

# Brickworks Regeneration Programme FCA

February 2023

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## Contract

This report describes work commissioned by David Harding-Smith, on behalf of Conwy County Borough Council, by an email dated 16<sup>th</sup> June 2022. Joseph Landells-Molloy and Tim Diesner of JBA Consulting carried out this work.

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## Purpose

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## Contents

1	Introduction	1
1.1	Overview	1
1.2	Scope	1
2	Site Location and Description	2
2.1	Existing Topography	4
3	Planning Policy	5
3.1	Policy Changes	5
3.2	TAN15 2004 (Overview)	5
3.3	TAN15 2021 (Overview)	5
4	Flood Risk	7
4.1	Development Advice Map (DAM)	8
4.2	Fluvial	10
4.2.1	Flood Map for Planning	10
4.3	Tidal	11
4.3.1	Flood Map for Planning	11
4.3.2	Updated Modelling	13
4.3.2.1	Defended Flood Outlines	13
4.3.2.2	Undefended Flood Outlines	14
4.3.2.3	Extreme Sea Levels	17
4.4	Surface Water	18
4.5	Reservoir	18
4.6	Historic Flooding	19
5	Safe Site Access and Egress	20
5.1	Other Observations	21
6	Summary	22
6.1	TAN15 2004	22
6.2	TAN15 2021	22

## List of Figures

Figure 2-1: Location Plan	2
Figure 2-2: Site Development Plan	3
Figure 2-3: Site Topography	4
Figure 4-1: Development Advice Map	8
Figure 4-2 - Summary of DAM Zone A TAN15 Policy Requirements (Section 9, TAN15 2004)	9
Figure 4-3 - Summary of DAM Zone C1 TAN15 Policy Requirements (Section 9, TAN15 2004)	9
Figure 4-4: Flood Map for Planning – Rivers	10
Figure 4-5: Flood Map for Planning - Sea	11
Figure 4-6: Updated Modelling – Tidal Defended Outlines	13
Figure 4-7: Updated Modelling – Tidal Defence Breach Test Locations	14
Figure 4-8: Updated Modelling – Breach A Test Results	15
Figure 4-9: Updated Modelling – Breach B Test Results	16
Figure 4-10: Surface Water Flood Risk	18
Figure 5-1: Flood Depths – Extreme Tidal Event	20
Figure 5-2: Flood Velocities – Extreme Tidal Event	21

## List of Tables

Table 4-1: Summary of Flood Risks to Plot 1	7
Table 4-2: Extreme Sea Levels	17
Table 6-1: Summary of Modelled Flood Levels	23

## **1 Introduction**

### **1.1 Overview**

This Flood Consequence Assessment (FCA) has been prepared following instruction from David Harding-Smith, on behalf on Conwy County Council, by an email dated 14/06/2022.

### **1.2 Scope**

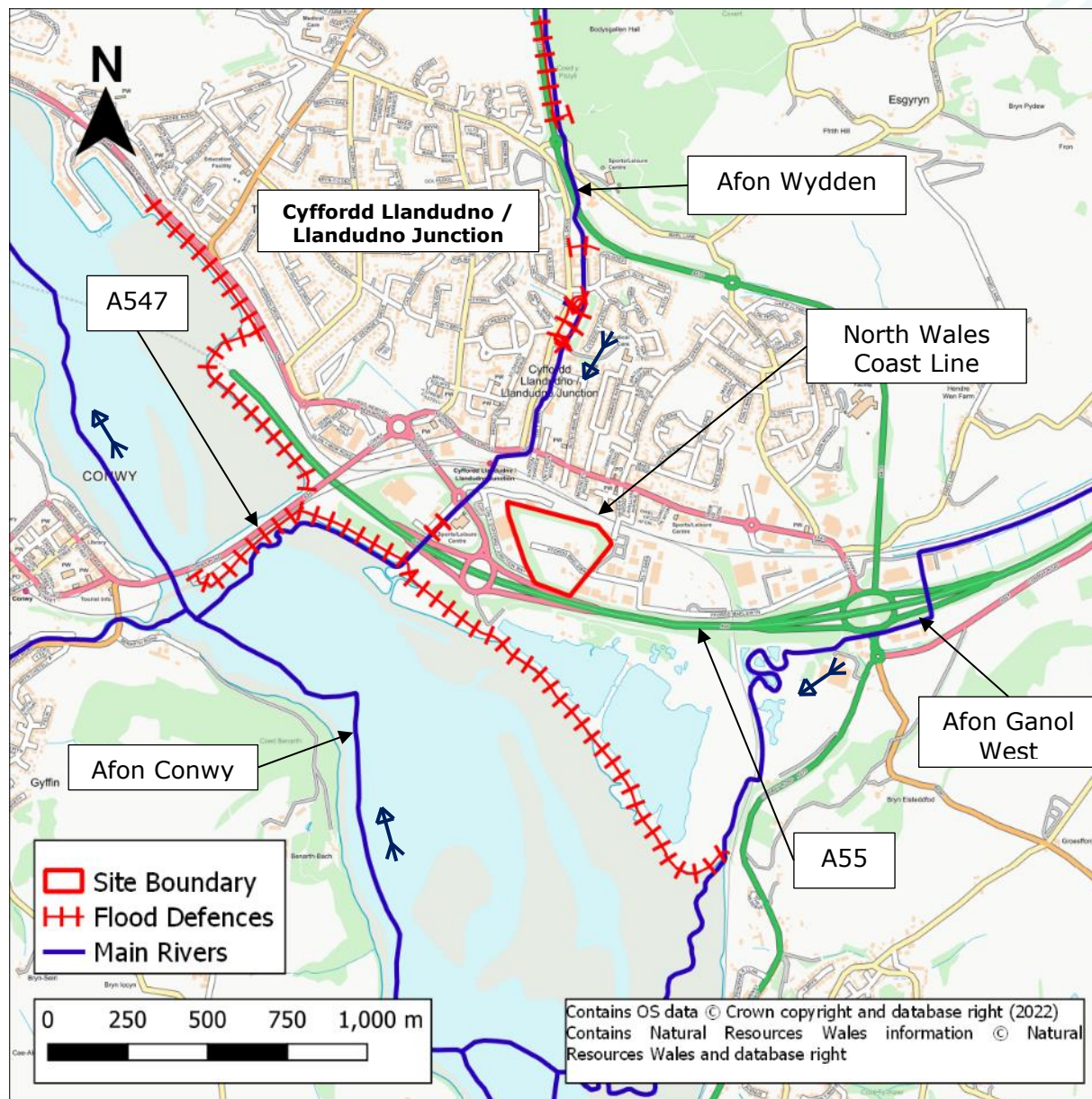
The FCA includes an assessment of flood risk to the development based on available information, including new modelled scenarios (defended and undefended tidal 1000-year plus climate change) using the existing Conwy Estuary model (which is the only tidal model in the vicinity) to confirm Flood Zone 2 outlines. The FCA also considers the impacts of the development on flood risk beyond the site.

A review of the existing Conwy Estuary model identified that undefended tidal outlines were not available, therefore further modelling has been undertaken as part of this FCA to include a defence breach assessment as an alternative means of assessing flood risk.

It is noted that a surface water drainage strategy is currently being developed for the proposed Plot 1 development, separately to this FCA. The drainage strategy will need to be developed in compliance with TAN15 and be SAB compliant.

## 2 Site Location and Description

Conwy County Borough Council (CCBC) are developing a regeneration strategy for the former brickworks and quarry site in Llandudno Junction, Conwy as shown by the red line boundary in Figure 2-1. The site is currently accessed via Ffordd Maelgwn and is bounded by the A55 dual carriageway to the south and the North Wales Coast Line railway to the north.

