

Celtic Way Flood Consequence Assessment

Version 3

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Contract

This report describes work commissioned by Jawsy Jabbar of Pinnacle Consulting Engineers on the 8th July 2022. Clare Burnell and Hannah Bard of JBA Consulting carried out this work.

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Purpose

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1 Introduction

JBA Consulting were commissioned by Pinnacle Consulting Engineers to prepare a Flood Consequence Assessment (FCA) to support a planning application to redevelop the former Quinn radiator factory in Imperial Park, Newport, into a data centre. This FCA demonstrates the suitability of the proposed development and describes the flood mitigation measures recommended to manage flooding at the site.

1.1 FCA requirements

This FCA follows the Welsh Government guidance on development and flood risk set out in the Technical Advice Note 15: Development and Flood Risk (TAN15). Where appropriate, the following aspects of flood risk should be addressed in all planning applications over their expected lifetime:

- The likely mechanisms of flooding
- The likely source of flooding
- The depths of flooding through the site
- The speed of inundation of the site
- The rate of rise of flood water through the site
- Velocities of flood water across the site
- Overland flow routes
- The effect of access and egress and infrastructure, for example, public sewer outfalls, combined sewer outflows, surface water sewers and effluent discharge pipes from wastewater treatment works
- The impacts of the development in terms of flood risk on neighbouring properties and elsewhere on the floodplain

2 Site Description

2.1 Site summary

The proposed development site is the former Quinn Radiator Factory, situated in Imperial Park in Coedkernew, Newport, as shown in Figure 2-1. The site is bounded by Celtic Way to the east, Dyffryn Lane to the south, Church Lane to the west and industrial units to the north. The site sits within a much larger and wider strategic employment area that includes Airbus, R&D centres, and Gocompare.com.

The site is situated approximately 3.2km north of the Severn Estuary.

Table 2-1 Site summary

Site name	Celtic Way
Site area	16.49ha
Existing land use	Disused Factory
Purpose of development	Data Centre
OS NGR	ST 27809 84105
Local Planning Authority	Newport City Council
Lead Local Flood Authority	Newport City Council



Figure 2-1 Site location

2.2 Site topography

A detailed topographic survey was undertaken by Laser Surveys in May 2021 and contained in Appendix A.

For ease of reference the Natural Resources Wales (NRW) Open Source 1m Light Detection and Ranging (LiDAR) data¹ has been used to illustrate the site topography as shown in Figure 2-2. The LiDAR data shows the site is relatively flat between 10.1mAOD and 10.9mAOD. The east of the site, currently occupied by parking spaces, is raised significantly higher than the rest of the site to approximately 13mAOD. The topographic survey also shows the finished floor level of the existing building is 11.0mAOD.



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

2.3 Soils and geology

The geology of the site has been assessed using the BGS Geology of Britain Viewer². The bedrock geology is shown to be St Maughans Formation comprised of Argillaceous rocks and sandstone. Superficial deposits are comprised of sand and gravel forming river terrace deposits.

The soils on the site have been assessed using the Cranfield University Soilscales Viewer³ and are shown to be freely draining, slightly acid loamy soils.

¹LE Geoportal for Wales: <http://lle.gov.wales/catalogue/item/LidarCompositeDataset/?lang=en>

² Geology of Britain Viewer. https://geologyviewer.bgs.ac.uk/?_ga=2.75172241.266172825.1657115636-2037829421.1650550580

³ Cranfield Soilscales Viewer. <https://landis.org.uk/soilscales/>

2.4 Proposed development

The proposed development plans are to redevelop the former Quinn radiator factory into a datacentre, including a substation, water treatment works and associated roads as shown in Figure 2-3.



Figure 2-3 Extract from proposed site layout

3 Planning Policy and flood risk

3.1 Planning context

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. These policies have the aim that all development in Wales is sustainable and improve the social, economic, environmental, and cultural wellbeing of Wales as set out in the Wellbeing of Future Generations Act 2015.

PPW uses a series of Technical Advice Notes to provide more guidance on areas of planning and development in Wales. Technical Advice Note 15 (TAN15), introduced by the Welsh Government in 2004, provides technical guidance relating to development planning and flood risk in Wales.

The initial requirements of TAN15 are to identify the vulnerability classification(s) and flood zones relevant to the proposed development, and to apply this information to the application of the justification tests.

3.2 Vulnerability classification

As shown in Table 3-1, TAN15 assigns one of three flood risk vulnerabilities to development. The development is proposed as a change of use from 'general industrial' to 'commercial'. As such there will be no change in development category which will remain as '**less vulnerable**' development.

Table 3-1 Development categories as defined by TAN15

Development category	Types
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 development (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.

3.3 Development Advice Map classification

The Development Advice Map (DAM) created by the Welsh Government is used to trigger different planning actions based on a precautionary assessment of flood risk. Figure 3-1 shows a portion of the site is located in Zone B of the DAM. Zone B is described as areas "*known to have been flooded in the past evidenced by sedimentary deposits*".

