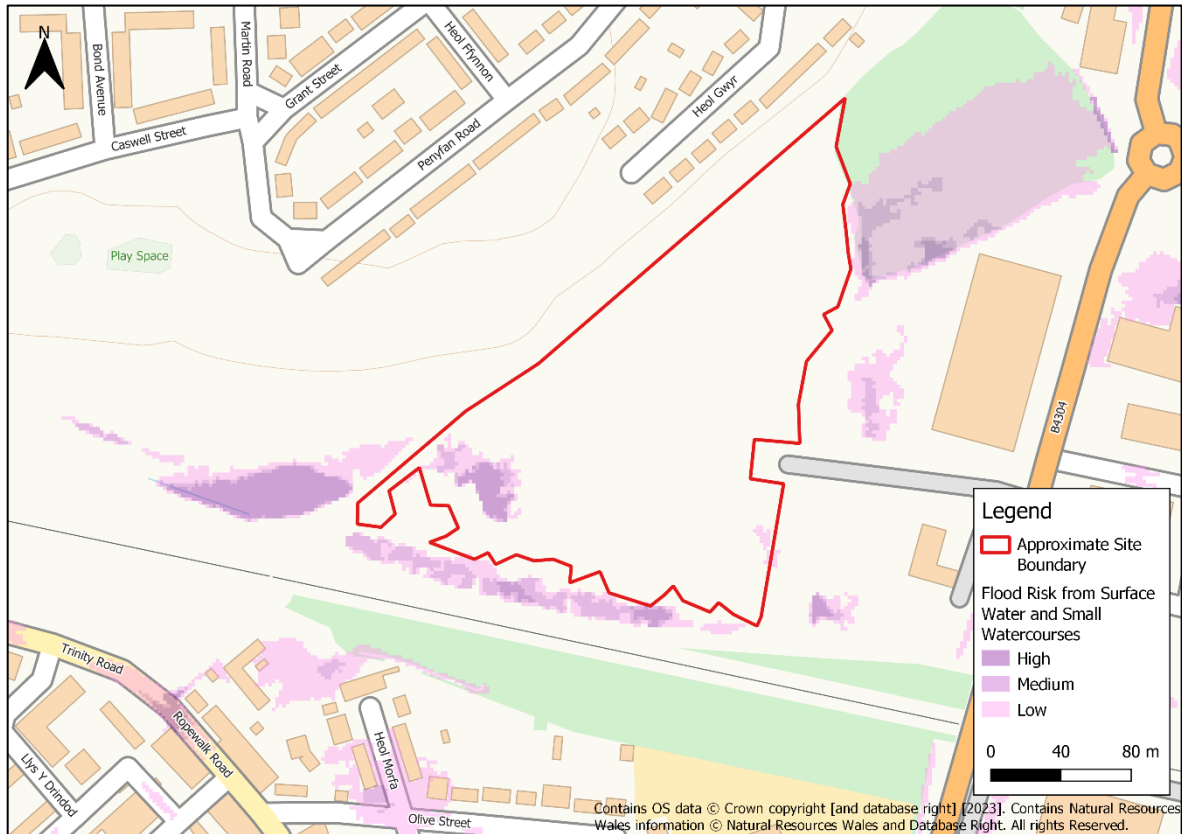


Figure 5-3 FRAW map - Risk of flooding from Surface Water and Small Watercourses

5.4 Flood Risk from Groundwater

Groundwater flooding is caused by unusually high groundwater levels. It occurs as excess water emerges at the ground surface or within manmade structures such as basements. Groundwater flooding tends to be more persistent than surface water flooding, in some cases lasting for weeks or months, and can result in damage to property. This risk of groundwater flooding depends on the nature of the geological strata underlying the site and the local topography.

Carmarthenshire Flood Risk Management Plan¹ states that 'ground water incidents are few and far between and as such is not currently perceived to be a major problem in Carmarthenshire'. It can therefore be concluded that the risk of groundwater flooding at the site is **low**.

5.5 Flood Risk from Reservoirs

NRW flood maps indicate that the proposed development site is located just outside of an area at risk of reservoir flooding. Therefore, the risk of reservoir flooding is considered to be **low**.