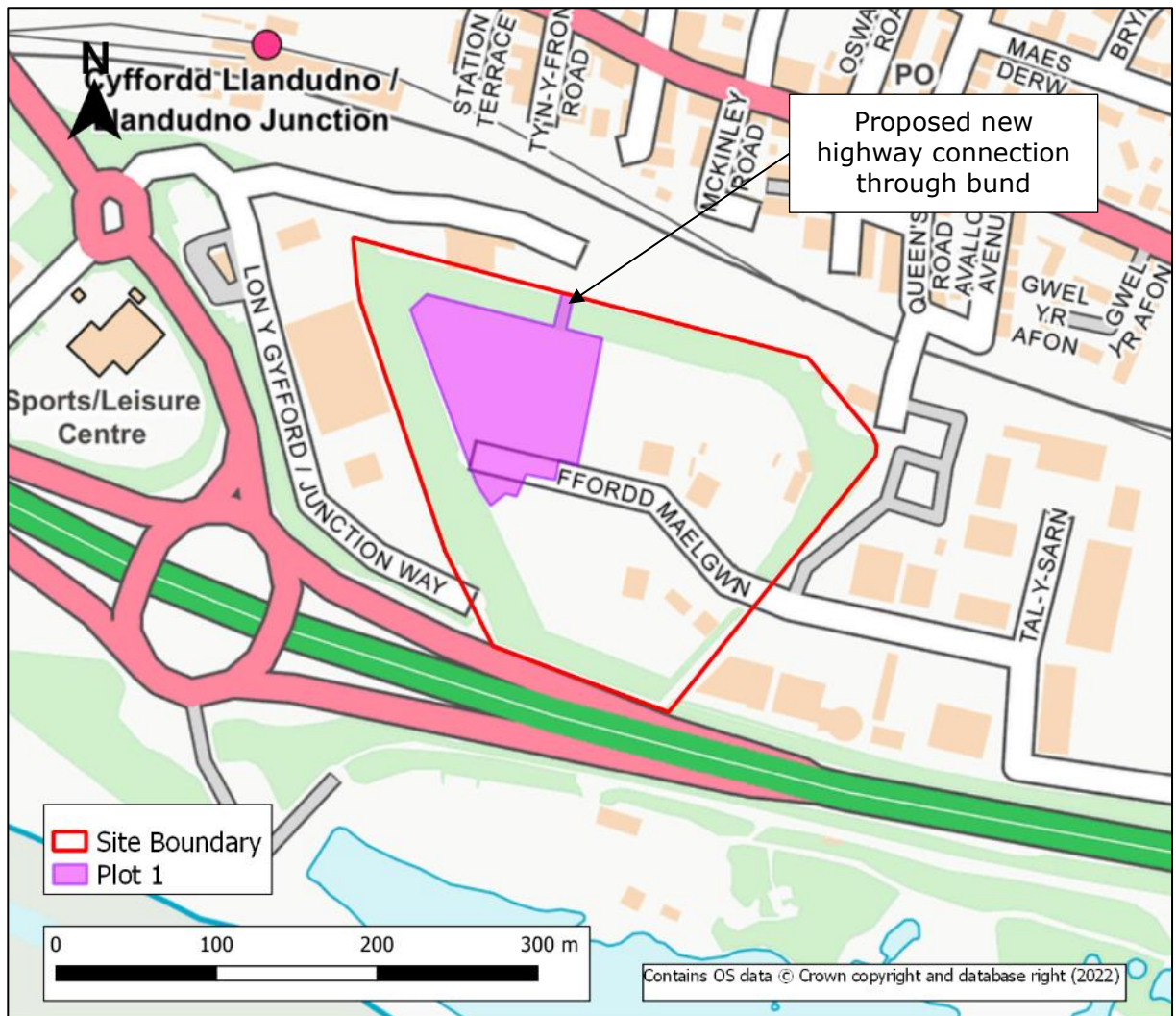


**Figure 2-1: Location Plan**

The tidal Afon Conwy (a Main River) is located approximately 250 m from the southern boundary of the site and flows in a north-westerly direction towards the Irish Sea. The Afon Conwy is defended by formal raised tidal defence embankments to the south and north of the A547 bridge crossing.

The Afon Wydden (a Main River), a tributary of the Afon Conwy, is located approximately 150 m from the western boundary of the site (and is mainly in culvert adjacent to the site). The Afon Ganol West (a Main River), also a tributary of the Afon Conwy, is located approximately 1 km from the eastern boundary of the site.

The site currently accommodates multiple tenants and land uses including a secure storage container / modular accommodation supplier, an aggregate recycling centre and a vacant site which was a car breaker / scrapyard. The site has previously been used as a historic landfill site.



**Figure 2-2: Site Development Plan**

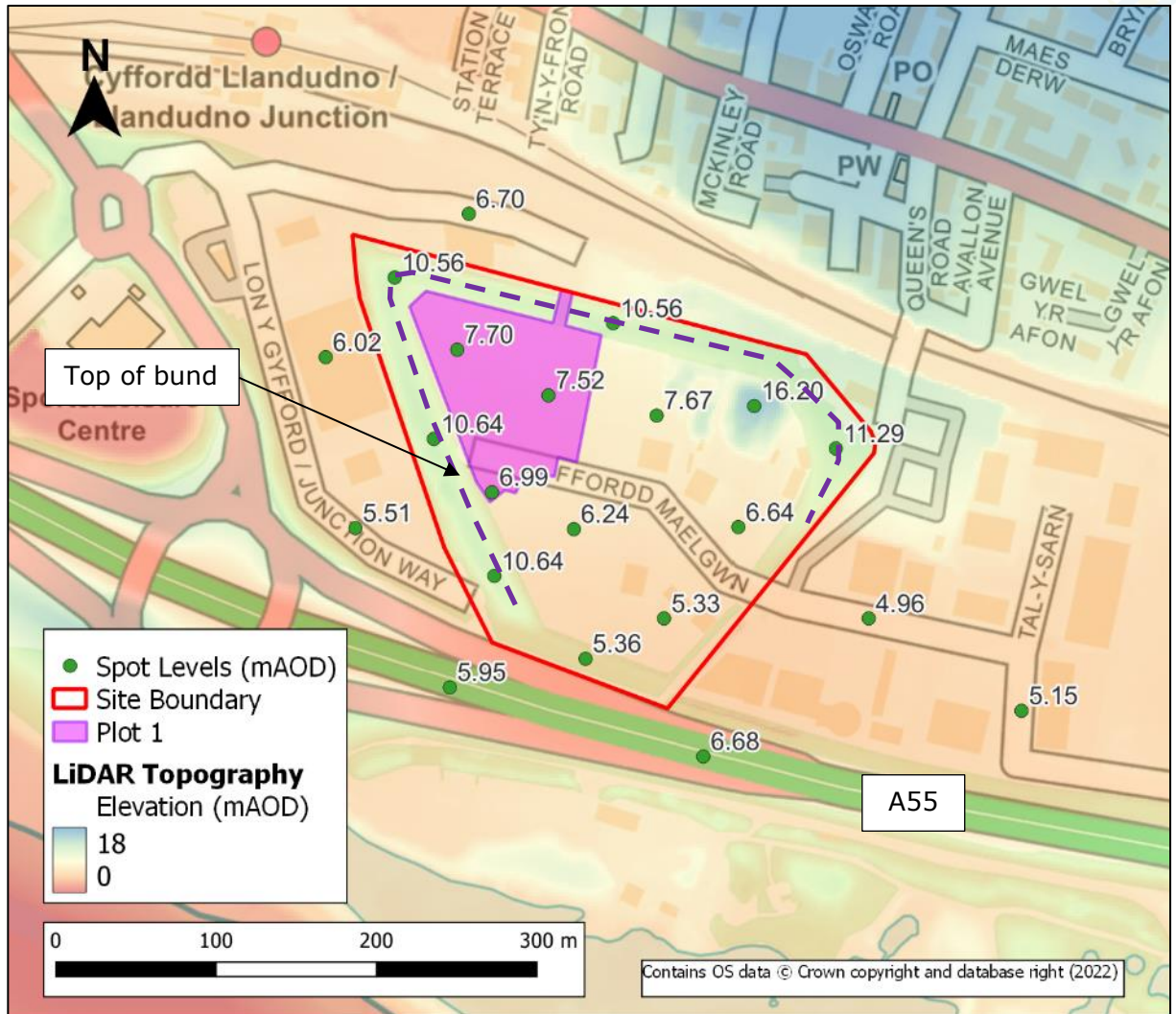
The site is proposed to be split into 6 plots. The planning application for development, for which this FCA has been undertaken, is for Plot 1 in the north-western area of the site (shown in Figure 2-2). Plot 1 has recently been used as a car breaker site / scrapyard and is proposed to be developed for a Waste Transfer Station. The Waste Transfer Station is likely to incorporate a single storey building, ancillary external landscaping, and new highway connection through the site perimeter bund (illustrated in figure above) to Lon y Gyfford. The Council remain responsible for demonstrating that justification for the proposed development is appropriate.

The information within this FCA can be used to inform wider site-wide flood implications for future development, however the justification test for development of the wider site area has not been undertaken as part of this FCA. The justification of additional areas of the site for future development, with respect to flood risk, needs to be taken into account by the client when development opportunities are more clearly defined.



## 2.1 Existing Topography

The local topography is presented in Figure 2-3 using available 2m resolution LiDAR data. The site generally falls away to the south and east, towards the Afon Conwy. However, there is an existing raised bund along the northern and western perimeter as indicated by the dashed line and the topographic survey spot levels. It is highlighted that this bund is not classified as a formal flood defence structure and no information is available regarding the construction of the bund. The southern areas of the site fall away to the east because the A55 North Wales Expressway is raised.



**Figure 2-3: Site Topography**

## 3 Planning Policy

### 3.1 Policy Changes

The guidance provided in Technical Advice Note (TAN) 15, dated July 2004, is used in the determination of planning applications by Local Planning Authorities (LPAs) in Wales with respect to flood risks. An update to the TAN15 guidance, dated December 2021, is due to become adopted policy on 1<sup>st</sup> June 2023. This may be adopted with as yet unconfirmed amendments/revisions.

The risk of flooding associated with this development has been assessed in line with the current guidance, TAN15 2004, however with cognisance of anticipated TAN15 2021.

### 3.2 TAN15 2004 (Overview)

The NRW Development Advice Maps (DAM) are used as the basis against which to assess the flood risk to development sites under TAN15 2004. The DAM is split into three zones (A, B, C1 and C2), for which specified planning tests are required.

New development should be directed away from Zone C and towards suitable land in Zone A, otherwise to Zone B, where river or coastal flooding will be less of an issue.

In Zone C, the tests outlined in sections 6 and 7 (of TAN15) will be applied, recognising, however, that highly vulnerable development and Emergency Services in Zone C2 should not be permitted.

The proposed development on Plot 1 is for a Waste Transfer Station, which is classed as 'highly vulnerable development'.

### 3.3 TAN15 2021 (Overview)

The Flood Map for Planning, which presents Flood Zones for different sources of flooding, will be used as the basis against which to assess the flood risk to development sites under the published, since rescinded, TAN15 2021 (dated December 2021). It is highlighted that the Flood Map for Planning uses more up to date modelling than the DAM, and is considered the best source of flood risk information.

The proposed development on Plot 1 is also classed as 'highly vulnerable development' under TAN15 2021.

The current revision of TAN15 2021 (as of February 2023) includes the following key guidance with respect to site development and flood risk:

- All development must be free from flooding from rivers up to and including the 1% Annual Exceedance Probability (AEP) event plus climate change, and from the sea up to and including the 0.5% AEP event plus climate change. The exception to this is for emergency services, which must be free from flooding from rivers and the sea up to and including the 0.1% AEP event plus climate change.
- Sites that benefit from defences which can be breached or blocked, including flood embankments, sea walls and culverts need to demonstrate that the consequences of flooding can be managed to an acceptable level in the event of overtopping, breach or blockage (for return periods up to and including the 0.1% AEP event plus climate change).