Zone B indicates areas which are generally suitable for most forms of development. TAN15 states that "*If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further*". This will be assessed in this report.

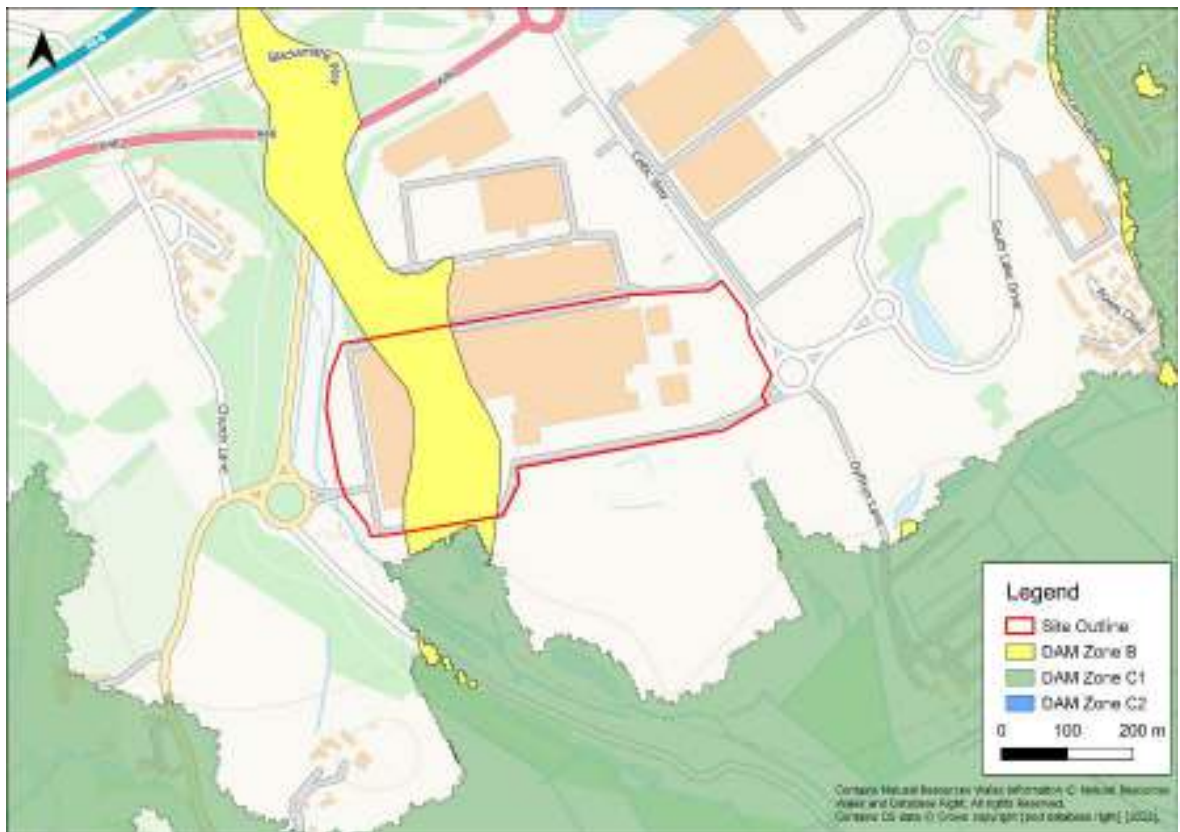


Figure 3-1 Development Advice Map

3.4 Flood Map for Planning

In June 2023 the Welsh Government propose to update TAN-15 and replace the DAM with the Flood Map of Planning (FMfP). Although the new TAN15 is not a material consideration, Welsh Government and NRW are advising that some consideration is given to the draft FMfP as best available information. Therefore, where a site is located in a FMfP flood risk zone it is recommended that an FCA is carried out, even where the site is not shown to be at risk on the Development Advice Map.

Importantly the FMfP includes the predicted effects of climate change, whereas the DAM did not. This difference is particularly important in coastal locations where rising sea levels can significantly extend the extent of flood risk.

As shown in Figure 3-2, the site is located in Flood Zone 1 of the Flood Map for Planning for Rivers. This means that there is less than a 0.1% Annual Exceedance Probability (AEP) chance of fluvial flooding in any given year, including climate change.