¹ <https://www.carmarthenshire.gov.wales/home/council-services/emergencies-and-community-safety/flooding/flood-risk-strategy-and-management-plan/#.ZU4CgXbP02w>

FLOOD RISK STATEMENT

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5.6 Flood Risk from Sewers

Carmarthenshire Local Flood Risk Management Strategy² states that 'several properties across Llanelli have experienced sewer flooding in the past'. However, there is no evidence to suggest previous flooding at the development site, so it can be concluded that the risk of sewer flooding at the site is **low**.

² https://www.carmarthenshire.gov.wales/media/3506/flood_strategy.pdf

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6 Detailed Flood Risk Assessment

Section 0 identified potential flood risk concerns with respect to river and sea flooding, either onsite or in close proximity. Consequently, to better understand these sources of flood risk, further assessment using results from the latest fluvial and tidal flood models of the area has been undertaken and is discussed below.

6.1 Fluvial Flood Risk

6.1.1 Hydraulic Modelling Availability

The site falls within the extents of the North Dafen Attenuation Scheme Hydraulic Model originally developed by WHS in 2019 on behalf of NRW. The study uses a 1D/ 2D linked ESTRY-TUFLOW hydraulic model to assess flooding from the River Dafen. Hydrological estimates have been developed using the Flood Estimation Handbook (FEH) statistical method. Climate change values assume a 25% increase in flows from the original estimates, as per Welsh Government guidance for catchments in the West Wales River Basin.

6.1.2 Fluvial Results

Figure 6-1 and Figure 6-2 show the results of the detailed flood modelling for the 1% AEP plus Climate Change and 0.1% AEP fluvial flood events. Both figures show that the site is not predicted to flood and the predicted extents of flooding are far less than shown on the FMfP and FRAW. It can therefore be safely concluded that the site is as **very low risk** of river flooding, and neither is flooding likely to impact upon access and egress.