Regarding site selection, in accordance with Section 7 of TAN15:

- Planning authorities should prioritise development in [Flood] Zone 1.
- Sites may also be allocated for any types of development on brownfield land in the TAN 15 Defended Zones.
- In [Flood] Zone 2 (Rivers and Sea), development may be allocated on brownfield land. It should be development that implements in full or in part a strategy to

regenerate or revitalise existing settlements or to achieve key economic or environmental objectives.

- Brownfield land in [Flood] Zone 2 may also be allocated for developments that address national security or energy security needs, mitigate the impacts of climate change or that are necessary to protect and promote public health.
- In [Flood] Zone 3 (Rivers and Sea), allocations for residential and other highly vulnerable development must not be made as the risks and consequences of flooding are not considered acceptable for these types of development. Allocations for less vulnerable development, including essential transport and utilities infrastructure, should only be made in exceptional circumstances.

## 4 Flood Risk

This section of the report assesses the flood risks from all sources to Plot 1 and the wider site. A summary of the risks to the Plot 1 development are provided in Table 4-1 below.

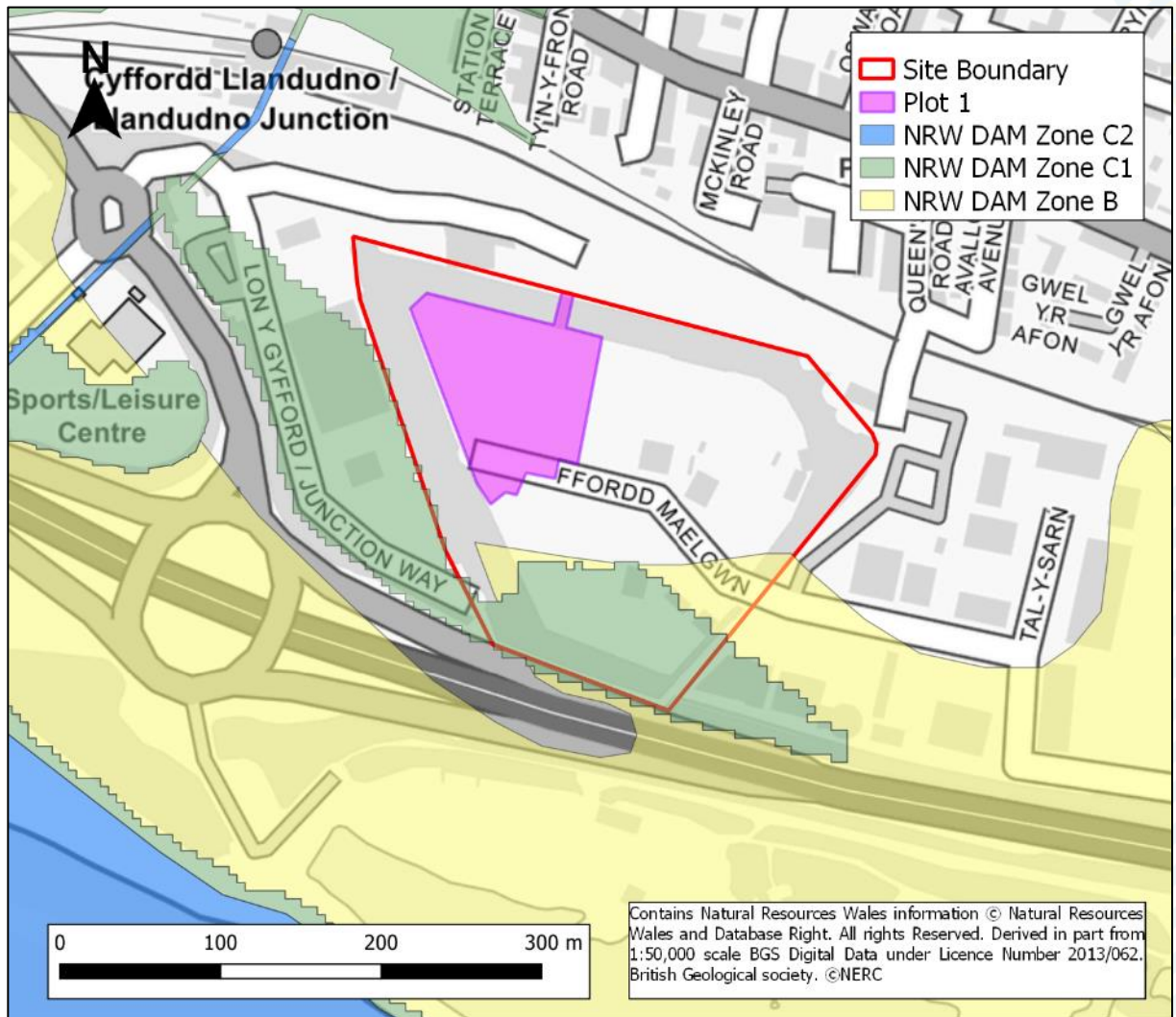
**Table 4-1: Summary of Flood Risks to Plot 1**

<b>Flooding Source</b>	<b>Flood Risk to Plot 1</b>
Fluvial	No risk - see Section 4.2
Tidal	No risk (Breach modelling)- see Section 4.3
Surface water	No risk – see Section 4.4
Reservoirs	No risk – see Section 4.5
Sewer	No available information
Groundwater	No available information
Historic flooding records	No risk – see Section 4.6

#### 4.1 Development Advice Map (DAM)

The DAM is presented below in Figure 4-1. It is highlighted that the DAM does not provide distinction between sources of flooding, and indicates the risk from both fluvial and tidal/coastal flooding. As earlier shown in Figure 2-1, the site is near three watercourses (the Afon Conwy, Afon Wydden and Afon Ganol West), at least one of which is confirmed to be tidal (Afon Conwy).

Plot 1 is not shown to be at risk of flooding; it is shown to be within DAM Zone A (i.e. areas beyond Zone B, C1 and C2).



**Figure 4-1: Development Advice Map**

A planning requirement for Plot 1, as highly vulnerable development within DAM Zone A, is to demonstrate that the development does not increase flooding elsewhere (see Figure 4-2), up to the 1000-year event (TAN15 2004 Appendix 1). This is discussed further in Section 4.3. Safe site access and egress in the event of a flooding emergency must also be considered (discussed in Section 5)

DAM	Development Type (Section 5)	Planning Requirements (Section 4)	Acceptability Criteria (Section 7 & Appendix 1)	Development Advice (Section 5, 6, 7 & Appendix 1)
A	Emergency services Highly vulnerable development Less vulnerable development Other	<ul style="list-style-type: none"> <li>Justification test not applicable</li> <li>Refer to surface water requirements</li> </ul>	<ul style="list-style-type: none"> <li>No increase in flooding elsewhere</li> </ul>	No constraints relating to river or coastal flooding, other than to avoid increasing risk elsewhere.

**Figure 4-2 - Summary of DAM Zone A TAN15 Policy Requirements (Section 9, TAN15 2004)**

It is not known when or how the rest of the site, as defined by the red line boundary on Figure 4-1, will be brought forward by Conwy County Borough Council. However, in accordance with current (2004) TAN15 guidance, new development should be directed away from Zone C and towards suitable land in Zone A, otherwise to Zone B, where river or coastal flooding will be less of an issue.

Should development in Zone C be proposed, the tests outlined in sections 6 and 7 (of TAN15) will be applied, recognising, however, that highly vulnerable development and Emergency Services in Zone C2 should not be permitted.

For highly vulnerable development in DAM Zone C1, the planning requirements defined in Figure 4-3 (an extract from TAN15) must be demonstrated for proposals to be considered acceptable in terms of flood risk.

DAM	Development Type (Section 5)	Planning Requirements (Section 4)	Acceptability Criteria (Section 7 & Appendix 1)	Development Advice (Section 5, 6, 7 & Appendix 1)
	Less vulnerable development		<ul style="list-style-type: none"> <li>Occupiers aware of flood risk</li> <li>No increase in flooding elsewhere</li> </ul>	
	Other	<ul style="list-style-type: none"> <li>Refer to surface water requirements</li> </ul>	<ul style="list-style-type: none"> <li>No increase in flooding elsewhere</li> </ul>	
C1	Emergency services Highly vulnerable development Less vulnerable development	<ul style="list-style-type: none"> <li>Application of justification test (section 6) , including acceptability of consequences (section 7 and appendix 1)</li> <li>Refer to surface water requirements</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable consequences for nature of use</li> <li>Flood defences adequate</li> <li>Agreement for construction and maintenance costs secured</li> <li>Occupiers aware of flood risk</li> <li>Escape/evacuation routes present</li> <li>Effective flood warning provided</li> <li>Flood emergency plans and procedures</li> <li>Flood resistant design</li> <li>No increase in flooding elsewhere</li> </ul>	Plan allocations and applications for all development can only proceed subject to justification in accordance with section 6 and acceptability of consequences in accordance with section 7 and Appendix 1.

**Figure 4-3 - Summary of DAM Zone C1 TAN15 Policy Requirements (Section 9, TAN15 2004)**

## 4.2 Fluvial

### 4.2.1 Flood Map for Planning

Natural Resources Wales' (NRW's) Flood Map for Planning data has been presented as the best available information on flood risk, including climate change, to inform planning advice.

A number of different maps are provided within the Flood Map for Planning, relating to different sources of flooding. The risk of flooding from rivers map is presented below in Figure 4-4. This shows that the Plot 1 (and also the rest of the site within the red line boundary) is entirely within Flood Zone 1 (i.e. not within Flood Zone 2 or 3) and is therefore not considered to be at risk of flooding from Main Rivers.