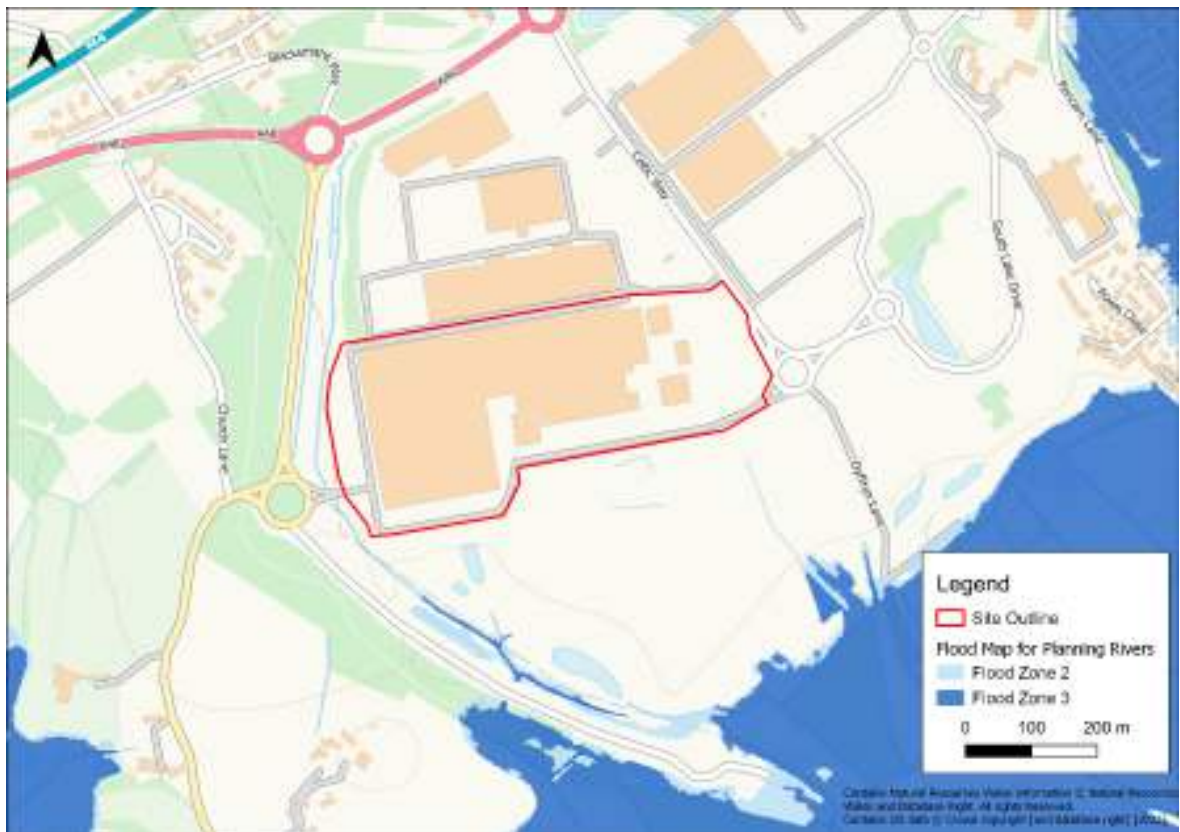


Figure 3-2 Flood Map for Planning Rivers

As shown in Figure 3-3, the proposed development site is mostly located in Flood Zone 1 of the Flood Map for Planning for the Sea. This means there is less than a 0.1% Annual Exceedance Probability (AEP) chance of fluvial flooding in any given year, including climate change. A small area along the southern and western boundary of the site is located in Flood Zone 2 (between a 0.5% and 0.1% AEP chance of flooding from the sea in any given year).

The area is also a TAN15 Defended Zone, protected by the Wentlooge tidal defences. This means flood risk management infrastructure provides a minimum standard of protection against flooding from the sea in the 0.5% AEP event.

It should be noted that the FMfP is based on a lifetime of development of 100 years, whereas the proposed development has a lifetime of 75 years. The FMfP also does not use the most up to date climate change guidance and is based on generalised flood modelling of the whole of Wales. These factors mean that the FMfP is not as reliable as detailed modelling for the area and may show that the site is at flood risk when this is not the case.

Detailed modelling for the area uses the latest climate change guidance, tailored hydrology for the area and information of the flood defences and structures along the coast. Therefore, the results from the detail model (Section 5) are considered more accurate than the FMfP.