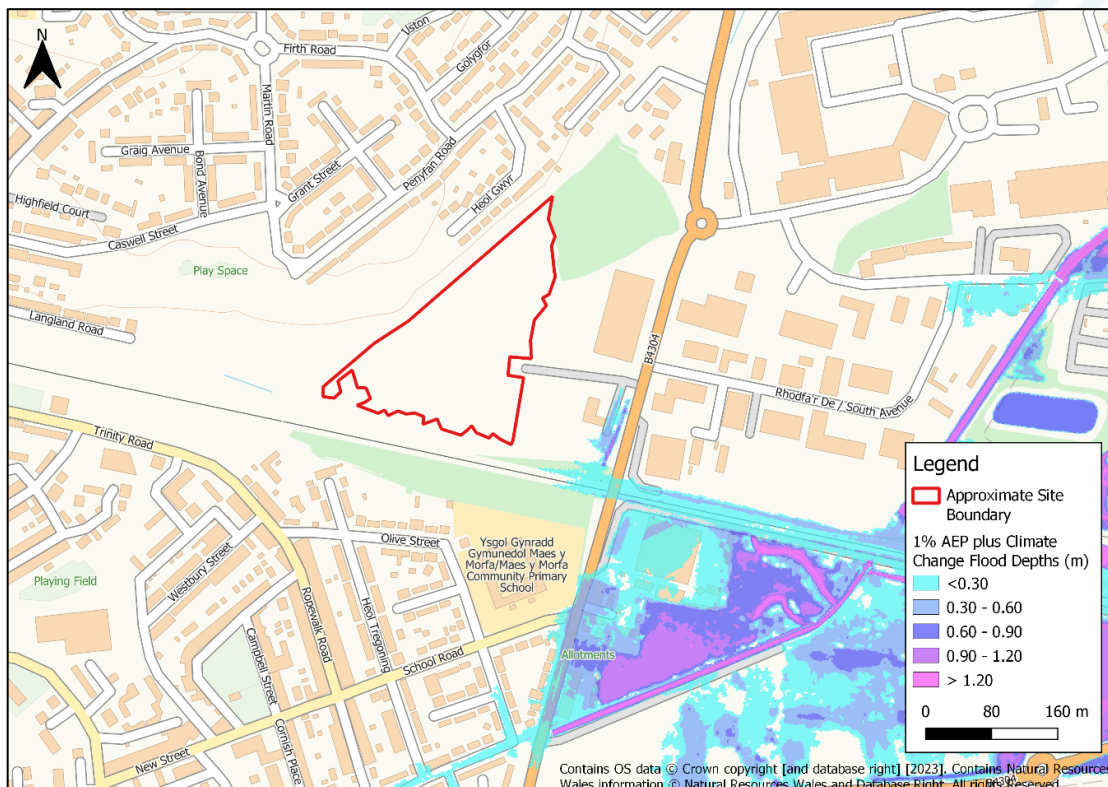


Figure 6-1 Fluvial 1% AEP plus Climate Change Flood Depths

FLOOD RISK STATEMENT

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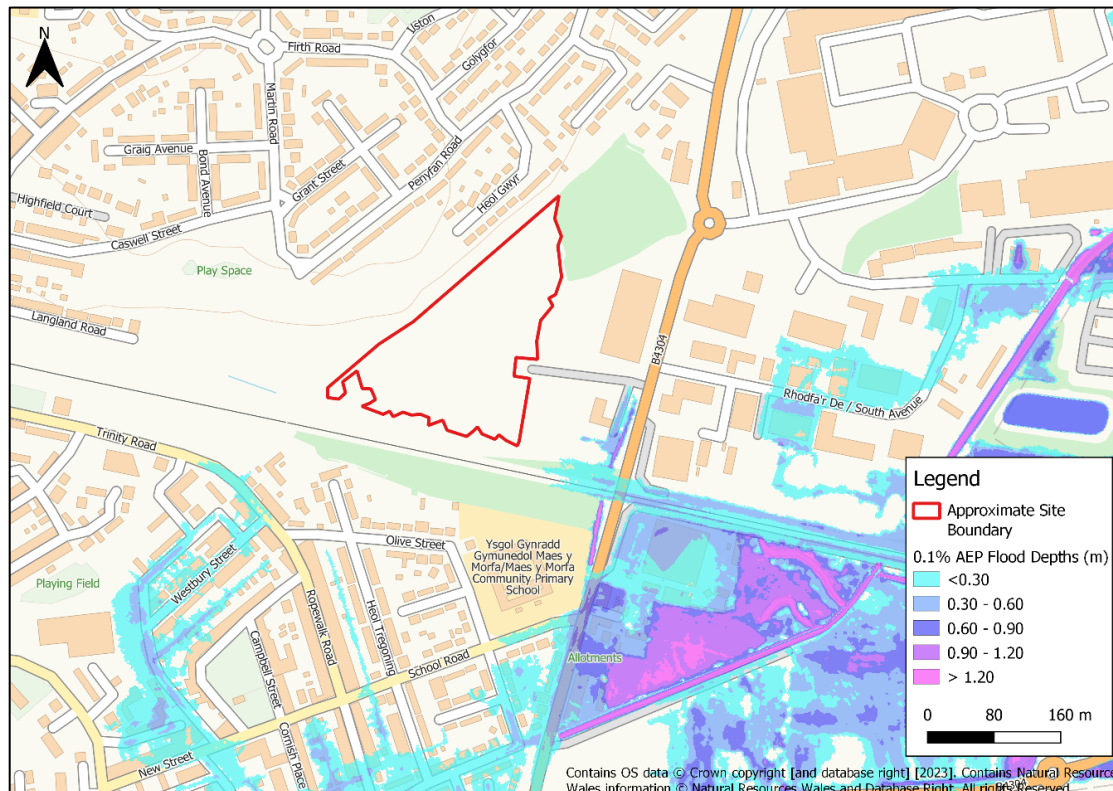


Figure 6-2 Fluvial 0.1% AEP Flood Depths

6.2 Tidal Flood Risk

6.2.1 Hydraulic Modelling Availability

Results from NRW's tidal model for Llanelli have been used to support this assessment. The version of the model used was updated in September 2023.

6.2.2 Tidal Results

The results for the defended 0.5% AEP and 0.1% events, both including allowance for 100 years of climate change, are shown below in Figure 6-3 and Figure 6-4. These figures show that the site is not at risk of flooding in either design event.

In the 0.1% AEP plus climate change event flood is predicted within the immediate vicinity of the site and may therefore impact access and egress to the site. This is discussed in more detail in Section 6.4.