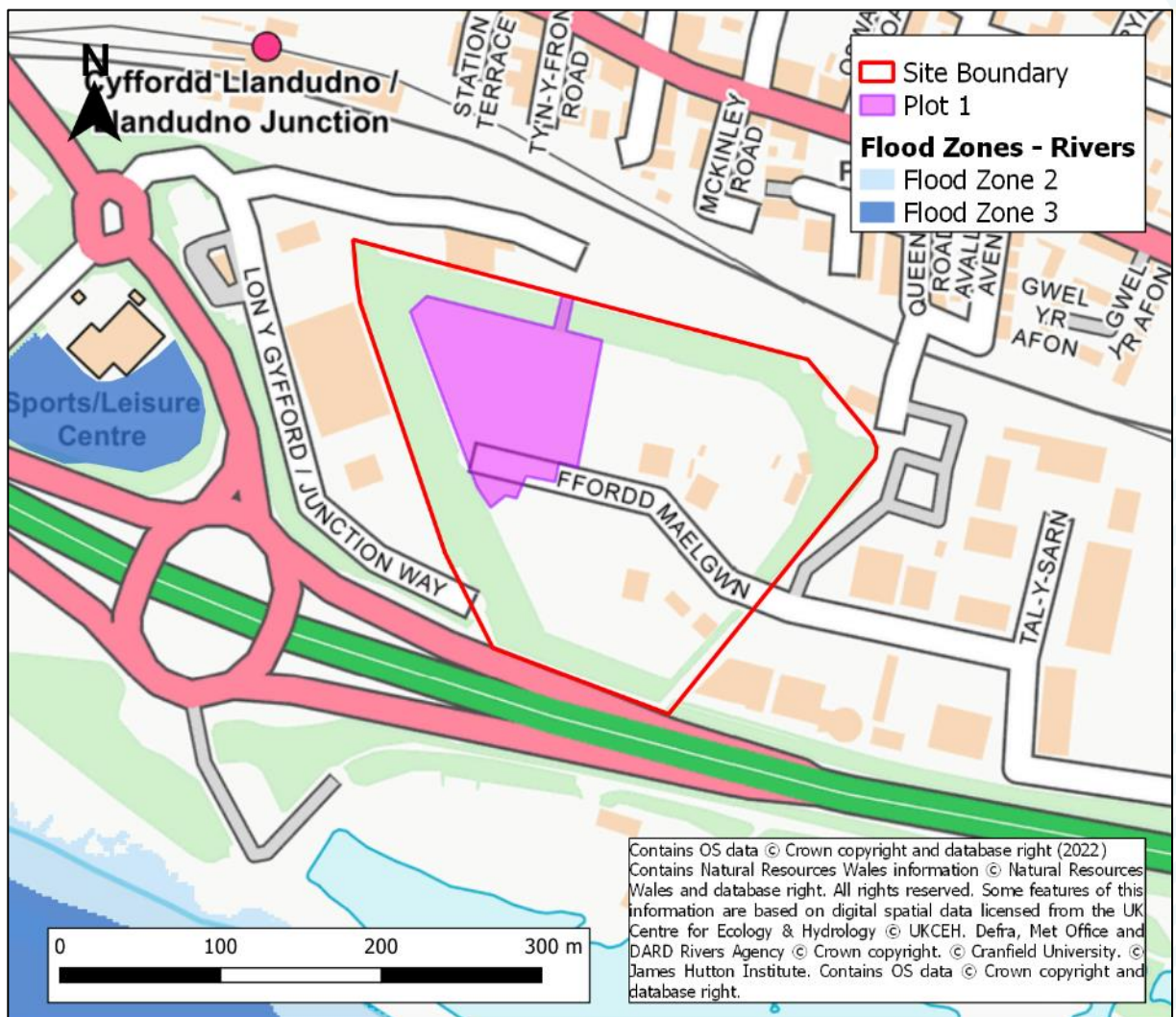


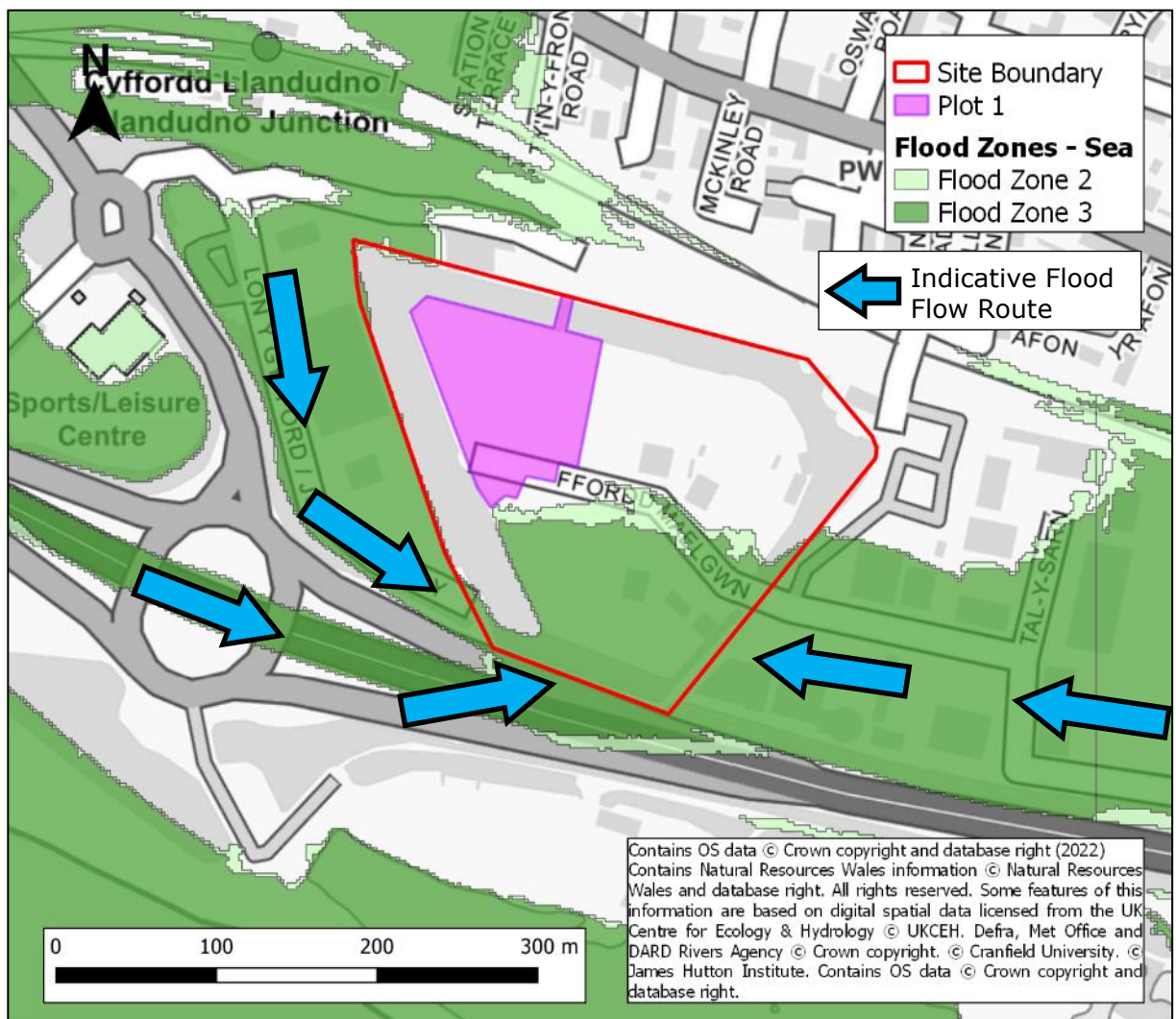
Figure 4-4: Flood Map for Planning – Rivers

**4.3 Tidal**

**4.3.1 Flood Map for Planning**

The Flood Map for Planning for the flood risk from the sea is presented in Figure 4-5 below. Plot 1 is not shown to be at tidal flood risk, based on current modelling, and is located within Flood Zone 1. However, other areas of the site within the red line boundary remain at some level of flood risk, but the development of these areas are not considered at this stage. Approximately two thirds of the site area is located within Flood Zone 1.

Inspection of the local topography indicates that there are three main flood flow routes that contribute to flooding of the site (outside of Plot 1). The first is from the north and west of the site, from the direction of Llandudno Junction station and Lon Y Gyfford, flowing southwards against the western bund on site, before entering into the southern end of the site by the A58. The second is eastwards along the A58 and then into the southern end of the site, where the topography is lowest. The third is westwards along Fford Maelgwn.



**Figure 4-5: Flood Map for Planning - Sea**

It is understood that the Flood Map for Planning in this area is not based on the most detailed tidal hydraulic model currently available; JFLOW 2D projection modelling has been used rather than the 2017 Conwy Estuary model or any other hydraulic model.



NRW indicated that the reason for not adopting the Conwy Estuary model (which is the only tidal model in the vicinity), is due to the lack of un-defended 1000-year climate change run, which is a requirement for consideration within the Flood Map for Planning.

### 4.3.2 Updated Modelling

In accordance with Natural Resources Wales (NRW) requirements, the Conwy Estuary model has been rerun for the tidal defended and undefended 1000-year climate change scenario to confirm climate change flood risk to the site.

The potential impacts of climate change to the site have been assessed for 100 years' time, i.e. the expected lifetime of the development. Following the latest guidance<sup>1</sup>, the development proposals have been assessed against the higher central or 70th percentile from United Kingdom Climate Projection 2018 (UKCP18) Representative Concentration Pathway (RCP) 8.5 to inform design levels. The upper end allowance (95th percentile from UKCP18 RCP8.5) has also been used to inform mitigation measures, access and egress routes and emergency evacuation plans (see Section 5).

#### 4.3.2.1 Defended Flood Outlines

The defended flood outlines are presented below in Figure 4-6. Plot 1 levels are elevated and there is no predicted flooding to this area during 1000-year climate change events.