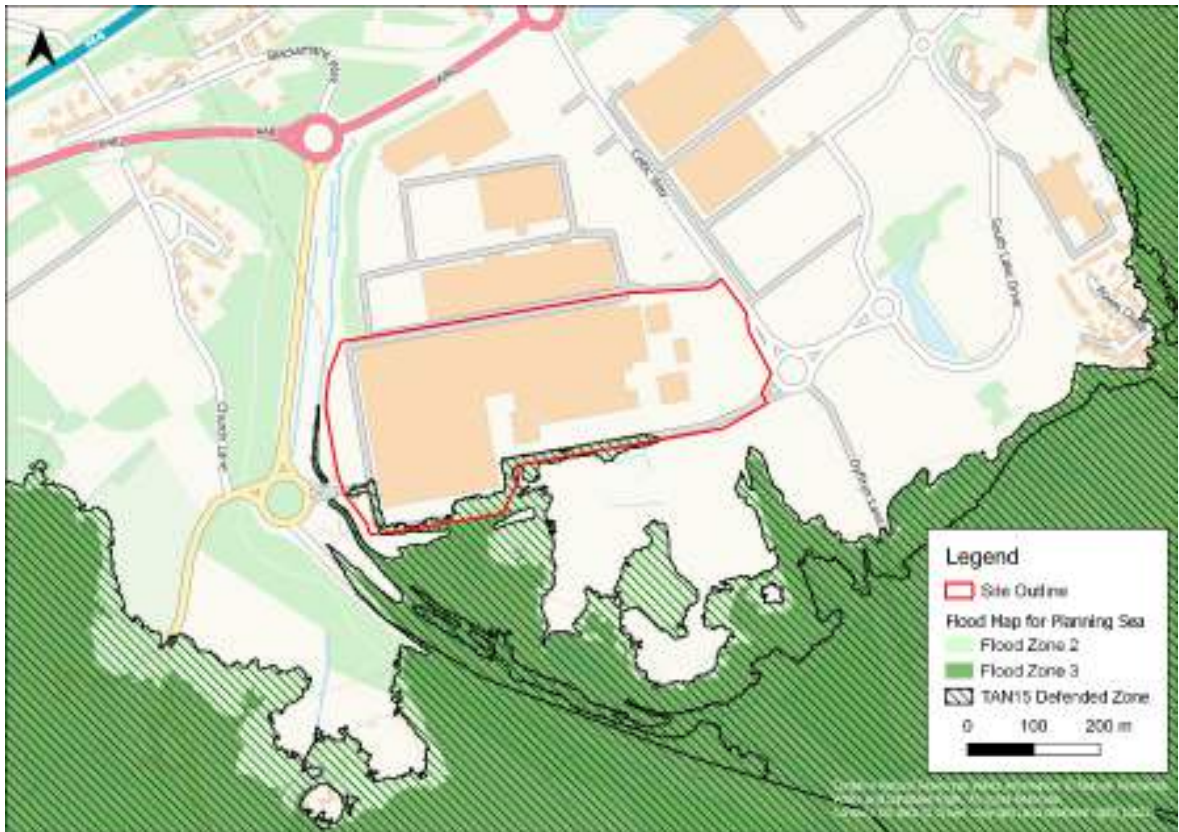


Figure 3-3 Flood Map for Planning Sea

The site is located largely in Flood Zone 1 of the Flood Map for Planning for Surface Water and Small Watercourses, as shown in Figure 3-4. This means that there is less than a 0.1% AEP chance of flooding from these sources in a given year. There are however some localised areas of surface water ponding within the site which are located in Flood Zone 2 (between a 0.1% and 1% chance of flooding in any given year). Furthermore, Dyffryn Lane to the south of the development and the access road to the west is shown to be a surface water flow path and situated in Flood Zone 3. This means there is a greater than 1% chance of flooding in any given year.

Given the nature of the site and the generalised modelling approaches to model surface water and small watercourse flood risk, it is not surprising that there are localised areas of flooding indicated. This does not indicate a significant flood risk issue, and largely reflects the limitations of the generalised modelling to account for existing site drainage and culverts in the local reën network. Following careful review of the Surface Water and Small Watercourses, a product produced by JBA for NRW, we are satisfied that the risk from this flood source is low.