FLOOD RISK STATEMENT

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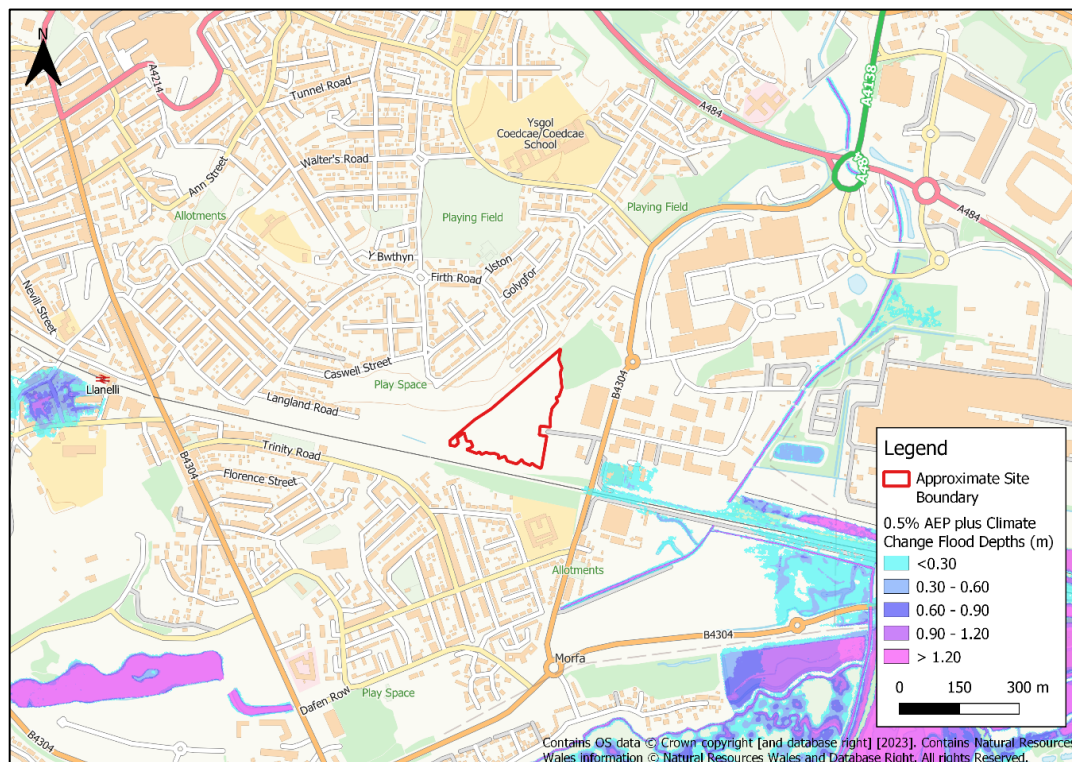