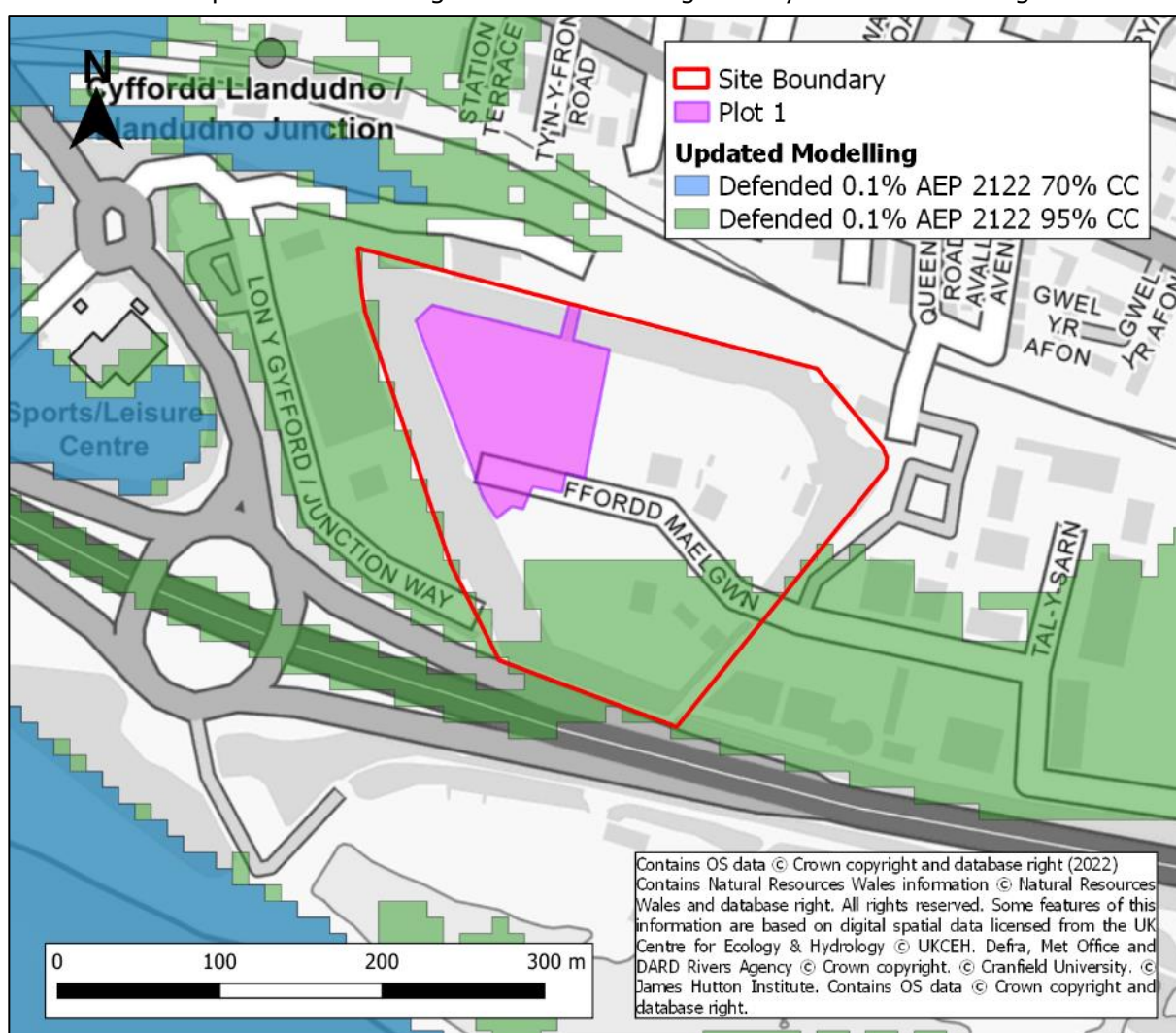


Figure 4-6: Updated Modelling – Tidal Defended Outlines

<sup>1</sup> Flood Consequences Assessments: Climate change allowances. Welsh Government. September 2021. [https://www.gov.wales/sites/default/files/publications/2021-09/climate-change-allowances-and-flood-consequence-assessments\\_0.pdf](https://www.gov.wales/sites/default/files/publications/2021-09/climate-change-allowances-and-flood-consequence-assessments_0.pdf)

The peak flood level to the north of Plot 1, against the site bund, is approximately 6.6 mAOD in the 1000-year event 95<sup>th</sup> percentile climate change scenario. The lowest elevation of Plot 1 is approximately 7.0 mAOD, meaning that Plot 1 is raised above the extreme flood level and the site bund does therefore not protect Plot 1 from flooding.

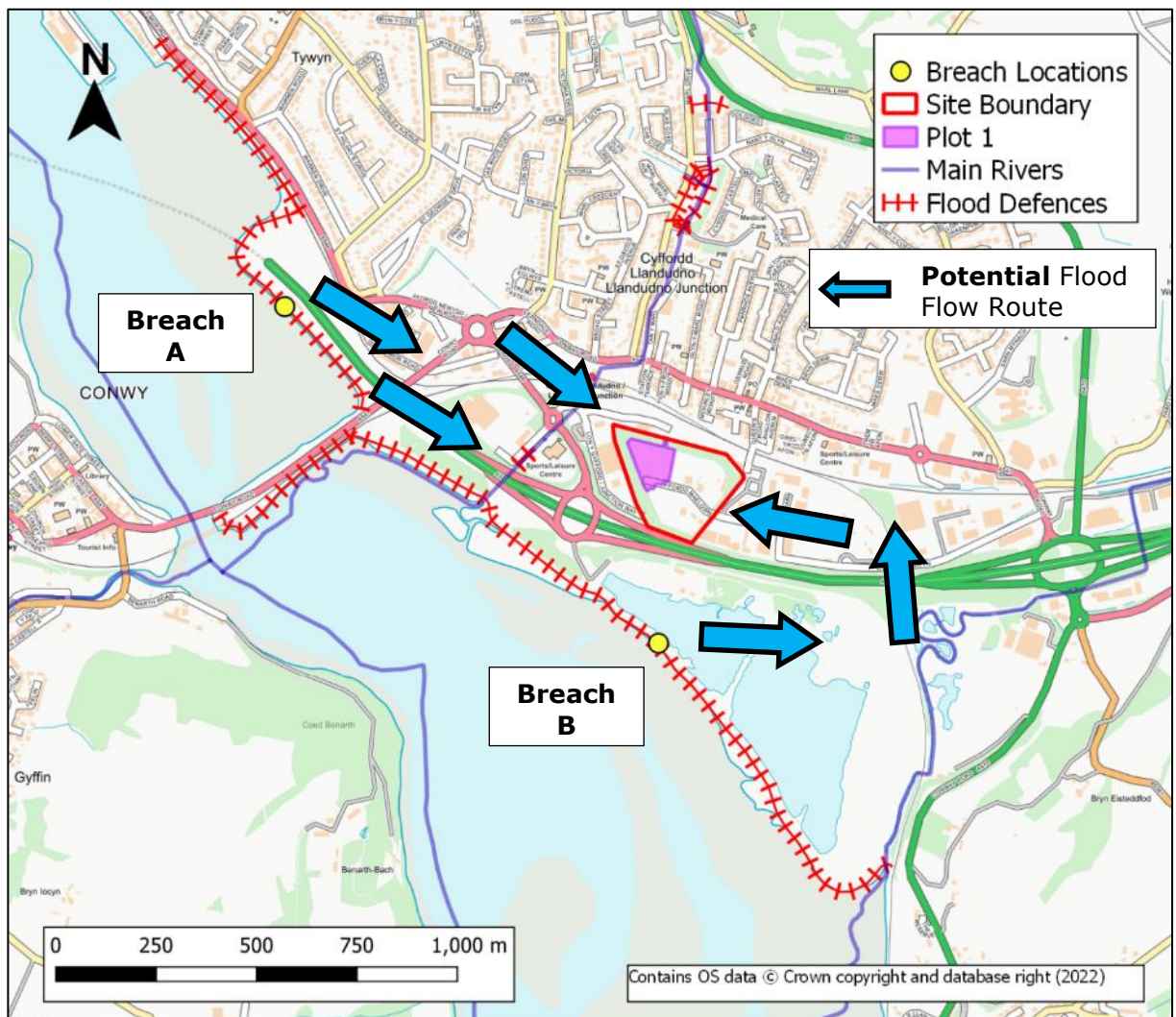
The southern part of the site and main access road (Ffordd Maelgwn) is however shown to be within the flood extent of the 1000-year event 95<sup>th</sup> percentile climate change scenario, as such, on this basis, Plot 1 development proposals will need to consider safe site access and egress. This is assessed further in Section 5.

The development of Plot 1 will however not impact the flood risk elsewhere as it does not interact with the flood outlines shown.

#### 4.3.2.2 Undefended Flood Outlines

The nearby banks of the Afon Conwy are defended by raised tidal embankments, as discussed in Section 2. The existing condition of the NRW flood defences is unknown and a condition assessment has not been undertaken as part of this FCA.

A review of the Conwy Estuary model found that there is no existing tidal undefended version of the model. Breach failure of the defences is considered a potential risk and the likely impacts have been investigated further, using the existing model.