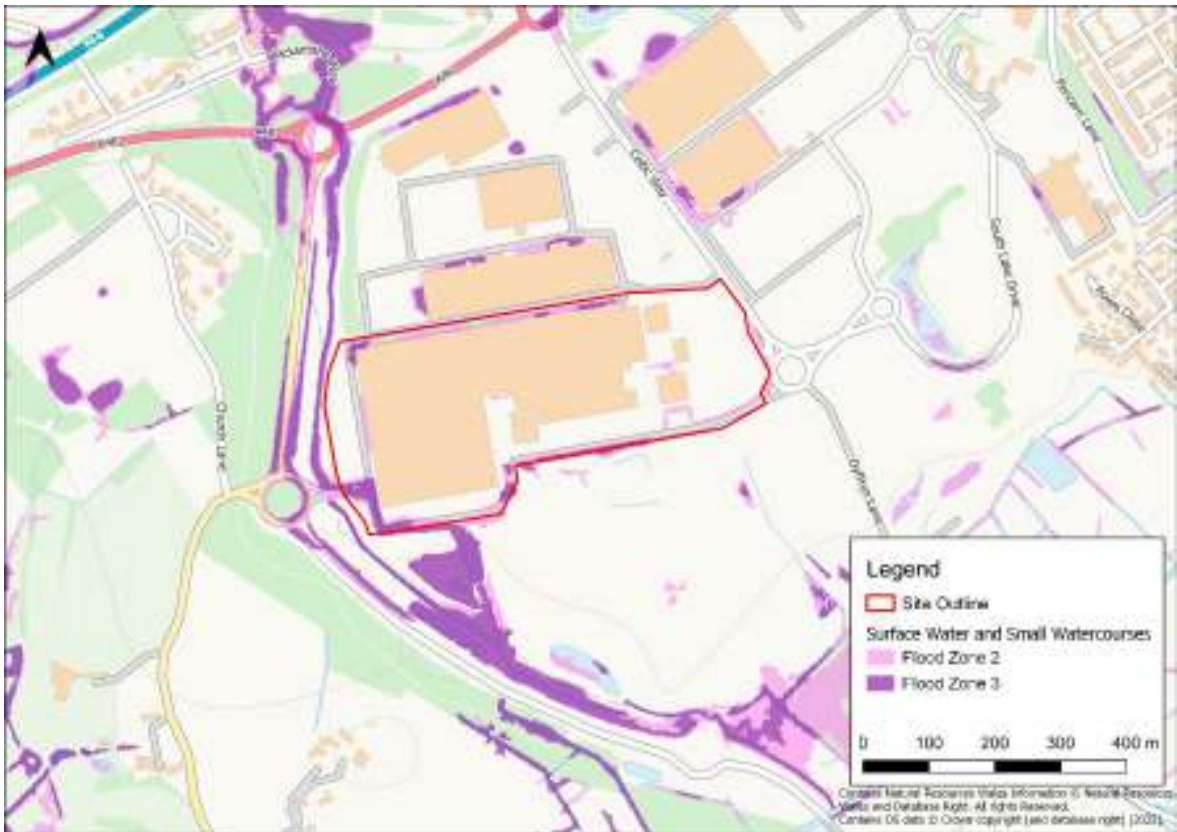


Figure 3-4 Flood Map for Planning- Surface Water and Small Watercourses

In a letter dated 14th January 2022, NRW clarified how they intended to respond to development management consultations, where flood risk is a material consideration. In particular, the letter stated:

'If a site is shown to not be at risk of flooding on the DAM but it is shown to be at risk of [flooding] on the new Flood Map for Planning, our substantive response will be 'concerns' and we will recommend an FCA is submitted in support of the planning application. Where these concerns are not appropriately addressed, we are likely to object to the development'

As shown in Figure 3-1 and Figure 3-3 above, the site is shown to be at minimal risk of flooding on the DAM but it is shown to be at risk of on the new Flood Map for Planning. This Flood Consequence Assessment has therefore been prepared in line with NRW guidance.

3.5 Local Development Plan

The Newport Local Development Plan (LDP)⁴, adopted in 2015, provides land use policies and proposals to encourage sustainable growth within the Newport City Council area until 2026.

Strategic Policy 17 (SP17) aims to provide 172 ha of employment land to provide an additional 7,400 jobs over the LDP period. The proposed development will re develop the former factory into a data centre, helping to provide new jobs in Newport.

⁴ Newport Local Development Plan, 2015, <https://www.newport.gov.uk/documents/Planning-Documents/LDP-2011-2026/LDP-Adopted-Plan-January-2015.pdf>

3.6 Justification Test

As the site is located in Zone B of the DAM, the Justification Tests do not apply to development in this Zone. However, for completeness, Table 3-2 below summarises how the proposed development could meet the requirements set out within the Justification Test. All of the criteria have been satisfied with regards to the proposed development.

Table 3-2 Justification Test

TAN 15 Justification Criteria	Comments	Achievable?
Its location is necessary to assist a local authority regeneration initiative or strategy, or contribute to key employment objectives, necessary to sustain an existing settlement or region	The proposed development will assist with employment targets identified within the Local Development Plan.	✓
The site meets the definition of previously developed land (i.e. it is not a Greenfield site) and concurs with the aims of Planning Policy Wales (i.e. the presumption in favour of sustainable development)	The site is a former radiator factory hence meets the definition of previously developed land.	✓
A Flood Consequence Assessment has been produced to demonstrate that the potential consequences of a flood event up to the extreme flood event (1 in 1000 chance of occurring in any year) have been considered and meet the [Acceptability Criteria] ... in order to be considered acceptable	An assessment of the flood consequences at the site has been undertaken to demonstrate the proposed development's acceptability. See Section 4 and Section 5.	✓

4 Flood risk assessment

This section assesses the risk to the proposed development from all sources of flooding, the risk of increased flooding to others, and how flood risks can be managed. This FCA is based solely on a desk-based analysis of existing and publicly available flood risk data.

4.1 Review of existing flood risk data

The latest available information on flood risk at the site 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 very low to low risk of flooding from rivers (Section 4.3).
Flood Risk from the Sea	*	The site is at very low risk of tidal flooding (Section 4.4). Further assessment is required to assess the potential implications of climate change on tidal flooding (Section 5).
Flood Risk from Surface Water and Small Watercourses	*	The site is at low risk of surface water flooding (Section 4.5).
Flood Risk from Groundwater	*	The site has a low risk of flooding from groundwater (Section 4.6).
Flood Risk from Reservoirs	*	The site is not at risk of flooding from reservoirs (Section 4.7).
Flood Risk from Sewers	*	The site has a low risk of sewer flooding (Section 4.8).

4.2 Historical flooding

NRW's map of recorded flood extents does not show any evidence of historic flooding on the site. No other historic flooding records were identified at the site in the Newport City Council Preliminary Flood Risk Assessment (PFRA)⁵.