Figure 6-3 0.5% AEP plus Climate Change Flood Depths

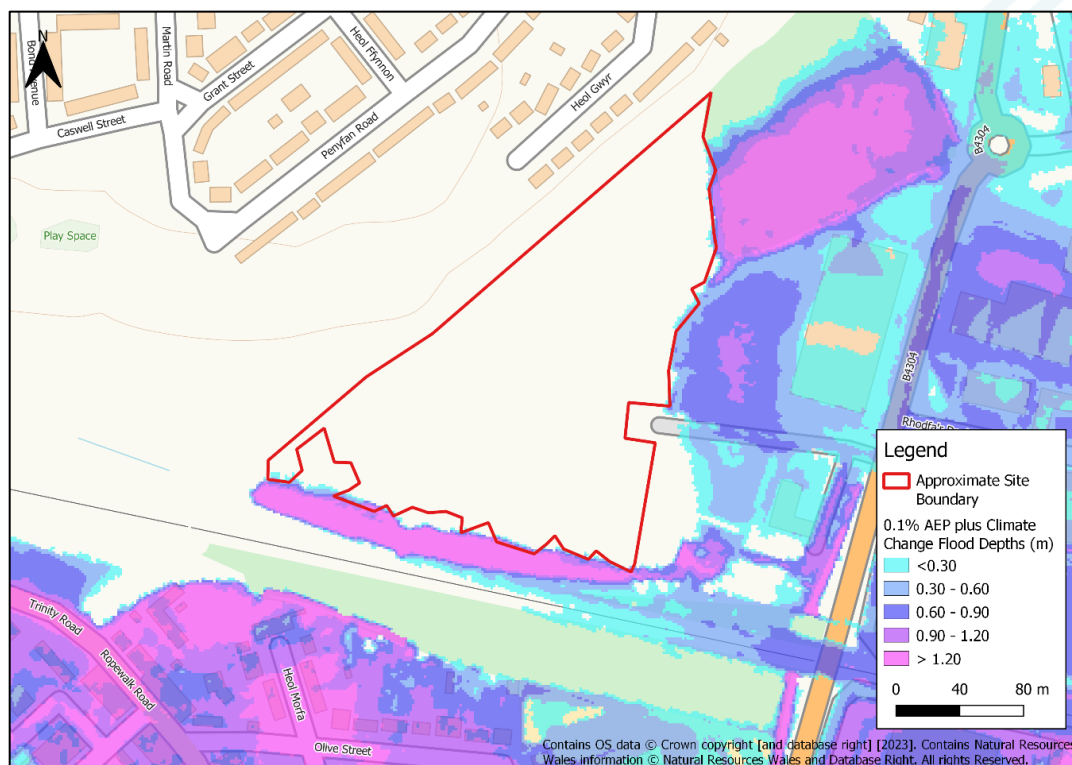


Figure 6-4 0.1% AEP plus Climate Change Flood Depths

FLOOD RISK STATEMENT

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Subject	Llanelli Traveller Site FRS

6.3 Model Results Summary

It is evident from both detailed hydraulic models discussed above, that the site is not directly at risk of flooding, in either the fluvial or tidal events required by TAN-15. Consequently, there can be confidence that any development of the site will be able to comply with the principal requirements of the Acceptability Criteria, as summarised below:

- 1 **Flood frequency requirements.** The site does not flood.
- 2 **Tolerable conditions.** The site does not flood.
- 3 **Avoidance of third-party impacts.** As the site does not flood, development will not cause or exacerbate flooding elsewhere.

6.4 Access and Egress

Access and egress will not be affected during the extreme 0.1% AEP fluvial event. However, as shown in Figure 6-5 access to dry land will be restricted during the 0.1% AEP plus Climate Change tidal event due to the scale of flooding across Llanelli. Consequently, it is recommended that an emergency plan is implanted to encourage evacuation of the site prior to a flood event. If occupants were unable or unwilling to evacuate the site, then it is recommended that they shelter on site until flooding recedes to a safe level. Flooding is likely to be short lived as tidal water will begin to recede rapidly after the peak of high tide.

Pedestrian access is currently available to the west/north of the site.