**Figure 4-7: Updated Modelling – Tidal Defence Breach Test Locations**

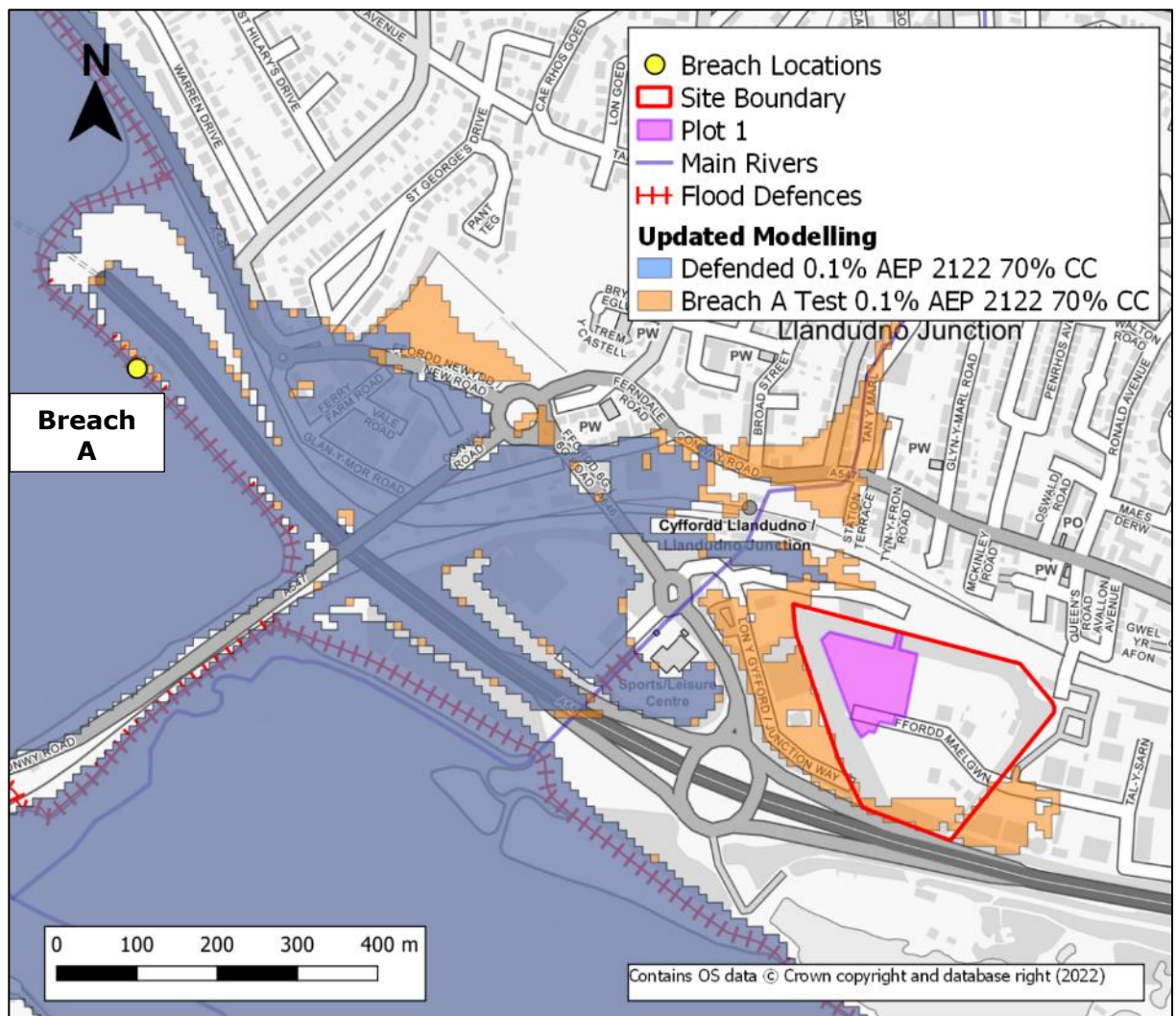
Two potential breach locations have been identified which could direct flood water towards the site (shown in Figure 4-7), based on the tidal flooding mechanisms earlier identified from the Flood Map for Planning.

The first (Breach A) is to the west of the site, adjacent to the A55; from here flood water could potentially be directed along the A55 or via Llandudno Junction station towards the site.

The second (Breach B) is to the south east of the site, adjacent to the Afon Ganol West; from here flood water could potentially spread eastwards then north, through the railway tunnel beneath the A55, then westwards towards the site.

### Breach A Test Results

The resultant flood extents from the impact of a breach at location A are presented in Figure 4-8 for the 1000-year event 70<sup>th</sup> percentile climate change scenario. This shows an increase in flooding compared to the defended flood extent, where overtopping of the existing flood defences is already shown to occur.



**Figure 4-8: Updated Modelling – Breach A Test Results**

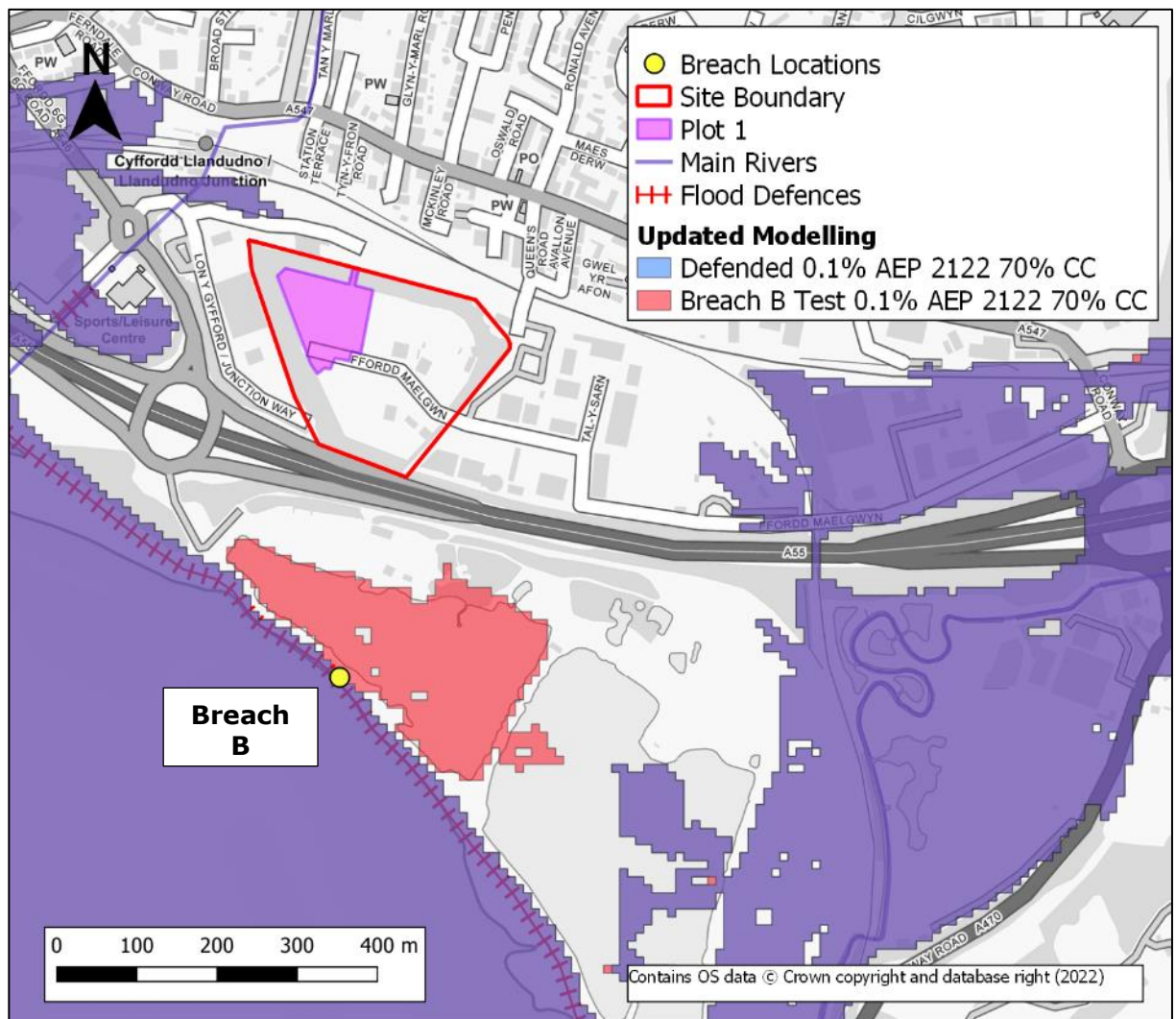
Flood water is shown to spread from the vicinity of Llandudno Junction station to the north of the site, along the western boundary of the site (against the bund) and is then directed into the southern part of the site against the embankment of the A55.

Plot 1 is shown to be free of flooding should a breach at location A occur. The flood extent interacts with the site bund to the north of Plot 1, with a peak flood level of 6.3 mAOD, however this is below the lowest ground level within Plot 1 of 7.0 mAOD.

It is noted that the existing access to the site (Ffordd Maelgwn) is shown to flood, as is part of the southern area of the site within the red line boundary.

### Breach B Test Results

The resultant flood extents from the impact of a breach at location B are presented in Figure 4-9 for the 1000-year event 70<sup>th</sup> percentile climate change scenario. This shows no increase in flood risk to the site; this is because the lagoon behind the breach is shown to attenuate the flood water that flows through the breach.



**Figure 4-9: Updated Modelling – Breach B Test Results**

### Summary

In summary, Plot 1 is not at risk from flooding from a breach in the tidal defences during the tidal 1000-year event, including climate change scenarios.

### 4.3.2.3 Extreme Sea Levels

The Extreme Sea Levels on the River Conwy adjacent to the site have been provided in Table 4-2 for a range of tidal flood events. Given that the site is defended by tidal embankments these flood levels could only potentially be reached on site in a true undefended scenario, i.e. where the tidal defences have been fully removed. As such the breach modelling presented above represents a worst case failure of the defences, however it is useful to understand the site levels in reference to the Extreme Sea Levels.

Referring to the site topography shown in Figure 2-3, the lowest elevation of Plot 1 is approximately 7.0 mAOD, the southern end of the site approximately 5.3 mAOD, and the primary site access (Ffordd Maelgwn) approximately 5.0 mAOD.