4.3 Flood risk from rivers

As shown in Figure 4-1, the site is at **very low risk** of flooding from rivers, according to NRW's Flood Risk Assessment Wales (FRAW) Flood Risk from Rivers map. This means there is less than a 1 in 1000 (0.1% AEP) chance of fluvial flooding in any given year.

⁵ Newport City Council Preliminary Flood Risk Assessment (2011) <https://www.newport.gov.uk/documents/Planning-Documents/Flood-risk/Preliminary-Flood-Risk-Assessment-Report-April-2011.pdf>



Figure 4-1 Risk of flooding from rivers

4.4 Flood risk from the sea

As shown in Figure 4-2, the site has a **very low risk** of flooding from the sea according to NRW's FRAW Flood Risk from the Sea map. This means that there is less than a 1 in 1000 (0.1% AEP) chance of tidal flooding in any given year.

However, the FMfP for the Sea (Figure 3-3) does show that the site is at risk of flooding when climate change is taken into consideration. Therefore, to better understand the potential implications of climate change on the risk of tidal flooding, further assessment using modelled data has been undertaken and is discussed in Section 5.



Figure 4-2 Risk of flooding from the sea

4.5 Flood risk from surface water and small watercourses

The site largely has a **very low risk** of flooding from surface water and small watercourses according to NRW's FRAW Flood Risk from the Surface Water and Small Watercourses map shown in Figure 4-3. This means there is less than a 0.1% AEP chance of flooding from these sources in any given year. There are localised areas, Dyffryn Lane to the south of the development and the access road to the west that are shown to be a high risk of surface water flooding (greater than a 3.3% AEP chance of flooding in any given year). As discussed in Section 3.4 we are satisfied that the risk from this flood source is low due to the generalised modelling approaches to model surface water and small watercourse flood risk.

5 Detailed tidal flood risk assessment

As the site is partially located in Flood Zone 2 in the Flood Map for Planning for the Sea, a better understanding of the potential implications of climate change on the risk of tidal flooding is required. The following section, therefore, assesses these sources of flood risk in more detail.

5.1 JBA Wentlooge model

The NRW Wentlooge model was developed in 2016 and extends from the River Rhymney estuary in Cardiff to the River Usk estuary in Newport.

This model has recently been updated by JBA, applying the new Coastal Flood Boundary (CFB) dataset⁶, released in 2019. For this study, extreme sea level estimates were taken from Node 396 (River Usk) and 408 (River Rhymney) and applied across the tidal boundary of the model. Wave overtopping values have not been recalculated from the 2016 version, and therefore remain precautionary as they assume the 100 years of climate change.

For all coastal locations, future sea level rise is a major consideration and should be applied to the extreme sea level estimates. The UKCP18 User Interface⁷ has therefore been used in accordance with Welsh Government Guidance on Climate Change Allowances for Planning Purposes (September 2021)⁸ to provide climate change uplifts for the study area. The predicted tidal flood levels, including the impacts of climate change, which were applied to the updated Wentlooge model are shown in Table 5-1.

Welsh Government guidance suggests that the lifetime of non-residential development is 75 years. The Wentlooge model results for the present day (2022) and for 75 years (2097) have therefore been used to assess the flood risk at the site.

Table 5-1 Predicted tidal flood levels

Year	Modelled Tide Levels (mAOD)			
	2022		2097	
AEP	0.5%	0.1%	0.5%	0.1%
CFB_396	8.36	8.7	9.06	9.4
CFB_4080	7.94	8.3	8.64	9.0

The extreme 0.1% AEP plus climate change (2097) sea level is well below the existing minimum ground levels of the site.

5.2 2022 - Present day model results

The proposed development site is predicted to be flood free in both the 0.5% AEP and 0.1% AEP present day (2022) events. Figure 5-1 shows the flood extent for the 0.1% AEP 2022 event in the vicinity of the proposed development site.

⁶ UK Government (2019) Coastal flood boundary conditions for the mainland UK coasts and islands <https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/coastal-flood-boundary-conditions-for-the-mainland-uk-coasts-and-island>

⁷ UK Climate Projections User Interface. <https://ukclimateprojections-ui.metoffice.gov.uk/ui/home>

⁸ Welsh Government. Flood Consequences Assessment: Climate Change Allowances (Sept 2021) https://gov.wales/sites/default/files/publications/2021-09/climate-change-allowances-and-flood-consequenceassessments_0.pdf.