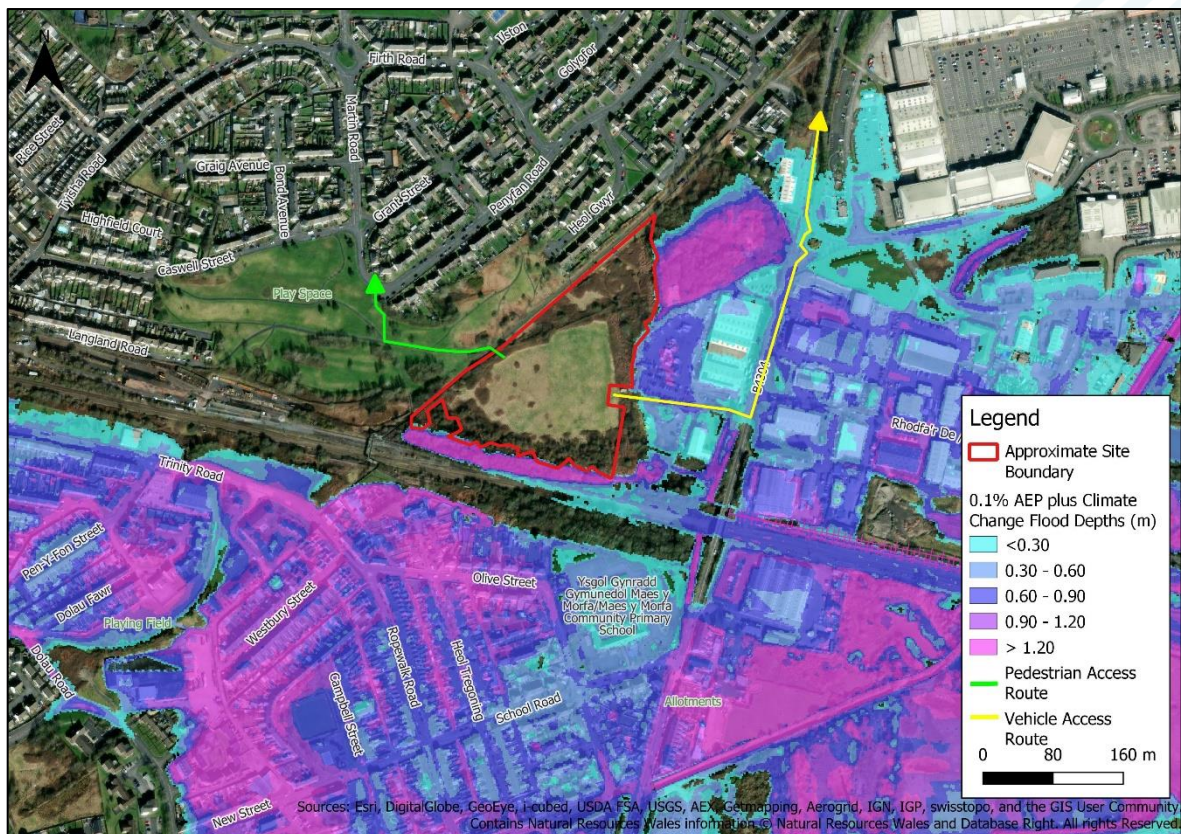


Figure 6-5 Access and Egress during the 0.1% AEP plus Climate Change Event

FLOOD RISK STATEMENT

JBA Project Code	2023s1482
Contract	Llanelli Traveller Site FRS
Client	Carmarthenshire County Council
Date	December 2023
Author	Erica Skinner BSc (Hons)
Reviewer	George Baker BEng AIEMA CEnv IEng MCIWEM C.WEM
Subject	Llanelli Traveller Site FRS

7 Conclusion

JBA Consulting (JBA) were commissioned by Carmarthenshire County Council to prepare a Flood Risk Statement (FRS) summarising the flood risk to a proposed traveller site included as part of Carmarthenshire County Council's LDP candidate site in Llanelli, Carmarthenshire.

Welsh Government, have advised that "When plans are reviewed, the flood risk considerations that feed into the settlement strategy and site allocations must be in accordance with the new TAN 15 and the Flood Map for Planning." Therefore, for the purposes of supporting this candidate site the draft policy has been given primary consideration.

The proposed 3.67ha candidate site is a greenfield site located west of the B4304 (Heol Trostre) in Llanelli, Carmarthenshire.

The River Dafen, A NRW designated Main River, flows in a south-westerly direction approximately 350m southeast of the site. At this point the River Dafen splits into two channels, both outfalling into the Loughor Estuary, approximately 1.5km southwest of the site. Both the River Dafen and Loughor Estuary are served by flood defences at reduce the flood risk at the site.

The proposed development is classed as residential development, with a 100-year lifetime of development. As such TAN-15 classifies the proposals as Highly Vulnerable Development.

The site is entirely located within DAM Zone A, which is considered to be at little or no risk of fluvial or tidal/coastal flooding. Development within DAM Zone A does not require the Justification Test, and there are no constraints relating to river or coastal flooding, other than to avoid increasing risk elsewhere.

The site is located in Flood Zone 2 and 3 of the Flood Map for Planning for the Sea and the TAN-15 Defended Zone. As such, under the new TAN-15 the proposals will need to satisfy the Acceptability Criteria.

The site is at very low risk of fluvial flooding and low risk of tidal, groundwater, sewer and reservoir flooding. The site is also at low risk of surface water flooding across the majority of the site.

Further assessment of fluvial and tidal flooding using hydraulic models demonstrates that the site is not predicted to flood during any of the TAN-15 tidal or fluvial flood events. The site therefore complies the requirements of the Acceptability Criteria.

Access and egress may be restricted during the 0.1% AEP plus Climate Change tidal event due to the scale of flooding across Llanelli. It is recommended that an emergency plan is implanted to encourage evacuation of the site prior to a flood event. Dry pedestrian access with remain possible under all circumstances.

All aspects of the Acceptability Criteria set out in TAN-15 have been assessed and shown to be satisfied. Consequently, we conclude that on the grounds of flood risk, the proposed development meets the requirements set out in both the extant and new TAN-15 and the aims of Planning Policy Wales.