Plot 1 is elevated above the 0.1% 2122 70<sup>th</sup> and 95<sup>th</sup> Percentile events by approximately 0.6 m and 0.25 m respectively. The southern end of the site is approximately at the same level as the present day 0.5% AEP event, whilst the primary site access is below the level of the present day 0.5% AEP event.

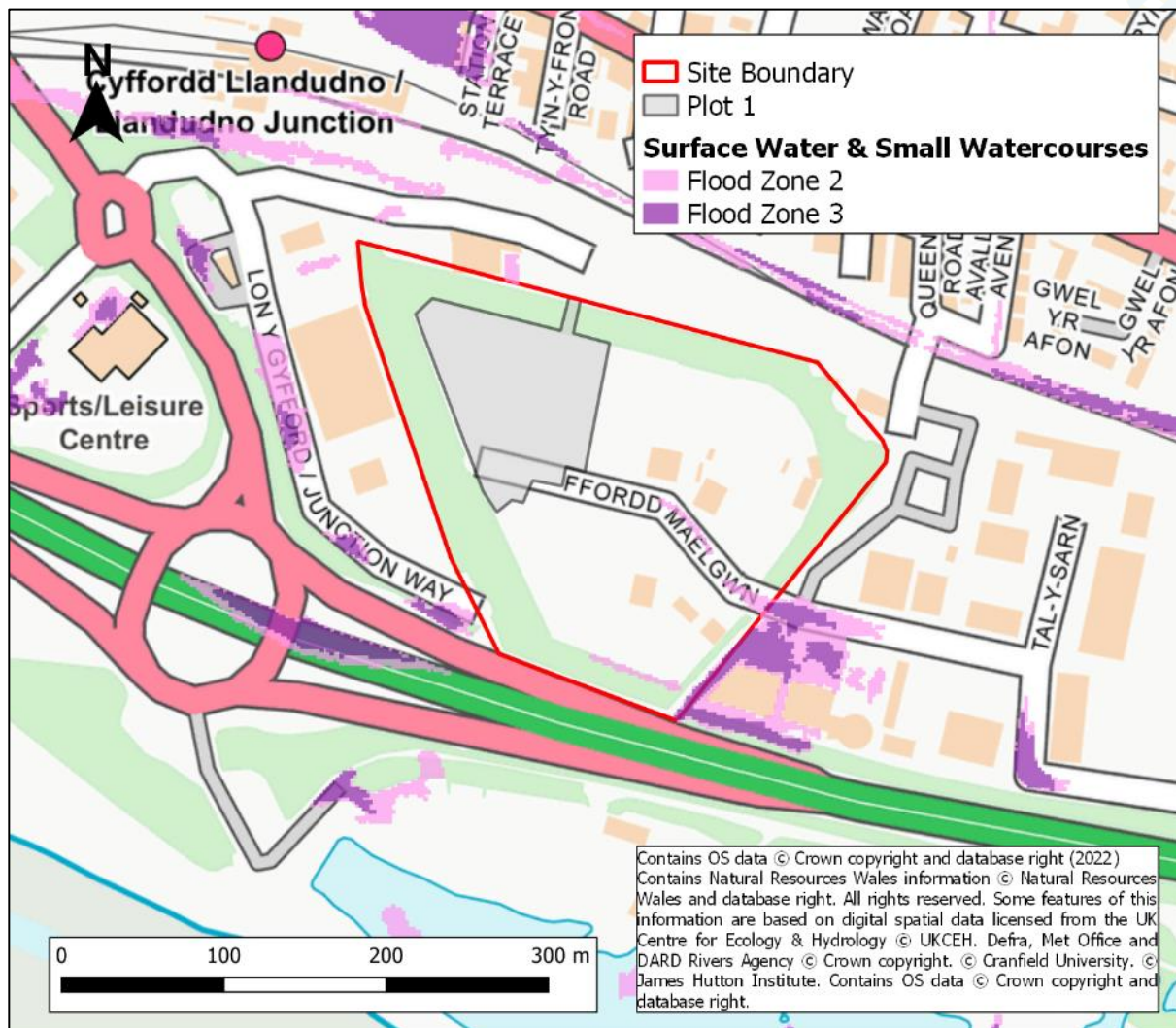
**Table 4-2: Extreme Sea Levels**

Tidal Event (AEP)	Extreme Sea Level (mAOD)
0.5%	5.27
0.1%	5.47
0.1% 2122 70 <sup>th</sup> Percentile	6.39
0.1% 2122 95 <sup>th</sup> Percentile	6.76

#### 4.4 Surface Water

The site is at very low risk of surface water flooding based on NRW's Flood Zone 2 and 3 for surface water and small watercourses.

Areas of Flood Zone 2 are localised within the red line boundary and are limited to the access highway and contained by existing landscaping in the southern area of the site. However, there is more significant surface water flood risk immediately outside of the site boundary along the current access highway which may have implications for safe site access and egress.



**Figure 4-10: Surface Water Flood Risk**

Development will need to ensure that surface water is fully managed onsite to not increase flood risk elsewhere. A surface water drainage strategy is currently being developed for the proposed Plot 1 development, separately to this FCA. The drainage strategy will need to be developed in compliance with TAN15 and be SAB compliant.

#### 4.5 Reservoir

NRW provide the Flood Risk from Reservoirs map, which shows areas predicted to be at risk of flooding from reservoirs in the unlikely event of a reservoir failure. The site does not lie within the extents provided in this map and as such is not considered to be at flood risk from reservoir failure.

#### **4.6 Historic Flooding**

NRW provide the Recorded Flood Extents map, which shows areas known to have flooded in the past from rivers, the sea or surface water. The site does not lie within the extents provided in this map and no anecdotal evidence of past flooding to the site has been made available to this FCA.

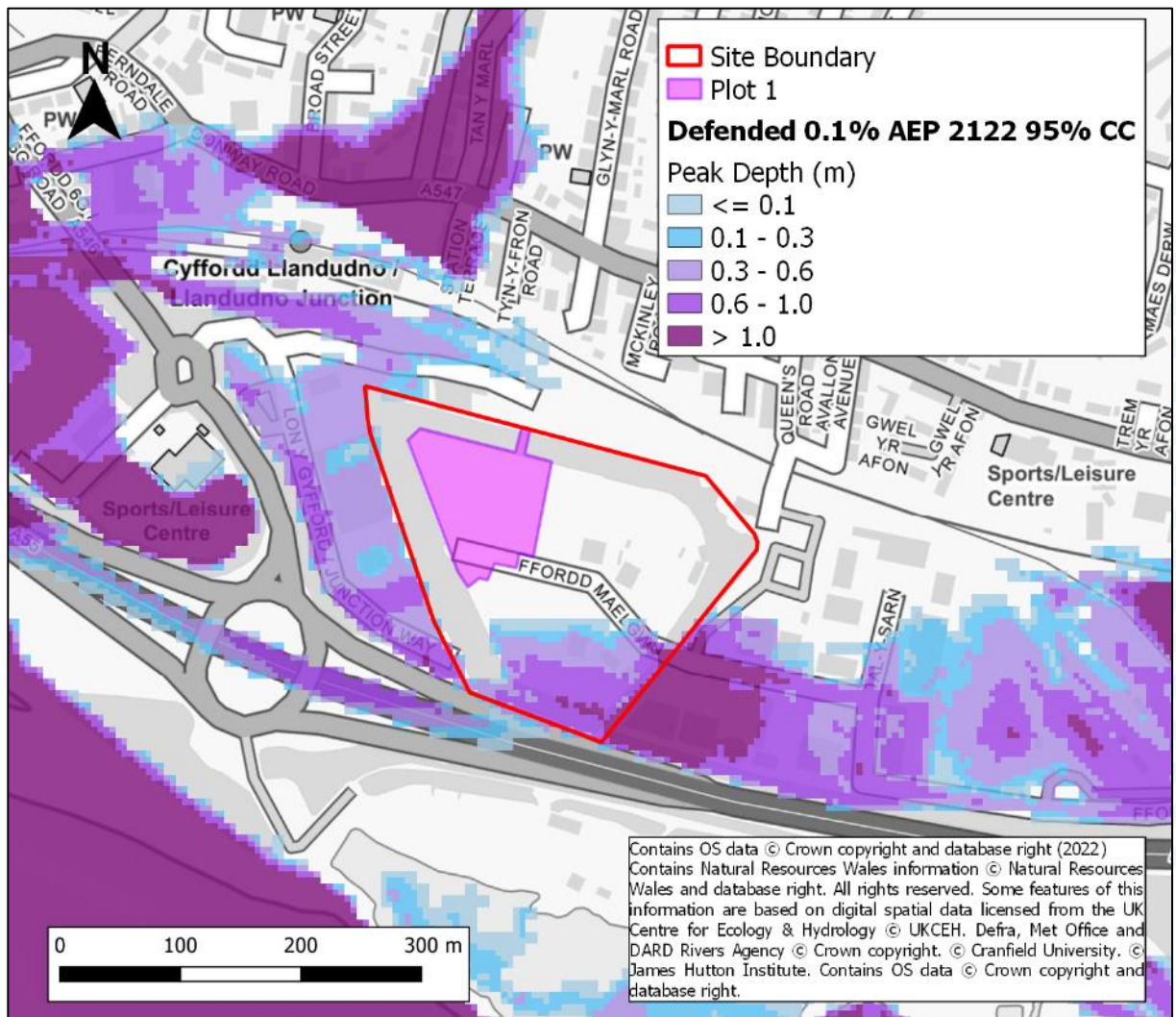


## 5 Safe Site Access and Egress

In an extreme flood event, defined in this case as the tidal 0.1% AEP event including climate change, there is the requirement in TAN15 (both 2004 and 2021) to limit flood depths and velocities for highly vulnerable development to below 600mm and 0.15m/s respectively, with infrastructure associated with highly vulnerable development e.g. car parks, access, paths and roads to below 600mm and 0.3m/s respectively.