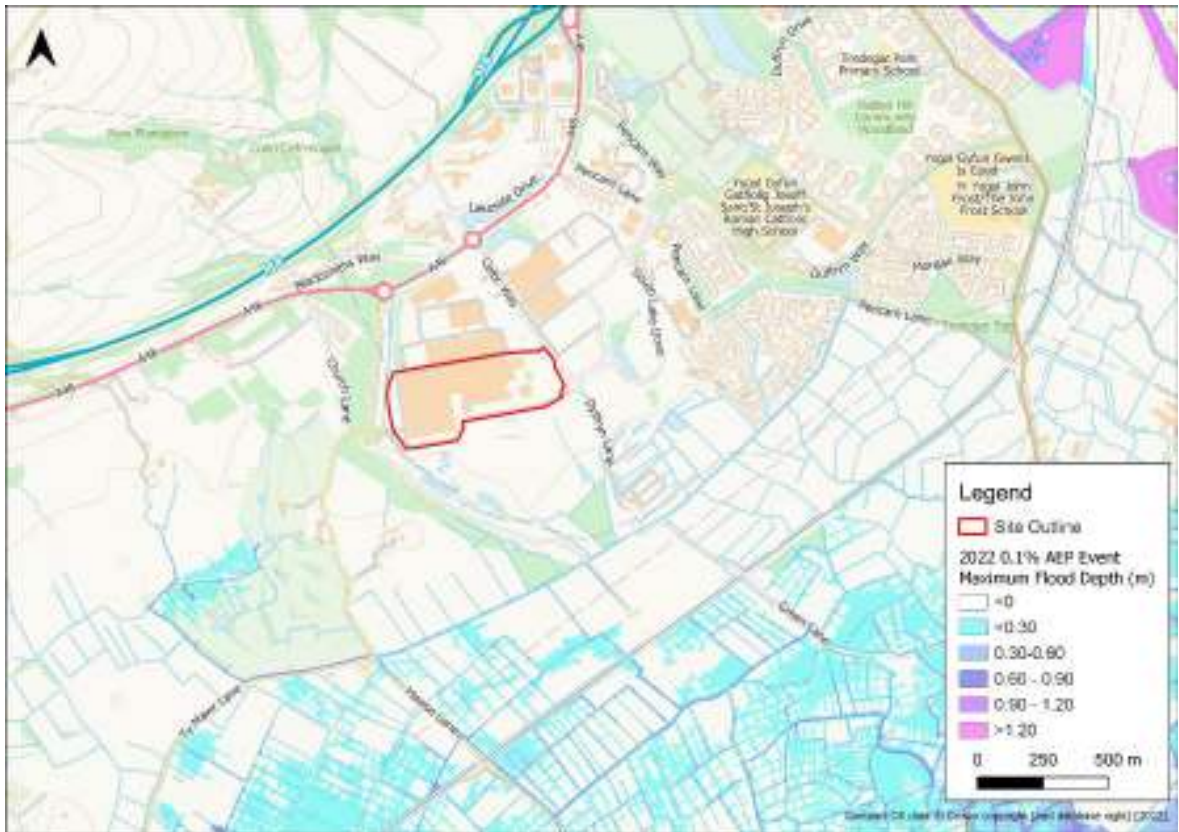


Figure 5-1 2022 0.1% AEP maximum flood depth

5.3 2097 – 75 year design life model results

The proposed development site is predicted to be flood free in both 0.5% AEP and 0.1% AEP 2097 events. Figure 5-2 shows the flood extent for the 0.1% AEP 2097 event in the vicinity of the proposed development site.