The latest guidance from the Welsh Government<sup>2</sup> states that: 'As a minimum, development proposals should be assessed against the relevant regional 70<sup>th</sup> percentile presented in Table 3 to inform design levels. **An assessment should also be made against the 95<sup>th</sup> percentile to inform mitigation measures, access and egress routes and emergency evacuation plans**'. (It is noted that there is no tidal risk shown to the site in the 70th percentile climate change allowance extreme tidal event, and as such no access and egress issues).

The peak flood depths and peak velocities in the tidal 0.1% AEP event including climate change (95<sup>th</sup> percentile) are presented in Figure 5-1 and Figure 5-2 respectively.

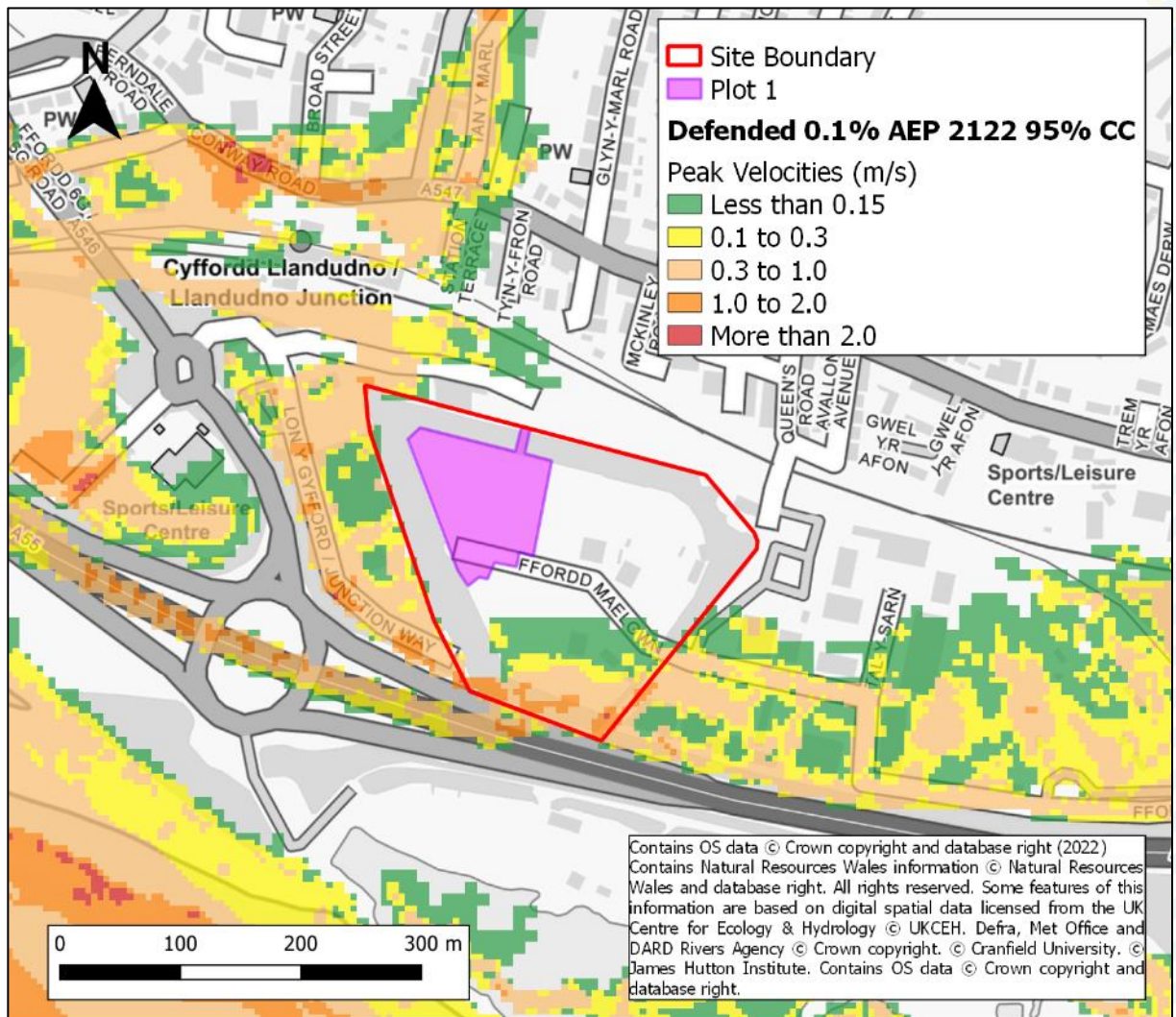


**Figure 5-1: Flood Depths – Extreme Tidal Event**

<sup>2</sup> Flood Consequences Assessments: Climate change allowances. Welsh Government. September 2021.  
[https://www.gov.wales/sites/default/files/publications/2021-09/climate-change-allowances-and-flood-consequence-assessments\\_0.pdf](https://www.gov.wales/sites/default/files/publications/2021-09/climate-change-allowances-and-flood-consequence-assessments_0.pdf)

Whilst the majority of Plot 1 and the site is considered to be at very low risk of flooding under this extreme tidal flood event, the southern extent of the site and also the existing access road to the site (Ffordd Maelgwn) is flooded. Approximately half of the flooded site area exceeds the 600mm allowable depth for flooding. The existing site access road is also shown to be flooded above 600 mm, within and beyond the site. The access road proposed as part of the Plot 1 development, through the bund, whilst free of flooding is not accessible due to flooding of Lon Y Gyfford, the A546 and also the A55.

Flood velocities are also shown to exceed tolerable levels within approximately half of the flooded site area, and also along the existing site access road (Ffordd Maelgwn). Flooding of neighbouring roads is also shown to exceed tolerable velocities.



**Figure 5-2: Flood Velocities – Extreme Tidal Event**

At present there are not considered to be any safe site access or egress routes in the event of an extreme tidal event. It is also noted that the site is not within a Flood Warning or Flood Alert area and would not be able to benefit from advance warning of tidal flooding.

### 5.1 Other Observations

It is highlighted that Ffordd Maelgwn is also shown to be at risk of surface water flooding; it is within NRW's Flood Zone 2 and 3 for surface water and small watercourses (see Section 4.4). No information is available regarding the depths or velocities of flooding associated with these flood events.

## 6 Summary

It is proposed to develop the site of the former brickworks at Llandudno Junction. The site is to be split into 6 plots. Planning application for Plot 1 is to be applied for, where it is proposed to build a Waste Transfer Station; the development layout is to be provided by the Council. This is classed as highly vulnerable development under TAN15 (2004 and 2021).

Plot 1 itself is not shown to be at risk from any flood sources, and the proposed development would not increase the flood risk elsewhere. However, the wider development site is shown at risk of flooding, and the primary flood risk issue regarding the Plot 1 development is regarding safe site access and egress in the event of an extreme tidal flood event.

A surface water drainage strategy is currently being developed for the proposed Plot 1 development, separately to this FCA. The drainage strategy will need to be developed in compliance with TAN15.

### 6.1 TAN15 2004

TAN15 2004 is the current guidance used by LPAs in Wales to determine the suitability of planning applications with respect to flood risk. This is currently due to be superseded by TAN15 2021 which is due to become adopted policy in June 2023.

With respect to TAN15 2004, Plot 1 is within DAM Zone A and will not increase the flood risk elsewhere. However, flooding emergency arrangements must also be considered.

Updated modelling has been used to assess safe site access and egress during a flood event (see summary below), however this suggests that in an extreme flood event the flood depths and velocities exceed tolerable limits and do not allow for safe site access and egress.

### 6.2 TAN15 2021

#### Flood Map for Planning

With respect to TAN15 2021 (not yet adopted), which will use the Flood Map for Planning (a more up to date flood risk dataset), Plot 1 is not shown to be at fluvial or surface water flood risk. Plot 1 is also not shown to be at risk of tidal flooding, however the southern part of the site and also the primary access road (Ffordd Maelgwn) is within Flood Zone 2 and 3. This suggests a higher flood risk to the site than the DAM maps.

#### Updated Modelling

The tidal Flood Map for Planning was checked against flood outlines from the Conwy Estuary model (considered to be a more detailed model than the Flood Map for Planning). In this, Plot 1 was free from tidal flooding in all defended events.

A breach in the tidal defences was also tested and Plot 1 was shown to be free from flooding. A summary of the modelled flood levels against the site levels is provided below in Table 6-1.

Critically, however, the main site access road (Ffordd Maelgwn) and also the proposed site access through the bund was shown to be at tidal flood risk in the 1000-year event 95<sup>th</sup> percentile climate change scenario. Under both TAN15 2004 and 2021 the flood depths and velocities exceed tolerable limits and do not allow for safe site access and egress in an extreme (defended) tidal event.

**Table 6-1: Summary of Modelled Flood Levels**

Scenario	Event	Level (mAOD)
Ground levels - Plot 1		7.0 to 8.0
Extreme Sea Levels (River Conwy, adjacent to site boundary)	0.5%	5.27
	0.1%	5.47
	0.1% 2122 70th Percentile	6.39
	0.1% 2122 95th Percentile	6.76
Tidal Defended (Flood level near Plot 1)	0.1% 2122 70th Percentile	N/A
	0.1% 2122 95th Percentile	6.6
Tidal Undefined (Breach - Location A) Flood level near Plot 1)	0.1% 2122 70th Percentile	6.3

Other notes/observations

It is highlighted that the wider site (red line boundary) is bounded by an informal bund structure. The bund’s construction and effectiveness as a flood defence structure is not confirmed. As demonstrated in the table above, Plot 1 is elevated above all modelled flood levels and as such flooding to Plot 1 should not be affected by the bund. Further consideration may need to be given to the impact of the bund on flood risk to the development of the wider site (not assessed as part of this FCA).

Should the waste transfer station include energy from waste operations, an emergency plan for operation, storage and egress during design events may be required.

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