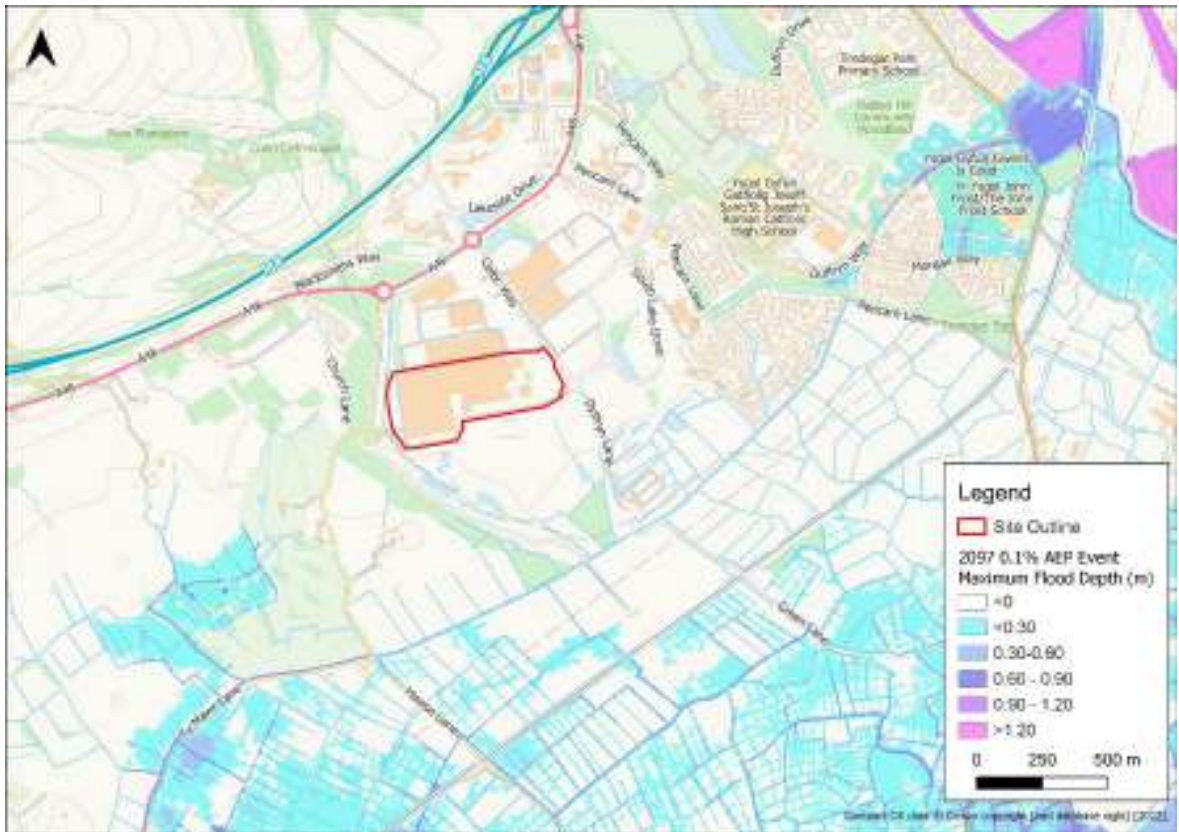


Figure 5-2 2097 0.1% AEP maximum flood depth

6 Assessment of Acceptability Criteria

Table 6-1 below details the acceptability criteria required by TAN15.

Table 6-1 TAN15 Acceptability Criteria

TAN15 Acceptability Criteria	Comments	Satisfied
Developer is required to demonstrate that the site is designed to be flood free for the lifetime of development for a 1 in 100(1%) chance (fluvial) and 1 in 200 (0.5%) chance (tidal) flood event including an allowance for climate change, in accordance with Tan15 Table A1.14.	The site is predicted to be flood free in all events for the lifetime of the development, up to 2097.	Yes
In respect of the residual risk to the development it should be designed so that in an extreme (1 in 1000 chance) [0.1% AEP] event there would be less than 600mm of water on access roads and within the property, the velocity of any water flowing across the development would be less than 0.4m/s.	The site is predicted to be flood free in all events for the lifetime of the development, up to 2097.	Yes
No flooding elsewhere	The site does not flood up to the 2097 event and therefore cannot have an impact on flooding to other areas.	Yes
Flood defences must be shown by the developer to be structurally adequate particularly under extreme overtopping conditions (i.e. that flood with a 1 in 1000 chance of occurring in any given year).	The site is protected by the Wentlooge flood defences of which NRW are the responsible management authority.	Yes
Effective flood warnings are provided at the site.	The site is situated in the Coast from Aberthaw to Severn Bridge Flood Alert Area.	Yes
The developer must ensure that future occupiers of the development are aware of the flooding risks and consequences.	Upon sale or transfer of the land to new occupiers, the developer should inform occupiers of flood risk adjacent to the site.	Yes
Escape/evacuation routes are shown by the developer to be operational under all conditions.	The evacuation routes to the north of the site are expected to be flood free during 0.1% AEP plus climate change event.	Yes
The development is designed by the developer to allow the occupier the facility for rapid movement of goods/possessions to areas away from flood waters.	The site is predicted to be flood free in all events.	Yes
Development is designed to minimise structural damage	The development is predicted to be flood free in all events.	Yes

during a flooding event and is flood proofed to enable it to be returned to its prime use quickly in the aftermath of the flood.		
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7 Conclusions

- JBA Consulting were commissioned by Pinnacle Consulting Engineers to undertake a Flood Consequence Assessment to support a planning application to redevelop the former Quinn radiator factory in Imperial Park, Newport, into a data centre.
- The proposed development will have a 'less vulnerable' development vulnerability classification which will not change from its previous classification.
- The proposed site is partially located in Zone B of Natural Resources Wales (NRW) Development Advice Map (DAM). Zone B is defined as areas of the floodplain that are known to have flooded before, as evidenced by sedimentary deposits. The Justification Tests of TAN15 do not apply to development in Zone B, although it is advised to apply the Acceptability Criteria.
- Flood Zone 2 of the FMfP of flood risk from the sea and a TAN15 defended zone encroach slightly into the southern boundary of the development site. This FCA has therefore been prepared on a precautionary basis as advised by NRW.
- NRW's Flood Risk Assessment Wales maps shows the site has a very low risk of flooding all sources of flooding. This does not take in to account the impact of climate change, therefore detailed tidal modelling has been undertaken to further consider this risk as identified in the FMfP.
- Detailed tidal modelling undertaken by JBA consulting in 2022 shows that the proposed development is predicted to be flood free during both the 0.5% AEP plus climate change and the 0.1% AEP plus climate change events for the present day (2022) and 75 years development lifetime (2097).
- This FCA has demonstrated that all acceptability criteria set out in TAN15 have been satisfied. Consequently, we conclude on the grounds of flood risk, the proposed development meets the principles and requirements set out in TAN15 and the aims of Planning Policy Wales.

Appendices

A Topographic Survey

JBA
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